

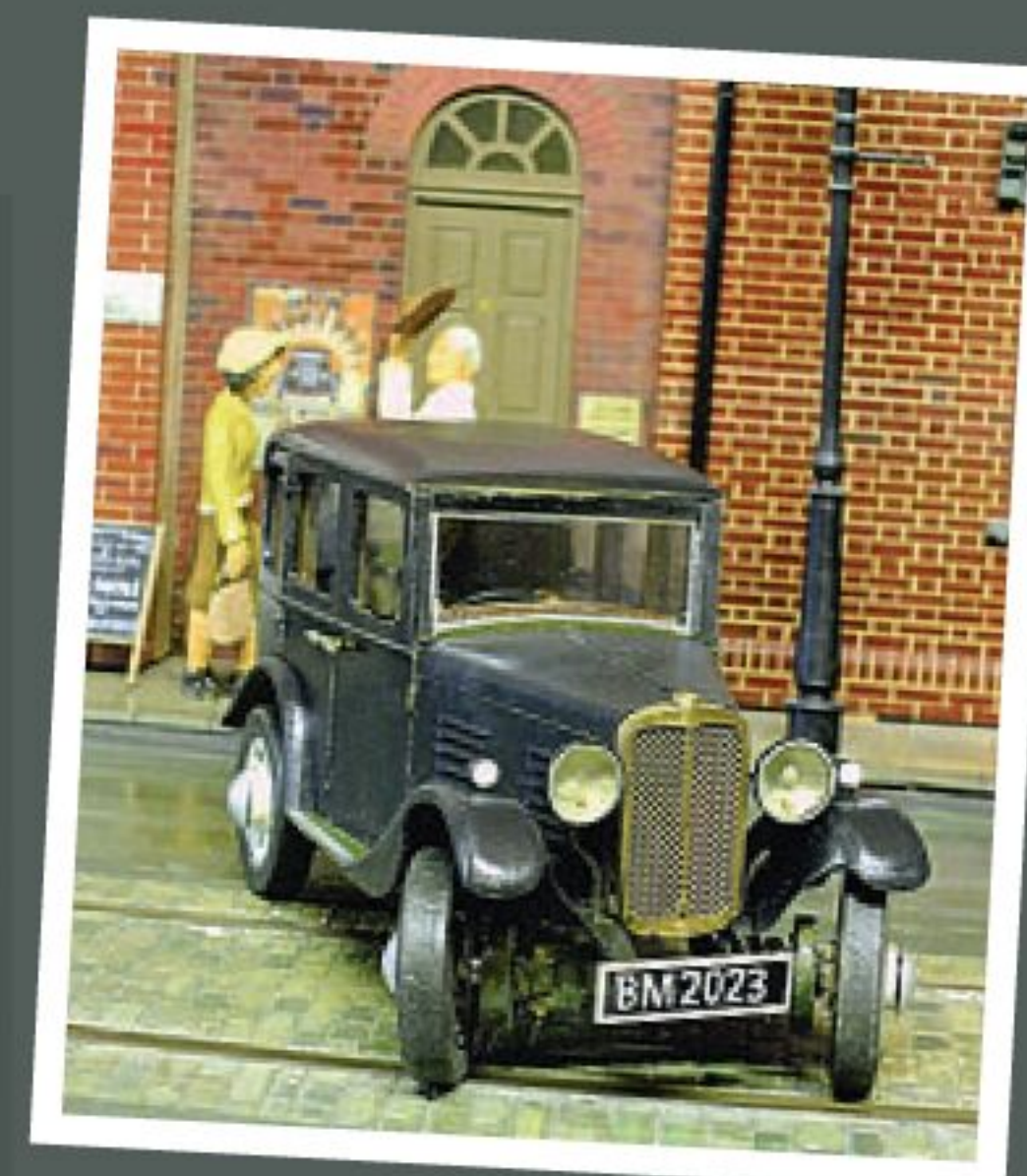
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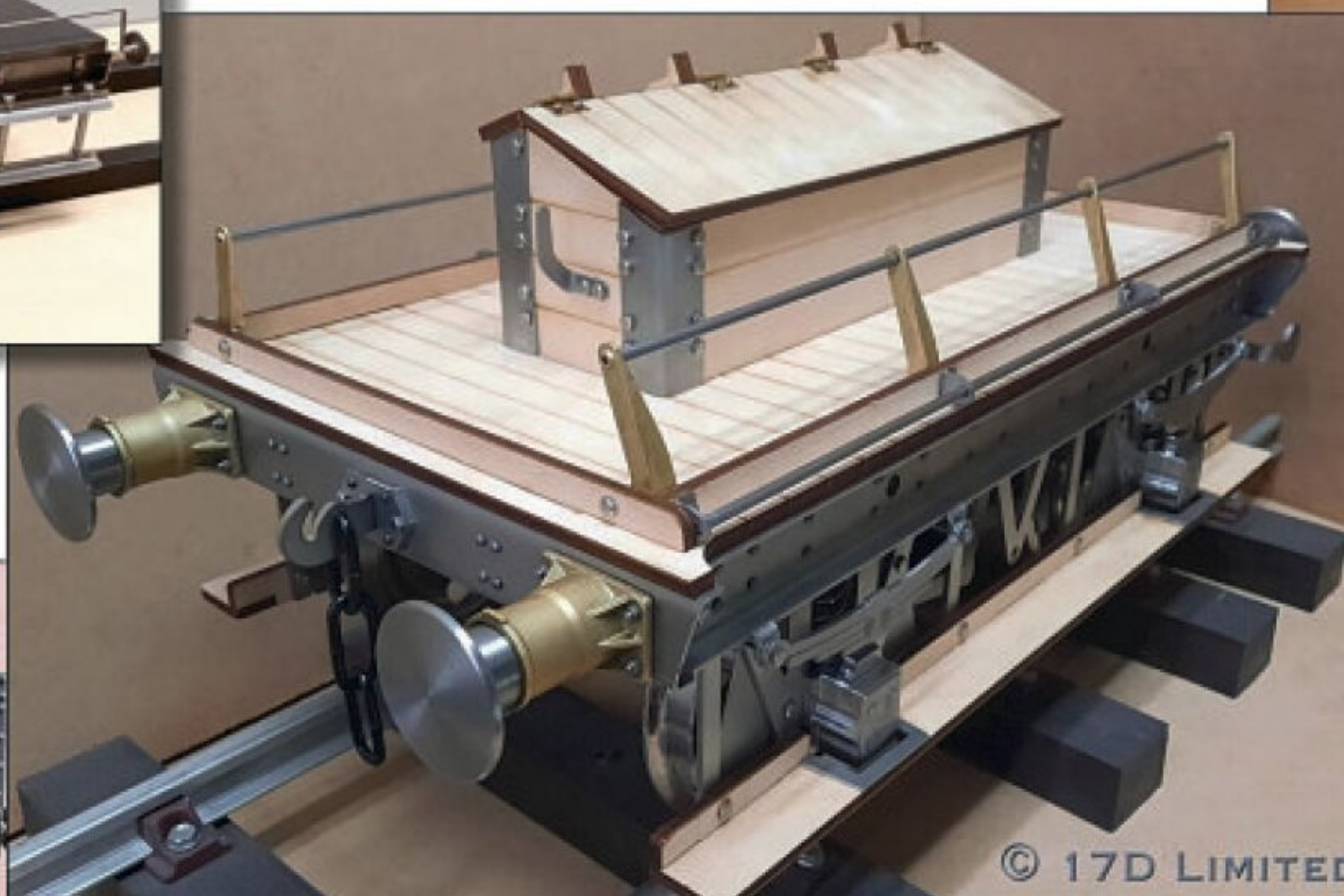
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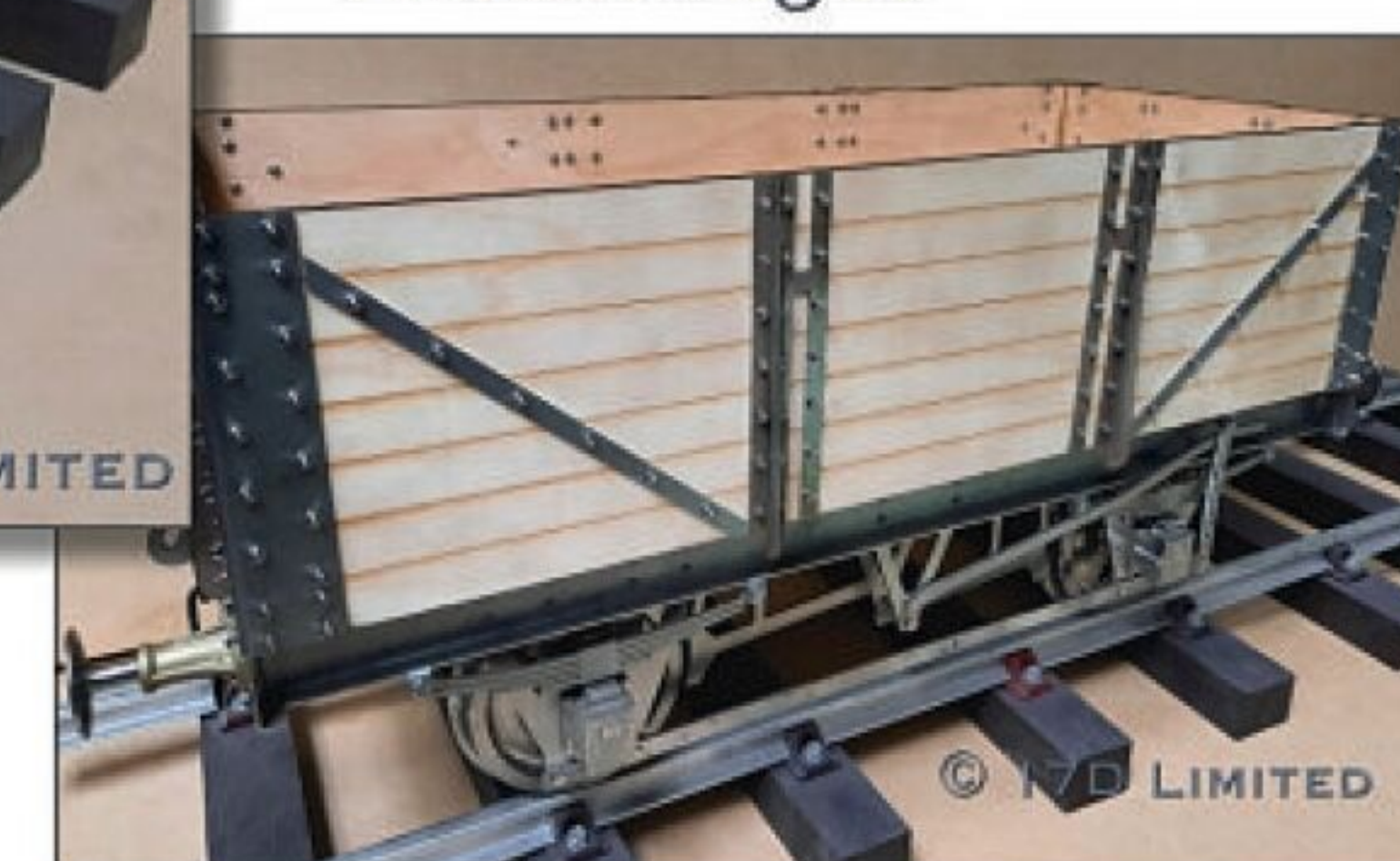


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ON THE COVER...

Steve Eaton wins IMLEC for the fourth time, on this occasion with his 5 inch gauge Black 5 locomotive (photo by Diane Carney).

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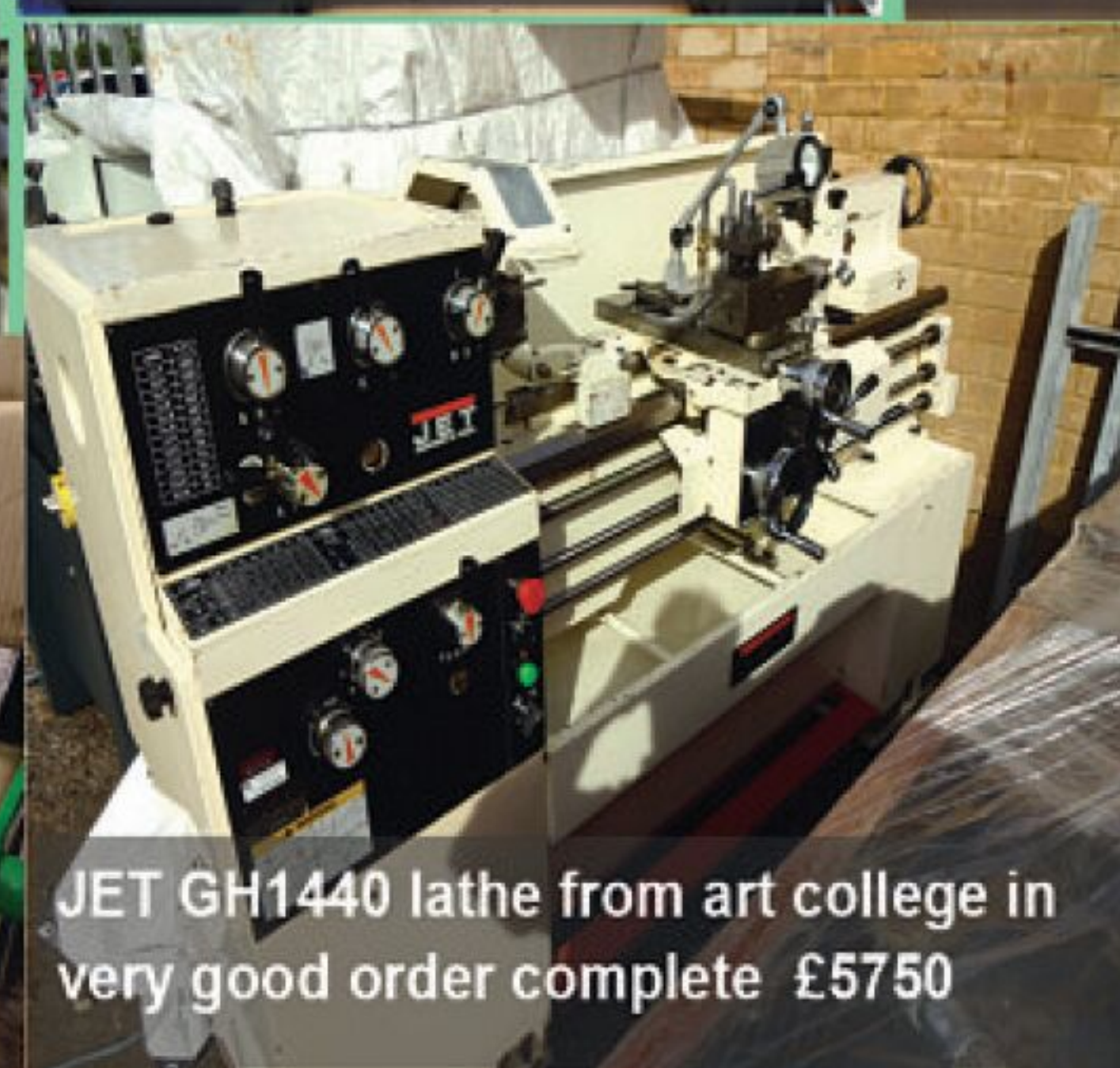
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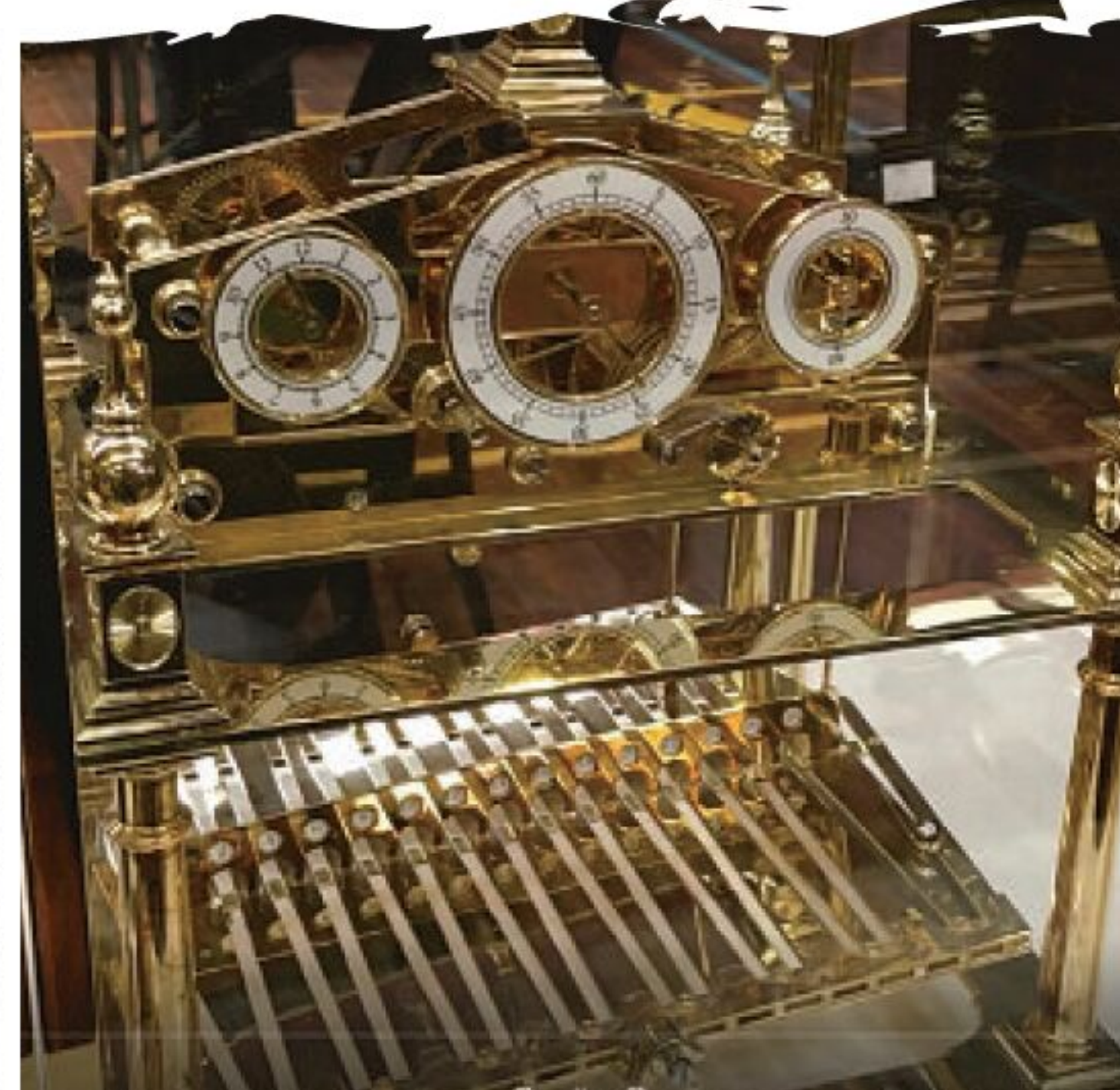


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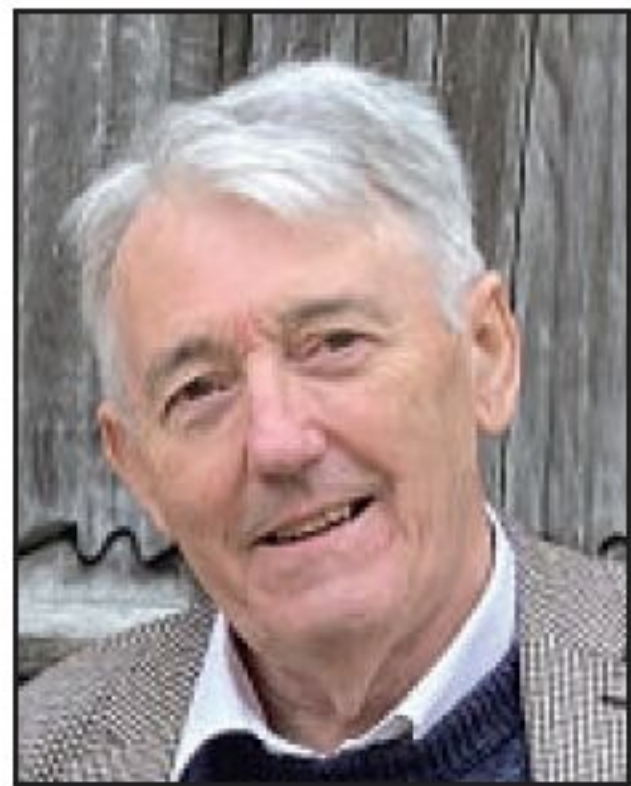


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MARTIN EVANS
Editor



DIANE CARNEY
Assistant Editor

IMLEC

I write this having just returned from the 54th International Model Locomotive Efficiency Competition, hosted by the Southport Model Engineering Club at their very pleasantly situated club track on the sea front next to Victoria Park. I was told that the club site is actually below sea level (lucky it's a raised track!) and I asked how it was that we weren't knee deep in water. The answer, apparently is 'sand dunes'. Between the dunes and the club there is a caravan park so I imagine the first sign of trouble would be sea-borne caravans. Other close neighbours include the model boat club, the croquet club, the cycling club and the radio car club as well as a rather nice looking and evidently popular restaurant.

The event was expertly managed by Ben Pavier and he and his team, and all the members of the Southport and Leyland clubs, are to be congratulated on making the event such a success. Everything ran extremely smoothly and everyone there appeared to be having a good time. There was an impressive entry of thirty 5 inch gauge locomotives and three 3½ inch gauge locomotives. The winner of the 3½ inch gauge category was George Winsall from the Rugby club, driving Welsh Highland Railway



IMLEC Results

locomotive *Russell*, with an efficiency of 1.3%. Third place was taken by Lionel Flippance from Worthing, driving his BR proposed 2-8-2 freight locomotive, with an efficiency of 2%. Billy Stock from Urmston came second, driving an LMS Duchess, with an impressive efficiency of 2.8%. This was topped though by Steve Eaton from Chesterfield, driving a Black 5, with an efficiency of 3.1%. This is Steve's fourth win at IMLEC and our front cover shows Steve with the rather grand 'Martin Evans Challenge Trophy', named, of course, after Martin Evans 'Mark One', my namesake and illustrious former editor, half a century ago, of *Model Engineer*.

Full results, in the form of a spreadsheet, are available from the IMLEC archive (www.imlecarchive.com/imlecresults/2024) and we hope to include a comprehensive account of the competition in our next issue.

St Albans Exhibition

Looking for a fun day out late in the summer? The St. Albans & District Model Engineering Society are again putting on their annual show covering all

aspects of model making with the accent on demonstration and involvement and most of all fun.

The doors open on Saturday/Sunday 28th and 29th September at 10a.m. and close at 5p.m. both days. Entry is £8 for adults and £2 for children over five. At the door you can pay by contactless payment or of course cash! Alternatively you can buy your tickets in advance on the club's website (www.stalbansmes.com) and save £1 on an adult ticket; child tickets (5-16) are £2 and infants under five are admitted FREE.

The exhibition fills a secondary school, having eleven halls at its disposal as well as the grass areas outside. All the local clubs take part also showing and demonstrating what they do. The exhibition supports the local RNLI charity who regard the show as their main event of their year.

There are have-a-go boats, racing cars, model railway and they hope to have the 'make an airplane and fly it outside' stand. There is also a drive-a-train for the very young and steam train rides for all outside.

The club expects over 2,000 visitors including many youngsters. Plan to spend at least half a day there, as previously mid-afternoon visitors have been disappointed they had not allowed enough time.

Parking on-site is free and free light refreshments are available all day.



St Albans MES

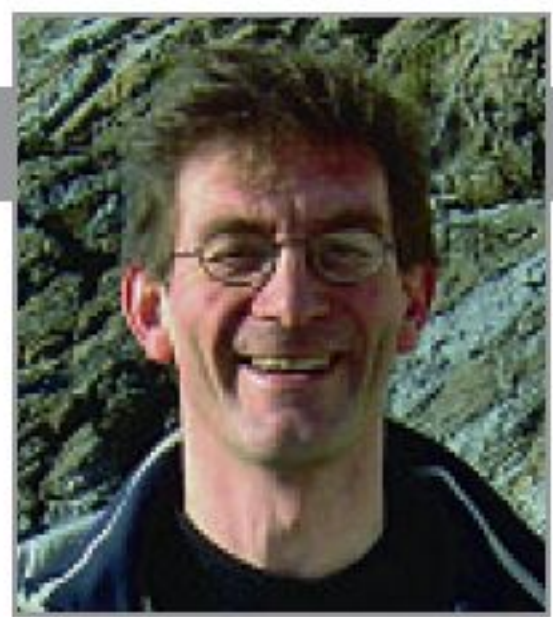
Martin Evans can be contacted on the mobile number or email below and would be delighted to receive your contributions, in the form of items of correspondence, comment or articles.
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Learning to Drive

PART 2

Mitch Barnes

looks at actually running a steam engine rather than just making them to look at under glass, with the help of SMEE's Boiler Management Course.



Locomotive driving

After lunch it was time for the next phase of the course, driving a simple steam locomotive. For this, an ideal candidate would be something early or narrow gauge because, true to the prototype, they lack the complexity of more advanced types but are a bit more sophisticated than a set of trainer wheels on a child's bike. Don't worry though - there's plenty to keep you busy.

For this part of the day a superbly built replica of an 1888 Bagnall locomotive *Excelsior* appeared, resplendent in lined out green livery and bearing a pair of side tanks, this being the second model that we would all have a go at driving (**photo 9**). It was



Somewhat less intimidating than I'd feared. Why, I might even be able to drive it!

so cute that it looked almost friendly and it rejoiced in an appropriately friendly name: *The King of the Pixies*. I understand that Ann and her late husband Gordon Hatherill had built it.

Its controls are eminently simple and, in fact, not a lot more complex than the vertical boiler we had operated an hour or so earlier, except that she had two injectors rather than one, and brakes and a forward/reverse lever. This is about as simple as a locomotive gets,

even with the slight added complexity, of course, in that when she's moving under her own steam, one spends half of one's time just trying to hang on.

Luckily the engine was ideal for beginners like me to cut our teeth on. The cab design is simple because it's the same on the real thing and it's similarly not too cramped for inexperienced fumbly fingers to deal with, because narrow gauge locomotives have proportionately much larger cabs than standard gauge models running on the same rails (**photo 10**).

The alternative would be something cabless from early on in the development and history of the railways such as a 'Canterbury Lamb' or 'Lion', among popular designs, because such complexities as sophisticated braking systems and superheaters hadn't come along by the time their full sized counterpart appeared for the first time and had its day in the sun (**photo 11**).

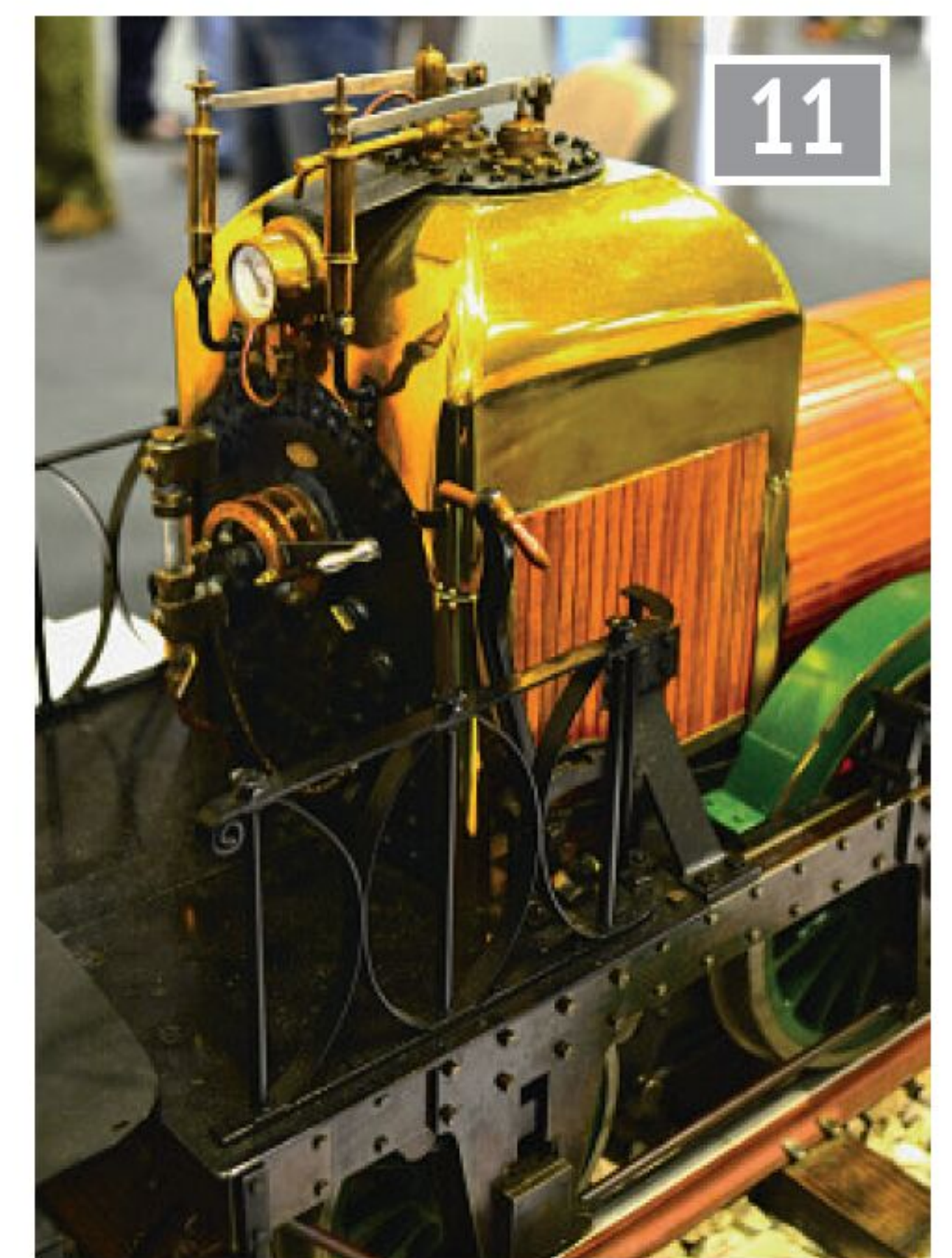
So here we are then, fresh from lunch, fed and watered. The locomotive was experiencing this too



SMEE



Far less daunting to handle than an express locomotive, Excelsior had the bare minimum of controls to make it efficiently drivable so it was an ideal trainer for this know-nothing loco-numpty.



Dating from around 1837, Lion's footplate sports a sparse selection of controls to occupy a cack-handed tenderfoot driver like me.



12

David preparing the locomotive for its first run of the day

because David Hatherill was preparing this little engine for its first outing for a while, having started while the rest of us were filling our tummies (photo 12).

In the photograph one can see the blower in place giving some forced draught to get the fire started. The tall funnel has a similar effect apparently and the combination of both helps draw the fire and get it going.

Having gained that basic knowledge, it was good to progress to the next stage and have a go at driving a steam locomotive for the first time.

It had only been an hour or so since the vertical boiler portion of the course but I realised I had already forgotten a little bit but I thought that a refresher behind the backplate would be a good idea. Filled with trepidation, the hour dawned. Well, as I'd stated above, that's why I was here and now armed with what remained of that knowledge imparted to me earlier, all of which by now seemed to be draining out of my brain, I knew that as with the vertical

boiler, 'as long as you follow the rules and don't do anything silly, there is nothing to be frightened of'.

This locomotive we'd be let loose on for the first time was a five inch gauge narrow gauge locomotive, so I was lucky. Some of the bits even looked the same.

She would be moving under her own steam, with the lucky driver swaying from side to side over the inevitable undulations in the permanent way beneath her so we would soon experience how disconnected and out of touch the directors of the early railways were. They thought that giving their drivers and firemen an enclosed cab to work in would tempt them to nod off at the controls of a locomotive! If said directors had ridden the footplate in those early days (or any time since) they'd have known that one spends half of one's time just like us, doing one's best not to fall off.

Having raised sufficient steam, David Hatherill showed us what this little engine could

do by taking her for a run around the shortish circuit, wringing out his mount. Coasting gently to a stop within a millimetre of the starting point, he made it look sooo easy. It would be for me too, once I get the hang of it, he said, climbing off the driving truck to make room for all of us.

I confess that I wondered if this little engine could possibly pull any of us around the track on those tiny little wheels but evidently sensing that we had doubts as well as nerves, to show us, David took it for another ride around the circuit, demonstrating his skilled use of the brakes once again by bringing it back to a halt, seemingly within a millimetre of his starting point.

On with the show then. We had now given up waiting for the other chap, who had for me initiated this day's events and who was still nowhere to be seen. Ho hum, more instruction for me and the other attendees then.

Now it's our turn. Who'd like to have a go then?

Five nervous novices tried

not to stand in front of each other.

If our no-show had turned up, he'd almost certainly have pushed me to the front! Memories of similar times, waaaay back in my schooldays, came to mind. At sports lessons to be precise. Being so useless at sport that dead people were picked for teams before I was, I was aiming not to stand at the front, like all the others perhaps. Fortunately for me, one or two of the others blinked first but after a circuit or two, each one returned unscathed with wide grins on their faces where previously trepidation was the theme. They were followed in quick succession by the other two, anxious to give it a try, having noticed that nobody had crashed anywhere on this sylvan circuit around Ann Hatherill's gorgeous laboriously tended, sun-dappled garden.

Still there was no sign of our missing attendee so now that everyone apart from me has had a go and survived unscathed, it's my turn.

Gulp.

But beneath it all, I knew that in a few minutes I'd look back on this experience with a circuit or two under my belt and a grin on my face as wide as everyone else's where uncertainty had dominated my facial features. As long as I didn't mess up that is. None of the others had, but would I?

Gulp again. I was at the front of the queue because it was only me left in the queue! Hopefully David wasn't thinking just how useless I'd be at the controls of his pride and joy, as sporty-team leaders were in my youth.

The first thing to do was to look over its coal fired boiler while adding a bit more coal with that tiny shovel and see if I recognised the bits I'd heard about and seen in the earlier parts of the boiler course. If I didn't recognise them now, they could be pointed out to me while refreshing my memory with the procedure for coal firing, before things started getting hot. Literally.

Jolly good, let's have a go then.

Feeling like someone climbing up to the gallows, I stepped forward and climbed into position on the driving trolley. Somehow, just doing that did something to my brain.

Well this is it - 'Showtime' as the Americans say and it was, after all, why I was here. Something to bear in mind is that doing this for the first time is like showing an initiate the controls of a motorbike or a single seat aircraft, where there will be no-one beside or behind me for advice if Things Go Wrong. On the plus side, thankfully because this is smaller scale, much slower and also much, much closer to the ground, this first nervous attempt is anticipated without quite the same level of impending doom; you've done the theory and tweaked some of the knobs and David showed me the taps again. But that much-appreciated kindly bit of last minute refresher instruction seemed to go in one ear and straight out of the other one without stopping inside my skull to revive my memory. Talking of which, it now seemed to have been instantly erased of all thought. Help! The reassuring voice over your shoulder is no longer there because there is only room for you on this little footplate and you're on your nervous own.

I knew from watching the others that this was very much the little engine that could, but was I a driver who could? I had my doubts but I wanted to assuage them and improve my confidence. I have an Adams T6 to drive one day.

Everyone is watching, I imagine to myself. Actually apart from David only a couple of people are – and that was only if they were looking up from admiring the roses in Ann's garden. Everyone else is contemplating with Ann the finer points of tweaking the throttle a bit on that upward gradient halfway round and the difference that a slight application of the brakes can make on the other side of it.

Having admired and been astounded by the quality of the workmanship of this model I had been entrusted with, let alone the hundreds of hours of skilled work required to build it, a stray wandering thought at last broke down the seemingly impenetrable wall of mental blockage that had taken over my brain at the point that I had sat down.

'I hope I don't prang it' I thought as I gingerly opened the regulator (also new to me) a tiny amount and braced myself to set off, but not too fast...

"Try releasing the brake and move the reverser to the pointing forward position" David suggested helpfully 30 seconds later, noting that this was still a stationary engine. It came to life, accelerating to just over a snail's pace. "And now's the time to close the cylinder drains". Even though he had shown me all these additional controls only two minutes earlier, nerves had made them escape my mind, along with everything else.

OK then, off we go... Hanging on (literally, as stated above), I realised as I gathered speed to nearly walking pace, this is fun! I opened the regulator a bit more and with that motion, my doubts started to ebb away as confidence began to replace them. *King of the Pixies* was a tiny locomotive but under the Power of Steam she had bags of grunt!

This was an ideal and gentle introduction for this ten-thumbed fledgling driver, a simple locomotive running on a gentle circuit, itself being a fairly short distance so that one can't get into too much of a mess. Despite the lovely mature gardens partially obstructing my vision around the circuit, David and Ann were keeping a watchful eye on me all the way around to prevent things getting out of hand. The grades, turnouts and inclines on this cleverly designed circuit I was trying to negotiate allowed me to get the hang of the throttle - opening up a bit when you reach that aforementioned gradient and closing it again when you

are coasting down the other side, whilst monitoring the pressure and water gauges and using the cylinder drains and the injector again when I was picking up a bit too much speed. There seemed to be an awful lot to attend to, with single handed operation; no doubt this would soon become second nature. Apparently it's a bit less hectic with two crew on a full size locomotive because the driver looks after the taps while the fireman deals with the fire and they share other tasks between them.

Confidence (or hubris) building as I returned to the starting point (OK then, ten feet beyond the starting point – it takes time to get the feel of the locomotive and its brakes) with the lovely locomotive and myself as yet miraculously unscathed, I decided to keep on going and completed a second circuit. Not wishing to push my luck too far as I coasted to a halt only 9 feet 11½ inches beyond the starting point this time (See? Improving!) I decided to pause while I was ahead and relinquished my seat to one of the others who wanted to try driving with a load behind the locomotive in the form of a wagon. Evidently a seasoned professional or an absolute natural, he got the hang of it like an old pro and completed several immaculate circuits with aplomb, bringing his mount perfectly to a halt AT the starting point every time.

Having allowed others to have a go, along with the others I tried several more circuits, with the added experience of more rolling stock being tagged along behind the driving truck. With more circuits and extra rolling stock coupled up, we could see and feel how extra weight makes a difference to the performance of the engine and what one has to do, to deal with these variations and thus build up our confidence and ability.

I improved a bit in that while I applied the brakes too early once and had to build up speed again, I got my overruns down to 9 feet 10 inches past the starting point so at least one

could notice a certain rate of improvement. Despite those 'improvements', if this had been a full sized railway the passengers would be carrying their luggage back along the tracks towards the station.

I also now understand why so many of this genre of miniature narrow gauge locomotives are built; apart from their friendly and cute appearance, with their large and roomy cabs they are practical to drive because it is fairly easy to monitor the gauges while bouncing along the track and concentrating on both staying aboard and looking out for obstructions.

Conversely, I also understand why many smaller live steam models have a sliding hatch built into the cab roof; at the angle one sits when perched on the driving trolley behind - and especially for a taller person such as me - it's really hard to crouch down and see the pressure gauge without that open hatch (especially when the locomotive is moving) and I also found the water gauge difficult to read at times, despite the prototypically tall cab (without a roof hatch). We were blessed that day with clear blue skies and brilliant sunshine that marked the end of a long run of rainless summer days. The only downside of this was that while driving I found that the bright reflected sunlight tended to obscure the gauge glass contents at times.

After a couple of hours, with the locomotive running out of steam almost as fast as the day's pupils, our minds sated with all we had learned, we were then shown how to 'put the engine to bed'. This was a very thorough session because in this case the *King of the Pixies* was going away for the winter and would be in safe storage somewhere for the next few months. Here we saw the action of the blowdown valve once the gauge glass had been cleared, dropping the ashpan and raking out the grate (the ash might be a good fertiliser, especially for roses apparently), lots of oiling up and general cleaning (**photos 13 and 14**). We could



The end of a day's concerted running - steam and fuel have run out and it's now time for bed.

also now deal with the vertical boiler and put it to bed too (**photo 15**). How useful a blowdown valve is; with the last of the steam present in the boiler you can squirt all the remaining water out. I wish my Stuart boilers had them. I forgot to ask how you purge a

boiler without one; sucking it out with a syringe seems to be my current method.

Conclusions

My impression after this day was that with all this new knowledge, even if I'm not very good at it, the prospect



Unused coal and lots of ash needs to be removed, the tanks drained and everything oiled up until its next run.



Time now to also clean up the vertical boiler and prepare it for the winter.

of actually driving something no longer holds quite such a feeling of awe. It also accentuated to me that along with an added understanding that you really do need to have an experienced hand at your shoulder to teach you the ins and outs of driving anything much more complex than a pot boiler – like driving a car, as succinctly put that morning by one of the other attendees, operating a boiler is something that books can only partly prepare you for and hubris has no place here.

So what can one take away from the day's proceedings apart from the nicely produced set of notes to joggle the memory cells in the coming weeks? What I knew when I signed up for the course could basically have been engraved on an ant's toenails. I felt far happier at the end of this course but as flying instructors

are often wont to say to a pupil who has just gained his or her licence after many months of effort, that newly won piece of paper that they have long coveted and are now holding in their proud and shaky hands should be regarded as simply as a Licence to Learn... because practical experience is priceless.

It had been a fascinating and very enjoyable day for me and (I think) our two very kind and incredibly competent instructors but did the anonymous greenhorn steamer chap who inspired me to join the session ever show up?

Perhaps he'll come along if there's a next time...

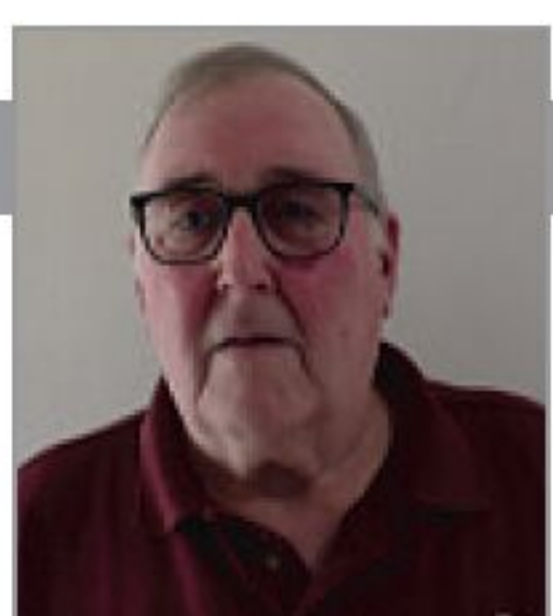
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ME

The Leufortin Project

PART 3

Ian Bayliss
presents
an internal
combustion G-scale
locomotive.



Continued from p.218
M.E.4748 July 26

Starting the build

At last a start in the making of parts. Various materials had been gathered up allowing for some flexibility in detail design. The chassis parameters had to be set early so this was an appropriate place to start manufacture. At the outset it was clear that it would be necessary to make whatever jigs and fixtures were required to achieve a reasonable level of competence particularly where two or more identical parts were needed - that's just about all components in this sort of work. This was even more so, bearing in mind that there were to be two locomotives of the breed. It seemed very quick that chassis sides appeared, using co-ordinate drilling on the X-Y mill table. The axle box holes were slotted out to the bottom of the frame just sized clear of the bearing diameter so that the axle boxes could be withdrawn and the complete axle dropped without a full blown strip down.

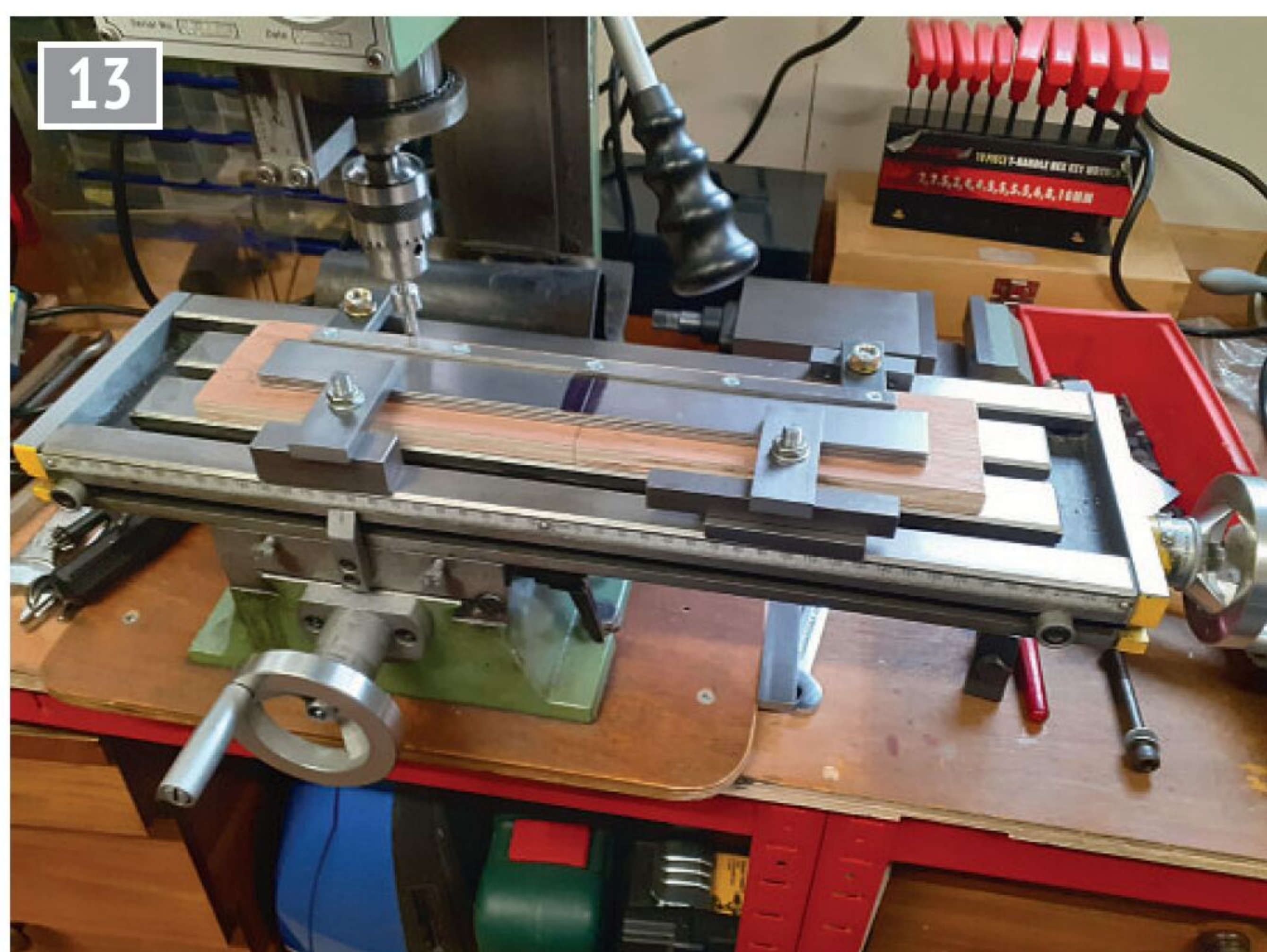
Photograph 13 demonstrates the basic fixturing ideas.

This was simply a steel bar screwed to a ply base, set on the mill with a lever DTI and four sawn over length blanks for the frame sides clamped in place. Hold down holes were then drilled. **Photograph 14** shows the blanks bolted down and milled to length. The Starrett pattern edge finder is now used to set up for the co-ordinate drilling of all four frames (second locomotive as well). I tend to use what are catalogued as 'Z-type' edge finders from Chronos as they give a much clearer indication of contact, making repeatability more consistent. I use one of these and the standard pattern Starrett edge finder very often for setting up operations on the milling machine. I can be more accurate than using the 'wiggler' type although they have their place, particularly for picking up scribed lines and intersections of same.

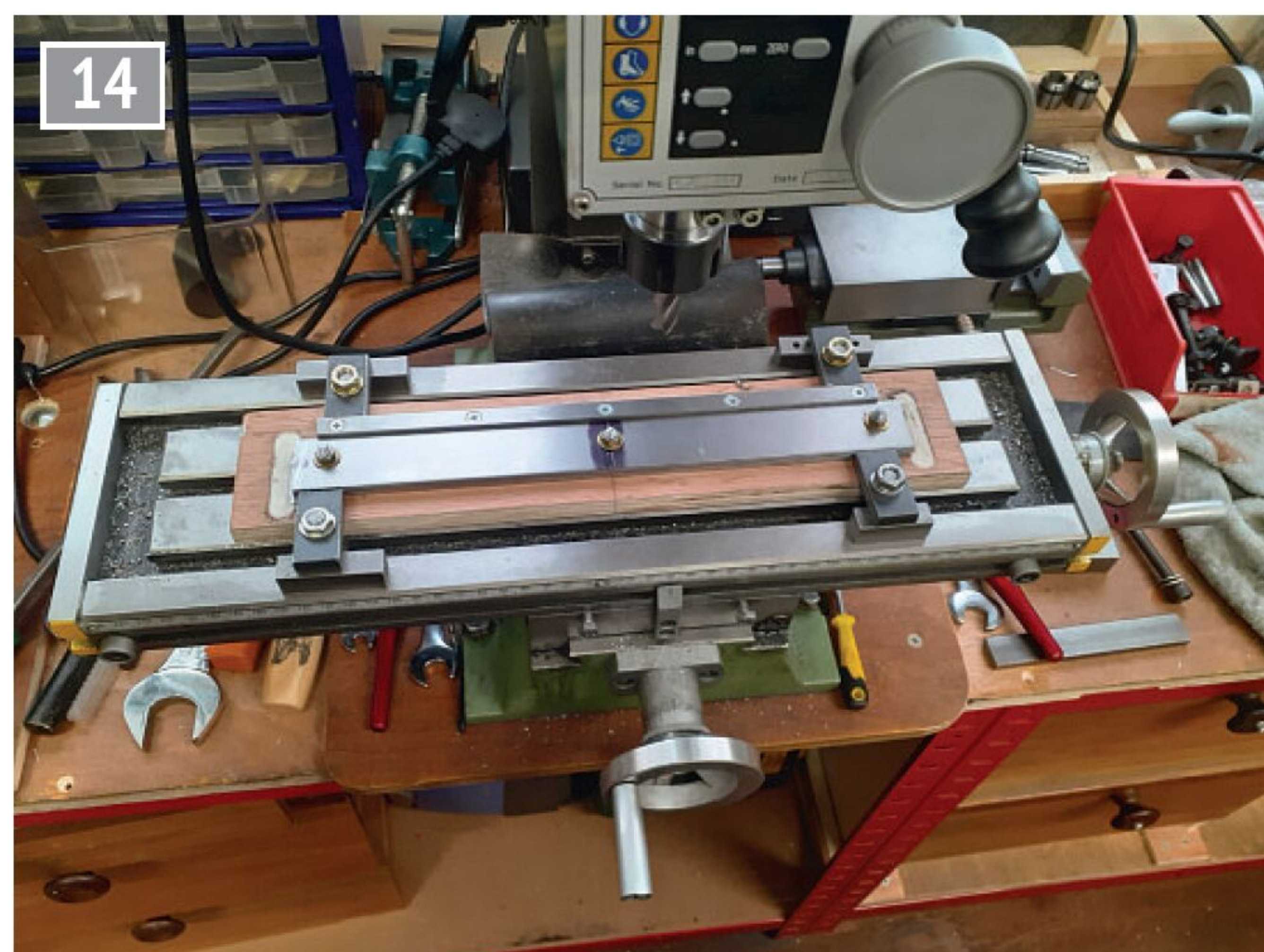
Remember to only move or change one clamp at a time otherwise it means setting the whole thing up again with the potential to build in errors. I know.

I still forgot the battery box mounting holes for the radio control receiver though on these frames.

Frame stretchers were easily squared and sized from stock brass bar in the mill vice, using a spotting drill and table co-ordinates to mark drill holes and tapping on the drill press. When tapping a good number of small threaded holes in anything other than round stock in the lathe, I use the drill press set up with a reversing tapping head. I break fewer taps that way. The torque can be set for each tap size. I try to design with through holes so the tap has less chance of bottoming out and breaking. This cannot always be achieved and I end up on the drawing board (CAD) moving holes around to take



First setup in the mill preparing the steel strip for the chassis frames.



Hold down bolt holes drilled and all ready for drilling using table co-ordinates.



The assembled chassis.



A completed wheel set with the tooling made for the job.



The old tipped bar turning lathe tool explained in the text.

into account the maximum depth I can get making it easier to judge from the tap entry into the hole when to remove the load on the drill press handles. I use a low speed, because these are tiny taps and need to be shown respect. For round stock in the lathe I use a spring loaded centre in the tailstock and small tap wrench. My favourite lubricant is CT90 aerosol.

Most holes are M2 or 10BA at this stage. Running board/footplate angles are pre-drilled on their top faces with only three stretcher holes in the vertical (to frame) leg. They are now handed items. They are bolted to the frame with 10BA screws and the remaining rivet holes spotted through from the frame. The insides of the frame rivet holes are countersunk a small amount. The 1/16th inch diameter snap head rivets are closed into the countersinks and then filed off flush. This can be seen in **photo 15**. The frame is then assembled as shown in this photograph on a small surface plate making it as square as was possible. The screws were 10BA slotted round heads, shortened as described previously, three to each end of each stretcher.

Wheels

Now comes one of the contentious bits. I have heard an awful lot of heated discussion concerning the making of wheels, particularly amongst those in the garden railway hobby. I had no intention to do so but I think it's fair to explain myself. This is also a useful place to explain how I break down

the making of a component into those basic steps. Thank goodness mine are relatively simple. It's my railway after all. **Photographs 16 and 17** show a set of four wheels, the homemade tools and the lathe tool used for tread profiles. I always make wheels in sets as required for each model.

I know my methods work for me and fully recognise and respect that others will not agree. I have already explained that I use the most basic of processes to achieve (well most of the time) the ends required.

The first job is to make a mandrel. This is a simple piece of bar stock turned with a spigot and a shoulder spigot for chucking, then a larger flange of some thickness, a bit smaller in diameter than the tread size of the wheel, but only a small amount. Drill and tap a centre hole at the large end M6. Drive in with Loctite 603 an M6 socket cap screw. Part the head off and turn down to the mandrel flange to 5 mm diameter, a snug fit for a reamed 5 mm hole. Thread M5 for a short way to accommodate a standard nut.

Cut a slice of steel of diameter the same or just a bit bigger than the flange of the wheel, say 12 mm thick, for the drill jig. Face both sides and ream through 5 mm diameter. Fit on the mandrel and clamp down. Drill and ream a 3mm hole through at a position which is inside the minimum designed flange and tread diameter as can be seen in the photograph and on into the flange of the mandrel. This must be left blind.

Cut (in this case) four blanks from stock steel bar 18 mm thick. These were from two inch diameter stock, the maximum diameter of the finished wheel being 48 mm. Face both sides to 16 mm being the finished overall wheel thickness. Using an M5 socket cap screw lock the blank to the drill jig. Mark a face as the back with an indelible marker. Drill the offset 3mm hole with a cobalt spotting drill into the blank to just 6mm and leave blind. Do all four blanks.

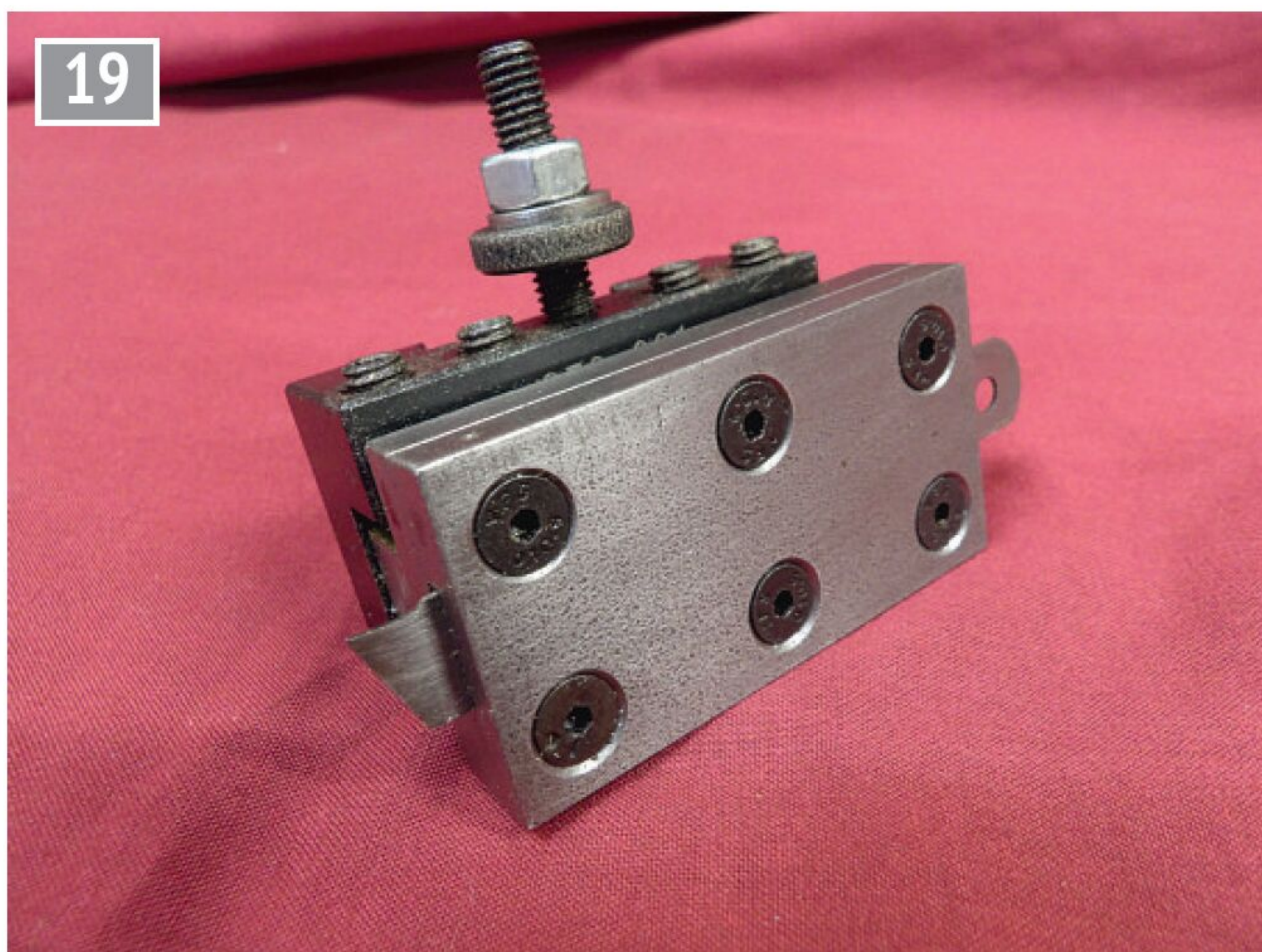
Mount a blank on the chucked mandrel with a 3 mm ground drive pin sandwiched in the blind holes. Lock it in place with a centre nut. Set the lathe saddle stop. Turn the wheel hub to size and length noting dial numbers. Do all four. Turn the maximum outside diameter. Do all four. **Photograph 17** shows an old ToolMex bar turning tool. The cutting edge of the tip

(SPUN1103) is an accurate 15 degrees angle to the main axis of the tool. Ensure that the toolpost is set square to the topslide and then rotate the topslide 5 degrees anticlockwise. This gives a pretty accurate 10 degree flank angle to the wheel flange.

The best success I have had with wheels and profiles with the Code 332 commercial track is to stick to the 2mm x 2mm rule popular in the



Cutting axle keyways in the first iteration of the model.



Homemade grooving tool for circlip and E-clip grooves.

United States i.e. flange 2mm high and 2mm thick at its root intersection with the tread diameter. Its just a bit of trigonometry and maths to determine where this will be due to the root radius (already on the tool tip).

Set the saddle stop. Turn parallel to the reset saddle stop the maximum diameter of the tread. Do all four. Remember all can be remounted with a close degree of accuracy on the mandrel.

The top slide setting will give a cone angle of 5 degrees. Shock horror for some! I have experienced no discernible difference between the 3 degree cone angle of commercial wheel sets and an homemade 5 degree cone

angle when running. After all, that is all that matters.

Retaining the same angle the coning can be turned on the tread, having locked the saddle, using the topslide and a watchful eye as the tool tip radius approaches the root radius of the flange. It is surprising just how accurately the eye can detect the point of tangential contact. After the first one make note of the cross slide dial reading and stick to that as the end point for the remaining wheels in the set. If the mandrel flange has been judged about right then it is a simple turning job to provide a bit of a relief to the flange on the rear face. A gentle relieving of the corner points of the flanges can be



Profiling and drilling coupling rods on the mill. These had been drilled out of 'sync' with the text but proved successful.



Part finished axle boxes sitting on their project book drawing with drill jig.

done with a Swiss file. BE CAREFUL!

Remove the mandrel, turn the wheel around, grip by the hub and ream finally from the back to the finished 6 mm diameter.

Voila! Une roue de chemin de fer.

Its taken longer to type it than to make one, almost, but it does demonstrate my methods of breaking down what appear to be complex items into simple operations. They may not be perfect, nor to everyone's taste nor may they be accurate in exactitude but they will be all the same in a given set for a locomotive or piece of special rolling stock. Decoration is at the discretion of the railway's owner. I do mine with a slot drill, the wheel being mounted in a rotary table chuck on the mill. Again all of the set will be the same. This will, as in this case, probably expose the mandrel drive pin hole

Axles are precision ground silver steel and one has a keyway cut for the final drive gear. Assembly also had Loctite 603 to supplement the wheel fixings. The original set up for cutting keyways can be seen in **photo 18**. This included the smallest (cheaper) milling collet chuck I had. It is obvious why the need arose for an ER16 collet chuck.

Fly cranks were drilled on a rotary table on the mill to ensure that if not accurate then at least all four (in fact eight) were the same. A gauge was

made and the crankpin hole position checked with this and a ground stock pin. All were very acceptable. Basic logic says that exactitude is not altogether necessary but ensuring this sort of item is exactly the same as its companions is what is required. Then some shape was added with a slot drill.

The crank pins were grooved with a home made tool (**photo19**), the cutting bit being made from a broken hacksaw blade. 4 mm circlips to retain coupling rods were not the best choice as it transpired later.

Brass axle boxes were turned up in the self centring four-jaw chuck for the initial operations followed by a three-jaw chuck and again a little drilling fixture was used that matched the frame drillings (**photo 20**). The photograph shows the part finished items as they came off the four-jaw self centering chuck and the drilling fixture ensuring they are a close match with the chassis.

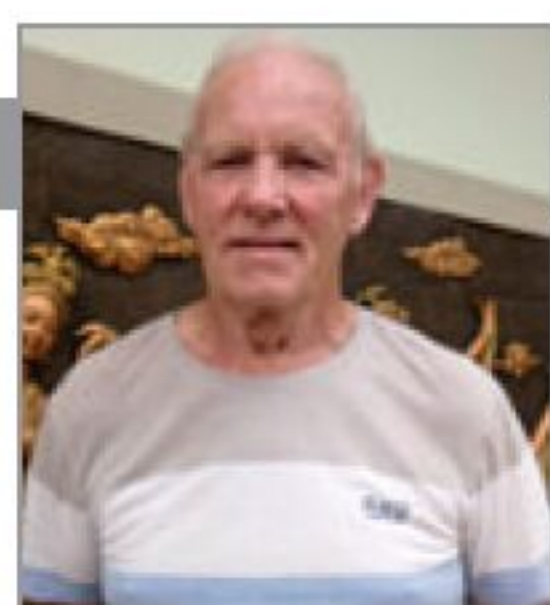
Coupling rods are a relatively simple profiling job on the mill. However the crank pin holes are not drilled, again on the mill and the profiling fixture, until the chassis and wheelsets are in place. The resulting set up is then measured across the axle ends so that the coupling rod eye centres can be set. I was fortunate here as with no play each was very closely matched. Profiling the ends was basic with some filing buttons after manually cutting away the excess lengths for holding on the fixture (**photo 21**). The brass end bearings are more of a fiddly job to get right. Tubal Cain was correct in his writings that it is good practice to make more of these fiddly bits than you need whilst you are set up and then use the best ones in assemblies.

● To be continued.

A Small Clearing in the Jungle: Phuket's First Railway

PART 2

Colin Standish introduces rail travel to Thailand's Tiger Kingdom.



Continued from p.210
M.E.4748 July 26

Now it was time to lay track but, before starting, using the small jig made to locate the fish plates, holes were drilled in each end of three lengths of rail; one outside, one centre and the inside. These were then placed on a straight section of track bed and held apart using the pre-cut spacing tubes. The first 2 feet or so of track was clamped down to the sleepers using G-clamps and the holes for the tie rods in the centre and inside rail spotted through from the outside rail and drilled (**photo 15**). Spacers and a tie rod were then inserted and secured. You will notice that in photo 18 the spacers are not yet bolted but are merely being used to hold the rails apart. As mentioned previously, the tie bolts and spacers were spaced out at 12 inch intervals along the track.

Once a short length had been fastened together, holes for the holding down bolts were drilled through the beam (**photo 16**). With the track now being securely held by the hook bolts, the G-clamps could be released (**photo 17**). That was the easy bit (**photo 18**) - now for the curves.



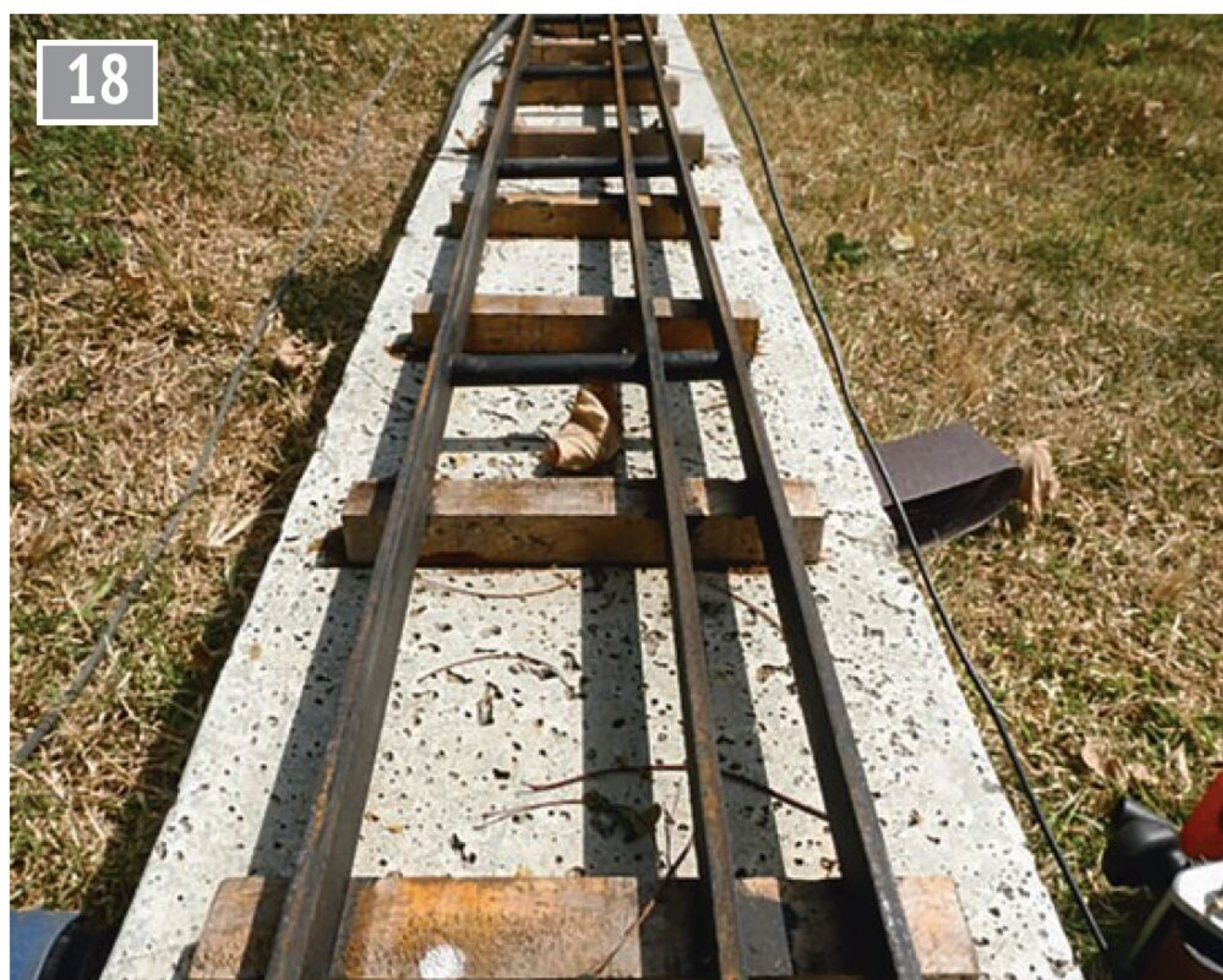
Tie bolt holes spotted and drilled through.



Drilling for the hook bolts.



Track secured.



First length laid.

There was not much difference in the modus operandi in drilling and securing the rail sections. For the first three lengths, the rails were suitably fishplated to those previous laid and the inner rail merely pulled round to match the radius of the track bed and held in position using G-clamps. The centre and outside rails with spacers placed between them were then pulled to meet the spacers on the inside rail and, again, clamped firmly to the track bed. The holes for the tie bolts were again spotted through from the

outside rail with the permanent spacers and bolts being fitted as work progressed. The hook bolts are now holding it permanently in position.

The only variable now was that of the starting/finishing points of the next rails to be laid. They would now be staggered because of the difference in the radii of the three rails on the curved sections; in my mind, not a bad thing (**photo 19**). The track laying took around a month to complete and was ceremoniously concluded by the temporary fitting of the



Ready to start the final curve.



The 'golden' fishplate (22ct brass).



Railhead before linishing.



Linishing in progress.

'golden' (brass) fish plate (photo 20). I stood back and thought, *I've done it*, followed by... *look upon my works, ye mighty*.

The final job was to go a round the track with a large linishing machine to remove the mill scale and prepare a nice clean, level surface to run on (photos 21 and 22). In photo 22 you can see a thermos flask in the foreground - this contains water, not coffee, for obvious reasons - and photo 23 shows the end result.

Now that the track was complete, I was eager to try out the locomotives, the first of which was a three and a

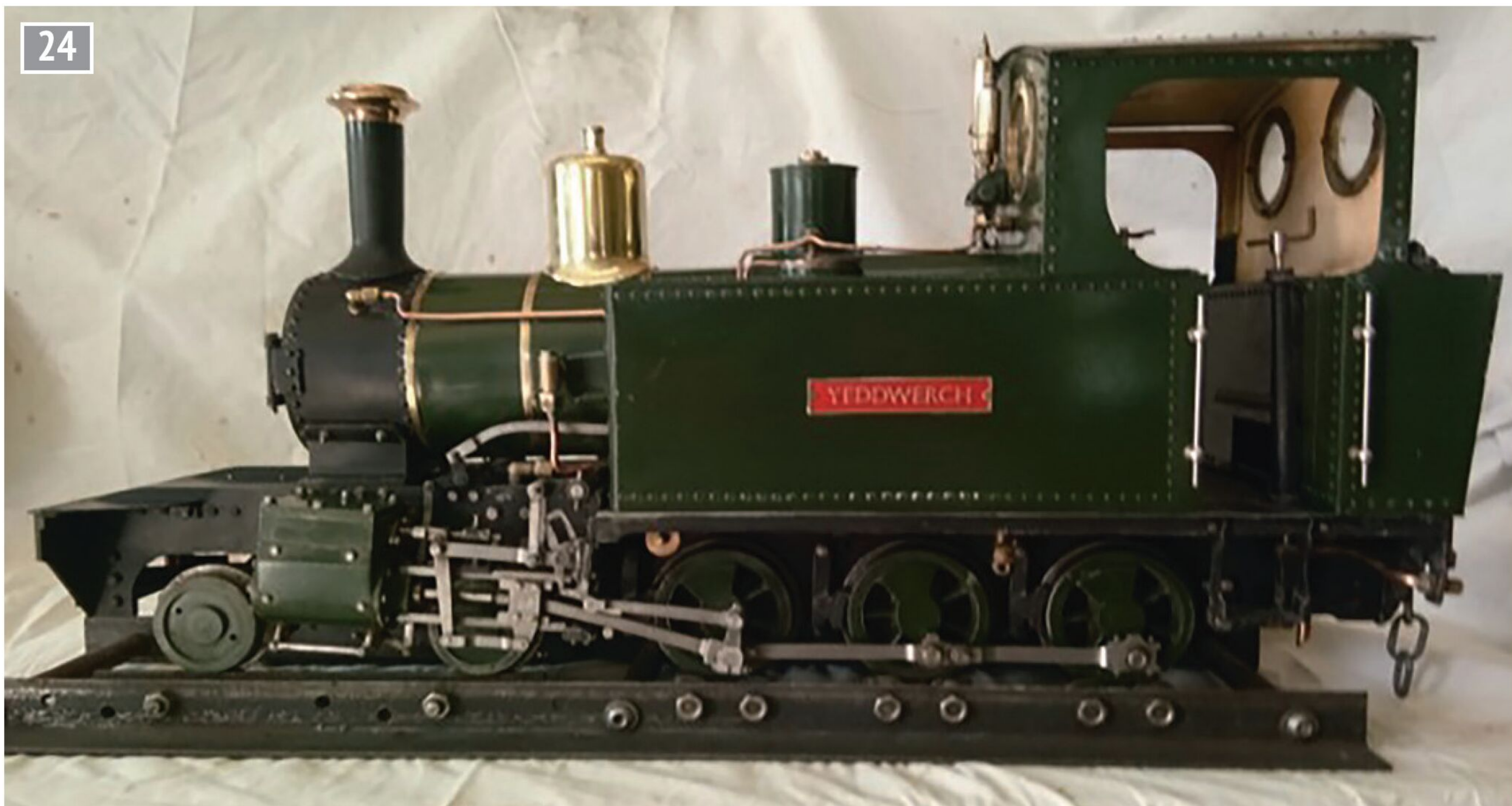
half inch gauge Spencer by Robin Dyer. This was the first locomotive I built, closely following its construction in the M.E. When completed the engine was named Yeddwerch for the following reasons.

Being new to the game, the construction caused me many a headache and was often referred to as the Yedwerch, which, in the local Wigan dialect means headache, *yed* being a corruption of head and *werch* being an ache. The name stuck and I had the nameplates made but spelt with a double d. This gave it the appearance of being a Welsh name that in turn gave the impression that the



Railhead after cleaning.

24



Locomotive Yeddwerch.

25



Locomotive MacCailein Mor.

locomotive was a small Welsh quarry engine. My apologies to all Welsh readers but it's my engine - I made it; I'll call it what I want and it looks right (**photo 24**).

The second engine is a three-and-a-half-inch Marquess by Martin Evans (the other one), again serialised in the M.E. This was named *Mac Cailein Mor* which is, of course, spelled

wrong, as was the original nameplate on the newly outshopped 4224, much to the consternation of the Scots and Diane when I asked her to produce the nameplates for

me. Again, apologies, this time, to our Scottish readers but that's how it was (**photo 25**).

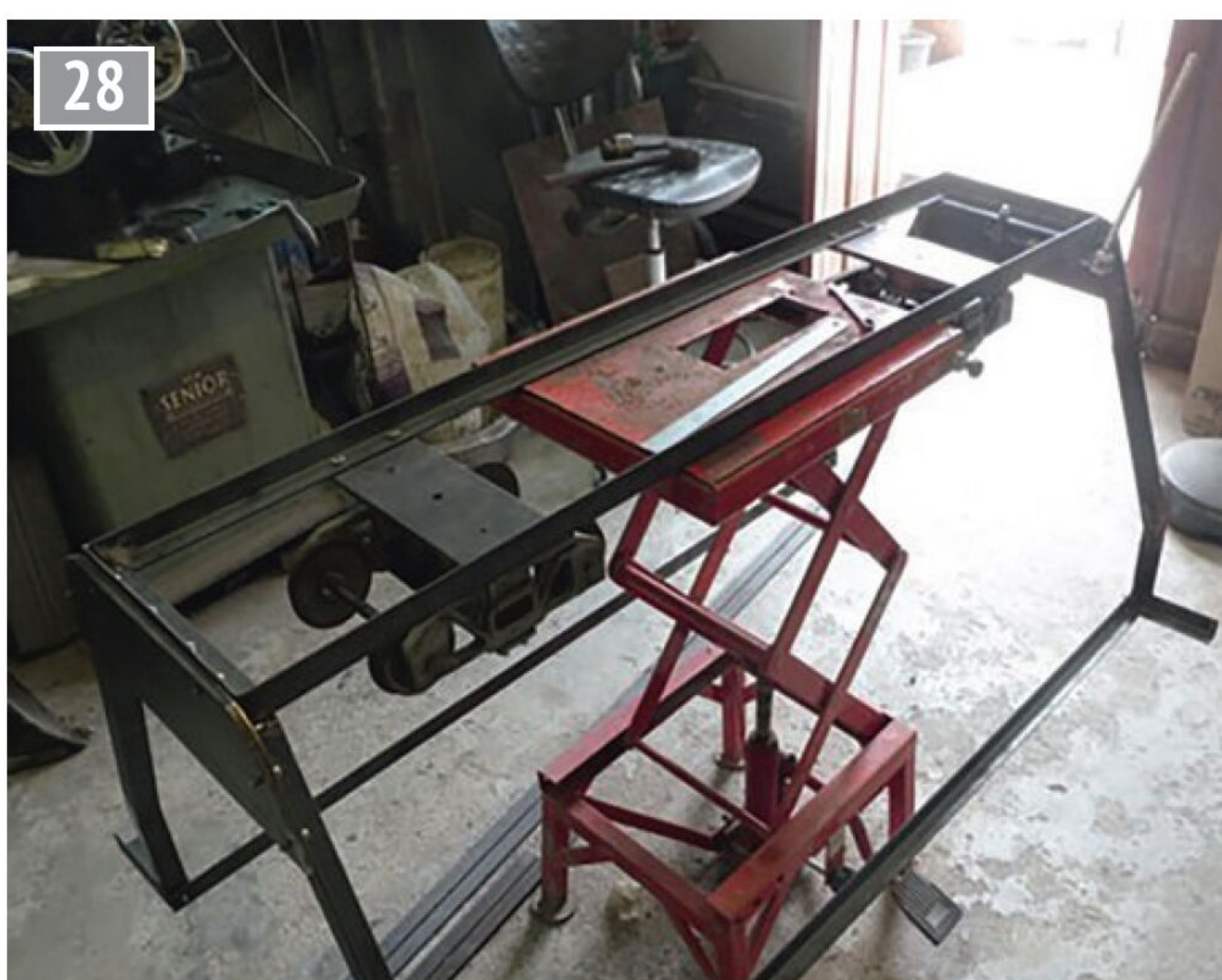
The work horse of the stable is a 5 inch gauge Ajax named *President*; built, I believe, in



Locomotive President gets steam up.



Locomotive Sivakorn.



Driving truck under construction.



Local children.

1953. This engine was acquired by the Wigan society as a club engine from the Bolton society when it disbanded. After years of use and a little abuse it was subsequently sold to a club member, Colin Sewardson, who I think was responsible for the addition of a tender, possibly to attempt to dampen the crabbing motion of the locomotive or just to be able to carry more water and coal, I'm not sure. Following Colin's death, Joan purchased it from his estate and I set about totally rebuilding it for her (**photo 26**).

The final locomotive in the stable is a 5 inch gauge battery powered engine, Charlatan, brought over here as a kit from Blackgates when we first arrived. This engine has been named *Sivakorn* which is the formal given name of our Thai grandson and carries the

cabside number 171013, his birth date (**photo 27**).

The construction of the Charlatan was not without its problems, the main one being the sourcing of materials, for example the bodywork was made from the side of an old washing machine salvaged from a local scrapyard, with the roof and running boards liberated from a piece of metal shelving. The radiator cowl was fabricated from 6mm aluminium sheet obtained from a local boat repair/service yard with the cab constructed from 3mm aluminium from the same place. When it came to the electrics, however, I repeatedly suffered one piece of bad luck after another culminating with an unseen stray strand of very fine wire, trimmed from a connector, falling onto the controller

and destroying it when power was applied. Throughout the electrical installation it seemed I was constantly in touch with 4QD who were helpful to the Nth degree and after the blow up graciously offered me a new controller at a greatly discounted price.

During the time spent writing this article I have been reading about John Ramsbottom who in 1857 succeeded Trevithick as chief mechanical engineer at the northern division of the London and North Western Railway. Here he built his first express locomotive and named it *Problem*. In fact, this went on to be the name given to that particular class of locomotive - so, you can see that by naming the Robin Dyers Spencer *Yeddwerch* I was not too far off the mark!

With the track complete all

I needed now was a driving truck. Fortunately, when I lived in the UK I was given four sets of ready-made bogie trucks, two of them with brakes, by another late friend from the Wigan MES, Morris Webster; enough for two passenger trollies. Drawings were done and a driving truck produced (**photo 28**) - the day was drawing close.

The first run was attended by our Thai family with great delight and wonderment at seeing their first steam locomotive, albeit a miniature, being able to take passengers for a ride. The local children soon got to know about the set-up and appeared regularly on Sunday afternoons for a ride on the farang's (foreigner's) train (**photo 29**).

ME

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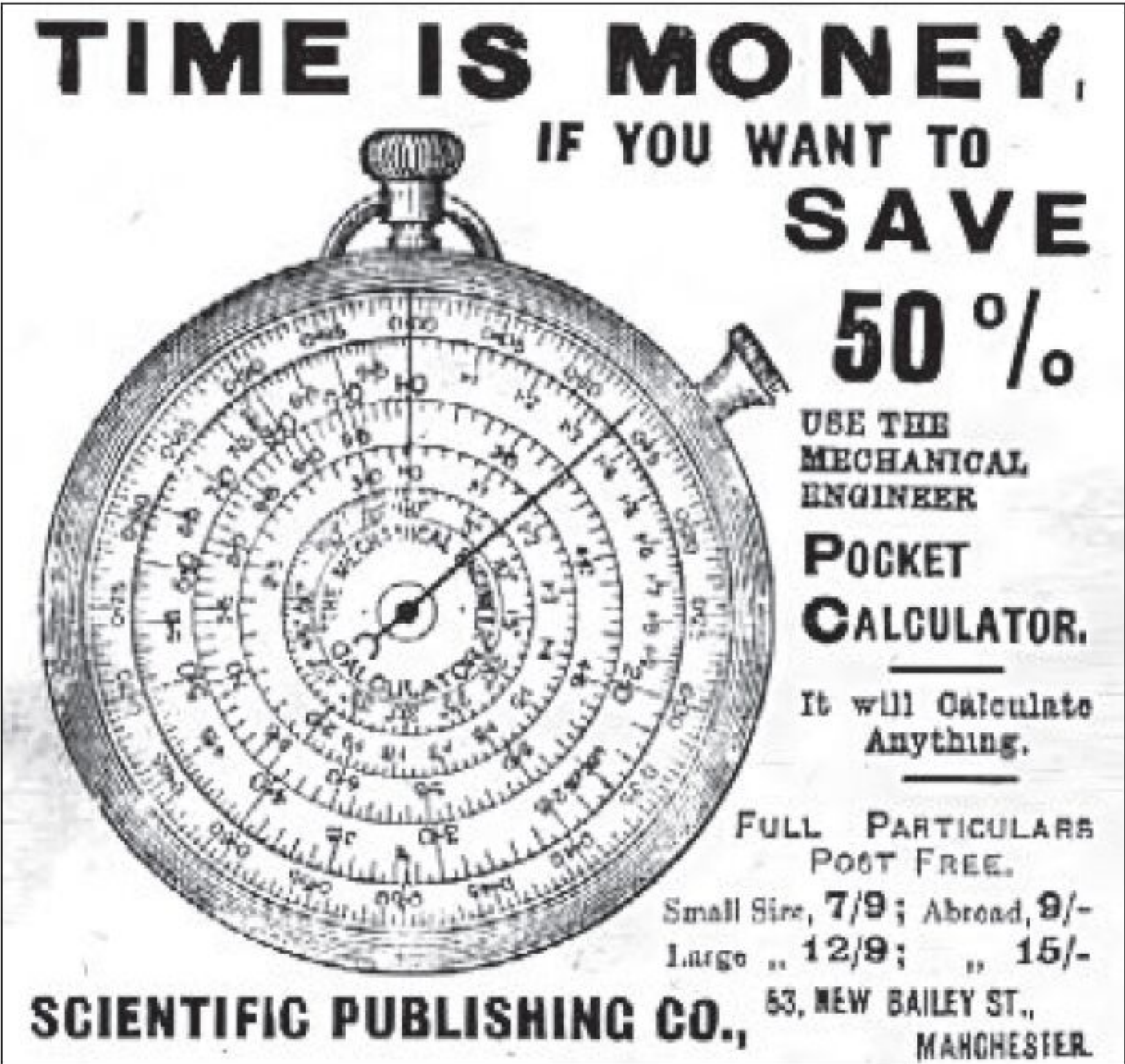
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Ron Fitzgerald takes a look at the history and development of the stationary steam engine.

Continued from p.140,
M.E. 4747, July 12

The Stationary Steam Engine

PART 60 – EVOLUTIONARY AND EXPLOSIVE STEPS

The arrangements of the engine and boiler shown in the patent for the dyehouse engine described by Farey in the *Treatise*, and the form adopted for the dredger's engine, are indicators of the evolutionary development of the Trevithick power unit.

Throughout each stage the cylinder and the working parts altered little after their first appearance in William West's model of 1797. Enclosing the cylinder body within the boiler became the distinguishing characteristic of the Trevithick high-pressure engine. It was thermodynamically advantageous in that the cylinder was maintained at the same temperature as the boiler steam and the long port connecting the valve chest to the lower end of the cylinder did not incur the heat losses that would have arisen had it been exposed to the atmosphere. Against this, Trevithick's plug cock valve design, like Murray's slide valve, might be regarded as a backward step compared to the Watt mushroom-headed valve which gave rapid opening and closing along with a larger port area. Trevithick and Murray's legacy was to be wire-drawing and convoluted ports, the Achilles heel of steam engine cylinder for the next century and a quarter.

Unlike the cylinder, Trevithick's boilers took longer to assume a stable form. The simple, externally-fired, tun boiler had serious limitations in terms of its steam raising ability and as its volume decreased

the thermal storage capacity of the water diminished as the inverse cube. Correspondingly, boilers of the size used by Trevithick were penalised with extreme breathlessness. One way of improving the boiler's performance was to install an internal flue. Boulton and Watt commonly made use of such flues in their waggon-type boilers and an even earlier type of internal flue boiler was probably known to Trevithick. The 'moorstone' boiler, built up of granite slabs tied together with iron clamps and containing copper internal flues, had been used in Cornwall to supply atmospheric engines. His father had scrapped such a boiler when the Carlose engine was transferred to Dolcoath in 1783.

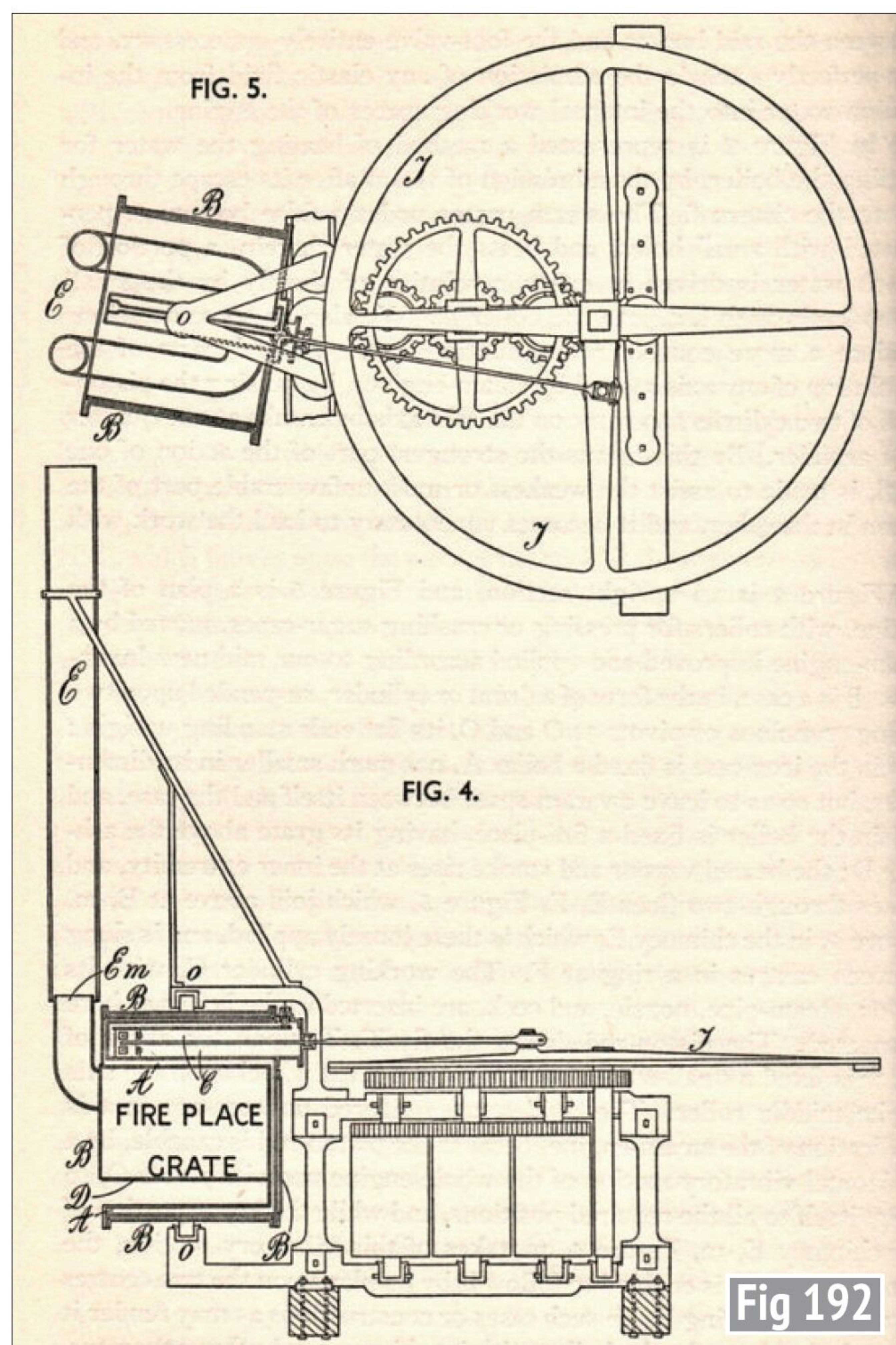
Trevithick was experimenting with an internal flue boiler as early as 1799. In that year Henry Clark worked as a rivet boy in Dolcoath where he:

...carried rivets to construct Captain Trevithick's new boiler said to be the first of its kind ever made. It looked like a great globe about 20 feet in diameter, the bottom hollowed up like the bottom of a bottle, under this the fire was placed. A copper tube attached to this bottom went round the inside of the boiler and then passed out through the side of the boiler, the outside brick flues then carrying the heat around the outside of the boiler and into the chimney (ref 325).

In its overall form this is unmistakably a common atmospheric engine haystack boiler made up of wrought

iron plates riveted together. Trevithick's contribution was the copper flue which must have entered the boiler vessel through the plates of the dished underside over the fire before winding around the interior to finally discharge the heated gases into a brick

flue system that surrounds the sphere. On a much smaller scale the boiler of the 1802 patent stationary engine bears some resemblance the Dolcoath boiler with its spherical exterior shape and the concave base over the fireplace (fig 192).



Dickinson and Titley's redrawing of the sugar crushing mill, Trevithick and Vivian's patent No. 2599 of March 24th 1802.

The London dyehouse engine has some similarities with the Dolcoath boiler; the underside above the fireplace is dished but its overall shape approaches more closely to a brewer's tun boiler with tapering sides below the hemispherical domed top. There is nothing in Farey's drawing to indicate that it had an internal flue

The patent drawings of the boilers for the road coach and the rolling mill depart much more radically from the forms of boiler described above. The boiler shell is now a cast-iron cylinder with one end plate cast integrally. Both boilers include the novel concept of a furnace placed within a flue which passes through the water space. The rolling mill boiler drawing also shows two side flues emerging from the nether end of the furnace tube and returning back through the boiler to pass out through the end plate where they unite into a vertical chimney. (Francis Trevithick had shown an internal flue in his drawing of the Camborne road locomotive, which was destroyed on the 28th December 1801 but this may be a misinterpretation of the information that he had received. There is an equal likelihood that it resembled the form of boiler shown in the sections of the patent covering the rolling mill and the road coach.)

The patent drawings of the boilers of the road coach and the rolling mill are not entirely clear but any ambiguity is resolved by Simon Goodrich who seems to have had direct access to the road coach during its brief career. He made a sketch of the boiler and the cylinder (**fig 193**). Measured off this drawing, the shell is 2 feet 6 inches in diameter and 2 feet 9 inches long. It contains a parallel sided, cylindrical furnace tube, 1 foot 9 inches in diameter, open to its full diameter at the firing end but with a closed end stopping just short of the opposite boiler end plate. A firegrate extends over the lower third of the tube, sloping down towards the

closed end and space is left for ash to accumulate under the grate. At either side of the firetube, at the closed end and at about 45 degrees above the horizontal diameter of the tube, a pair of parallel return tubes connects the farther end of the flue tube with front or firing end of the boiler where the tubes unite into an external chimney.

In Goodrich's drawing the power cylinder is inserted above the furnace flue with its valve chest external to the front plate. A plug cock controls steam admission and exhaust and the exhaust is led away by a pipe that discharges within the chimney. The total internal length of the power cylinder is 3 feet which agrees with the stroke of 2 feet 6 inches as stated by Trevithick.

The London Road Coach dated to late summer 1803, by which time three more puffer type engines were operating in Cornwall. At least one of these has features that can be identified with the patent cylindrical boiler design. Cook's Kitchen Mine was half a mile to the east of Stray Park. According to Francis's correspondent, Hugh Hunter, of the three Cook's Kitchen engines, one wound Bramblam's shaft, another Chapell's shaft and a third was referred to as the Valley Puffer. Henry Clark, who was a boy working at Dolcoath smith's shop at the turn of the century had a particular memory of the Valley machine:

...The engine had a cast iron cylinder boiler about 6 feet in diameter and 10 to 12 feet long with cast iron ends; a wrought iron tube passed through it. The fireplace was at one end and the chimney at the other. The cylinder was let into the boiler and the steam puffed out the side.

Clark states that this engine had a cast-iron cylindrical shell and a wrought iron internal firetube but as the fireplace and the chimney are described as being at opposite ends of the boiler it would seem that there was no U-shaped return tube, possibly considered unnecessary in view of the

length of the boiler. Another of Francis Trevithick's correspondents adds that the Valley engine had a horizontal cylinder fixed in the end of the boiler, the piston rod worked in guides not much above the ground with a connecting rod to a crank on the winding drum. The steam was exhausted directly to atmosphere.

Whilst it is evident that the internal flue boiler was evolving in the first years of the nineteenth century the impression that Farey gives in discussing the dyehouse engine is that the tun boiler was still the accepted form of the Trevithick high-pressure engine in 1804. Circumstantial evidence points to this being the case in the disastrous explosion that took place on the 8th of September 1803 when the boiler of one the first Trevithick engines to be used in London exploded.

The engine had been in use by a contractor who was draining the foundations of a tide mill being built on the banks of the Thames between Greenwich and Woolwich. In John Farey's words the explosion was as violent as the blowing up of a gunpowder mill and was heard for miles around. Only the bottom of the boiler remained on its seating - it had parted with the rest at the level of the chimney. A 5 cwt fragment was found 125 yards away embedded 18

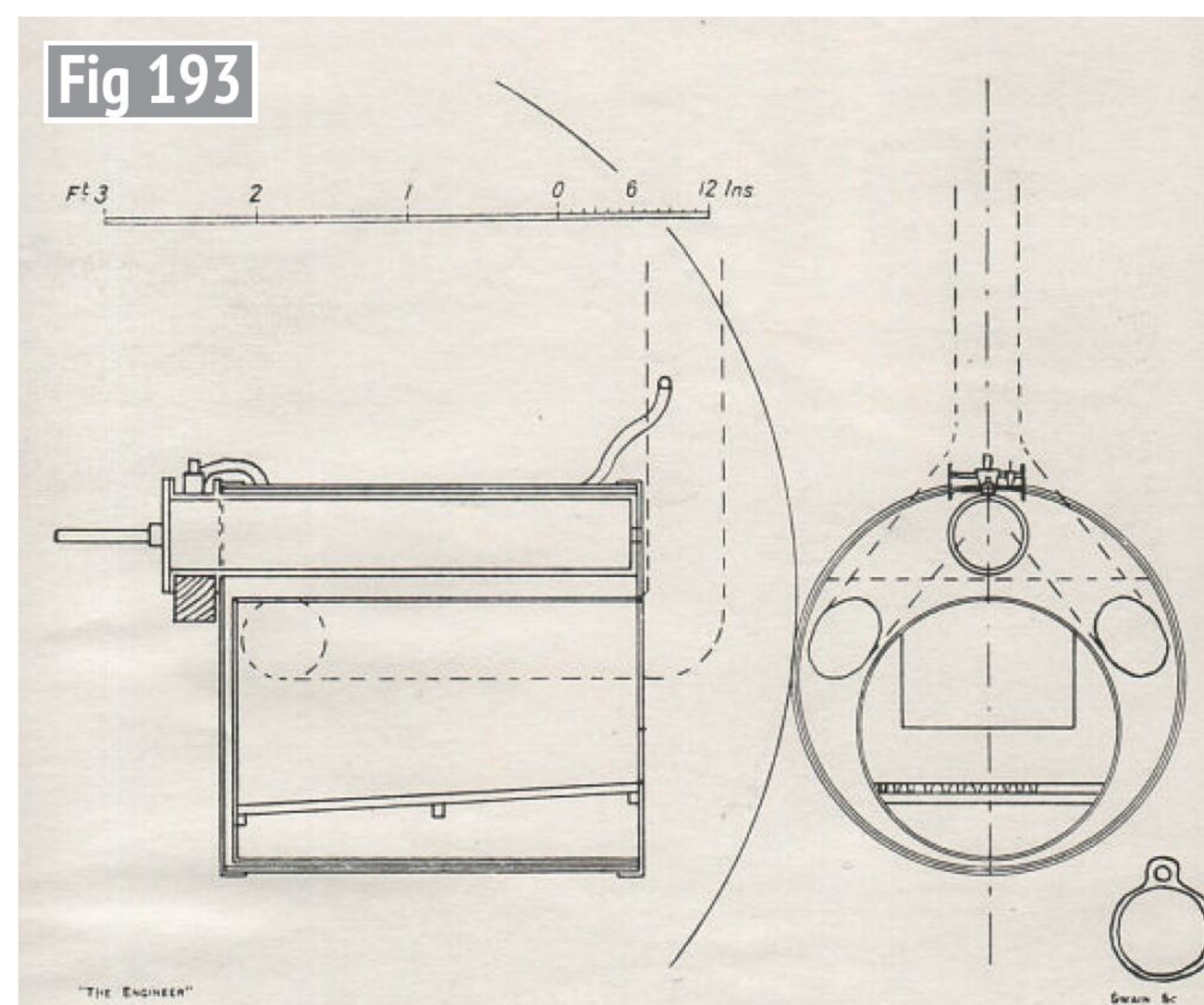
inches in the ground. Three men were killed outright and another three were seriously injured.

Trevithick went to the site shortly after the accident had happened. He describes the engine to Giddy as having a cylinder that was double-acting, 8 inches in diameter, working a bucket pump 18 inches in diameter which lifted water through a head of 21 feet. Details of the boiler were limited to the fact that it was ... *round...*, six feet in diameter with walls between one inch and an inch and a half in thickness. Trevithick adds later ... *I shall never let the fire come in contact again with cast iron* ... all of which suggests that the boiler was of tun type rather than the later cylindrical type containing a wrought iron flue.

The circumstances that led up to explosion were described in slightly different ways by Trevithick and Farey. According to Trevithick's description, in charge of the engine was a ... *boy...* who:

...went off to catch eels in the foundation of the building ...engine was left in charge of one of the labourers, he saw the engine working faster than usual, stopped it without taking off the spanner which fastened down the steam lever... a short time after it burst...

Farey says:
...the temporary engine was managed by a boy who is said



Simon Goodrich's drawing of the boiler and cylinder of the road coach.

to have confined the safety-valve by placing a prop of wood upon it and jamming (sic) it under a beam in the roof. He left the engine working in this state and went away. Another workman afterwards stopped the engine and the steam, having no escape, burst open the boiler very soon afterwards.

The explosion caused considerable consternation and the old enemy, James Watt junior, was quick to pile in. It had been reported to Trevithick that:

...Boulton and Watt have sent a letter to a gentleman of this place who is about to erect one of those engines saying they knew of the effects of strong steam long since and should have erected them but knew the risk was too great to be left to careless gentlemen ...that it (high pressure steam) was an invention of Mr. Watt and the patent (Trevithick's) was not worth anything...

When told that Trevithick was working his engines with 40 psi Watt senior had drily commented:

...I would work my engine with steam of 100 lbs to the inch but I would not be the engineman...

Trevithick, although evangelical on behalf of the future of high pressure steam, was as not as irresponsible in his approach as Watt's comments suggest. He made a practice of proof testing his boilers. Farey wrote that:

The strength of the (Greenwich) boiler was proved previously to setting the engine to work for the first time by forcibly injecting cold water into the boiler with a small forcing pump until it escaped from the safety valve which had a heavy extra load applied upon it for the time in order to subject the boiler to a more severe internal pressure than the steam could ever occasion when in use.

Trevithick had also sought Giddy's advice. Giddy would be aware of the most up-to-date research on the subject although whether he agreed with Trevithick that the boiler should have been capable of sustaining 500 p.s.i. is an interesting point.

Notably, neither Farey nor the other, often hostile, commentators made any mention of cast-iron as a factor in the explosion. Today cast iron would be condemned out-of-hand for such a pressure vessel but in 1800 it was a new material with unexplored potential. The fashion for mill structures with cast-iron frames have already been touched upon earlier in this series but the most spectacular gesture of confidence was Telford's proposal to replace the old London Bridge over the Thames with a 600 foot single span, cast-iron arch in 1800.

In fact, Telford was venturing into almost completely uncharted waters for there was no established body of knowledge on the strength of materials to support his design. Banks' tests at the Shelf Ironworks had produced some limited results and William Reynolds at Ketley in April 1801 had crushed a 'small' cube of cast iron which failed at 64 tons/sq. in. Further tests by Reynolds on a column 1 inch square and 36 inches long had shown failure at 5 tons per square inch in buckling. This fell far short of an adequate body of scientific theory. Until the eighteen-twenties when Eaton Hodgkinson and William Fairbairn carried out systematic investigations there were no reliable figures for ultimate tensile or compressive strength of cast iron and the important distinction between these stresses as they affected cast iron was unknown. Of fundamental consequence for boilers, hoop and axial stress would not begin to be explored for another forty years.

Enthusiasm for cast iron took a century to erode to the point where today it is frequently regarded as the work of the devil by structural engineers. Whilst the argument for this extreme view is not difficult to see, a brief examination of the performance of a cast-iron shell boiler in the light of modern theory is perhaps worthwhile. The lowest quality of cast iron currently recognised is grade

150 which should be capable of sustaining tensile loads in excess of 16,000 lbs per square inch. A boiler of 4 feet diameter with a shell thickness of one inch carrying 50 p.s.i. would generate a hoop stress of 1,162.5 p.s.i., a factor of safety ignorance?) of about 13.5. (Farey in Volume II of the *Treatise* p. 29, gives a calculation for the strength of a cast-iron boiler 4 feet in diameter with a shell thickness of 1½ inches. He uses a figure of 20,000 p.s.i as the ultimate tensile strength and calculates the bursting pressure as 1,250 p.s.i by dividing 40,000 by 32, a safety factor of 25. The publication date of the *Treatise* was 1827 by which time a number of investigations into the strength of cast iron had been undertaken but he does not give a source or date for his data. Whether this information was available to Trevithick and Giddy twenty five years earlier is unknown. This however makes the difficult to verify assumption that the iron is free from stress raisers such as flanges, cold shuts, blow holes, slag inclusions and brittle fracture. It might however be pointed out that cast-iron cylinders for the Cornish steam engine as it developed in the years after Trevithick often attained 10 feet in diameter with walls one inch thick. Failure seems to have been rare even though they frequently held steam at 50 p.s.i and on occasions higher although an older cylinder exploded in South Wales in 1806 when it was converted to take high pressure steam (ref 326).

In fact the Greenwich boiler had failed not because of the endemic unsuitability of cast-iron for steam boilers but because of abuse. It emerged that on the Sunday before the explosion the boiler had been allowed to boil dry and the plates were heated to red-hot, burning out all of the joints. The extent to which this had weakened the boiler is unknown but the immediate cause of the explosion was the rise in pressure that occurred

when the safety valve was obstructed. The practice of loading down the safety valve to obtain increased power was almost universal and tacitly accepted. Whilst the engine was running it was often possible to avoid any dire consequences but once the cylinder ceased to draw steam from the boiler the pressure increased and if the load on the valve was not removed catastrophe was inevitable. If Farey is correct, a prop jammed between the roof beam and the safety valve lifts the youth's malfeasance to heroic proportions. It is however notable that none of the commentators saw fit to question the wisdom of employing a juvenile to look after such a potentially lethal piece of machinery.

●To be continued.

REFERENCES

Ref 325	Life... Vol II, p. 119
Ref 326	Life... Vol II, p. 150

NEXT TIME

Recovery from disaster.

We Visit the Llanelli & District Model Engineers

John Arrowsmith

visits a thriving club by the beach in South Wales.



The visit to this well established club in South Wales took place during their Spring Rally in March so, in addition to normal club activities, there was a bustling atmosphere both in the club and around the grounds (**photo 1**). The weather was generally good although quite a cold wind kept everyone on their toes.

The club itself has been in existence for 50 years, occupying various sites around Llanelli. The present site was acquired in the early 1980s when the Local Authority decided to develop the old munitions factory site into a recreational Country Park area. A member of the club at the time made some enquiries about whether a model railway would be a good additional attraction and the Authority agreed, so about 1984/5 the hard work of building began.

The first track to be built was the raised 3½ and 5 inch gauge circuit and that continued to be the only operational track until 2005 when the 7¼ inch gauge ground level track was started. An interesting discovery was made, during the building of the steaming bays for the new track, when they found they were building in the old boating lake bowl which made the digging a lot easier. The track itself is about two-thirds of a mile on a double circuit, but this does include a rise of about 2 metres from the station area to Briary Hill Halt (**photo 2**) on the far side. This section of track has a 1:45/50 gradient which really tests inexperienced drivers! The original raised track had been built following the contours of the ground but



The impressive departure end of the main station with large signal gantry and numerous track crossings.



The picturesque setting of Briary Hill Halt, almost at the top of the main track incline.

when the ground level track was built it produced some quite different track heights. For example, as the main ground level track approaches the station there are three different levels which makes for some interesting running. The raised track operates in an anti-clockwise direction.

All the tracks have been laid to an excellent standard which enables some hearty running. The ground level steaming bays make use of the depth

of the old boating lake by having the tracks at ground level, but the foot access is recessed below the tracks. They are served by a large turntable which has a good, wide access bridge from the movable unloading table. Not only can this table move up and down to suit vehicle heights but it can rotate over a small quadrant, again to facilitate unloading (**photos 3 and 4**). The area then has a track which leads down to the main



The access line from the turntable to the main station.



The main ground level steaming bays with good access all round.



An imposing GWR style signal box now used for other purposes.



The attractive front of the clubhouse entrance.



Inside the raised track storage shed.

station area and has additional sidings to accommodate both locomotives and stock between running turns. Adjacent to the steaming bays is a large, brick built structure which used to be their operational signal box and is named in honour of Richard Sourbutts. This typical GWR outline building is now used as a compressor house whilst still retaining all the old signalling equipment (**photo 5**).

To support this, the club have built a very useful clubhouse (**photo 6**) with a good sized kitchen area and quite a large meeting room so the club can cater for a large number of members and visitors during busy open days. A large storage shed (**photo 7**) is adjacent and serves the raised track system. There is a traverser across the front of the shed to connect to the



A good length access traverser outside the main storage shed.



The short tunnel under the raised track for ground level access from the unloading area.



The access track to the raised track steaming bays with the main line access track alongside.



A view of the main raised track movable bridge which gives access to the clubhouse and raised track.



The raised track swing bridge, main line and sidings in front of the clubhouse.

steaming bays (**photo 8**). They have an interesting connection from the main unloading facility next to the park road. The track to the raised track steaming bay is at a right angle to the main ground level tracks with crossings at each track; it then continues alongside the clubhouse by passing under the

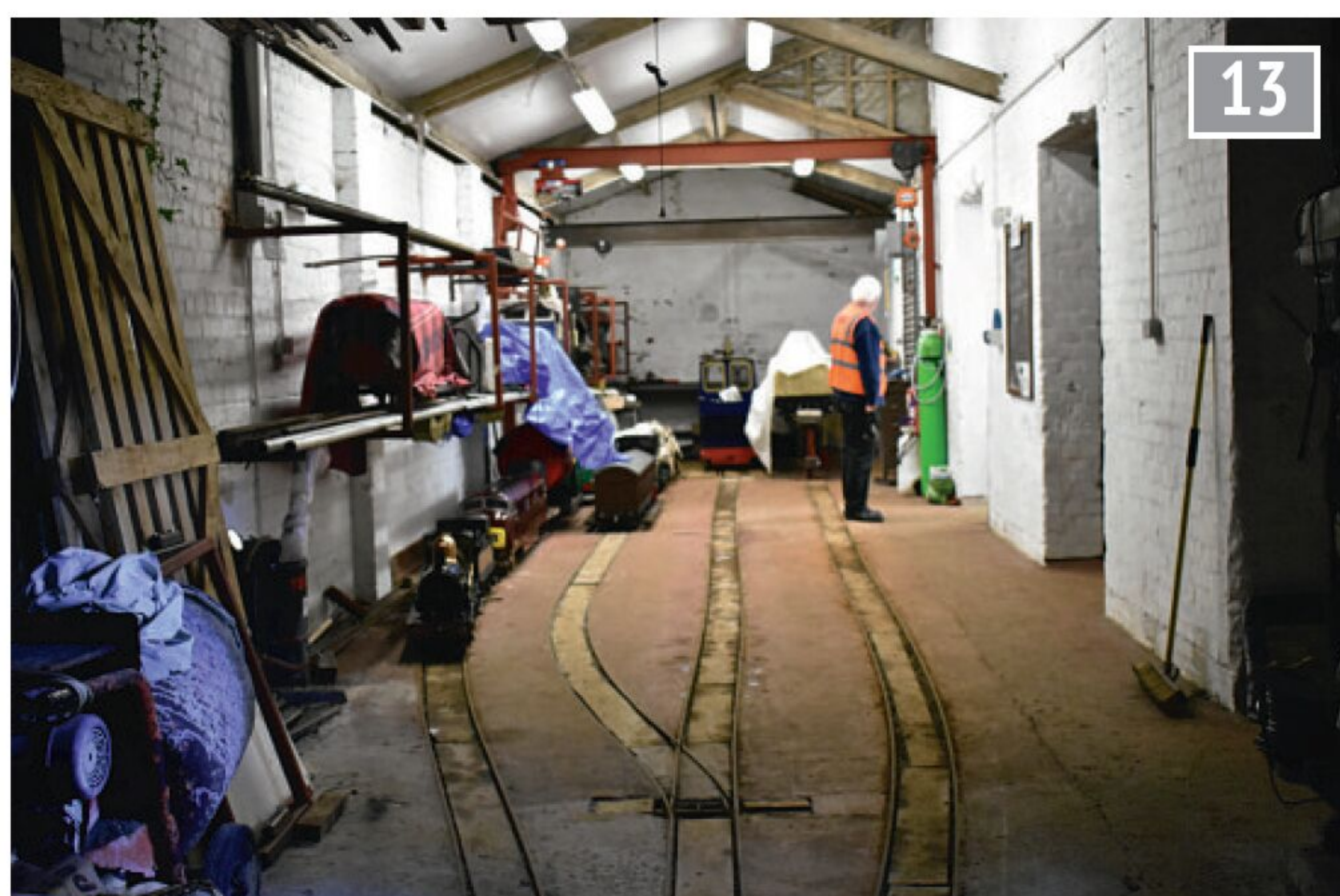
raised track (**photo 9**). It looks most unusual but it works very well (**photo 10**). With the main raised track circuit passing in front of the clubhouse patio and picnic area, a large swing bridge gives access to the area (**photo 11**). This is obviously closed during running with step access over the track during

these operations (**photo 12**).

The membership of the club is around 70 with four good young engineers and a man of the cloth, the Reverend Jim Flanagan who is also the club's secretary and chaplain - not many clubs have one of those but he, along with all the others, takes an active role on

operating days.

The Country Park has a number of other events during the year and the club are usually involved. They have a good working relationship with the park authorities and this enables the club members to enjoy this high quality facility within the park.



Plenty of storage and light in the building.



Chris Wilson's superb Armstrong/Gooch 4-4-0 at rest in the storage shed.



The club's Class 42 Warship diesel on charge in the storage shed.



Another section of the workshop with the usual Myford and showing the new access stairs to the upper floor.



The large Warco lathe and Milling machine.

As this ground was a former munitions factory, one of the redundant buildings has been acquired for use as a workshop and locomotive storage shed (**photos 13, 14 and 15**). It is also connected to the main tracks via a spur across one of the park roads.

Being a former munitions building it is substantially built and the club have been able to

increase the space available to them by adding an upper floor within the confines of the building. There are a number of rooms which the club use and this means they have a comprehensive workshop with a range of machines and tools. In one workshop there is the usual Myford lathe and a bench together with a useful bandsaw. This

shop also includes one of the new staircases which gives access to the new upper floor (**photo 16**). In another practical working area, a large Warco lathe is part of the workshop along with a large milling machine (**photo 17**). All in all the club has a really first class workshop and storage facility available to its members. This facility, with its track access, is regularly pressed into service as the club operate every weekend, from March to September for public running and on a Wednesday they meet for the usual site maintenance where there's always the option of a steam up if members want it.

I hope my notes have provided a flavour of the atmosphere at the club which gives everyone a warm Welsh welcome and allows visiting drivers the chance to drive on an excellent track - one which will test the most

experienced while, at the same time, ensuring that you enjoy yourself.

I offer my sincere thanks to Rob Rayner and Jim Flanagan and all the other members I met and talked with, for providing lots of information and help with good humour during my visit. Gentlemen, you have a fine club and great facilities which provide a good day out for both locals and visitors - and in a wonderful location! Where else can you take a short, five minute stroll from a great running track to end up on a fantastic beach where you can breathe a good lungful of fresh sea air ... and then stroll back to a completely different world of steam and hot oil that we all love, along with the good company of fellow model engineers? Wonderful! Long may it continue to be so.

ME

A Live Steam Hudson Locomotive in '0' Gauge

Joe Rothwell brings an abandoned '0' gauge chassis to life.

The Grand Master 'LBSC' was the first, of course, to model a live steam Hudson in '0' scale with the engine debuting in a 1933 issue of *Model Engineer* magazine. Drawings and castings are still available today and these are what rarely show up on eBay and, when they do, they are usually partially assembled with questionable quality. The other '0' scale Hudson offering is from 'Little Engines' (LE, a US company, established years after the above LBSC engine) which includes drawings and a few castings, and, just like the LBSC 'kit', this also shows up rarely on eBay.

I have yet to see a finished model of either offering on eBay, though I have seen a couple on private-type auction sites. So, it was with great surprise when I saw a chassis and boiler encompassed with a brass engine shell on eBay. The advertisement stated that the chassis needed 'timing' and the boiler needed 'plumbing'. The brass engine shell bore no resemblance to our beloved Hudson but the chassis had the six large drive wheels, however both leading and trailing trucks were missing.

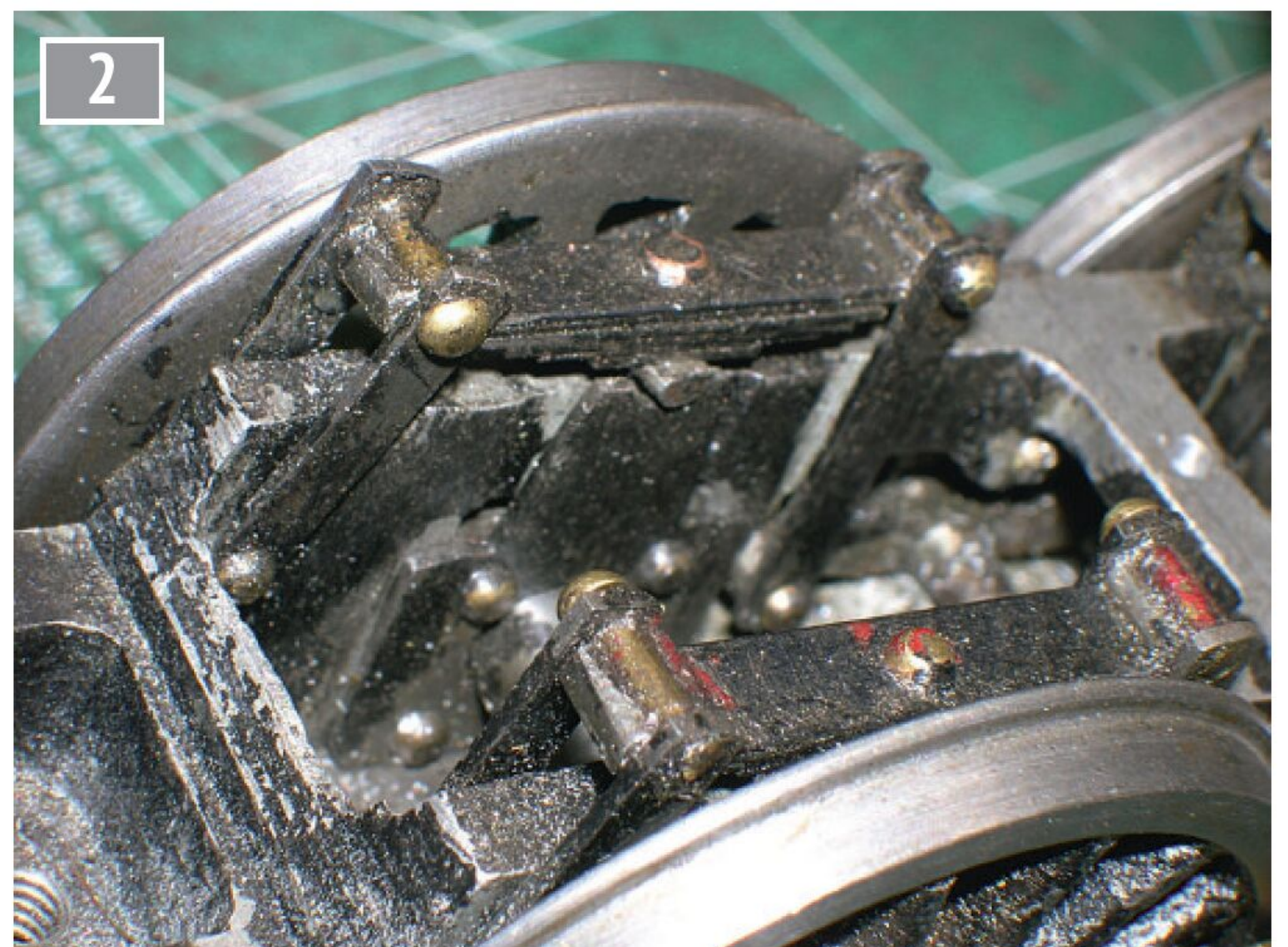
I made an offer and it was accepted. On arrival, it was inspected along with a bag of parts which included the front and rear trucks, cow catcher and air compressors among other things, all from various engines, but none of it yet fitted



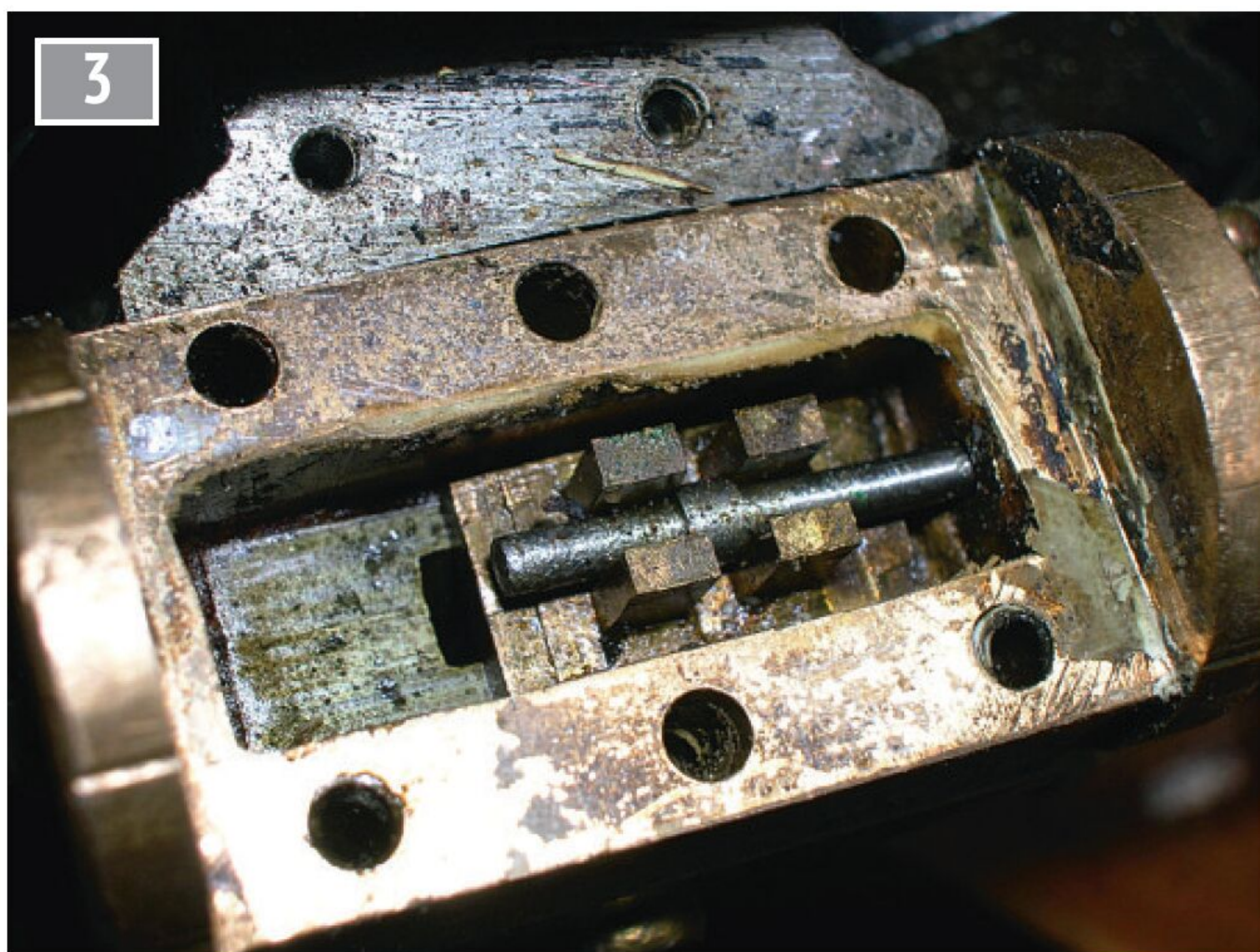
The chassis as received. The radius rods have been removed, awaiting installation of the slightly longer rods. The Williams brass shell is in the background.

to the chassis. The boiler was a not specifically designed to fit this chassis and the brass engine shell was worse than the pictures, so these items were set aside. The chassis was the '0' scale Hudson from LE but was cast in aluminum and not the bronze chassis

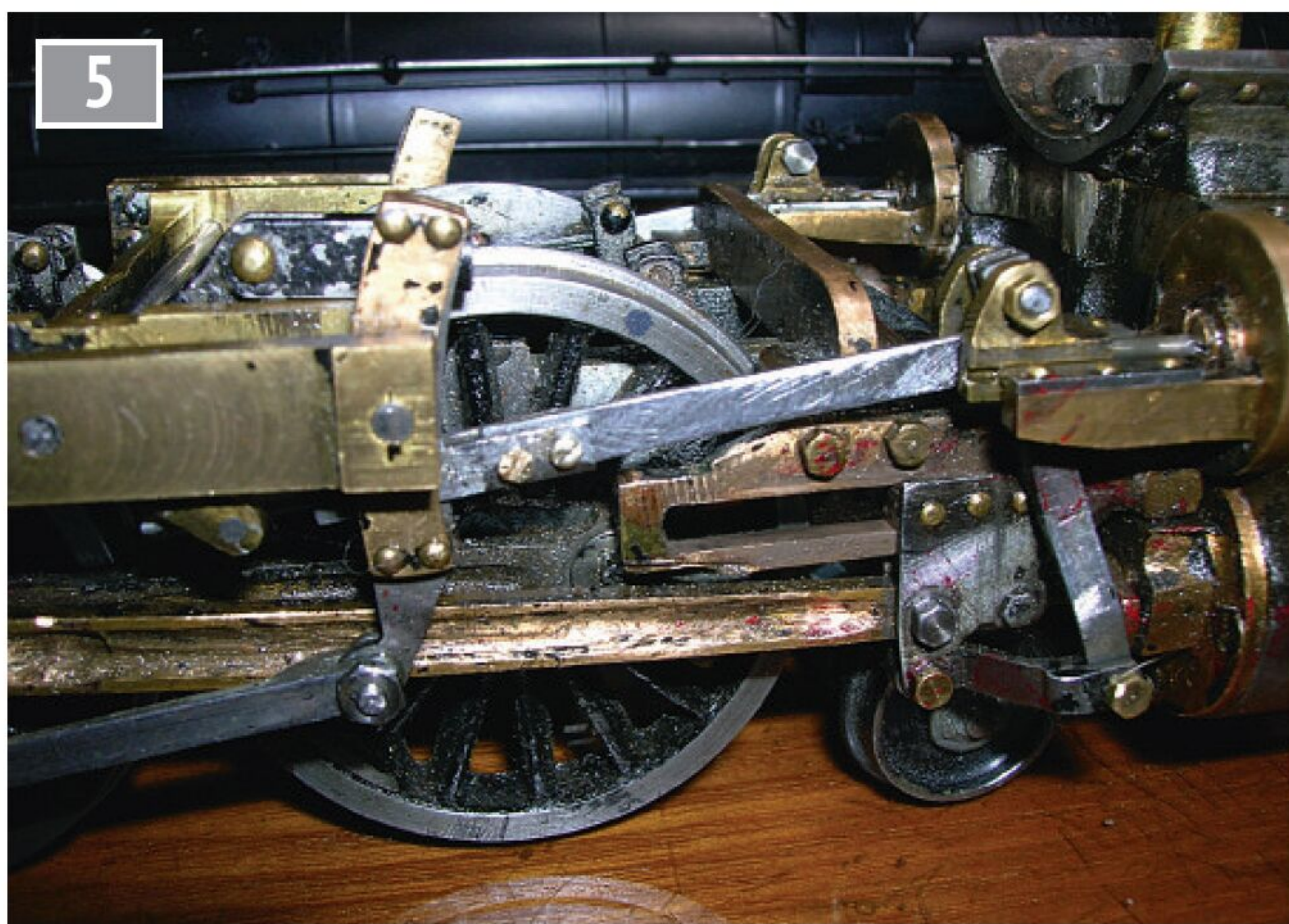
frame that LE offers, which is strange (**photo 1**). One note worth mentioning is the operational equalizing-beam suspension on this chassis, mimicking its big brother (**photo 2**). All the Walschaerts-type gear was attached and the cylinder-chest casting and



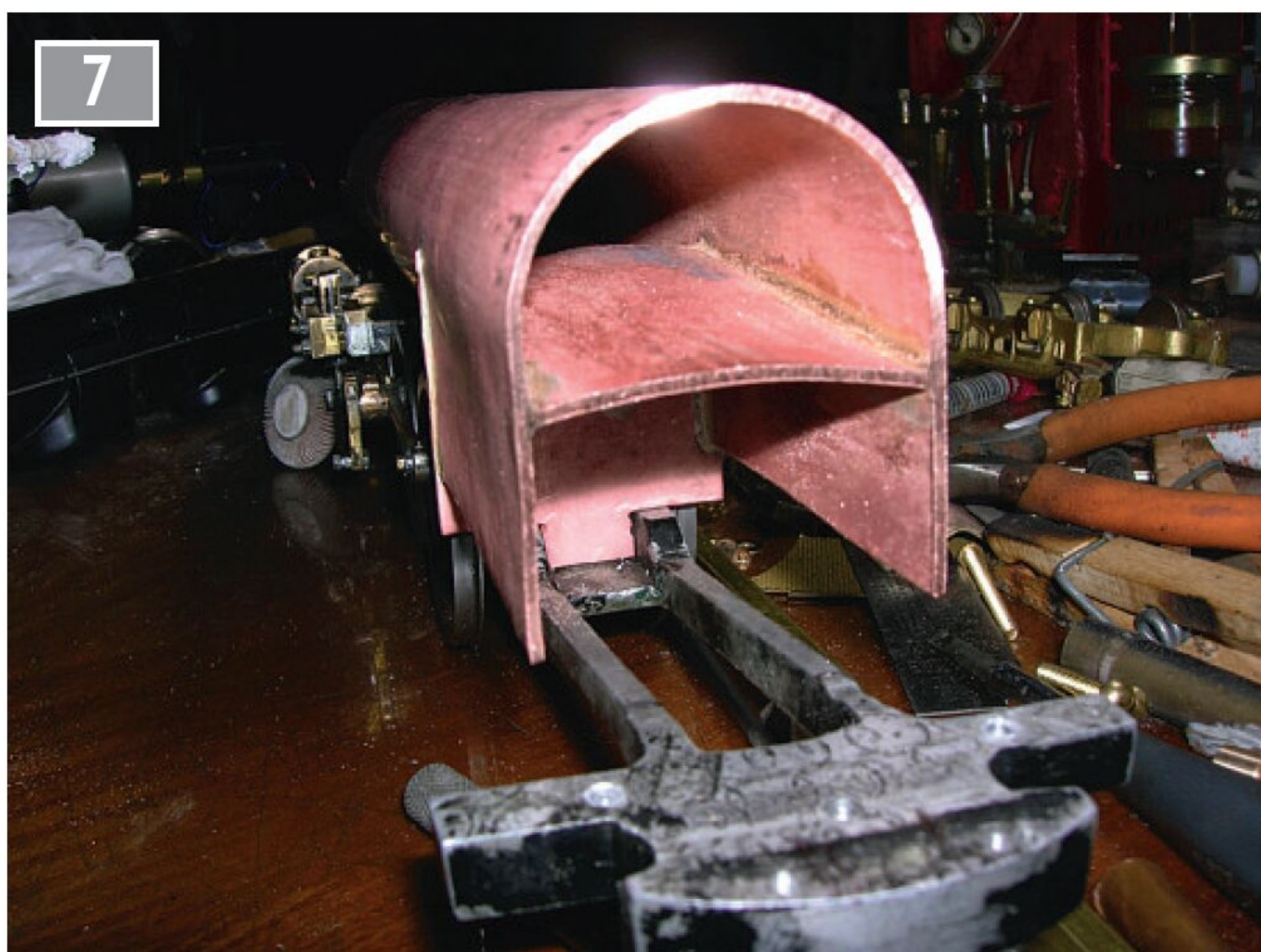
Operational equalizing beam suspension at this scale is impressive. Aluminum cast frame is evident here too.



Slide valve revealing the issue with ports.



Radius rod on the right side fastened with watch screws

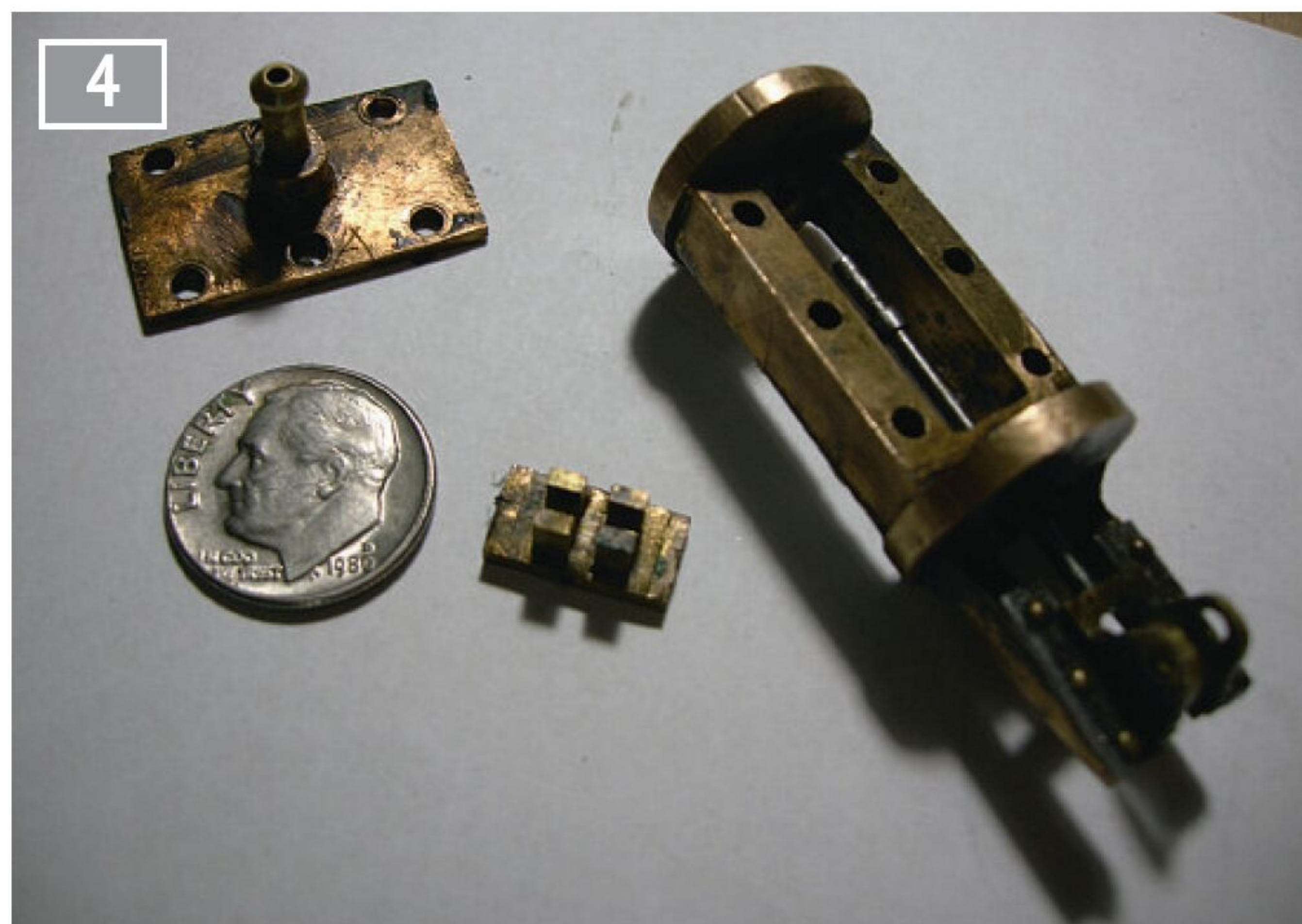


The fire box has dry legs on all sides. Instead of stays, I curved crown sheet. My idea was that the size is so small, stays wouldn't make that much of a difference.

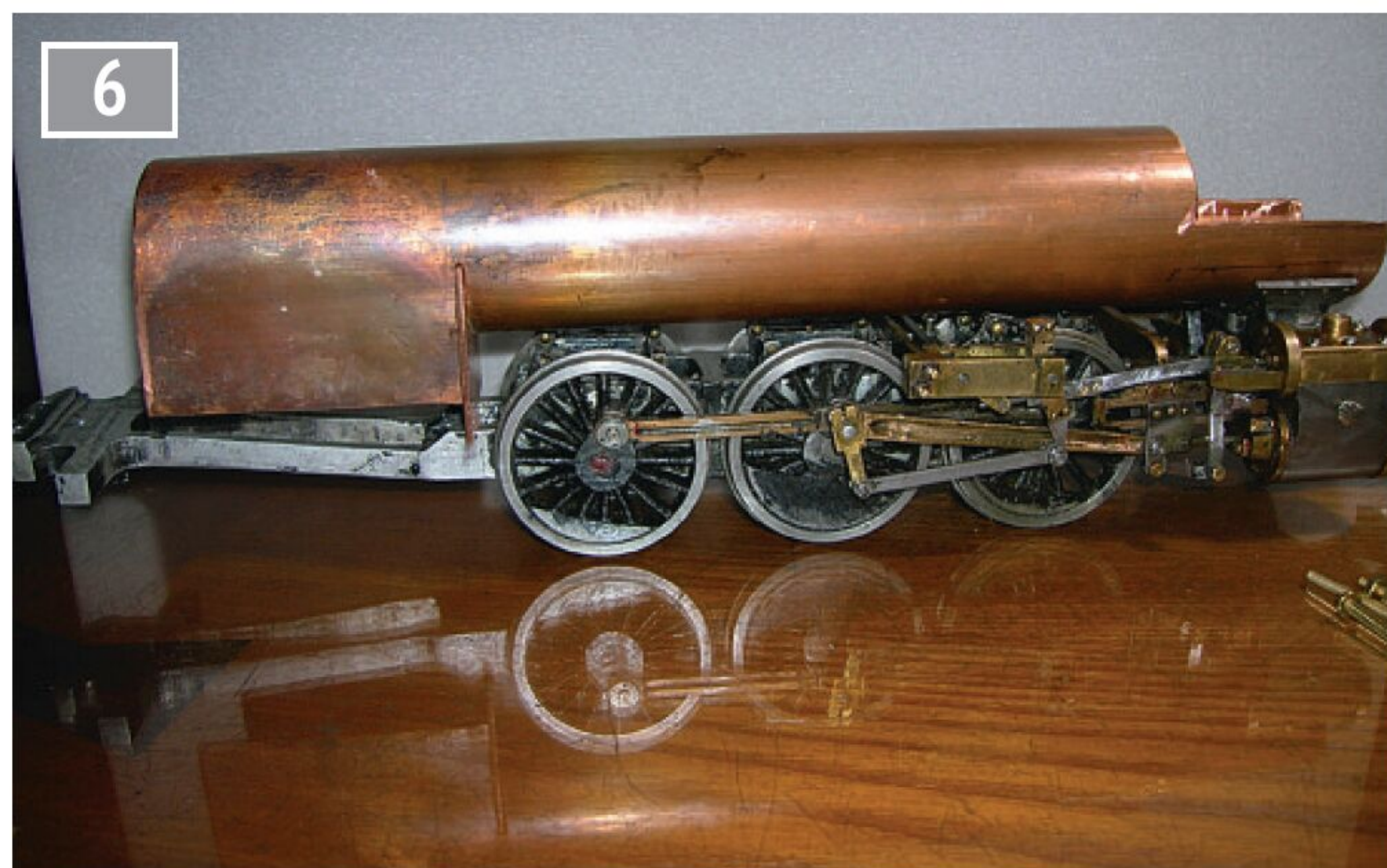
valve-chest castings were also from LE and machined to their specifications.

A set of LE drawings would be nice but I opted to wing it, mainly because a brass body

shell from a 'Williams' electric '0' gauge Hudson was going to be used, which wouldn't fit the drawing anyway. The Williams brass shell is really nice and has a beautiful black paint



Just for an idea how tiny we're working here... dime scale!
(The dime is about 18mm diameter dear UK reader!-Ed)



The first boiler being test fitted. Note the smokebox lower half that is left on. The top half of the smokebox will be the brass Hudson shell.

finish but most of the panel joints (inside the shell) had to be re-soldered using a high-temp soft solder. The solder used by the Williams factory is a too low-temp type and not meant for live steam. The paint held up fine after soldering was completed.

But first - timing the chassis took centre stage and so it was plumbed for compressed air. The wheels would not turn with air applied and no amount of adjusting the eccentric crank helped. The slide-valve chest covers were removed and the drive wheels turned by hand, revealing the issue. The slide-valves were not un-covering the rear ports and not covering the forward ports in their back-and-forth motion (**photos 3 and 4**).

A new set of radius rods was made 3/64ths of an inch longer, which seems almost negligible, but made all the difference in the world.

Removal of the original radius rods was a bit dicey as they were riveted on one end and then backed up with a little solder. The new radius rods were tapped with a jewelers-tap and very tiny watch-screws now fasten the works together and can be quickly disassembled, if need be (**photo 5**). The chassis demonstrated good power when compressed air was applied, so a boiler can now be matched to the chassis and the brass Hudson shell.

A 1 5/8 inch outside diameter copper pipe makes up the boiler, which is the inside diameter of the Williams smokebox, and therein lies serendipity (**photo 6**). The boiler is fired with a ceramic burner (coal is also an option) that sits in a firebox with fire tubes piped to the smokebox, much like its full-size brethren (**photos 7 and 8**). The safety valve exits the shell where the



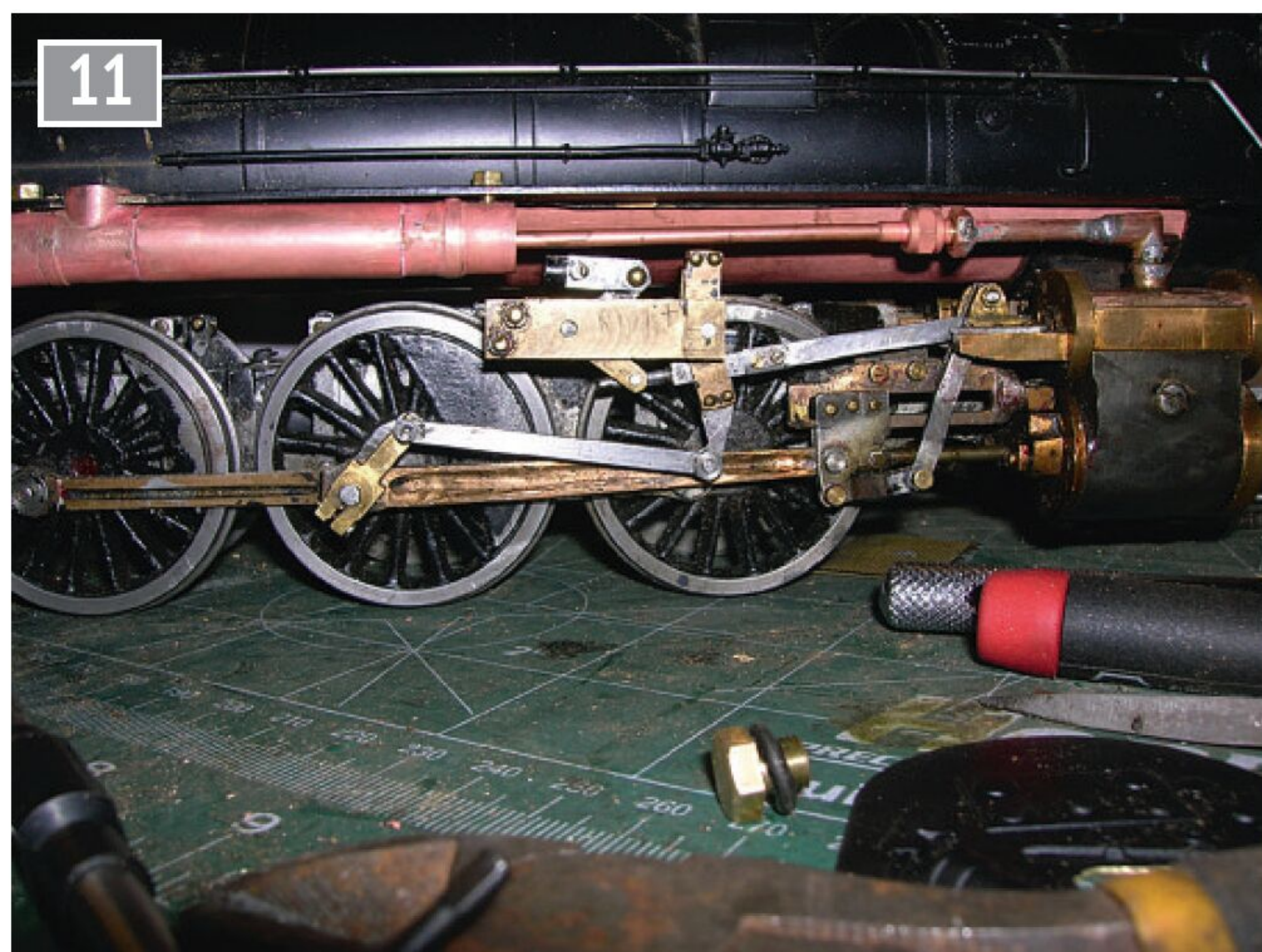
Test fitting the boiler to frame and firebox items which include the throat plate and ceramic burner.



The boiler is insulated with cork in the wet areas and ceramic blanket around the firebox area.



Oil tanks turned on a mini lathe and soft soldered.



Oil tank fastened to cat walk and plumbed to the top of slide valve chest.

real ones do on the full-size engine and the Goodall valve exits the sand dome through a hole that's drilled in the centre. The throttle is an internal type and exits in the smokebox through the front tube-plate (**photo 9**).

Safety-Silv 56 was my choice of solder for the boiler along with JM Easy-flo for the flux. The torch and tips are from Sievert and worth every penny. Oil tanks were turned by using the solid-brass scale air tanks that were on the William's shell, much like the G scale 'Aster' Hudson (**photos 10 and 11**). No pressure gauge or water glass is used and would be hard to see anyway because of how tight the tender cosies up to the cab.

The first test fire was performed and the results were

dismal. A 'stack blower' was used to speed up the firing and when pressure was achieved and the throttle opened up, it ran great. When the stack blower was removed, pressure dropped within 15-20 seconds and all the tricks that were tried to mitigate this were of no avail. Simply put, the fire tubes were too narrow and choked off the draft, among other things. Another new boiler was needed...rats...

Tempering the disappointment of a failed boiler was that it did run well with the stack blower, so I was close. A tip from a fellow steamer led to an online model boiler-calculator (John Baguley model engineering pages - www.modeng.johnbaguley.info) where you plug in the numerical values of your



Water jet cut parts are worth every penny and made the second boiler go together faster and much more accurately.

design and out pops how well the design might work. First, the failed boiler parameters were plugged in and instantly got the results I saw the boiler suffer with, so confidence in the calculator was high. Armed with this calculator and a slice of humble crow-pie, a second new boiler was built.

I decided to use the services

of a water-jet company and sent them drawings for this second boiler and what jewels did I get back (**photo 12**)! The first boiler had three $\frac{1}{4}$ inch fire-tubes and two $\frac{3}{16}$ inch fire-tubes and the firebox had 'dry legs' on all four sides, all the parts cut by hand (**photo 13**). The new boiler has three $\frac{3}{8}$ inch tubes and two $\frac{1}{4}$ inch



13 New boiler with wet legs. The slanted sides take advantage of the ceramic burner's radiant heating characteristics.



15 The boiler awaiting safety and Goodall bushings to be turned, threaded and soldered on.

tubes and the firebox has 'wet legs' on three sides, with the key boiler parts cut by water-jet (**photos 14 and 15**). A second ceramic burner was made due to the wet legs making the fire-grate area slightly smaller. Both boilers are identical on the outside dimensions and it's the internal dimensions that make all the difference. Now it fires up quickly, *sans* stack blower, and maintains pressure with ease, but requires a little more attention to water level during a run (**photo 16**).

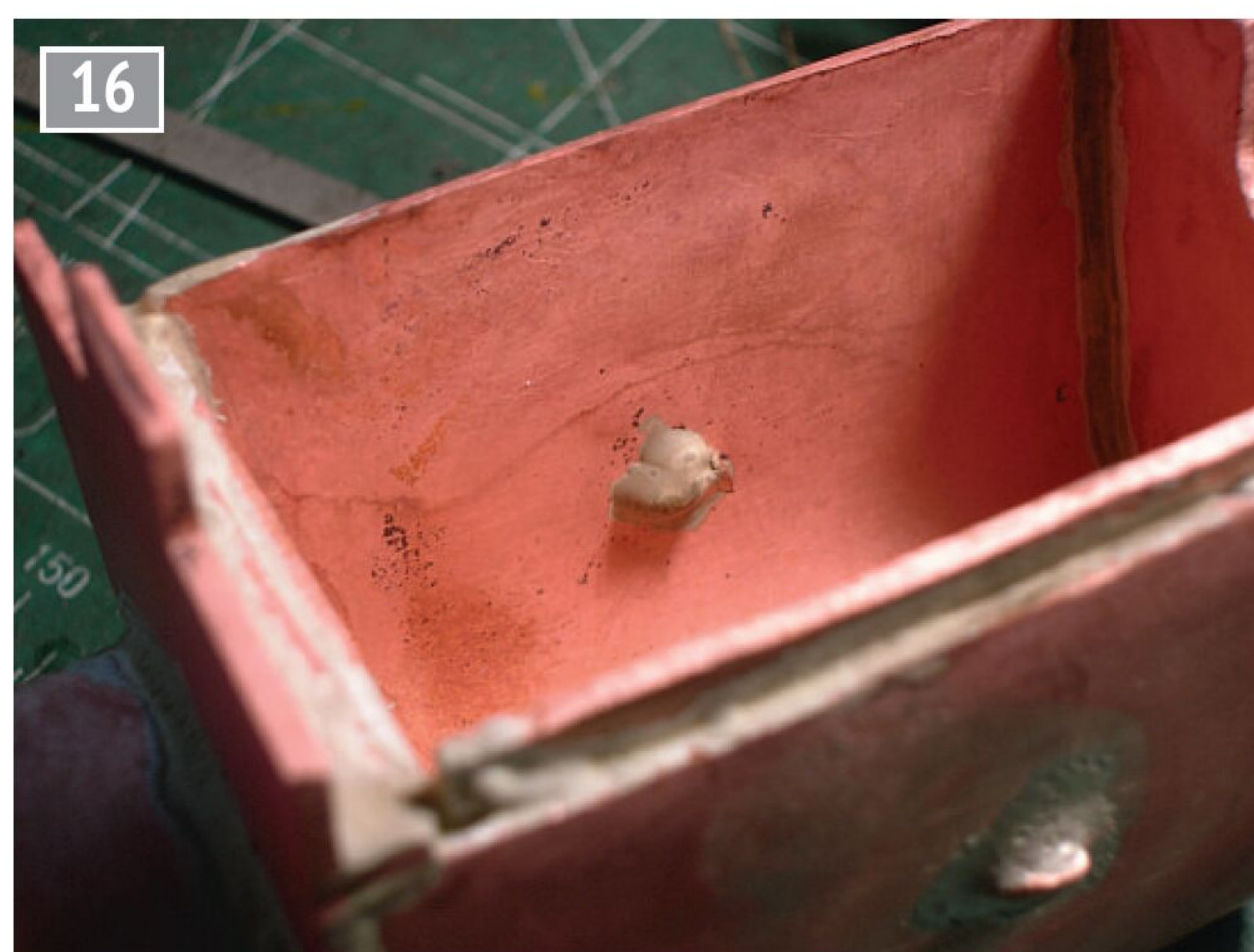
The frame ends were trimmed to bring it into scale

with the Williams shell before the detail parts were attached (**photo 17**). Fitting the trailing truck went through a couple of revisions before becoming practical and the leading truck was even trickier. It's the massive cylinder chest; it's difficult to get around it. I ended up making a new leading truck with water-jet cut parts and I'm happy with the results.

After running it a bit, water started to gush out of both the piston rod glands and the slide-valve rod glands during the run, enough so that a trout 'fingerling' could swim



14 Though a bit more complex, it went together so easily it was actually fun.



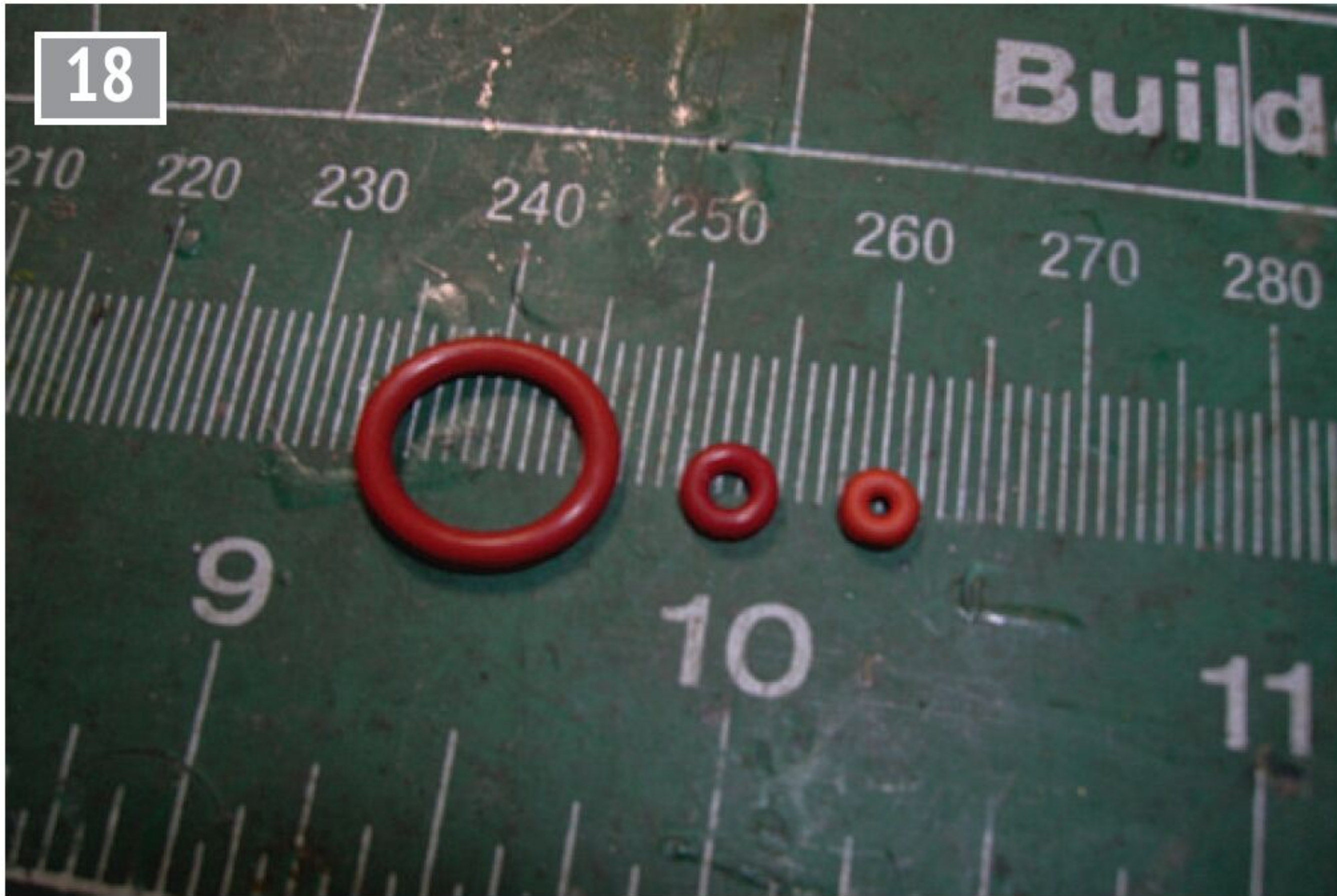
16 A couple of heavy copper wire stays were soldered into sides of the firebox.



17 It's nice to fit these parts... you're on the home stretch! The truck in the photograph is the original one that came with the chassis. It has been replaced with my design, not pictured.

alongside and keep pace. The packing material was the old-fashioned graphite string and was not sealing anymore. I found no graphite string here in the USA but there were several vendors in the UK. I ended up

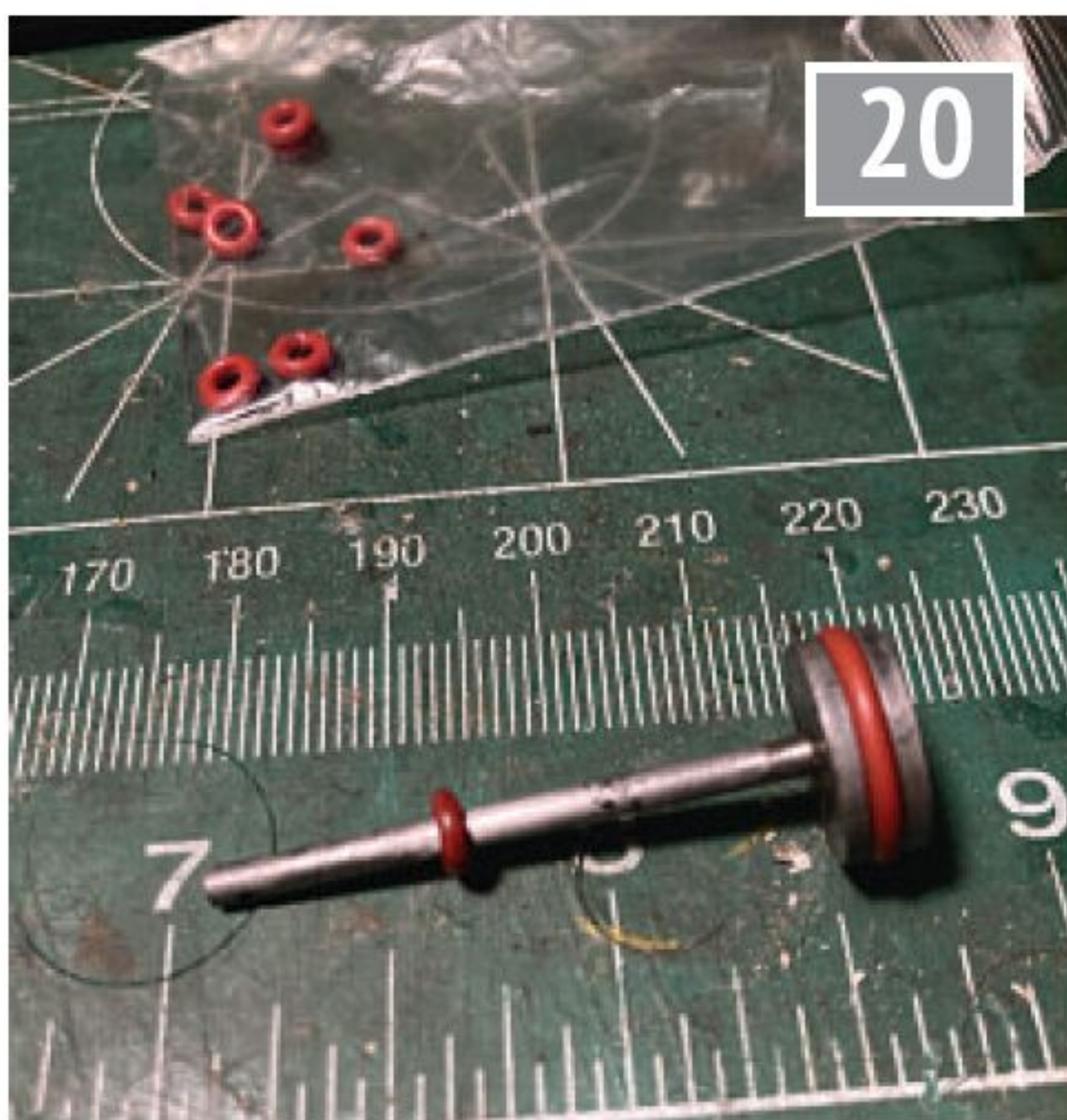
trying red silicone 'O'-rings and have had the 'good luck' so far (**photo 18**). One advantage is how easy they are to install and another is how tight they seal without much friction. Even the pistons got a set of 'O'-rings



Three sizes of 'O'-rings completed the build... so far...



'O'-ring for the slide.



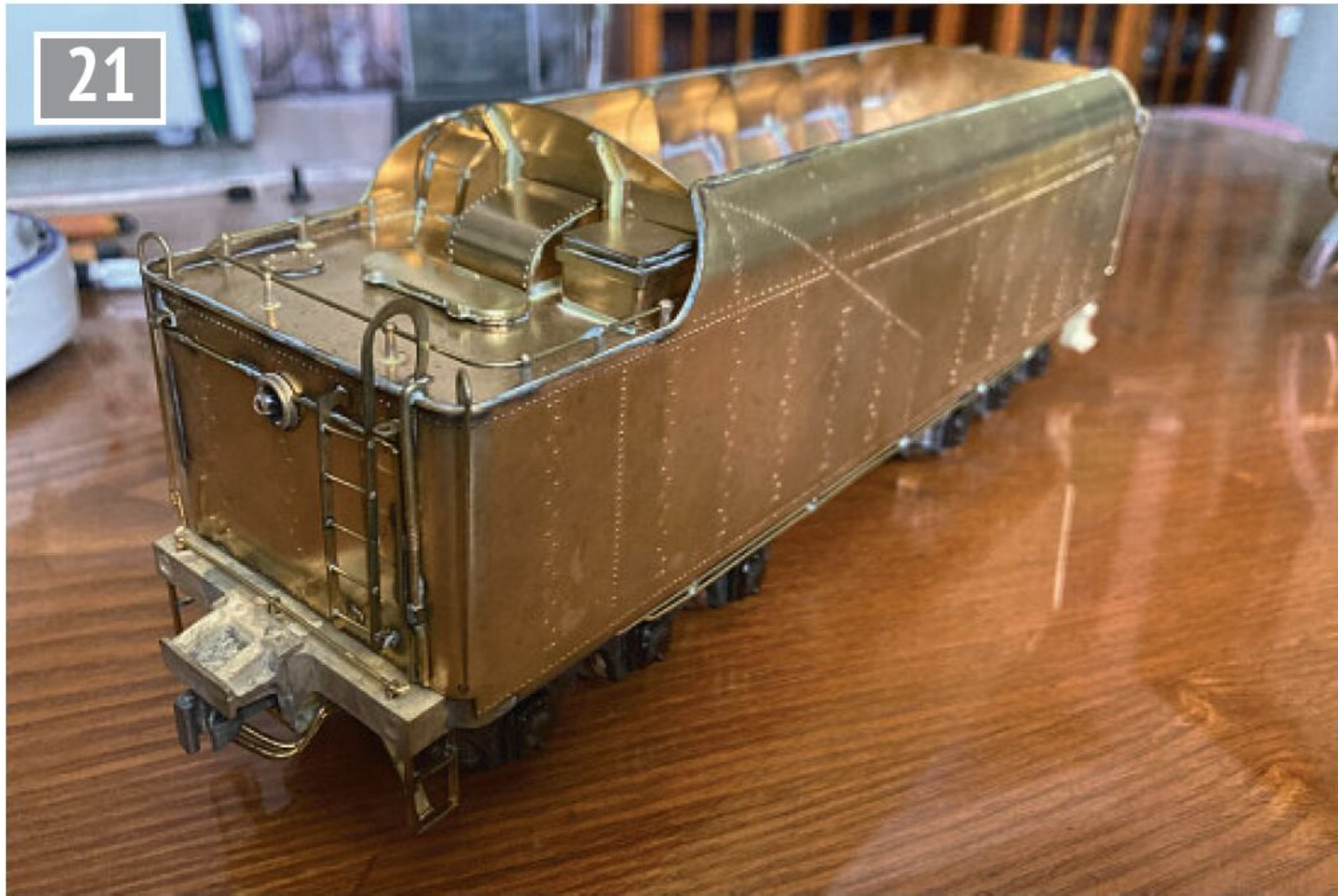
If an 'O'-rings fails for whatever reason, it can still be replaced with graphite string.

along with the piston rods (photos 19 and 20). Power was increased by half again.

A future up-grade is planned due to the corrosion build-up with the iron cylinder chest. After a day's use, the cylinder walls and port faces start to rust and pit. I polish these surfaces to mirror and this delays the onslaught but, all too quickly, a major overhaul is needed. The cylinders are going to get a brass sleeve and the port faces will be chrome-plated. This should alleviate the problem somewhat.

The tender is a one-piece aluminum casting from a long defunct company called 'Scale-Models, Inc.'. It is rather crude, though it is correct in shape and size and has the proper six-wheel trucks. It also has a cavernous interior that holds a 'Regner' butane tank which is piped over to the Hudson firebox. I recently acquired a gorgeous 'Max Gray' brass tender that is being modified to carry the Regner tank and will replace the aluminum tender (photo 21). It really complements the engine and will complete the build when done.

I was able to contact the builder of the chassis, which is almost un-heard of when purchasing items off eBay. His name is Tony Boccaccio, MIT graduate and retired NASA Design Conceptual



Stunning 'Max Gray' Hudson tender...

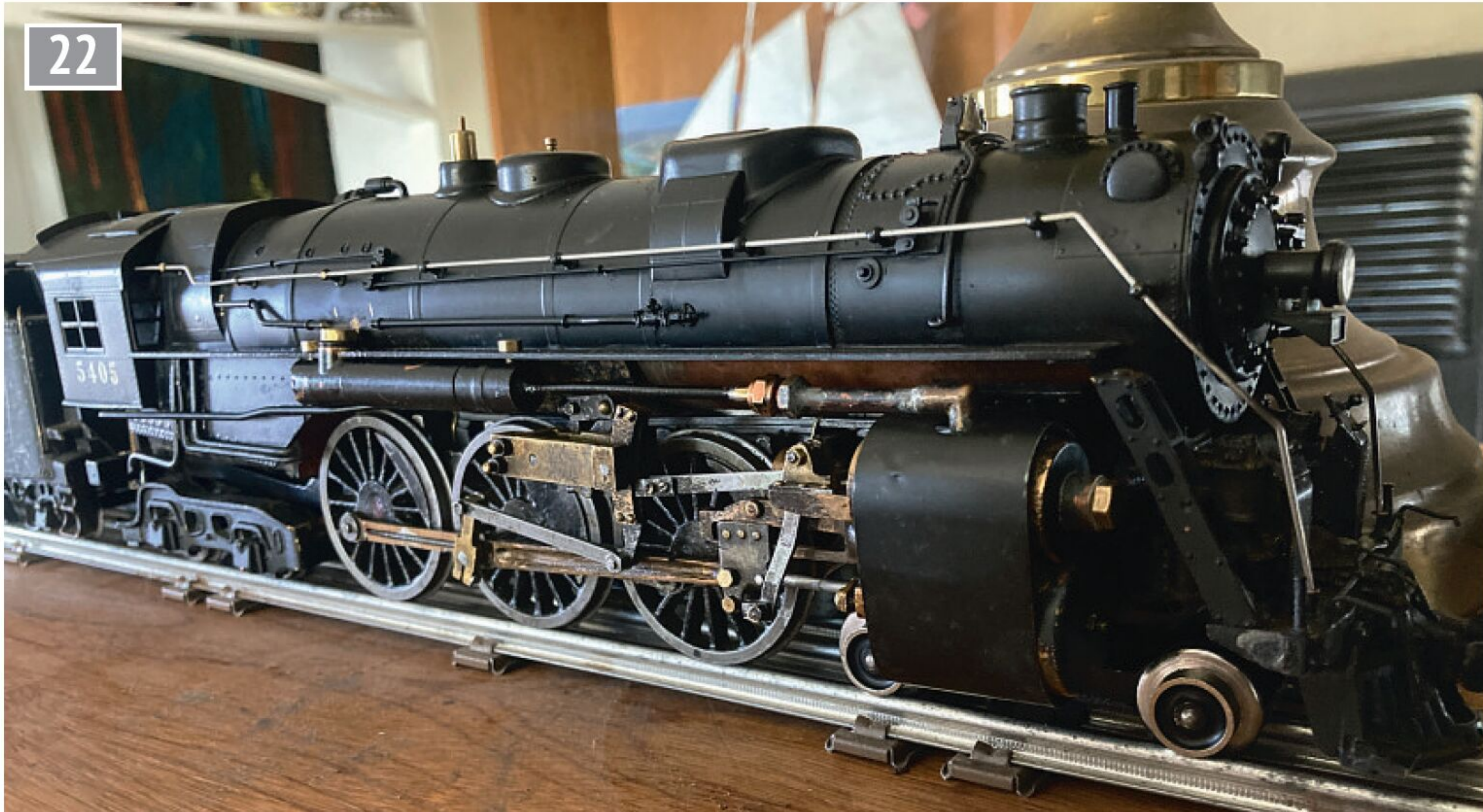
Engineer, working exclusively on the Space Shuttle. Tony's grandfather, Sal, was a New York Central Engineer and operated Hudsons and Niagaras during their heyday. The two of them worked on this chassis in Sal's 'Twilight Years' (Gramps taught Tony from an early age in his home basement machine shop in Long Island, NY) and Tony mentioned they had re-cast the chassis frame in aluminum due to its superior heat-expansion characteristics. Tony continued to work on the chassis after Sal passed, off and on, he estimates for 10 to 15 years.

Age is what put the chassis on eBay, otherwise Tony would have finished it and the engine. As for myself, it was time, effort and resources well spent, IMHO, and I felt it an honour to bring the project to

completion. For 'O' scale, this is a magnificent engine and is so rare, I consider it one of the 'Holy Grail' engines for anyone's collection, especially the LBSC version (photo 22).

- Boiler: Fire-tube/fire-box
- Fuel: Butane/propane and ceramic-grate burner
- Fittings: Safety valve, Goodall valve, throttle, displacement lubricators (2)
- Blow-off pressure: 60psi
- Cylinders: Two double-acting D-valves
- Reversing gear: Walshaerts
- Weight: 7lbs
- Dimensions: Engine 14 inches/ 24 inches with tender 4 inches tall/ 3 inches wide

ME



The completed Hudson locomotive.

Part 17:

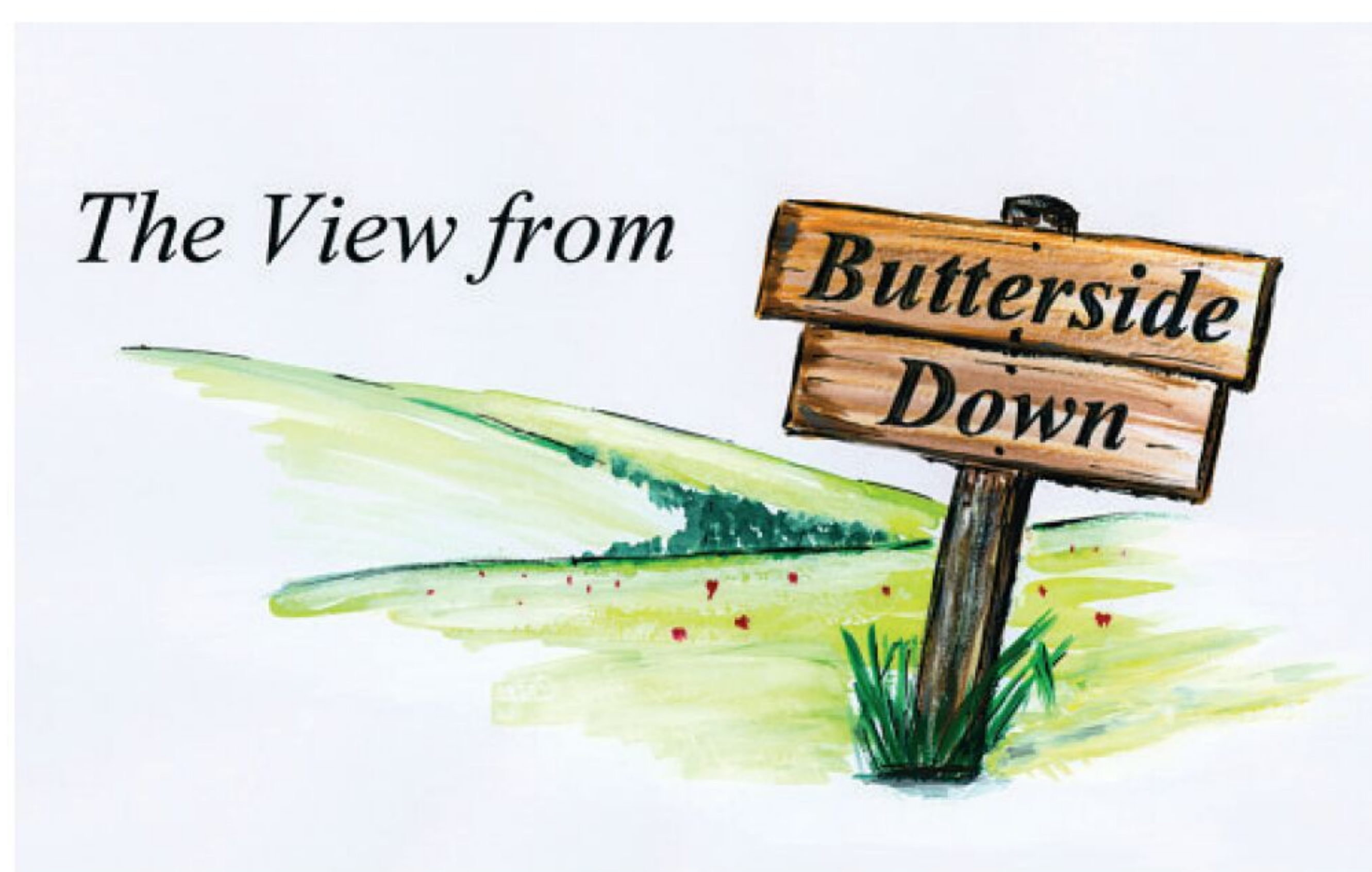
Pastures New - Part 1

The Decanter, The Desk and the Dining Room

Steve Goodbody takes a random walk through model engineering.



Continued from p.199
M.E.4748 July 26



"Anyone fancy more port?" I asked, raising my voice above the post-dinner chatter and pointing to the remnants of a bottle of '92 Prager nestling in an elegant cut-crystal decanter - a much-loved wedding present - standing upon the desk beside my left shoulder. The group, seated around the dining table, merry and focused upon the fast-disappearing cheeseboard, cheerfully bellowed their affirmation.

However, as I pushed back my chair to decant another bottle, my elbow inadvertently nudged an arrowed push-button situated incongruously beneath the desktop and, with a whirr and accompanying judder, the desk and decanter began ascending rapidly towards the ceiling while the latter, disturbed by the vibrations, scampered lemming-like towards the edge, clearly intent upon a brief but terminal dalliance with the

deceleration demon and the hardwood floor below. Rainer, seated beside me and having far quicker reactions than I, checked its progress in the nick of time and handed me the still-intact glassware as the desk shuddered awkwardly to a halt.

"So, tell me", he began with a knowing smirk, "why do you have a motorised desk in your dining room?"

At the other end of the table Jenny rolled her eyes before fixing me with a frustrated stare for this, as Rainer well knew, was an increasingly sore subject in the Goodbody household.

"Thanks for asking, Rainer" I replied with mock annoyance "and no more port for you, I'm afraid."

Straining at the seams

In essence, as with so many things in today's world, it's all the fault of the pandemic - at least that's my excuse.

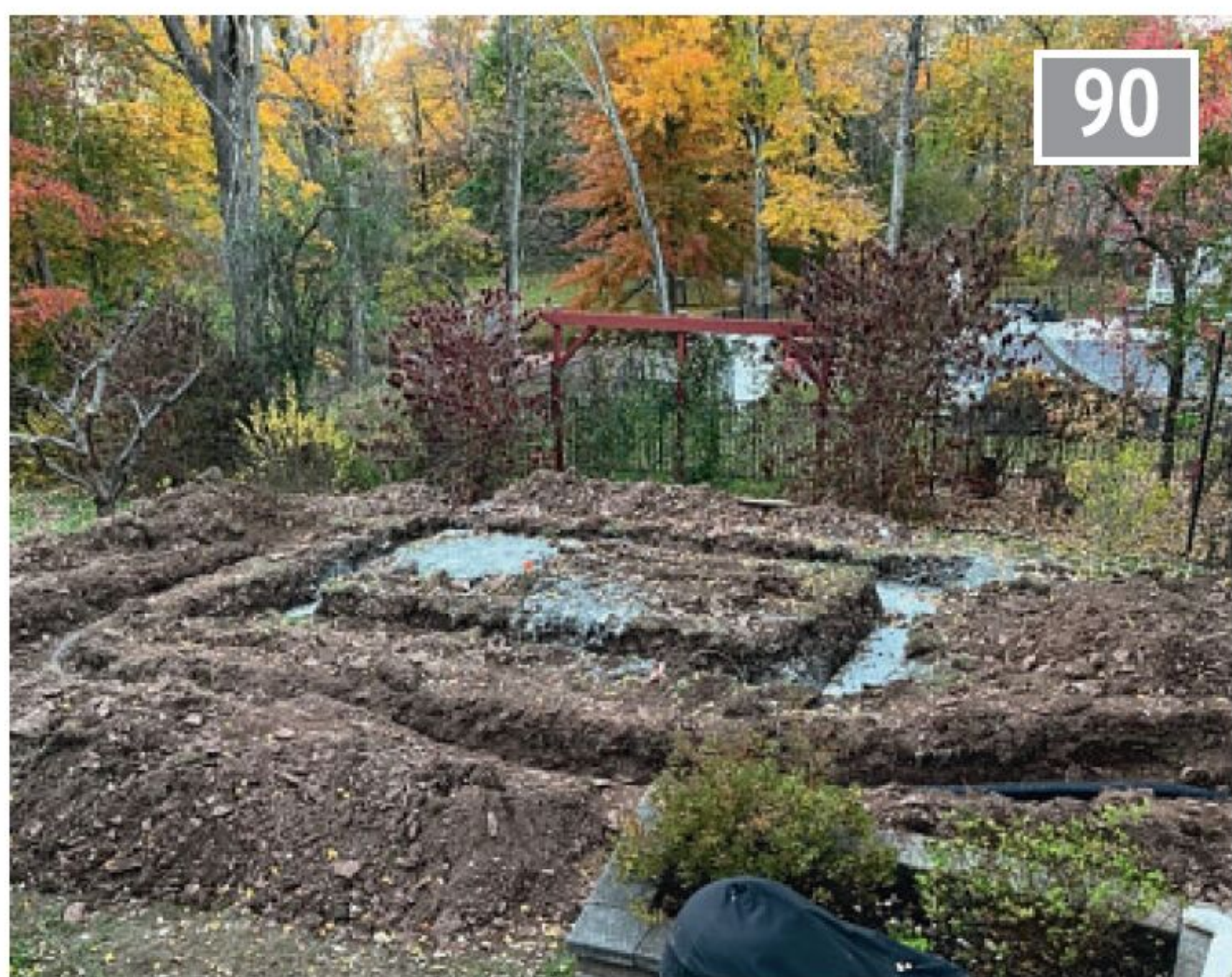
Beforehand, every weekday morning we would leave the house, Jenny and I to our respective places of work and the children to school, and by evening we would arrive home to our Goldilocks-sized abode, not too large, not too small, perfect for our needs.

Thence came Covid-19 but, before I continue, let me first state that, compared to the experiences of many, many people during the pandemic, our family foursome was immensely fortunate for, in addition to avoiding sickness, both Jenny and I could work just as productively from our home as in our offices - arguably more so - and the children's schools did a first-rate job with their online curricula and remotely-taught lessons. Given the circumstances, we really could not have had it easier, and we count ourselves incredibly lucky as a result.

However, with that said, having four people permanently encamped in its relatively small space, each with online lessons or online meetings as their roles dictated, and with everyone needing peace and quiet for their base of operations, the family home began to show its limitations.

The children were straightforward - their bedrooms were ideal for their needs - and, with a laptop-sized occasional table unfolded each morning in one corner of our bedroom I was also set for





With a day spent mechanical digging, you too can turn your once attractive garden into a passable copy of the Somme.



Two weeks later and the foundation is ready for the shed's imminent arrival.

the day. But for my busy wife, with her seemingly endless stream of online meetings interspersed with training courses and seminars beamed to participants located around the globe, a secluded location, a decently sized desk and a photogenically attractive background were essentials. But the only location which came remotely close to fulfilling these criteria was, as you may have guessed, our dining room and therefore, with a motorised variable-height desk shoehorned into one corner, in February 2020 our dining room became Jenny's temporary office for, suspecting we wouldn't be entertaining visitors for the foreseeable future, the downsides seemed relatively few.

There's temporary ... and then there's temporary...

By the late spring of 2022, more than two years later, my patient wife was heartily sick of her increasingly permanent dining-room-come-office. With Jenny now working from home on a fulltime basis, the room, with its adjacent stairway to the second floor, its neighbouring front doorway and its additional role as our formal eating area, had become an increasingly impractical and noisy office venue for a world in post-pandemic resurgence. Furthermore, as the decanter near-miss had shown, her motorised desk was plainly unsuited to its role as a part-time drinks table and that was, clearly, the last straw.

But what could be done? With the various options listed, examined from every possible angle, and mostly rejected, only one remained standing: the basement workshop, home to my model engineering activities for the past ten years or so, must be emptied and turned into Jenny's new office. A sad day, you might assume.

Shed no tears

Of course, I was not planning to give up the hobby, at least not if I could avoid it, and this meant that a new workshop would be needed, one which, while no longer located within its perimeter walls, must be sufficiently close to the house to remain commutable in no more than ten seconds for, when several feet of snow are lying upon the ground, the wind is blowing hard and the temperature is minus twenty Celsius and still falling – altogether not uncommon features of a New Jersey midwinter day – one does not want to be exposed to the elements for longer than is absolutely necessary. Furthermore, it would have to be efficiently heated during the winter and cooled during the summer to be habitable year-round and well insulated to keep the heat and cold in their desired locations, regardless of the season. Lastly, its location must be accessible for loading and unloading the trailer with its variable cargo of railway train and traction engine which you, informed Reader, know all about by now.

Inevitably, it didn't take long for those Wonderland dragons to muscle in on the act.

"Hey," they began, "*since you're putting together a wish-list, what if you add a library-come-office above the workshop? Then, you'd have somewhere convenient to store all those books and drawings which you've gathered over the years and a quiet place to read and write and collect your thoughts for those interminable magazine articles*" they continued.

"*Not that your thought-collecting needs a dedicated space, for it's never yet happened and wouldn't take long if it did*" the third dragon mumbled parenthetically, mistakenly believing I couldn't hear. Impolite but not inaccurate, I granted magnanimously.

Therefore, a couple of weeks later, having explored the options and weighed the pros and cons and discovered that, to the dragon's delight, a two-story structure wasn't out of the question, Jenny and I ordered a new garden shed from a well-regarded purveyor of such items located in Pennsylvania's Lancaster County - the Amish and Mennonite dominated region made famous by the 1985 movie, *Witness* - which, while sharing the same common noun as the prior cloche-windowed shed in East Sussex, was to be, in every sense of the word, as far removed from its predecessor as could reasonably be imagined.

An armed escort

How difficult can it be to dig a hole and fill it with concrete, I ask you? Well, those familiar with the task and aware of the innumerable potential pitfalls will undoubtedly know that, from the moment a shovel first strikes the ground, and the resulting clod of earth is transferred from A to B, all bets are off as to what will happen next. Sure enough, before the first day's excavation was over, two of the house's drainage pipes, installed eighteen years prior and wholly forgotten shortly thereafter, had been rediscovered the hard way and thoroughly mangled in the process. But as this was the only real problem to befall the contracted mechanical-digging-of-the-hole then I was, between you and me, secretly pleased. Regardless, with the winter's freeze fast approaching there was no time to waste, and so, with additional trenches dug and replacement pipes laid, by the time the first delivery of concrete was decanted into the hole by the labouring team, our once attractive back garden bore a passing resemblance to the Somme (**photo 90**).

By mid-November however, with the trench re-filled, the four foot deep foundations complete, a sturdy perimeter wall laid neatly on top and a four inch thick reinforced concrete slab slathered into the space between, everything was finally ready for the shed's arrival on the scene (**photo 91**). With the ground nicely firm, thanks to a succession of sub-zero nights, and a crisp and clear day in the offing, at ten o'clock in the morning on the last Tuesday in November 2022, with the Thanksgiving turkey recently converted into several gallons of hearty soup in readiness for the long winter ahead, a large flat-bed truck drew to a halt in the road beyond the driveway, closely followed by a member of the local constabulary in his much-blighted automobile which immediately reversed into a neighbour's drive and stopped with a disquieting air of permanency.

Reaching the roadway, I greeted the truck's driver with the customary offer of a bathroom and a coffee which he, rounded haircut and moustache-less beard betraying his non-local origins, politely declined with a nervous shake of his head. Then, despite having just completed a no-doubt gruelling hundred-mile journey, he hurried nervously away to begin unlash the shed's flatbed moorings, fully aware that his every movement was under the scrutiny of an armed officer of the law.

Turning my attention towards the police car, I noticed that its window was whirring downwards to reveal the uniformed public servant within.

"Morning officer!" I called cheerfully with a forced grin, dreading the moment when I would be informed of all the laws that we were presumably breaking and of which I was wholly unaware. "Is something wrong?" I asked innocently.

The policeman, one ear tuned to the dispatcher on his radio, turned his head my way. "Not at all - but I saw this coming through town and followed it to see where it was going. I've never seen one this big unloaded - do you mind if I sit and watch?". Relieved, and with the impending dread suddenly lifted, I assured him that it was perfectly okay by me and felt sure that the truck's driver wouldn't complain either.

Wandering over to the busy Pennsylvanian, I explained the situation, and he, until then panicked that a visit to a New Jersey jail cell might be imminent, broke into a smile as the tension eased.

"Thank heavens for that!", he exclaimed, nodding to the official spectator who raised his hand in return "and yes, I'd really love that coffee - with cream and four sugars if I may - and might I please also use your bathroom, for I'm fair bursting indeed". Ten minutes later, with three steaming mugs in hand, an excited Englishman, a much-relieved Mennonite and a well-armed keeper-of-the-

peace gathered amiably around the latter's steed, chatting about nothing in particular, all enjoying a companionable outdoor break on a beautiful late-autumn morning.

The beast of burden

Now I, like our friendly officer-of-the-law, had absolutely no idea how the shed, all two hundred and sixty-four square feet of it, was to be removed from the trailer and navigated to its ultimate location in our back garden, but at the very least I expected the imminent arrival of a small army of burly folks, all with similar haircuts, beards and the quaintly old-world mannerisms of our driver, each bearing an array of jacks, winches and pulley-blocks and ready to strain at the ropes in the stamp-and-go fashion of a man-of-war's crew dragging a grounded ship into deeper waters, as the great Patrick O'Brian would undoubtedly have put it. Curious at his team's lateness, I asked our Pennsylvanian companion when the rest of the gallant crew would arrive.

"Crew? Nay, there's only me and I'll be done within the hour" he replied matter-of-factly, adding "'Tis the mule does all the work, see" before draining his coffee, handing me the empty mug with polite thanks, and heading back to his truck to continue the preparations.

Now I don't know about you, but every now and then I am presented with a statement which is so unexpected, or so improbable, that I find it impossible to formulate a response which does not sound either rude, foolish or both and, on those occasions, likely after opening and closing my mouth a few times in silent guppy-fashion, I generally assume that I must have misheard the speaker, apologise, and ask him or her to repeat the last sentence. This, you might reasonably assume, was one of those times, but with the driver now back at his vehicle and busy with a bewildering array of ratchets and ropes I turned instead to the policeman for clarification.

"Did he say mule?" he asked, beating me squarely to the punch, eyebrows raised into well-above-forehead territory.

"Um, yes, I think he did" I replied, realising that, while the use of livestock for shed-shifting may be *de rigeur* in rural Amish Pennsylvania - the horse and buggy is still a common sight on the roads of Lancaster County after all - there were probably laws against that kind of thing in our manicured suburban New Jersey neighbourhood. My companion, his face bearing an incredulous *they'll never believe this down at the station* look, was clearly racking his brains to recall any donkey-related statutes in the local rulebooks, dusty and un-needed for the past seventy or so years.

"Why me?", his eyes implored as we glanced at each other, wondering what to do next.

With no better options, we both turned towards the shed, still sitting atop its articulated transportation, the only conceivable hiding place for a Pennsylvanian beast of burden eager to get on with its *raison d'être* and return home to a welcoming stable and an enjoyable nosebag of mash.

"Now this, this I've got to see" the incredulous keeper-of-the-peace whispered softly.

Ghostly assistance

Disappointingly, it soon became apparent that we had firmly grasped the wrong end of the stick. As we watched, a caterpillar-tracked contraption edged slowly from

its hiding place at the front of the truck, engine whining noisily, and turned to crawl menacingly towards the rear. The policeman, having mentally returned '*Livestock Regulations*' to its grimy shelf, was now presumably scrambling his way along the virtual bookcase in search of guidance on how to deal with this new development while we, agog, witnessed the mini-tank perform a neat three-point turn and edge up to the trailer's rear. Glancing at each other, the same question was plainly mirrored on both our faces - *How is it doing that?* - for, as far as we could determine, the machine in question was performing these manoeuvres wholly without the aid of a driver.

At that moment, however, our friendly Pennsylvanian rounded the corner and hove into view, a complex box of buttons, joysticks and knobs suspended from his neck at an ergonomically convenient height. Gently nudging one of the controls, an incongruous black antenna rose and unfolded from the front of the tracked beast and, with that deployed, it began inching obediently towards the shed once again, a pair of forks sliding into the gap beneath. As it came to rest with the antennae pressed firmly against the shed's rear wall, the driver flicked a switch, the engine died, and we could hear ourselves think once again (photo 92).

"A remote-controlled mule - now I've seen it all" my



The mechanical mule draws the shed from its trailer, improbable antennae spread wide.



93

The skilful driver guides his radio-controlled beast through our just-wide-enough entranceway.

companion muttered and I, dumbstruck, nodded in agreement.

From that point onwards everything happened shockingly quickly. With the front of the truck's bed tipped hydraulically upwards and the mule's forks and antennae supporting its downhill end, the shed began to move backwards down the slope. Then, perhaps anticipating the

shouted warning forming in the throats of his grimacing onlookers, the driver paused the proceedings at the critical moment and deftly placed two supporting wheels at the far end, one at each corner, before restarting the robotic beast and dragging the shed fully off the truck's bed.

In no time at all the entire building, having traversed the intervening roadway, was



94

Within the hour, it's almost there!

up and over the kerb, across the front garden, and through the just-wide-enough gate (photo 93) to reach its ultimate resting place atop the concrete foundation awaiting beyond (photo 94). Finally, with the shed's wheels removed and the robotic mule returned to its stable, and having reliably informed me that a team would be along tomorrow to finish the job, our driver climbed into

his cab, waved his farewell, and disappeared around the corner, no doubt relieved to be bound for the less police-intensive pastures of his rural Pennsylvania home.

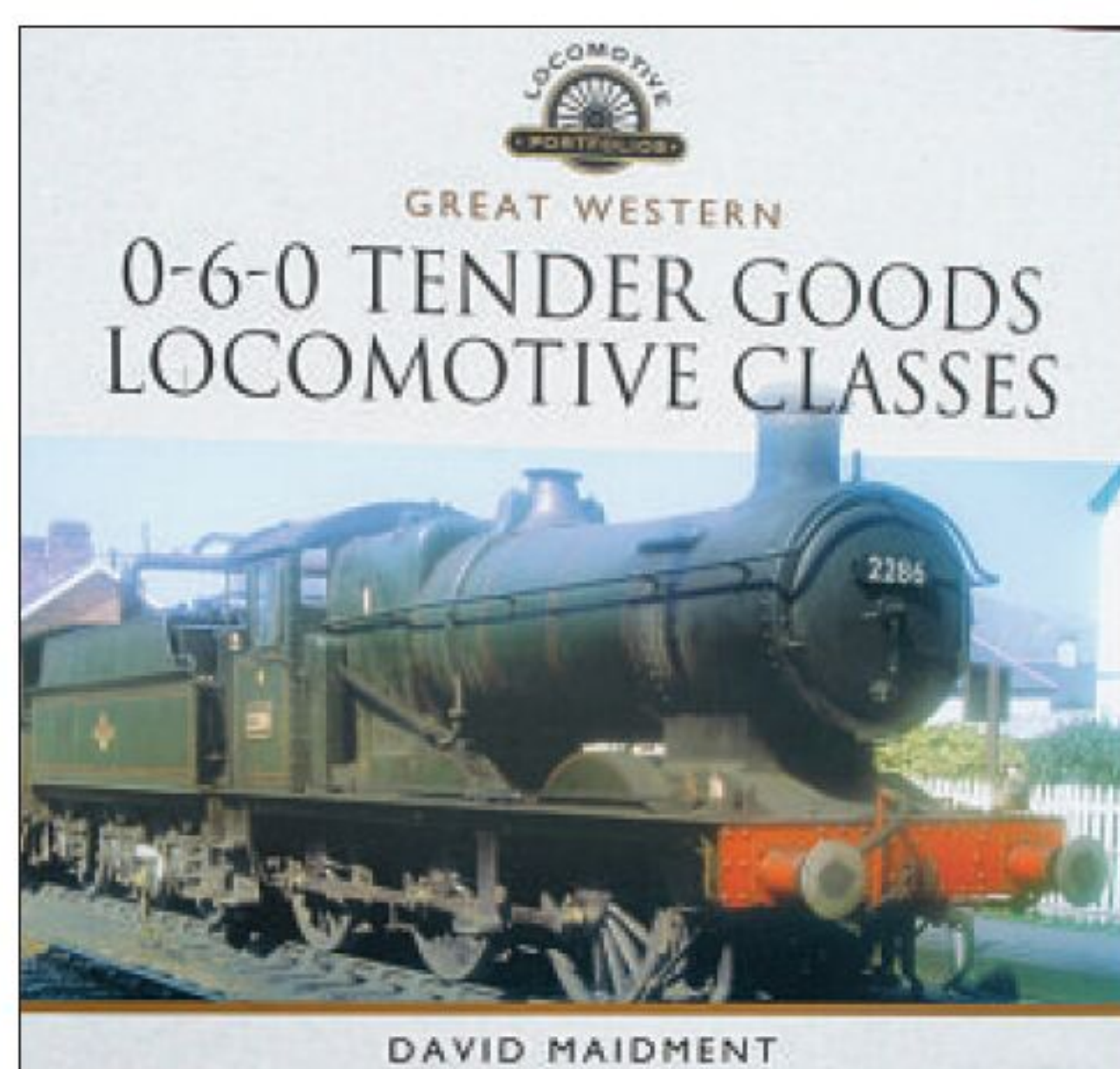
"At least we didn't need any carrots", I concluded silently, bidding the policeman a friendly goodbye.

● To be continued.

Book Review

Great Western 0-6-0 Tender Goods Locomotive Classes

David Maidment



One of an extensive series, this book follows a formula describing the classes of a particular type owned by a railway company. There are brief biographies of the engineers responsible, then details of each class. All are well illustrated and there is an index.

Although technical and engineering detail is limited - and more would improve the book - there is information here helping model makers and model engineers. Some models are illustrated. Appendices list all the locomotives in a particular class, their build dates and withdrawal from service.

The GWR had a number of broad gauge 0-6-0 locomotives originating under Daniel Gooch. Names were often classically inspired including *Bacchus* (my

favourite), *Leander*, *Amphion* and *Osiris*. Later names were more prosaic. Joseph Armstrong's Swindon class used town names like *Windsor* and *Reading*.

Many standard gauge examples were absorbed from other companies, including the Bristol and Exeter and Pembroke and Tenby before and after the grouping. Forty one came from the Taff Vale in 1923. The ex Cambrian 'Small Goods' locomotives were fitted with four wheel tenders and a photograph shows one at Porthmadog.

Best known were the Dean Goods built from 1883, reliable locomotives that lasted until 1955. Some saw overseas service during the First World War. Surprisingly, some were rebuilt as 2-6-2s for Birmingham suburban

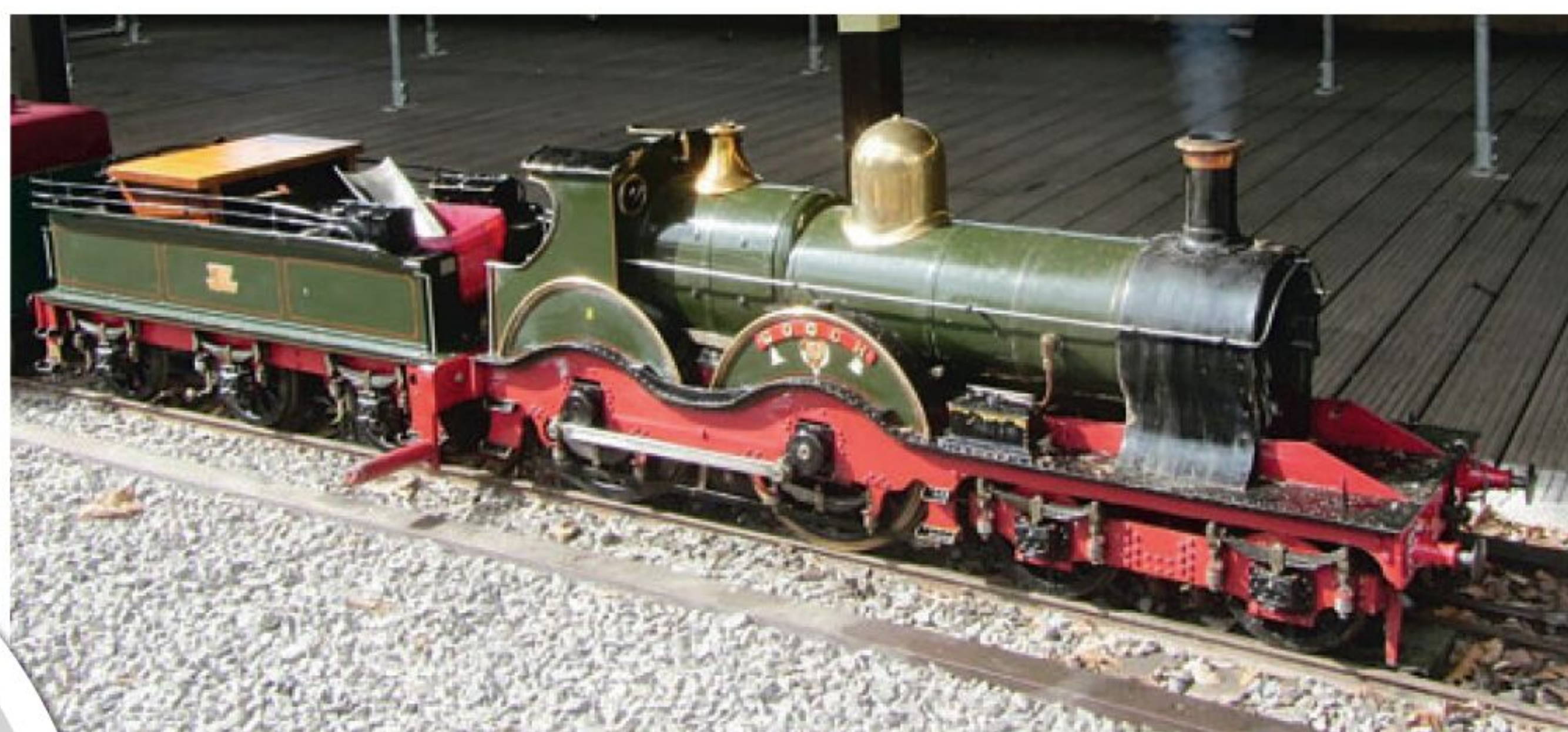
work. Another was trialled with pannier tanks and condensing gear.

Since the GWR had good 2-6-0 locos it is puzzling that Charles Collett decided to build the 2251 class. However, his design was lighter than the moguls and with a taper boiler and bigger cab improved on the Dean Goods which had suffered during wartime service. Many class members operated in mid Wales. The book has photographs, some in colour, of the class at Brecon, Carmarthen, Dolgellau and even Dowlais Top plus several on the former Cambrian main line.

Buying this book supports the excellent work of the charity *The Railway Children* set up by the author helping street children around the world.

Roger Backhouse

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Gooch

Dear Martin,

I was delighted to see a photo of Chris Wilson's 'Gooch' in M.E.4743 (May 17) at the Llanelli Spring Rally. These locos rarely appear in the model engineering press, probably as few have been built. I have the original one designed and built by John Clarke at his workshop at The Old School, Love Lane, Denbigh, North Wales. I have always wondered how many have been built and how to find out. Perhaps you could put in a request in a forthcoming issue of *Model Engineer*. What may not be commonly known is that he started the Polly kit locomotive business, not to be confused with the Mr Clarke to whom the business was later sold and who was not related. Attached is a photo of mine at the East Somerset SMEE railway at the Royal Bath and West Showground at Shepton Mallet, Somerset.

Regards,

Michael Malleson

National Railway Museum

Dear Martin,

Whilst I share Steve Goodbody's view of the National Railway Museum failure to provide information about exhibits (M.E.4742, May 3) may I say something in defence of the museum and their store. Yes, I really did write those words.

As Steve found, this is a fascinating part of the museum. There are some excellent models and a glorious miscellany of other items. For example they include a signal

box name sign from Kington Junction, a maquette for the statue of Britannia at Euston, the Lancashire and Yorkshire Railway's signalling school model railway, relief maps of Europe, lamps galore, many models and items of railway crockery!

My favourite model is a 1901 sectioned model of a French Ouest Railway De Glehn-Bousquet four cylinder compound 4-6-0, a masterpiece of the model makers art. Unfortunately it is badly displayed but bear in mind that stores were never intended to show objects as they would have been in the museum itself.

Most museums have large reserve collections (or stores) with just a fraction of objects actually on display. The NRM is no exception and some years ago, long before the present management team was in place, they made a sensible decision to open a large part of their stores to visitors.

In that, it differs from most museums which either never open their stores or have restricted opening. For example Edinburgh City has a Museum Collections Centre in Broughton Market open to visitors either by appointment or on the first Tuesday afternoon of the month. I visited the Leeds Reserve Collection with a party visit and Glasgow Museums offer scheduled tours of their large collection of ship models. Most stores house a varied collection and that variety is part of their appeal.

The Science Museum has a large reserve collection, including the largest items, at Wroughton near Swindon. It is occasionally open to the public. Nearby the Museum of London houses reserves including the

steam roller *Pride of Ilford* but as far as I know that is never opened.

To some extent the NRM uses *Locomotion* at Shildon as their reserve for larger items and with a new hall opening this spring will display even more locomotives and rolling stock. Whilst I have previously criticised the NRM and *Locomotion* in particular for their somewhat sterile displays there's no doubt *Locomotion* has always housed a good collection which will now be enhanced.

Yours sincerely,

Roger Backhouse
(York)

Rape Seed Oil

Dear Martin,

I was reading Doug Hewson's LNER B1 article in M.E.4716 (May 5, 2023). On page 640 he makes a casual passing reference to the use of rape seed oil for tempering and advises that it is cooking oil... well, not quite. Should you have *actual* rape seed oil, **definitely** don't use it for cooking. Oddly, it does have a connection with steam propulsion. This short video will give you a brief primer: youtu.be/c1kyubykrvA?si=kACiwp7UuDU73Lcg

Kind Regards,

André Rousseau

Scaling

Dear Martin,

Describing the Midlands Garden Rail Show in M.E.4742 (May 3), John Arrowsmith wants to know if the people on a rock wall in Fig 5 are rail enginers or climbers. By referring to them as scaling the rock wall he is correct, but the 'scaling' is the removal of loose and fractured rock from the wall before it falls on its own. The term comes from hard rock mining where one of the most dangerous jobs is scaling the roof.

Best regards,

John Bauer
(Ontario, Canada)

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A New Kit on the Block

Henk-Jan de Ruiter is impressed by the latest offering from Pocher model kits.



Pocher



Hornby

Pocher (uk.pocher.com) is worldwide famously known and recognized in the model kit builders fraternity for their state-of-the-art model kits.

The history of Pocher goes way back to 1951 when Arnaldo Pocher, who was a goldsmith engraver, founded his first company Pocher Micromeccanica in Italy, which very soon turned into the Corrado Muratore and Arnaldo Pocher Company. In the beginning they started making and designing accessories for model trains. After this they also produced detailed freight and passenger carriages in white metal and model locomotives.

At the International Toy Fair in Milan in 1966, Pocher introduced their first model kit in the large scale format of 1:8, based on the Fiat F2 130HP from 1907. It contained a vast number of around 800 parts made out of all kinds of material, mostly plastic, but also including copper, brass, aluminum, leather and rubber. This was, for that time, an unusual and expensive approach never seen before in the model kit world.

As this kit was enthusiastically received by



Hornby Pocher Lotus 72D model kit.

hobbyists around the world, Pocher decided to develop more 1:8 modelkits, such as the Alfa Romeo 2300, the Rolls-Royce Phantom and the Mercedes 500K.

These classic kits could contain as many as 2500 to 3000 parts and could measure in length up to between 50 and 75 centimeters. They were based on the original plans of the automobile manufacturer and had often (metal) spoked wire wheels (to be assembled spoke by spoke!) and an engine with working crankshaft and pistons. The method of assembly is always a combination of screwing and sometimes glueing parts together.

In the late 1970's the Pocher company was sold to the Rivarossi model train company and the Pocher range was expanded by the Prestige series of Pocher kits of other

contemporary sportscars like the Ferrari F40 and the Porsche 911. For some of these kits so-called Transkits were developed by some third party niche companies in order to enhance a model even further.

In 2004 Hornby (uk.hornby.com) took over the helm of Pocher and after a long period of silence Hornby surprised the model kit world in 2013 with a 1:8 model kit of the Lamborghini Aventador. This was the first in a line of new Pocher diecast modelkits with a majority of metal parts. The series was later expanded with other Pocher model kits like the Lamborghini Huracan and the Ducati 1299 Panigale motorcycle.

And now recently Hornby has released another diecast metal Pocher model kit and for the first time in their history it features a Formula 1 racecar, the Lotus 72D with the legendary Ford Cosworth DFV 3.0 V8 engine (DFV stands for Double Four Valve). It is shown here in the famous JPS John Player Special livery of 1972 as driven by the World Champion Emerson Fittipaldi. It is a pre-painted kit with incredible detail in the 1:8 scale and of considerable weight and dimensions. A completed model will measure a length of about 58 cm with a width of 25 cm and a height of 13 cm, weighing around 3 kilograms and consisting of almost 500 parts.

The story goes that building large scale 1:8/1:12 high-detail model kits as a youngster, whether from this brand or from other kit manufacturers, like Tamiya, Revell, Ixo, Italeri, Airfix or MFH Model Factory Hiro, have often laid down the basis for a technical career.

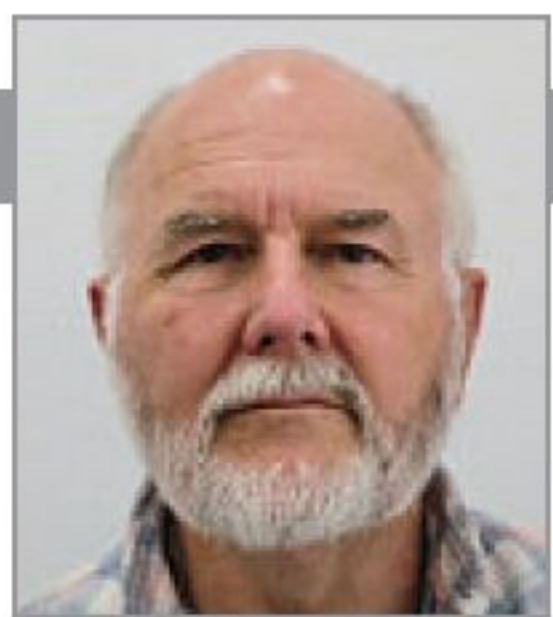


Heavy metal department.

ME

Making Tyres for a Model Road Vehicle

Chris Pattison discovered that suitable tyres were hard to find so cast his own.



Background

I am in the (slow) process of building a 3 inch scale Atkinson waggon. As with all of these projects, there are multiple building challenges. Working on only one aspect of a build can sometimes get tiresome and boring. Every now and then, one needs a new challenge to stretch the mind in another direction. I do enjoy the variety of jobs to be done in a project such as this – it gives me a good practical reason to use my engineering training, knowledge and experience.

I have worked for an adhesive tape manufacturer, as well as with a manufacturer in the mine rock support industry. So, I have had some exposure to chemicals and working with them, as well as manufacturing.

Having machined the front and rear wheels and axles for my wagon, it was time to consider the tyres for the wheels. Historically, these tyres would be solid, besides, over the counter pneumatic tyres do not quite look the part.

Technical Parameters

My research into solid tyres shows that these would need to be reasonably hard to take even scale loads, namely the wagon weight and the driver, which could add up to a couple of hundred kilograms. But, at the same time, have some degree of 'give' to provide some cushioning. Too hard a material could lead to the tyre material fracturing and pieces spalling off. An appropriate hardness seemed to be in the 60 to 80 Shore hardness range.

Rubber Durometer Scale Section

A Durometer scale is a measurement for rubber material hardness. The list below gives an idea of rubber hardness in use. Most rubber materials fall into the Shore A scale. Shore 70A is a commonly chosen material hardness for most applications.

- Shore 20A = Rubber Band
- Shore 40A = Pencil Eraser
- Shore 60A = Car Tire Tread
- Shore 70A = Running Shoe Sole
- Shore 80A = Leather Belt
- Shore 100A = Shopping Cart Wheel

Material for the job

There appeared to be a couple of ways to do this:

- 1 Obtain extruded section which could be cut to length and bonded to the wheel.

Advantages: Simple process

Disadvantages: Bonding the material to the rim; countering the natural 'spring' of the material to stay straight.

- 2 Bond rubber directly onto the wheel itself.

Advantages: A secure method of ensuring a bond between tyre and wheel.

Disadvantages: For rubber, it would need to be vulcanised to the rim in a mould; the need to make a mould. For urethane the need to make a mould that will hold the liquid until it set; the possibility of bubbles spoiling the moulded product.

Considering the first option, the question was where to get hold of suitable material for this job. The first port of call was model engineering supply companies on the internet. But most focus on the rail side

of our hobby, few on the road locomotives. Living in New Zealand, suitable materials are not easy to get hold of.

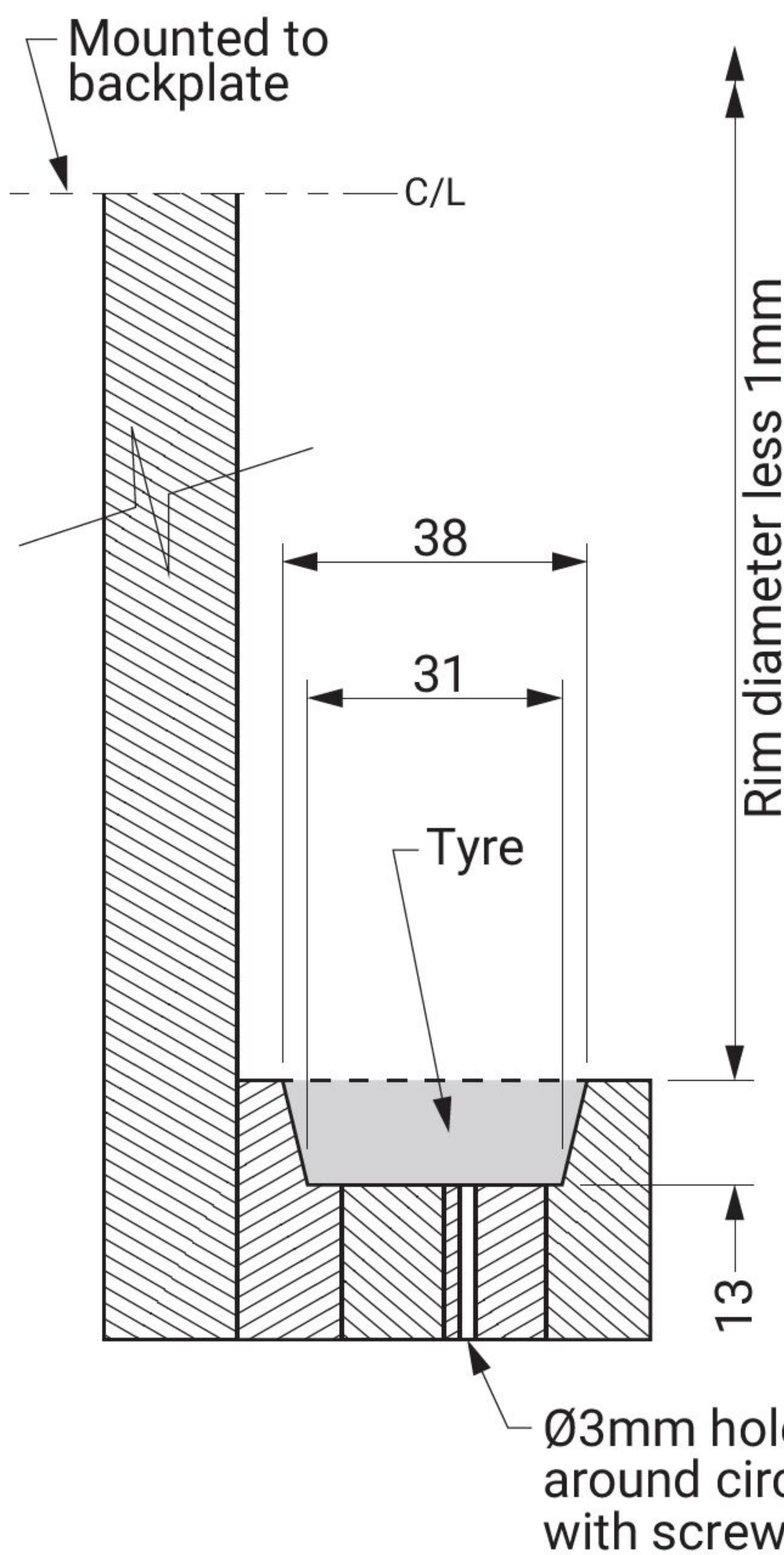
Only one lead presented itself on the internet - a model engineering supplier in the UK who advertised rubber in lengths of a suitable cross-section. These could be cut to length, then attached to the wheel rims. The cost would have been rather steep, considering shipping to NZ. Shipping cost may have been reduced if a fellow club member, who is building a Burrell TE, joined me to make a bulk order.

Unfortunately, this ran into a dead end, as it appears that this company is no longer trading. It is rather annoying that advertising websites continue to be on line when the company is no longer in business. Oh well, such are the joys of dealing long distance. The only saving grace was that this website showed the cross-section of the tyre material, a detail which was not on the plans for the wagon.

If this material were available, as noted above, a problem would be curving the rubber material around the rims, bonding it to the rim and also getting a good quality joint between the two ends of the material. The recommended tyres need to be about 13 mm thick, the sides tapering in from the rim. I'd need one tyre for each front wheel, with two side by side on each rear.

Next, I tried to source suitable rubber locally but the thickness, or close to it, was only available in sheets which would then have to be cut to

Fig 1



Notes

- Cut 31mm groove to depth
- Cut tapered sides to 38mm width
- Sand & finish with varnish to seal surfaces
- Finish sand with fine paper & coat groove with release agent

Tyre Mould Details
Mat'l: MDF

Mould section.

width and length. Furthermore, the cut tyre edges would be square and would need to be tapered in, a further trim operation. To get them to look good, my past experience working with rubber told me that the cut edge would not be exactly pretty and would probably need to be dressed with a sanding wheel. The extruded or flat rubber option, was looking to be increasingly difficult to work with. All in all, it was progressively looking to be in the 'too hard' basket.

The second option was to consider casting the tyre in polyurethane instead of rubber. Polyurethane may be cast in any form, providing a suitable mould is available. However, there is the issue of air entrapment, so creating voids in the finished article. Finally, there was the problem

of bonding the urethane to the rim - but that would have been an issue anyway using rubber strips.

I pondered over how I could build a suitable mould to do this. Such a mould would appear to be quite a challenge, especially considering that the rim diameter was bigger than my Myford could accept. However, I did have a wood lathe that had a gap that looked big enough.

I really could not see a reasonable way to do the job on the flat, like a doughnut without a) potential leakage of material, b) having a method of pouring the liquid into an enclosed mould without voids and overspill. Also, creating the gap between the tyres on the rear rim in the casting would pose moulding issues. If I cast the tyre as one, I would then

have to machine the groove after casting, which could be problematical with rubber. Finally, the front and rear wheels are different diameters, so I was facing making two moulds in the flat.

The only advantage of going the flat route was that the rubber could be cast directly onto the wheel rim. But then, doing this would be an all or nothing exercise, and if it went wrong, I could face a difficult cleanup operation of the rim.

Technical considerations

Fortunately, I chanced upon an article by Steve Bellinger in the December 1979 *Model Engineer* (M.E.3623) on this same challenge. The eureka moment was reading his method of centrifugal casting. This gave me the way out to do the job.

I already had indirect experience in this area, as the rock props I worked with years ago were made of centrifugally cast stainless steel tubes. The big advantage of this method was that the molten metal consolidated itself by centrifugal force to the outside, with all contaminants and dross rising to the (inner) surface, to be later machined away in the bore finishing operation.

So, I decided upon this line of action. I made a bunch of rings from MDF that were glued together and then onto a backing board mounted onto my wood lathe backing plate (**fig 1**). This fitted into the gap in the lathe, but only just (**photo 1**).

I then turned the outside nice and round, then the inside diameter of the rings to the same outside diameter as my larger rims. I made a template of the tyre profile out of an old credit card to keep me on track regarding the groove depth and its final profile. Machining was done in stages:

- 1 Turn inside cavity to rim outside diameter.
- 2 Mark out the inside to show the top width and also full width of the tyre.
- 3 Machine the top width square down to full depth.
- 4 Machine the side tapers.
- 5 Sand and finish with varnish.

Being an inside cut, the groove held onto the wood dust, so frequent application of a vacuum cleaner was needed to check dimensions and groove bottom flatness (**photo 2**).

Finally, I had a mould into which I could cast my tyres. This was then given numerous coats of varnish and finished with fine sandpaper to seal the surface.

I also drilled a number of 3mm holes through from the outside into the centre of the tread, and plugged them with short screws. This was with the intention to blow compressed air into the holes, so releasing the cured tyre from its mould. I was a bit apprehensive that the urethane, once cured would be too stiff to extract, in which case I would have to make a



Note the narrow gap between mould and lathe bed.

two-part mould. Thankfully this did not occur.

Meanwhile I ordered a urethane pack, some mould release agent and also tint to colour the tyres black.

I then calculated carefully the volume of a tyre, in my case, each tyre needed 360cc of mixture, which then gave me the quantities of each component, which were 2:1. These were measured out, the one component tinted and then the two mixed together.

Casting

From the article in *Model Engineer*, I was made aware that the centrifugal casting would need to be done by

spinning the mould at a reasonable speed. Too slow would not keep the fluid in the groove. Too fast may result in stuff spraying everywhere but my slowest lathe speed was still too fast.

My solution was to get my variable speed hand drill and jury rig it onto the lathe. Initially I tried running the drill directly on the rim of the mould but this did not work and was prone to lose traction (**photo 3**).

I then used the rubber core of a drum sander to drive a rubber band, made from a bicycle inner tube wrapped around the outside of the mould (**photo 4**). The speed itself was a guesstimate but it worked



Direct drive did not appear practicable.



Machining the groove.



Spinning the mould with belt from bicycle inner tube.



Cast tyre curing in the spinning mould.

out nicely for me. I guess that it was about 2 revolutions per second. I used gaffer tape to hold the drill switch down at the chosen speed.

The casting was straightforward – a) measure each component volume out, b) tint the one component per instructions and mix, c) then mix the two components together in a 500cc disposable container. For stirring the mixture, I found disposable sushi chopsticks worked very well.

The mixture was poured gently into the mould groove whilst it was steadily turning

and this filled up to the edge of the groove, being the rim outside diameter and proving my calculations. It was then left to keep rotating for a couple of hours until fully set (**photo 5**). I used the small residue in the mixing container as a guide to its degree of setting.

The entire mould assembly was then removed from the lathe and, as recommended, soaked in the oven at 65 degrees Centigrade for a few hours to allow the casting to fully cure.

Finally, time to remove the casting. This is when I removed a screw or two from the rim



Completed tyres.

and injected compressed air down the hole and under the tyre, so lifting it from its groove. A distinct pop could be heard. This worked well and the tyre could then be prised out of its groove with a pair of screwdrivers. Thankfully, the urethane was sufficiently flexible to be cooperative. Had it been too hard, a split mould may have been needed to be made. A prospect I was not looking forward to.

I later refined the process by measuring the more syrupy component by weight (taking into account its specific gravity) on a (kitchen) scale

directly into the mixing cup, instead of working by volume. The process of transferring it from a measuring cup to the mixing cup was leaving some component behind, leading to waste and inaccuracy. The second (tinted) component was still runny enough to be measured by volume.

Results

The results came out well. There was no evidence of bubbles in the finished castings – besides, if there had been any, they would end up on the inner surface, to be hidden when mounted on the rims. I cast a total of six rings, two for each of the rear rims and one each for the front rims (**photos 6 and 7**).

As the front rims are slightly smaller than the rear rims, I will have to cut these tyres down slightly, but the advantage is that as the tyres are already on a curve, so the added bend curvature should not stress the tyre and adhesive too much.

It now remains to bond the tyres to the rear rims using suitable adhesive. The smooth inside surface will have to be buffed to provide a key for the adhesive. The front tyres will have to be cut to fit the front rims, but as they are only about 15mm smaller in diameter, I do not expect any issues. I will use hose clamps to hold the tyres down when I glue them to the rims.

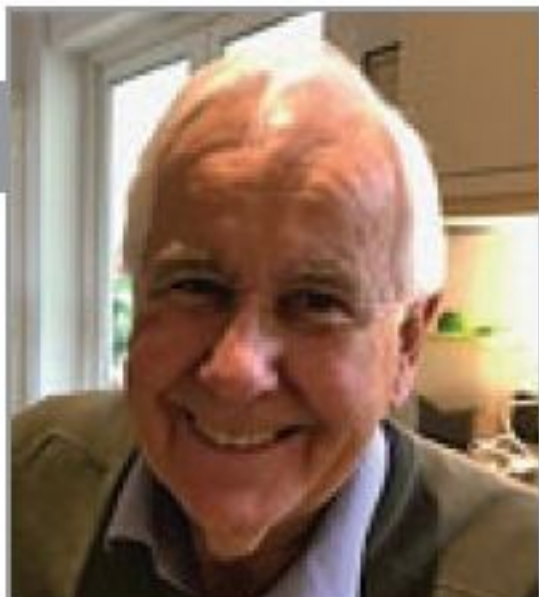


Tyres fitted to the rim.

ME

A New Tender for a Stirling Single

Salisbury and District Model Engineers build a tender for Salisbury Museum



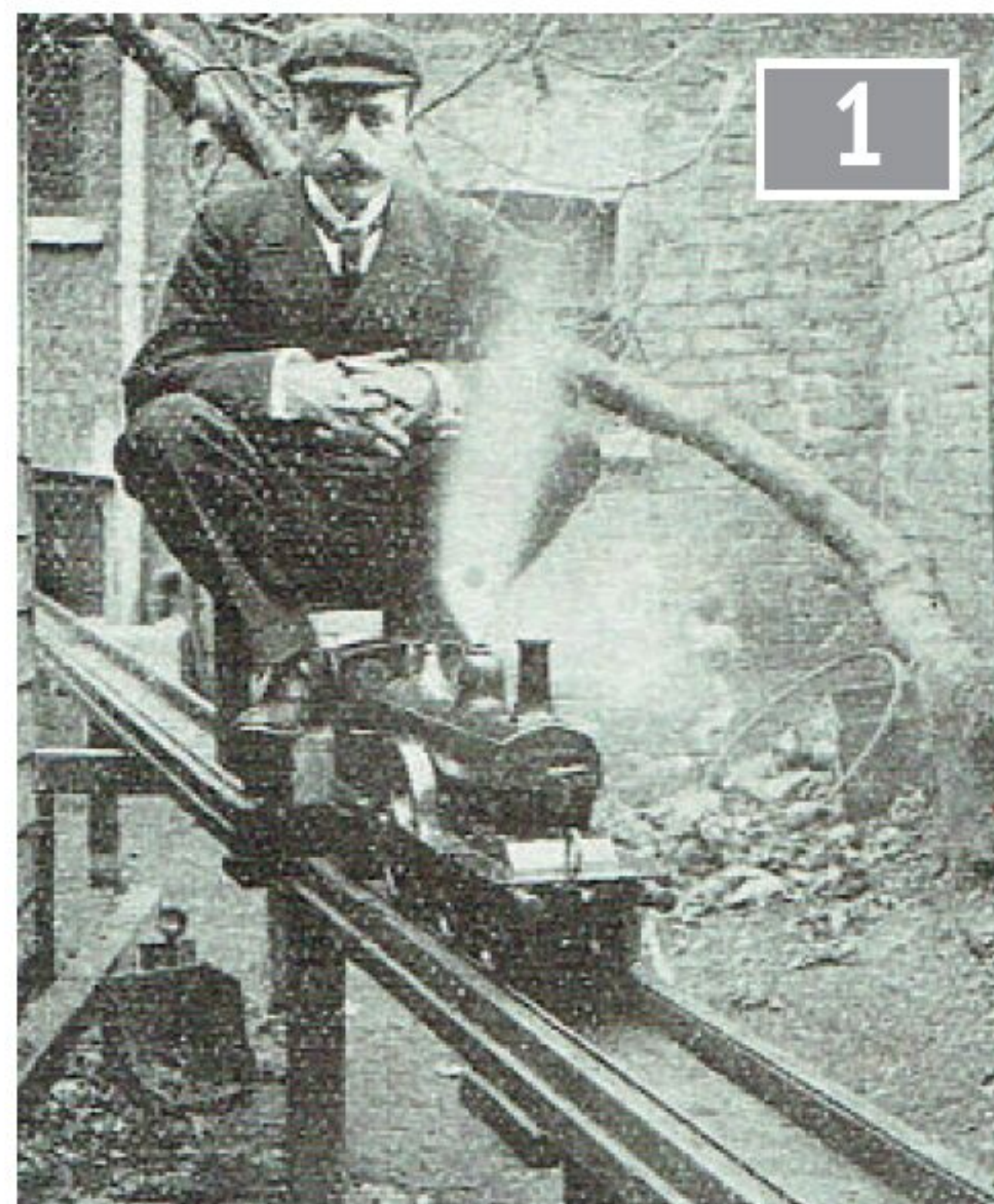
Des Adeley and Dave Murray describe how a model Stirling Single was supplied with a new tender.

Background to the project

Mr Walter Alcock, as he was then, was a keen model engineer, who built two small steam locomotives. Sir Walter, as he became, was the Salisbury Cathedral organist from 1917 till 1947. Amongst his many musical accomplishments, he played the organ in Westminster Abbey for three coronations. Walter was also a founding member and first president of the Salisbury Club in 1937.

Apart from other contemporary articles and photographs, he features in an article written by Percival Marshall, based on notes supplied by Walter. In the article, which appeared in *Model Engineer* for May 1899, on page 81 there is a photograph which shows Walter driving his Midland Single (**photo 1**). The locomotive was built to one inch scale and a gauge of $4\frac{3}{4}$ inches and was to his own design. The photograph is also reproduced on page 176 of the 2nd February 1996 *Model Engineer* (M.E.4010).

In all other photographs that Salisbury And District Model



Walter Alcock driving his Midland Single.



Salisbury choristers admiring two of Mr. Alcock's engines.

Engineers (SADMES) members had seen, neither the Midland Single, nor the Stirling Single that he went on to build and exhibit, ever had a tender (**photo 2** - with an interested group of choristers from the cathedral). Both relied on the driver being perched on a riding trolley.

It would appear that Walter Alcock followed the design marketed by W. Martin & Co., of East Road, West Ham, London. Martin's marketed drawings and castings for a $4\frac{3}{4}$ inch gauge Stirling Single, as re-built by Mr H.A. Ivatt. The advertisement (**photo 3**) shows a domed Stirling Single No 776.

In full size this was the second Stirling Single to be rebuilt with a domed boiler under Mr Ivatt's direction. No. 776 was known as the Newcastle Exhibition Engine, which had been new in March 1887 and was out of the works with its new boiler in July 1896. This locomotive was the first rebuild to receive the smaller dome but still retain

lever reversing, both features found in Walter's model. In full size the hazard of moving the reversing lever, while at speed, with steam applied, and with the higher boiler pressure acting on the backs of the slide valves, must have been a health and safety issue. All the five subsequent Ivatt rebuilds featured wheel and screw reversing gear.

About the museum locomotive

The Stirling Single locomotive pictured at the museum is



Advertisement for Stirling castings.

4



The Salisbury museum's Stirling Single.

built to one inch scale and 4³/₄ inch gauge (**photo 4**). It was presented to the museum in 1978 by the grandson of Sir Walter Alcock, with the belief that the tender had been stolen. For some years several members of the SADMES were aware that the museum in Salisbury had a historic locomotive, for which they had no tender. So, in mid July 2022, several members got together (over a lovely meal in the pub!) to discuss the feasibility of the society making one. As a small society with a very limited budget, it was decided that Des Adeley announce the project at the next society meeting to gauge the interest. The society members were keen to pursue

this project so it was decided to contact the museum director and suggest that his locomotive should have a tender, to make it a complete exhibit.

Following a phone call, it was agreed that the Salisbury club should visit the museum to carry out a detailed inspection of the locomotive and various options were discussed. It was noted that, at some stage, the locomotive had been repainted in the wrong colour. No doubt the locomotive's paintwork had been in poor condition when presented to the museum in 1978. In the interim some museum volunteers had attempted a repaint. Maybe they lacked

knowledge of the period but the light green chosen would be more appropriate to an LNER livery, of some thirty years later. This was discussed with the museum staff but their decision was that, as a museum artefact, nothing should be done to the locomotive - neither would it ever be returned to steam. It was requested that the tender paint work be matched to suit the existing semi matt finish of the locomotive.

The 'tender' plan

Many measurements and photographs were taken of the locomotive in the museum, including recording the cab and buffer beam widths, the

footplate height and finally the tender hitch height, so that this could all be taken into account during the build of the tender (**photo 5**).

A bill of materials for the major parts which were needed was produced and sourcing the items commenced (as cheaply as possible!) noting that the major expense will be the wheel castings.

Although an appeal through the editor Martin Evans (who kindly published the letter) and also to the curator of the SMEE archives, was made for copies of the Martin drawings, that we could beg, borrow or buy, none could be found.

However, as a direct result of our appeal through *Model Engineer*, the team had some good luck. A gentleman named Keith Richards, from near Stanstead, offered (for a donation to his local club), a tender of the same era that could be used for parts. Photographs showed that this tender had great potential in pushing the project forward. Plans were made to collect it and, in October 2022, it was collected by Des Adeley.

On receipt this proved to be a very interesting, if somewhat rusty exhibit (**photo 6**). The tender definitely appeared to have been built to the Martin design but while the scale lengthways was correct, it was built to run on 5½ inch gauge track. The well-made tender body had been constructed from tin plate but, the model having lain in a damp cellar for many years, had deteriorated.

5



Measuring the locomotive's tender hitch height.

6



Replacement tender in original condition.



Restored tender chassis united with its new body.

The build

The assistance of a local firm who did shot blasting was sought, who recommended a chemical treatment - which then rendered subsequent soft soldering repairs impossible! Therefore, a new body in brass of appropriate width and length was constructed, with the help of a Doncaster Works drawing dated 1882.

By this time the chassis had been dismantled and various members of the Salisbury club re-gauged the wheel sets, rebuilt the axle boxes with hinged covers for oiling and so on. New buffers were required as the original ones were of two different sizes, one in brass and the other in steel. A suitable screw link coupling was found while looking through Des's 'That will be useful one day' stock of materials. When subjected to criticism all aspiring model engineers should remember the dictum, 'You cannot beat stock' which Des's wife says should be engraved on his tomb stone! However, the 'stock' item had certainly proved fortuitous during this project.

Once the new tender body and the narrowed chassis had been reunited (photo 7), a further visit to the museum was necessary to ensure that the ride height of the tender sole plate was compatible with the locomotive's footplate - which it was!

The brass tender was sprayed using an aerosol of grey etch primer (photo 8). Matching the locomotive paint proved quite a challenge. Using a swatch a BS colour match was identified, only to find out there were several shades of the BS number and most paint suppliers used RAL numbers - so back to the museum with another swatch! Interestingly a local DIY store was able to mix the paint but we could have painted another 10 tenders with what was left - don't you just hate minimum quantities! The green and black acrylic paint was applied to the tender by airbrush (photo 9) and the tender re-assembled. Finally, GNR transfers were added to the side (photo 10).



The new body gets a coat of etch primer.



The colour coat is applied.

With the tender completed the focus was then directed to how best to display the model.

It was decided to mount it on rail tracks. A plinth was manufactured from mahogany



The completed tender.



The project team present the new tender to the museum.

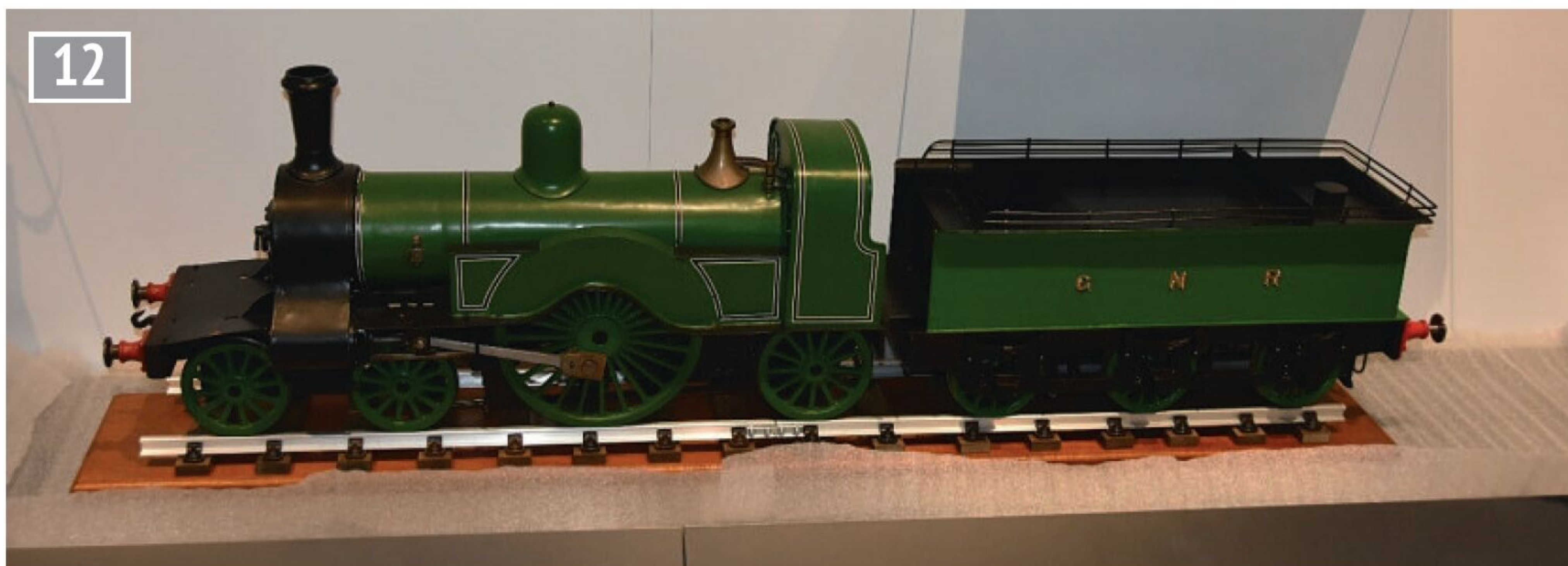
and, unfortunately, sleepers that could be purchased seemed a little out of scale. Therefore, it was decided to manufacture some from lime. It was discovered that other timbers tended to give an out of scale grain – thank goodness for stock!

The track and chairs were bought from Maxitrak and could we just say a big ‘thank you’ to the staff who kindly went through all their stock of chairs for the display track to ensure they were all black!

Delivery

On 13th February 2024 the tender was complete and finally handed over to the Salisbury Museum by four of the team involved in the project - Mike Orman, Dave Murray, Des Adeley (Project Lead) and Dave Tonks (appearing left to right in **photo 11**). The locomotive was placed in one of the new display cases in the refurbished wing of the museum for safe keeping ready to be displayed when the exhibition halls were opened to the public (May 2024).

So should you go to the museum and view the exhibit please do not criticise us for a livery. We all know that no self-respecting shed master would have allowed an express engine off shed, looking like that in the late 1800's. But at least the exhibit now looks complete and a bit of history had been preserved for future generations (**photo 12**).



Stirling Single now complete with its new tender.

ME

NEXT ISSUE

Battle of the Boilers

The famous contest, a century ago, established the supremacy of coal fired boilers for model steam locomotives.

Kinematics

We look at the relationships between position, velocity and acceleration.

BR Standard Mogul

Doug Hewson embarks on the construction of a 5 inch gauge model of a British Railways standard 2-6-0 tender engine.

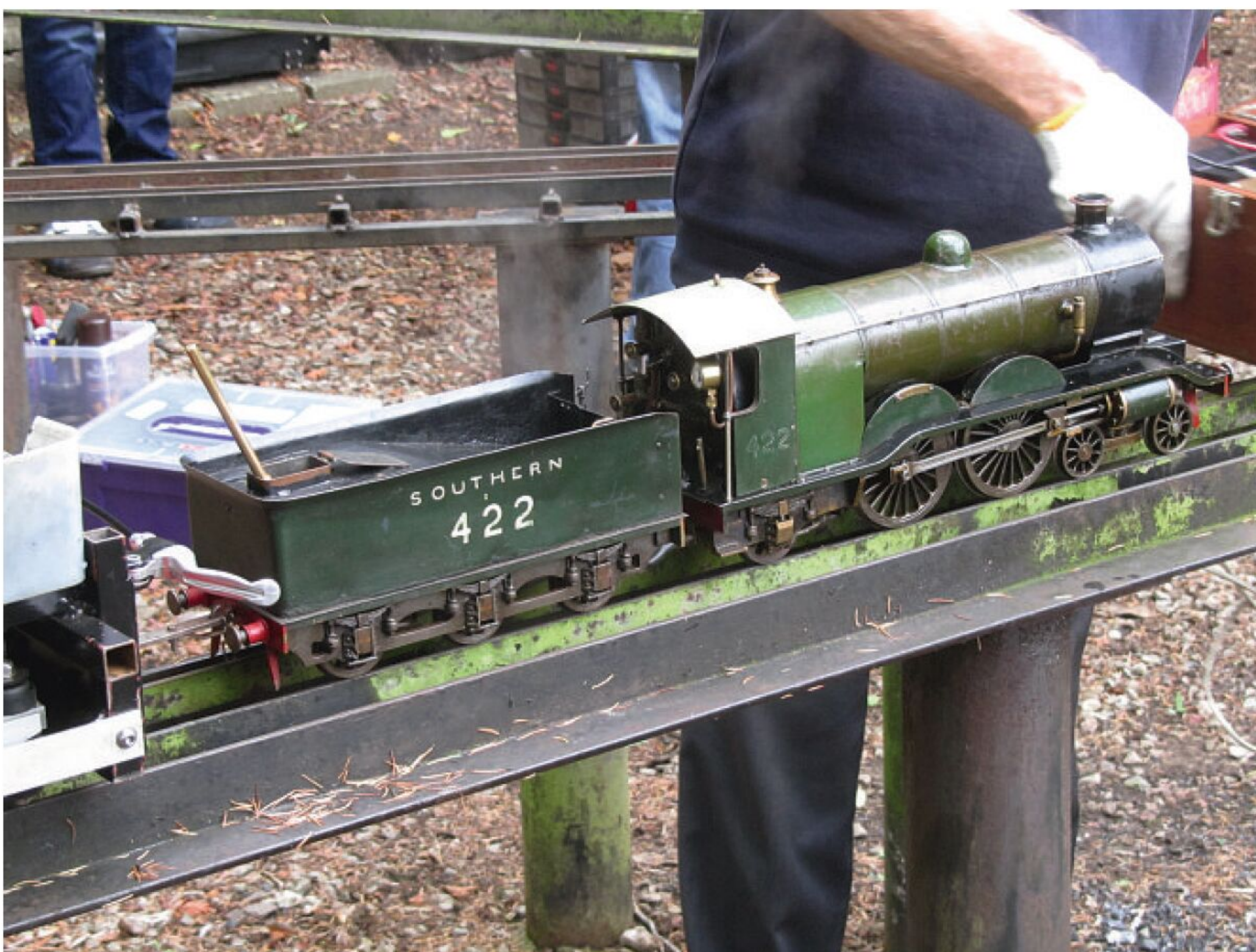
Driving trolley

Mike Joseph constructs a simple driving trolley to accompany his 5 inch gauge battery electric locomotive *Zahia*.

Publicity

Roger Backhouse reminds us that the motto *Publish or Perish* applies as much to model engineering societies as it does to scientific discovery.

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ON SALE AUGUST 23 2024

Enhanced By Vehicles PART 2

How introducing road vehicles improved a model tramway

Ashley Best realises that a typical street scene is not all trams.



Continued from p.191
M.E.4748 July 26

The limitations

The first and major problem to be solved (or avoided) concerned wheels. Here there was an interesting and very helpful fact in that many, perhaps most, of the cars in the twenties used artillery wheels with wooden spokes (**photo 9**) and the thirties manifested a change to wire-spoked wheels being almost universal.

I really didn't feel able to tackle sets of wheels with wire spokes and tyres so settled instead on artillery wheels which I decided to make from wood after failing with MDF. I found it essential to use hard, fine grain, dense timber which could be turned on a metalwork lathe (**photo 10**).

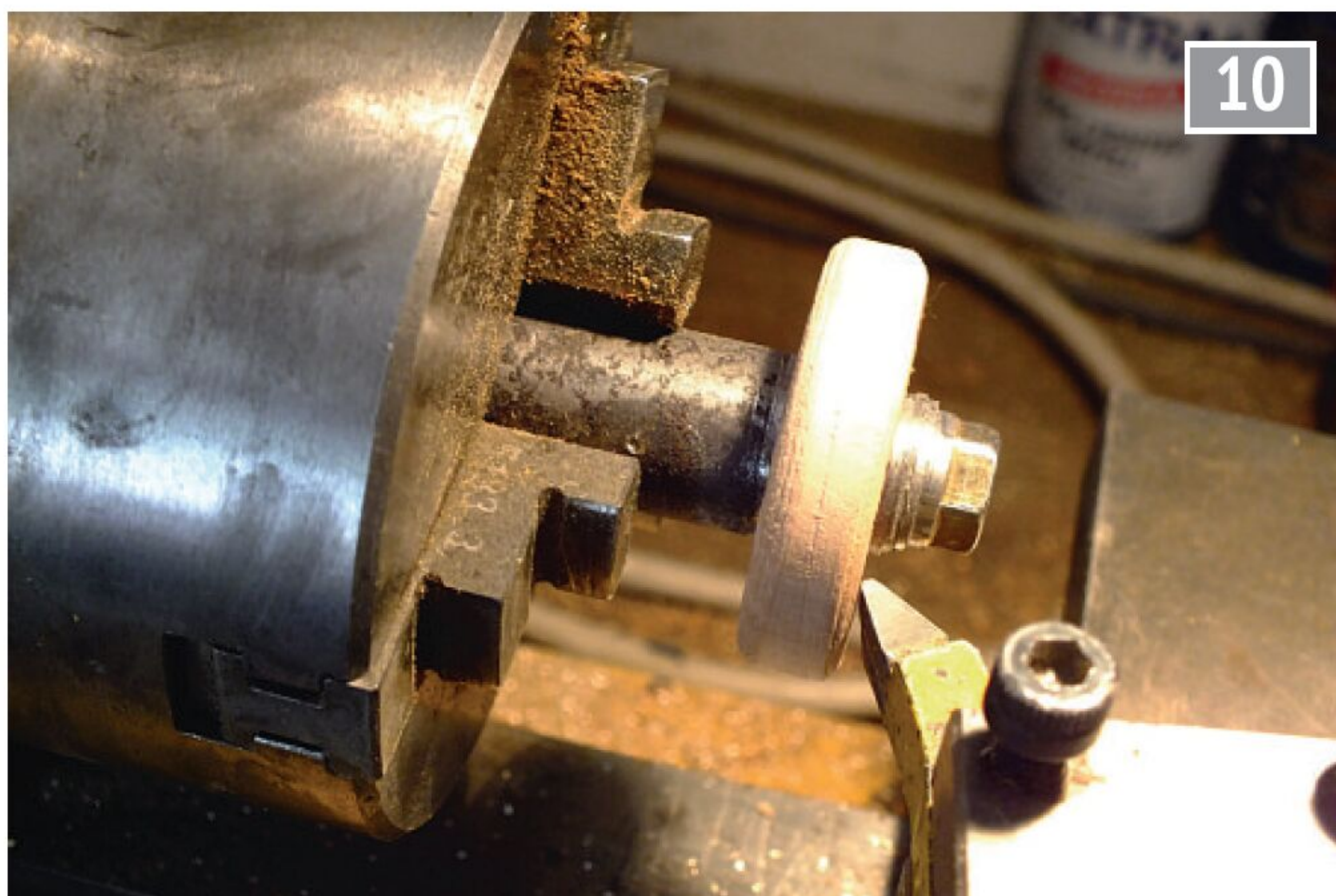
I found just what I needed from my own garden where I had cut down a large section of Prunus which is a perfect timber for the job. It is very like pear wood and there are several other suitable wood types. The blanks were cut roughly to circular of appropriate diameters, drilled with 6.25mm centre hole and



'Artillery' wheel.

then turned on a mandrel to the desired diameter and tyre profile with centres and rim included. Most of the wheels used on vehicles of the period had 10 or 12 spokes. The wheel centres were marked

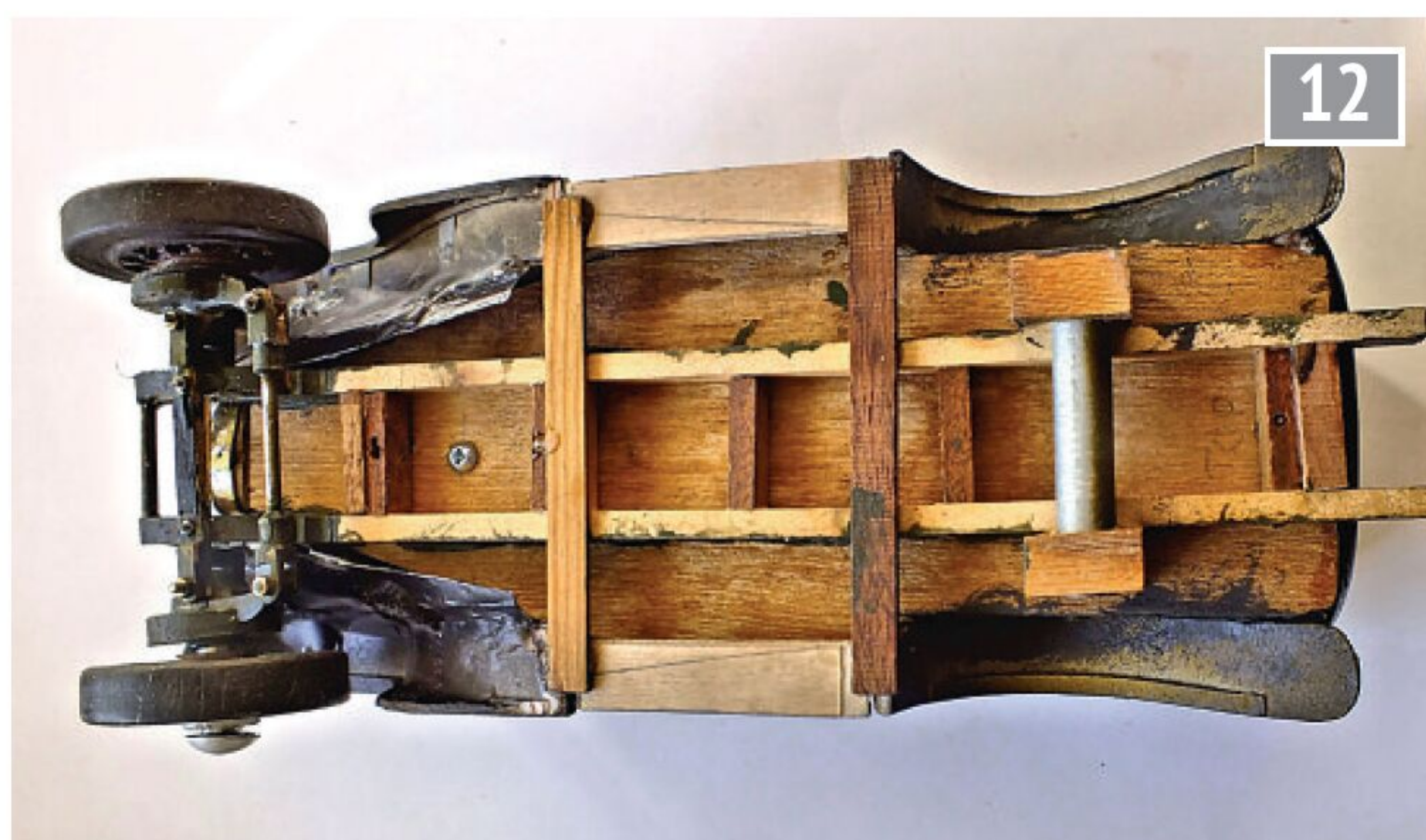
out and spaced for 10 spokes and then drilled accurately to create initial holes which could be coarse filed out leaving the spokes to be finished carefully with fine needle files (**photo 11**). This, I have to



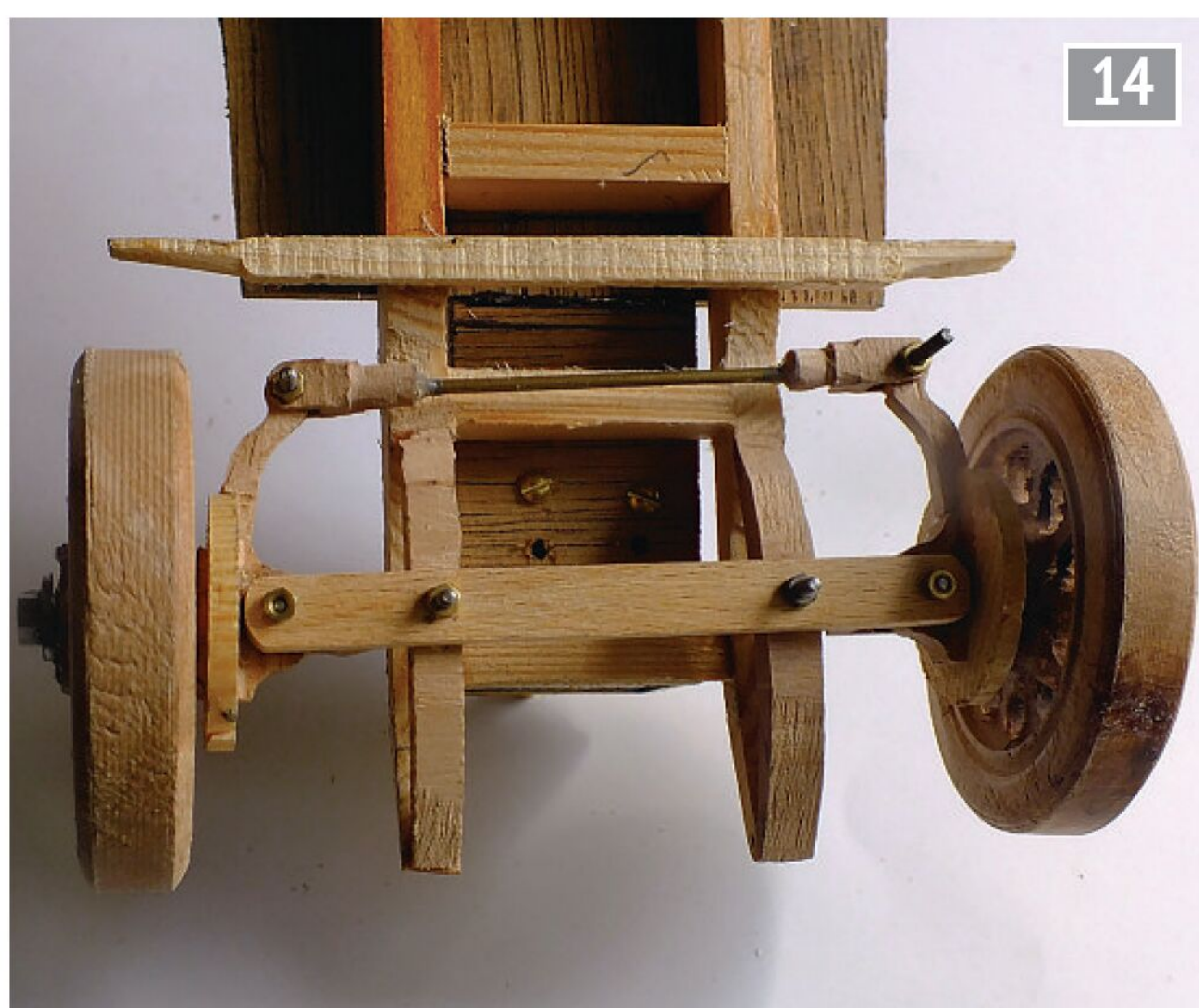
Turning a wheel.



Spokes drilled out and finished by filing.



Underside of the chassis.



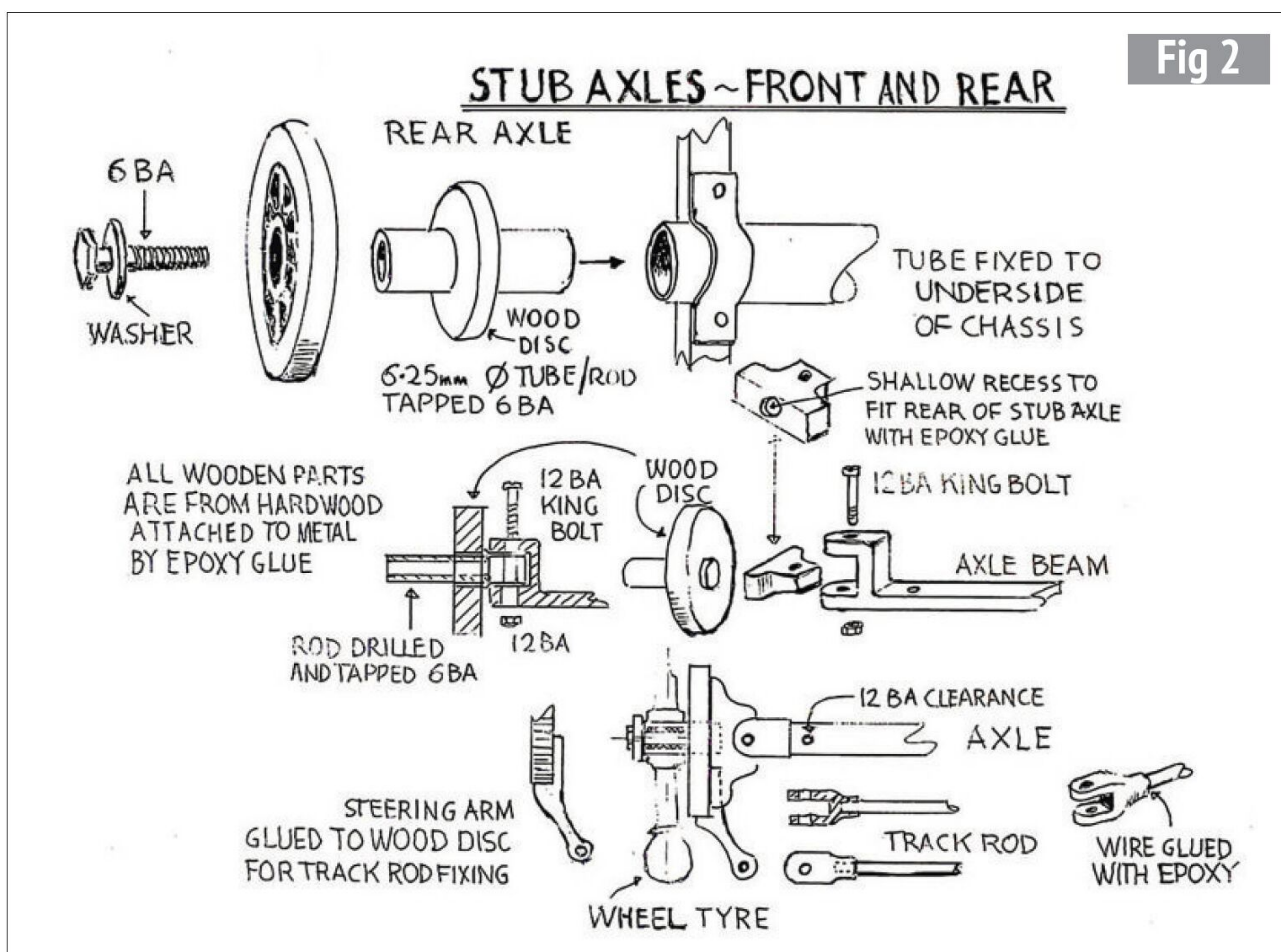
Front axle steering.



Finished vehicle obstructing tram track.



Mudguards are made from ply and aluminium.



Stub axles.

confess, is a tedious and hand straining job best done over a period of a few days.

With the wheels made, the main chassis came next. I evolved a simple design which could be used on different models. Sets of wheels were thus made and used in the same way every time. I made no attempt to make working springs as, obviously, there would be no point. The chassis of each model has the same structure and consists of two parallel beams with cross braces and a fitting at the back to hold the rear wheels (**photo 12**). At the front, imitation springs are made ready to support the front wheels on their axles. This front axle assembly is made to allow the wheels to steer, but with no connection to a later fitted steering wheel (**fig 2**). It is possible, however, to set the wheels in a steered position to create the illusion of a vehicle turning (**photo 13**). When fitted the wheels *do* turn on their axles, so the vehicle can be pushed along.

Plans

There was the usual problem of dimensioning the models correctly. In this sort of project there is no pressure to work to exhibition standard

perfection which would require exhaustive research and time. These were to be 'appearance models'. As such basic sizes such as wheelbase, height and track were likely to be the only ones existing. I always like to work from full-sized general arrangement drawings; much the same, but simpler than those in tram-making. Accordingly, I set out to produce such suitable drawings, two of which are shown in **figs 3** and **4**.

Steering and mudguards

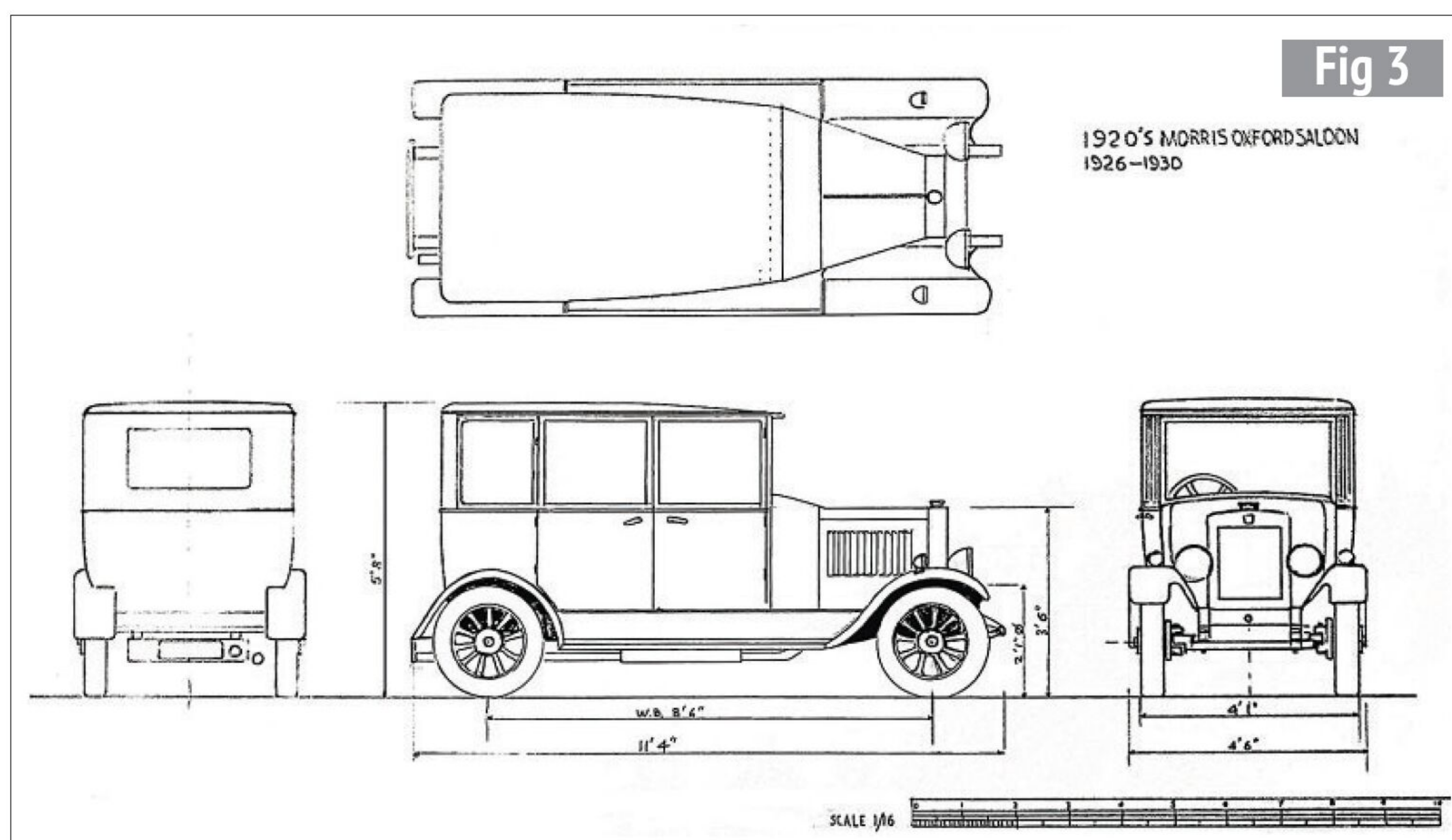
Front axle steering is made as a complete assembly and then fitted and secured by screws passed through the bottom leaf springs (**photo 14**). I left the final fixing to the end as removing the wheels - front and back - during construction has to be done regularly.

Mudguards are made by laminating three pieces of 0.9mm ply on a former using PVA glue, clamping and drying for at least 12 hours. This applies to both front and rear mudguards. On the inner sides of the front guards, after a paper pattern has been made to the correct size, thin metal, in this instance aluminium, cut to the profile was carefully fitted and glued with quick setting epoxy (**photo 15**).

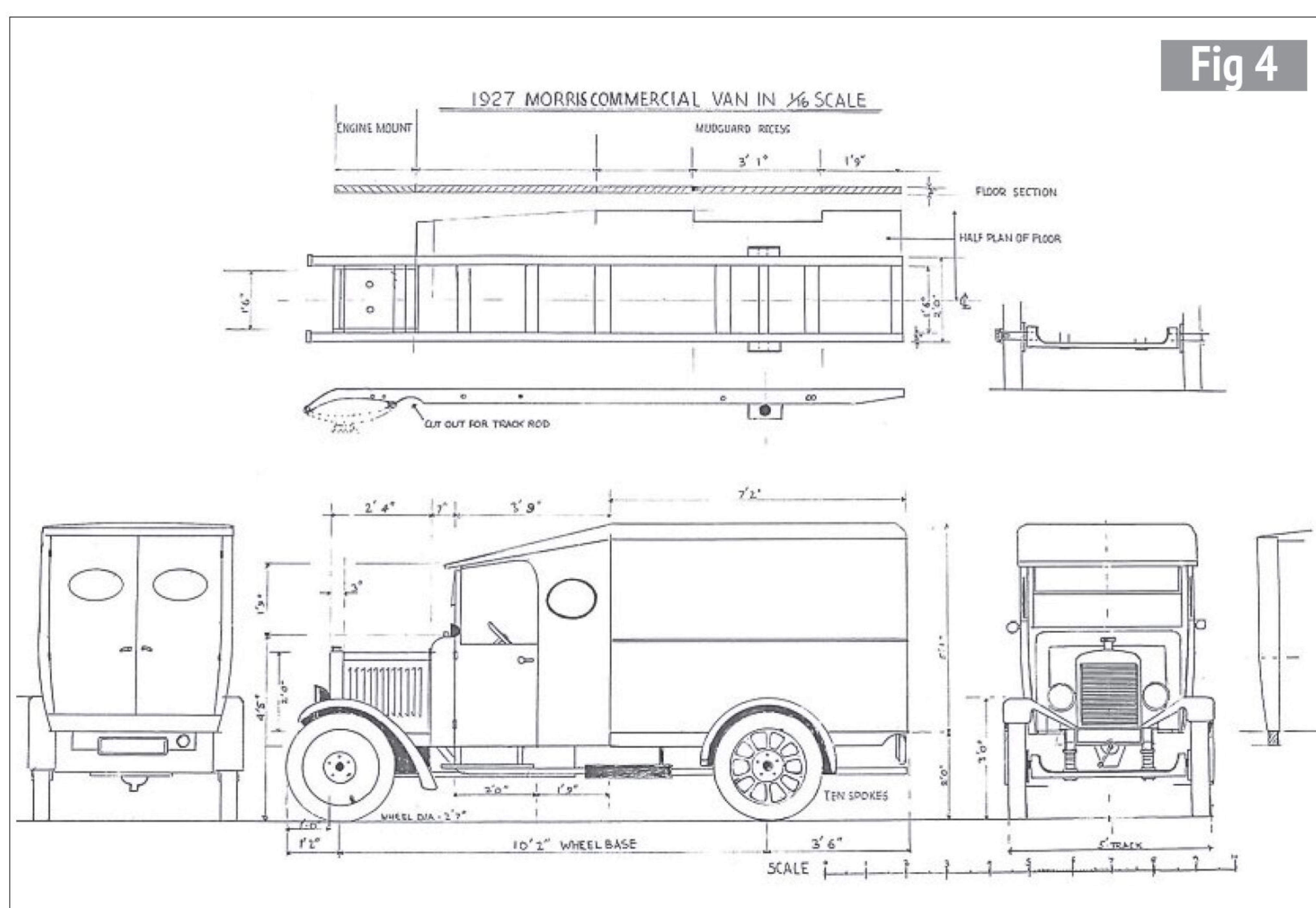
The undersides, which are invisible, were then strengthened with aluminium gauze and more epoxy so this thickening can be quite robust. Any extra curvature and thickening can be built up with Milliput and filed to shape later. It would be possible to make a hardwood former and carefully planish shim brass or aluminium to the compound shape of the front mudguards, but for these models, not fully detailed exhibition efforts, the time and effort was thought unnecessary. The chassis, complete with wheels, next needed to have the bodywork floor fitted. This was cut from 4mm ply following a paper pattern (**photo 16**).

Engine and scuttle

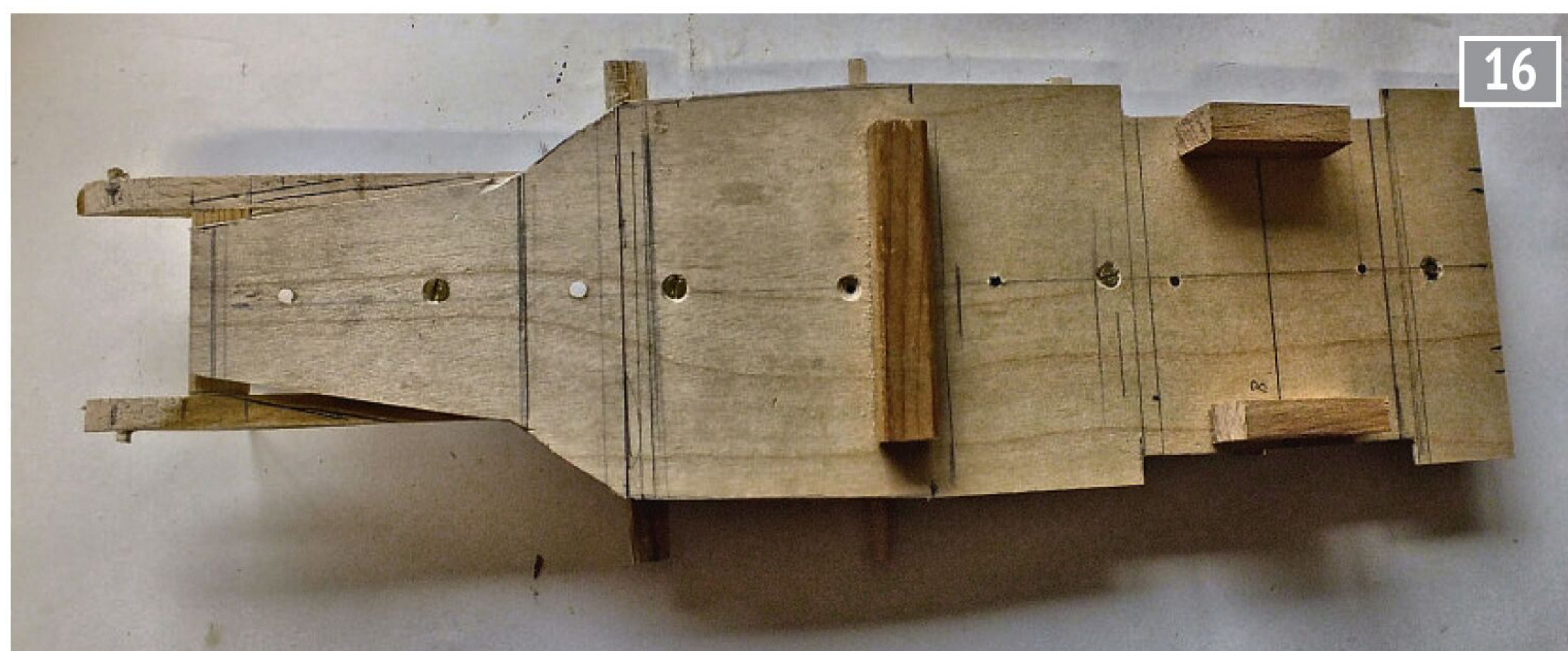
The engine compartment is a prominent feature of any



Morris Oxford saloon.



Morris Commercial van.



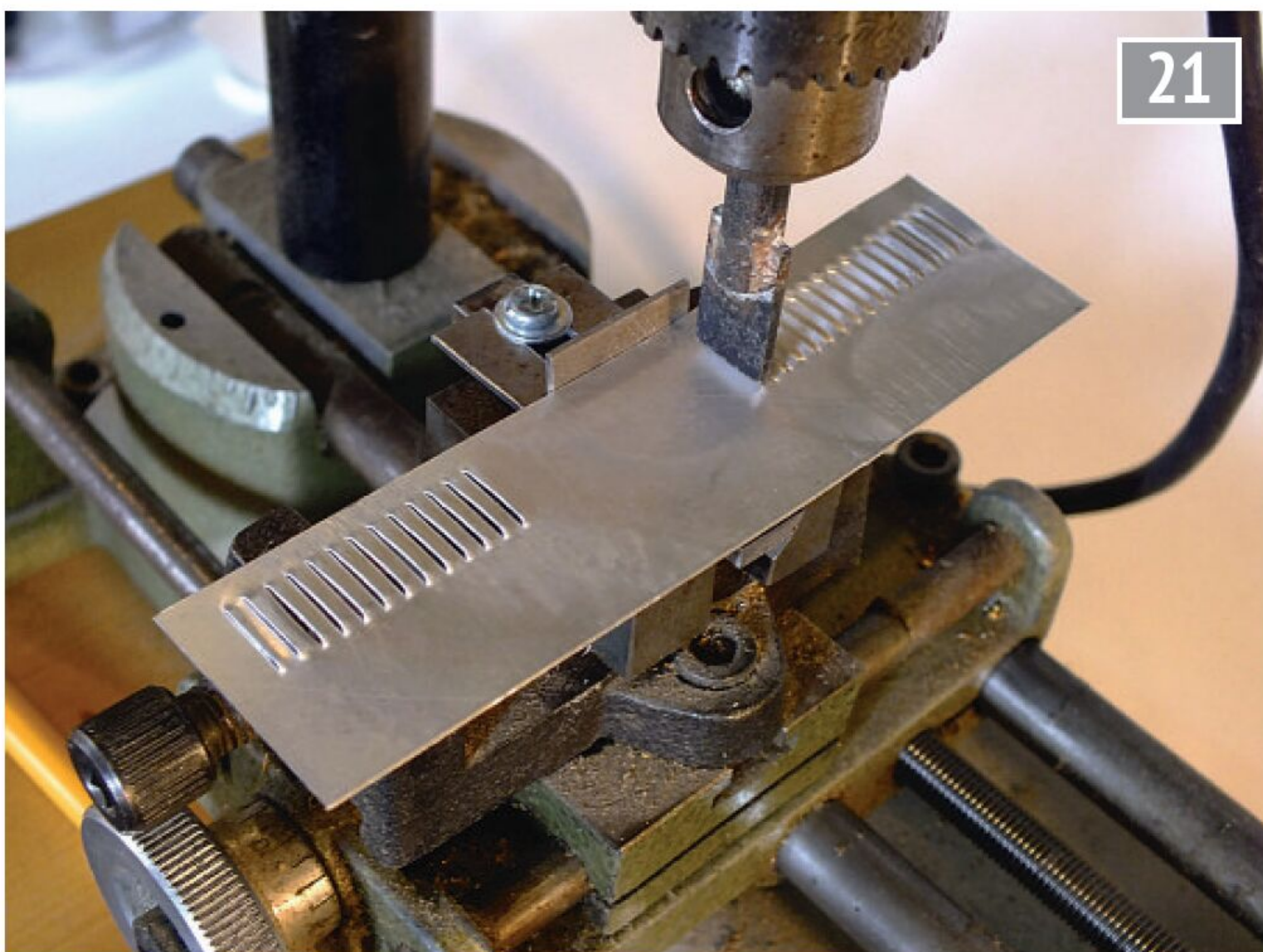
Floor attached to chassis.



Morris Commercial lorry.



Aluminium bonnet and scuttle shaped over a former.



Louvre press tool.

car or van. In many early vehicles such as the Morris Commercial lorry (**photo 17**), it was a parallel-sided item but in later models, there was a taper running back to the

saloon width at the windscreen (**photo 18**). I made these parts from solid wooden blocks cut and sanded to the desired profiles, then clothed with sheet aluminium or brass



Tapered engine compartment.



Louvred side panels.



The completed bonnet and scuttle.

shim panels (**photo 19**). The side panels feature ventilation louvres (**photo 20**) and for these I made a press tool to stamp them (**photo 21**). I found this worked well but aluminium

was a much better material than brass. The metal cladding was fixed with epoxy glue (**photo 22**).

●To be continued.

Geoff Theasby reports on the latest news from the clubs.



Rejoice, for the wanderer is returned! I don't know where he went but Debs and I took our annual visit to the lands of my forefathers, Iceland and the Faroes, in the good ship *Bolette*. Plenty of low cloud and cold but we saw whales and dolphins and a few cruisers got the classic picture of a whale diving under their boat, its massive tail flukes dwarfing them.

In this issue: I see no locomotives..., send a gunboat, great seamanship, a windmill, disastrous locomotives, damaged goods and wrecked goods.

The fire station visit denoted in M.E.4747 also had on show this Polaris Ranger, which can travel over rough terrain and moorland. It has a demountable pump to get close to the event (**photo 1**).

W. www.polaris.com

This flat bottomed boat can reverse its rear ramp into a doorway and help rescue people from flooding without even getting their feet wet (**photo 2**).

On the motorway, a sight to gladden Jeremiah Clark's heart. A matching pair of orange Caterham Sevens being overtaken by a McLaren



Polaris Ranger fire service open day.

600 LT. Some miles down the road, a car darted in front of a lorry, causing the driver to drop the anchors, which everyone around him also did, but nothing happened and the miscreant got away with it.

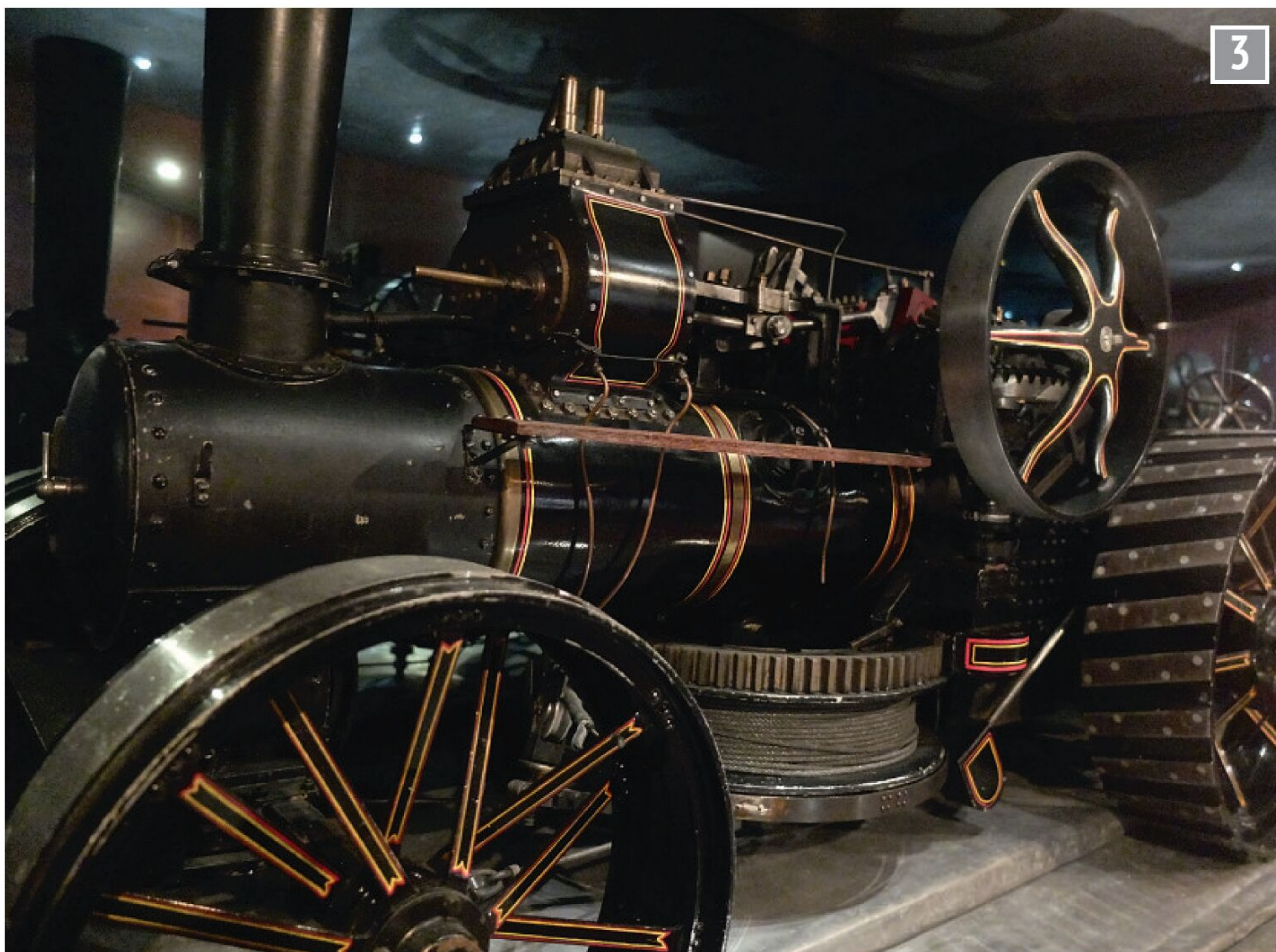
Guildford MES is holding a Gala on 6/7th July, notified too late for this column. However, they are holding an Open Day in September and readers may care to note this revised date. The original conflicted with another event in the park so the date was changed to 22nd.

Regarding a note hidden behind a desk at **Reading SME**, John Billard writes, 'This was about two disastrous Scottish

4-6-0 designs - the 956 Class of the Caledonian Railway and the River Class of the Highland Railway. The big 956 engines were a total flop (in the words of eminent railway writer O S Nock) and the River Class never ran on the Highland despite the five locomotives having been built for it. What was wrong with the 956s? Everything. Designed by William Pickersgill there was poor boiler design and steam circuit, an ineffective superheater, a grate and ashpan that clogged up quickly and a derived valve gear between the frames that was an engineers' nightmare. Made for the heaviest



Flat bottomed rescue boat same location.



Fowler BB1 on display in cruise ship.

Aberdeen expresses their fastest recorded speed was 65 mph and the sound they made was a cacophony. Built in 1921 they were scrapped by 1935 having been used only on goods trains. What was wrong with the River Class? Nothing. The designer Frederick Smith had a major falling out with the civil engineer who immediately banned them as being too heavy for the line. Smith then resigned and the engines were sold. Why the desk? RSME member Peter Venn had recently inherited a desk that revealed, stuck behind a drawer, personal information about Smith and details of how he tried to dispose of the engines that was not preciously known to the National Railway Museum. Ironically, Smith's weight calculations for the River Class were later found to be correct and they returned to the Highland line after it had become the LMS in 1923'.

Halesworth & District MES, summer *Newsletter*, carries a cautionary tale from Ken Hutchinson, about buying a steam engine sight unseen. It arrived in a cardboard box with no packing whatsoever, on a plywood base, and

several items were damaged. He rebuilt it on an aluminium baseplate, replaced damaged pipework, and produced an engine its original builder would have been proud of. LOWMEX, possibly the finest model exhibition in the East of England, it is claimed, will be on 3/4 November. Kevin Rackham writes on the visit by Ipswich SME, a repeat, as the last was some years ago and relationships did not seem cordial. This year all attendees got on like a house on fire, making the event most

enjoyable. Gary Edwards writes on dyslexia, only a short article, but it caused the editor's spell-checker no end of confusion, and it took much longer to proof read than other items... (I know how he feels – Deborah Theasby). Clive Randlesome bought a twin bogie shunter of no fixed design and rather tatty within. It was rebuilt in a centre-cab design and painted red and white in the North American style.

W. www.hdmes.co.uk

Contrary to my expectations that there were no locomotives

in Iceland, I found three! One was a model of a Fowler BB1 in a display case on the ship. It was beset by spotlights, which caused reflections all over it, Only by getting really close to the curved glass panel could I eliminate them (**photo 3**). Another was outside the Folk Museum in Reykavik but the bus didn't stop and I found a model of this locomotive in the Maritime Museum. These two locomotives were imported from F. Jung in Germany for the Minør railway, building or extending Reyjavik harbour and named *Minør* and *Pioneer*. Both have been preserved, making Iceland the only country in the world to have preserved 100% of its steam locomotive fleet (**photo 4**). Much of Iceland's maritime industry covers the three 'Cod Wars' with the UK and pride of the museum is the gunboat *Odinn*, which took part. Tours around the ship were highly interesting, to me particularly in the radio and radar equipment. The disagreement was over the extension of Iceland's fishing limits to 200 miles, to which the UK objected on behalf of the UK trawlermen. By dint of daring and supreme seamanship by the Icelandic ships the conflict was settled without bloodshed. (I was a supporter of Iceland at the time, as protecting some of the fish species was not going well and in danger of being wiped out.) This beast was parked outside the fire station (**photo 5**). A cruise ship also



Folk Museum locomotive.



Emergency vehicle.

needs to have a good and well trained crew, because they may have to get the ship in and out of the less well-travelled ports, often without tugs to assist. Indeed, our visit to Klaksvik was called off as adverse winds meant we could not use the harbour. The call at Torshavn was accomplished very neatly in the small harbour, which was dwarfed by our 62,000 ton vessel. This included turning the ship on its vertical axis and backing into our berth. I found the ship's officers having lunch near our table, so I conveyed my congratulations to them in person. In Seydisfjordur, a small technology museum was 500 metres away. It had recently been hit by a landslip, which caused major damage. This tractor was presumably damaged at the time and also a lathe which I could not trace, although it had a ID plate with the name of a Danish equipment dealer (photo 6).

Whistlestop, spring, from **Hereford SME**, informs us that the boating lake was reserved

for junior members' radio control. Phil built a replica of the *SS Politician*, of 'Whisky Galore' fame (*Cabinet Minister* in the film - she ran aground off Eriskay in the Hebrides, carrying 20,000 bottles of Scotch). The recovery of this cargo tested the ingenuity of the residents and the Customs and Excise. The ship was blown up to prevent further illicit attempts. (Reminds me of an acquaintance who was given some bottles of spirits. A teetotaler, she poured them down the sink, whereas the sensible course would have been to give it to someone who would appreciate the gift.) Editor, Martin Burgess, has acquired a milling machine and a conundrum. That is, how do you move a half-ton machine through a doorway which is too low, too narrow and deeper than the mill. Richard Dobson investigated windmills. Near an event involving his wife's activities (handbells) he discovered a 6-sail windmill, at Heage, dating from 1797.



Ruined tractor.

John Townsend builds on his item in the autumn *Whistlestop*, about railway points, illustrated with pictures taken at various locations, mostly used by ex-quarry locomotives. He showed more stub points, often changed over with the assistance of the Mk 1 safety boot. Gerry Harrison visits the Spa Valley railway and John Plumb saw a Shackleton being rebuilt at Duxford, by the IWM. He mentions the joke about its noise levels and the fact that it has been described as '100,000 rivets flying in close formation'. (I always liked the 'Shack', one of my favourite aircraft, which I saw at Newark Air Museum, next door to Hamfest.) Their last duties in active service were as maritime patrols and early warning. They were fitted with the AN/APR20 radar, which began life in 1945 and, subsequently, the Fairey 'Gannet', before the Shackleton. They were unofficially named after characters from the children's tv programme *Magic Roundabout*. Being called Brian in use is not too bad, neither is Dylan, but Ermintrude? This activity began when *Zebedee* was allocated to VP293 as the 'Shack' had a tendency to bounce on landing. A cautionary tale from John Goodwin concerns assisting the surveyor when laying out for a factory chimney base pad, when he made a fundamental mistake in ignoring the red numbers on the levelling staff!

W. www.hsme.co.uk

The **Gauge 1 Model Railway Association N&J** arrives. Editor, Rod Clarke remembers when he hit the big time, as editor, for one issue only, of the City University's *N'ion Weekly* student mag. Later, in 1961, attending a journalists conference, interested parties were invited to see the presses of the Daily Mirror at work. They arrived to see only three words on the first page - 'Man in Space'. This was Yuri Gagarin. Drama of a high order! Another in the series of themed issues, this time relating Issue no 282 and 'Mikado' locomotives. The name appears to have been coined in 1897 when a

3 foot 6 inch gauge line was being built in Japan, when there was great popular interest in all things Japanese. Andrew Giffen built three Beyer-Garratts. Since beginning the series, eight more locomotives have been built, including three Garratts. Dick Moger built a Gresley P2 'Mikado', *Wolf of Badenoch*, including the Bugatti nose, although it is hard to get right. Another comprehensive paint colour checklist is the longest yet, I think, over 30. An understandably anonymous member writes on buying locomotives at auction and the pitfalls in doing so, detailing several locomotives and the faults he found. Bob Whitfield assisted with taking the portable track 'Stanley Midland' to the Statfold Barn model railway show. Andrew Pullen has died. Unusually, there are seven appreciation orations/obituary notices. The letters page concerns itself with radio control. Finally, lots of trade adverts suggest G1 is alive and well.

W. www.g1mra.com

The **Gowrie Locomotive Trust Newsletter 18, Spring** is here, amounting to 44 pages. An appeal for the boiler funding has begun. The cylinder and steam manifolds have been cast, so the assembly of the power bogies will soon be possible. The material for these items is old car brake discs, thus the high quality chemical composition is known and Alan Freebury was at the foundry to watch them being cast. Alan also details the other ongoing projects, including separating the wheel sets from the old chassis, and the seized pistons. Ed Hollis writes on other single Fairlie locomotives. There were 215 manufactured in all, now only three exist.

W. www.gowrielocomotivetrust.com

And finally, how many surrealists does it take to change a light bulb?

Two, one to hold the giraffe, and one to fill the bath with brightly painted bicycles.

ME

Club Diary

10 August 2024 – 5 September 2024

August

10 Canterbury and District MES

Open day for visiting clubs.
Contact : secretary@cdmes.org.uk

11 Sutton MEC

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

11 Westland and Yeovil MES

Running the track at Yeovil Junction – Steam Train Day and Steam Punk. Contact : Michael Callaghan, 01935 473003

13 Westland and Yeovil MES

Running the track at Yeovil Junction – Diesel Day. Contact : Michael Callaghan, 01935 473003

16 Rochdale SMEE

Quiz. Castleton Community Centre, 19:00. See www.facebook.com/RochdaleModelEngineers

17 Maidstone MES

Open Day at Mote Park.
Contact : secretary@maidstonemes.co.uk

17 Westland and Yeovil MES

Public running day. Contact : Michael Callaghan, 01935 473003

18 Bradford MES

Public Running Day. Members from 11:30, public from 13:30 to 16:00, whatever the weather, Northcliff. Contact: Russ Coppin, 07815 048999.

18 Cardiff MES

Steam up and family day at Heath Park, Cardiff. Contact : secretary@cardiffmes.co.uk

18 Guildford MES

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

20 Westland and Yeovil MES

Running the track at Yeovil Junction – Diesel Day. Contact :

Michael Callaghan, 01935 473003

22 Sutton MEC

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

25 Westland and Yeovil MES

Running the track at Yeovil Junction – Steam Train Day.
Contact : Michael Callaghan, 01935 473003

25-26 Cardiff MES

Open Day at Heath Park, Cardiff. Contact : secretary@cardiffmes.co.uk

27 Westland and Yeovil MES

Running the track at Yeovil Junction – Diesel Day.
Contact : Michael Callaghan, 01935 473003

29 Guildford MES

Open day, 10:00-13:00. See www.gmes.org.uk

31 Westland and Yeovil MES

Track running day 11 :00.

Contact : Michael Callaghan, 01935 473003

September

1 Cheltenham SME

LBSC Memorial Bowl. Contact: csme@cheltsme.org.uk

1 Westland and Yeovil MES

Running the track at Yeovil Junction – Steam Train Day and Snakes & Bugs. Contact : Michael Callaghan, 01935 473003

4 Bradford MES

Meeting: 'Talga - Rolling Stock Manufacturer' by Colin Smith, 19:30, St James' Church, Baildon, BD17 6HH. Contact: Russ Coppin, 07815 048999.

5 Sutton MEC

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

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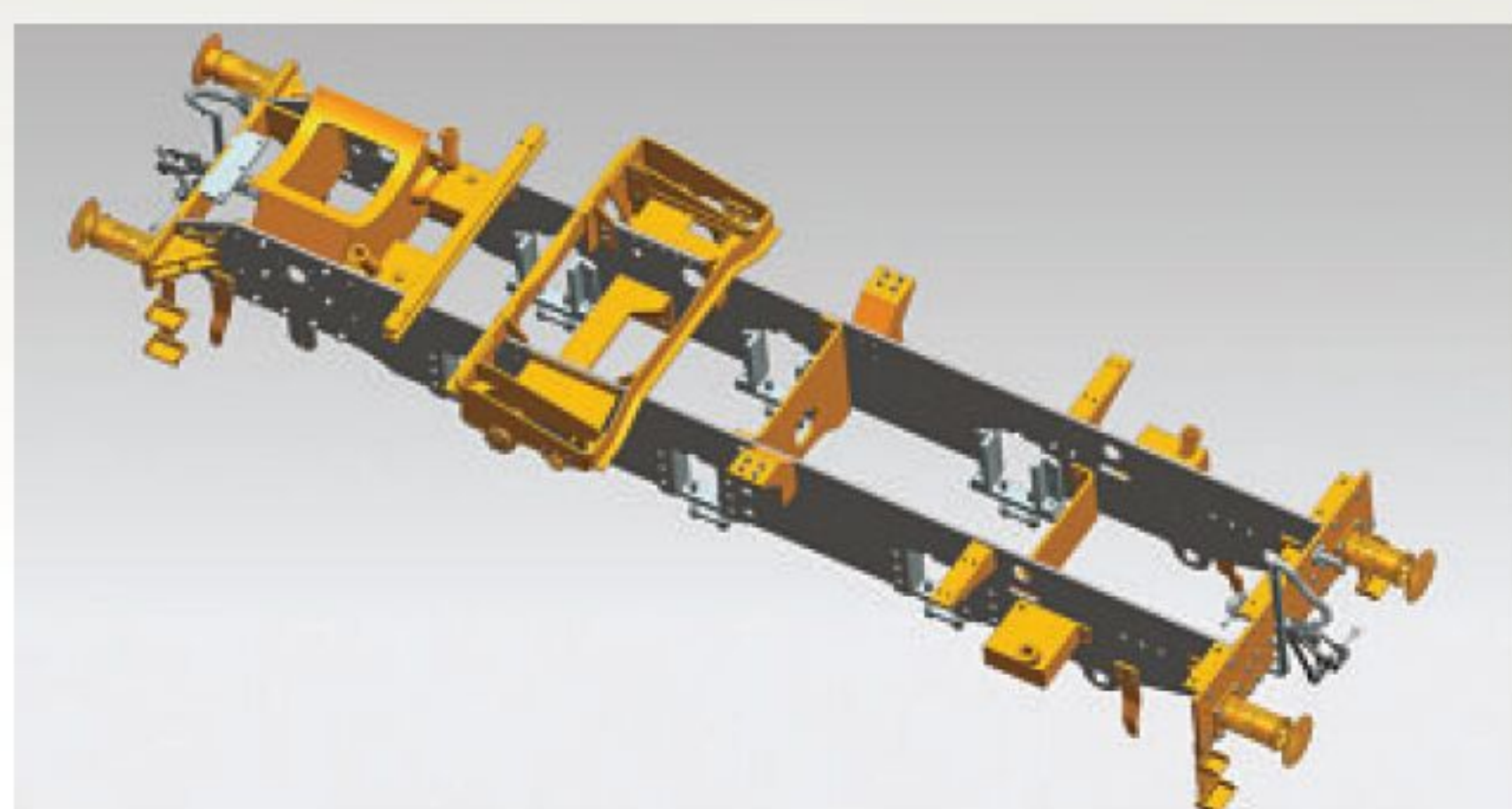
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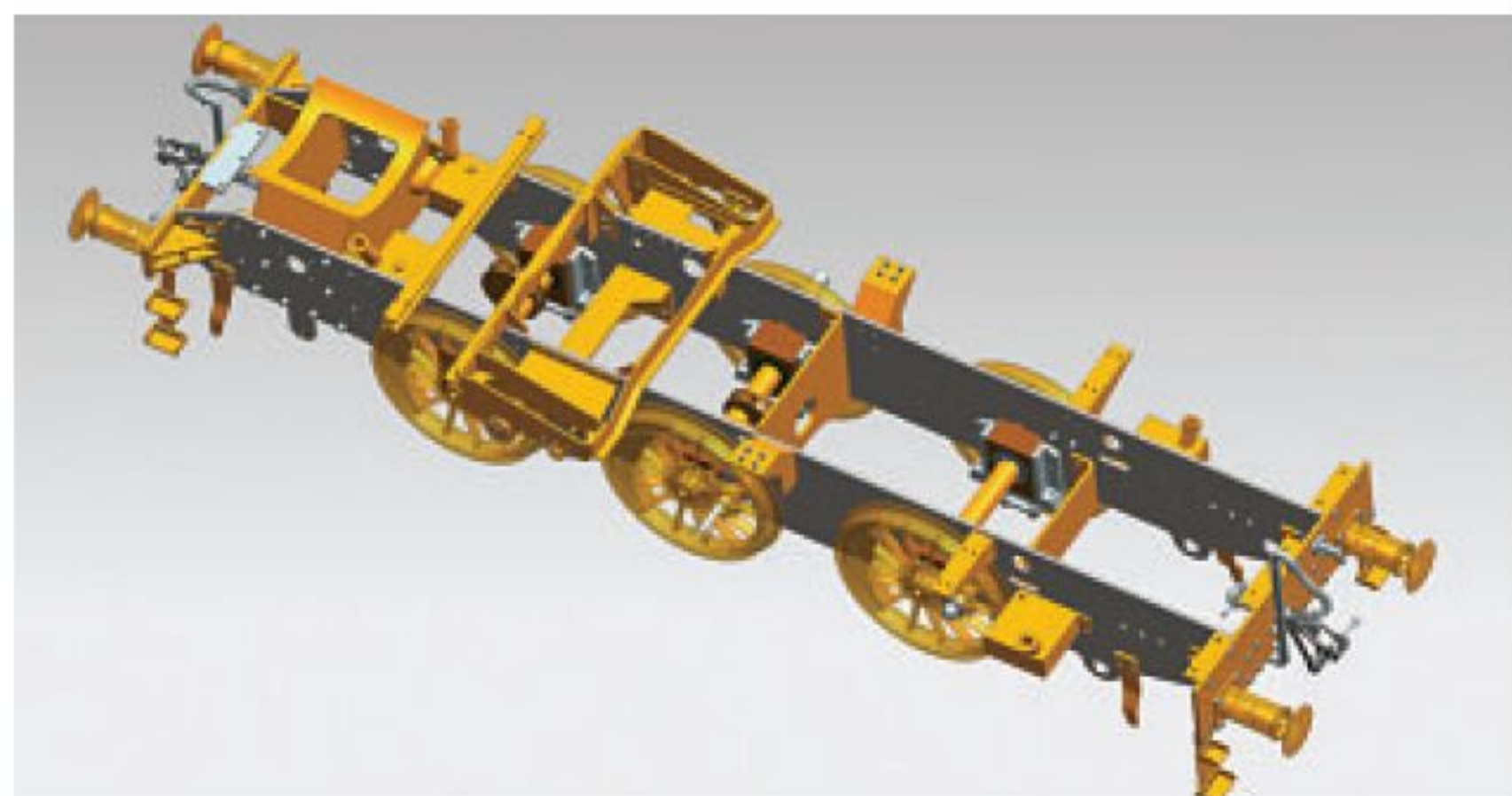
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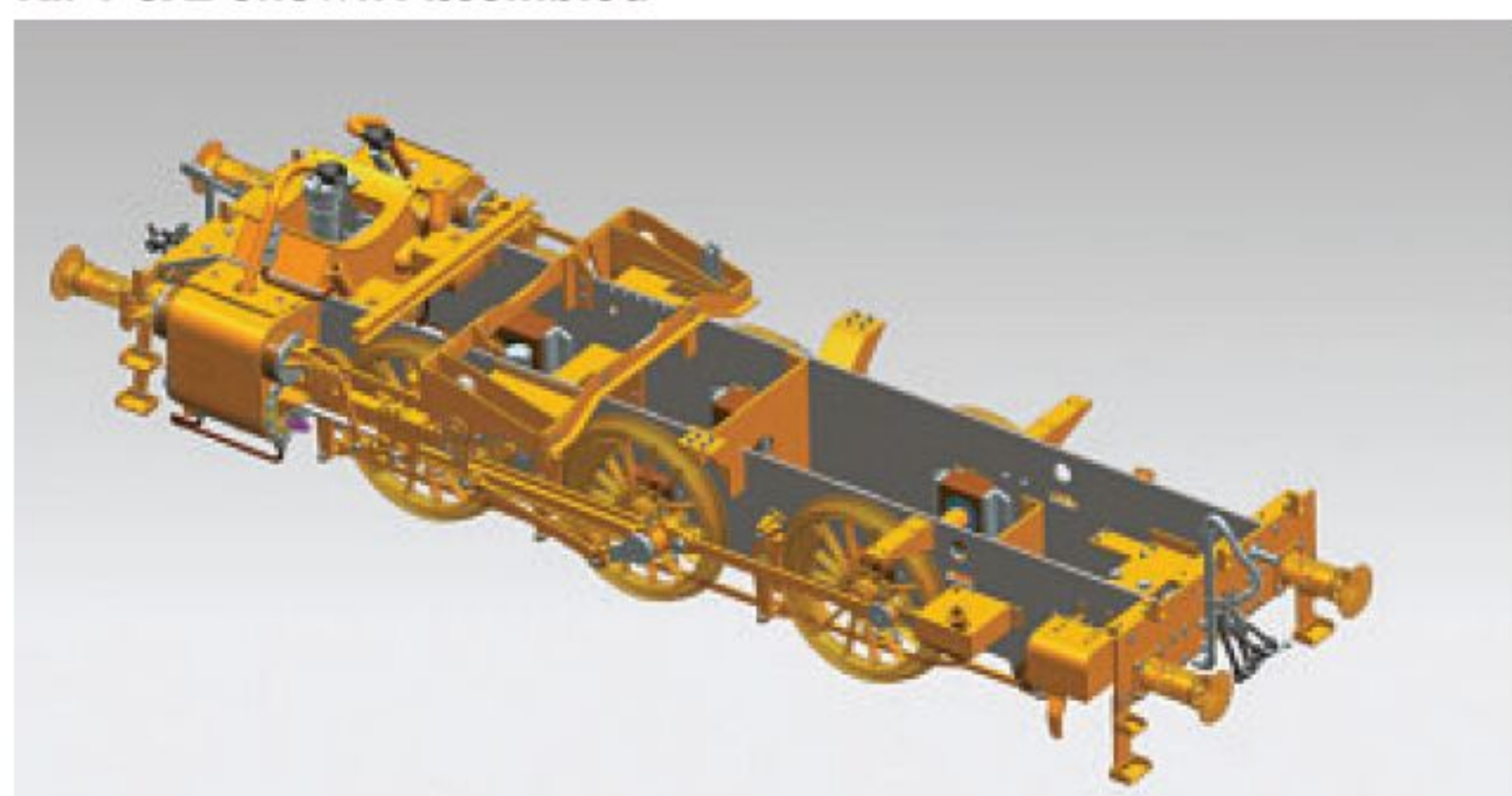
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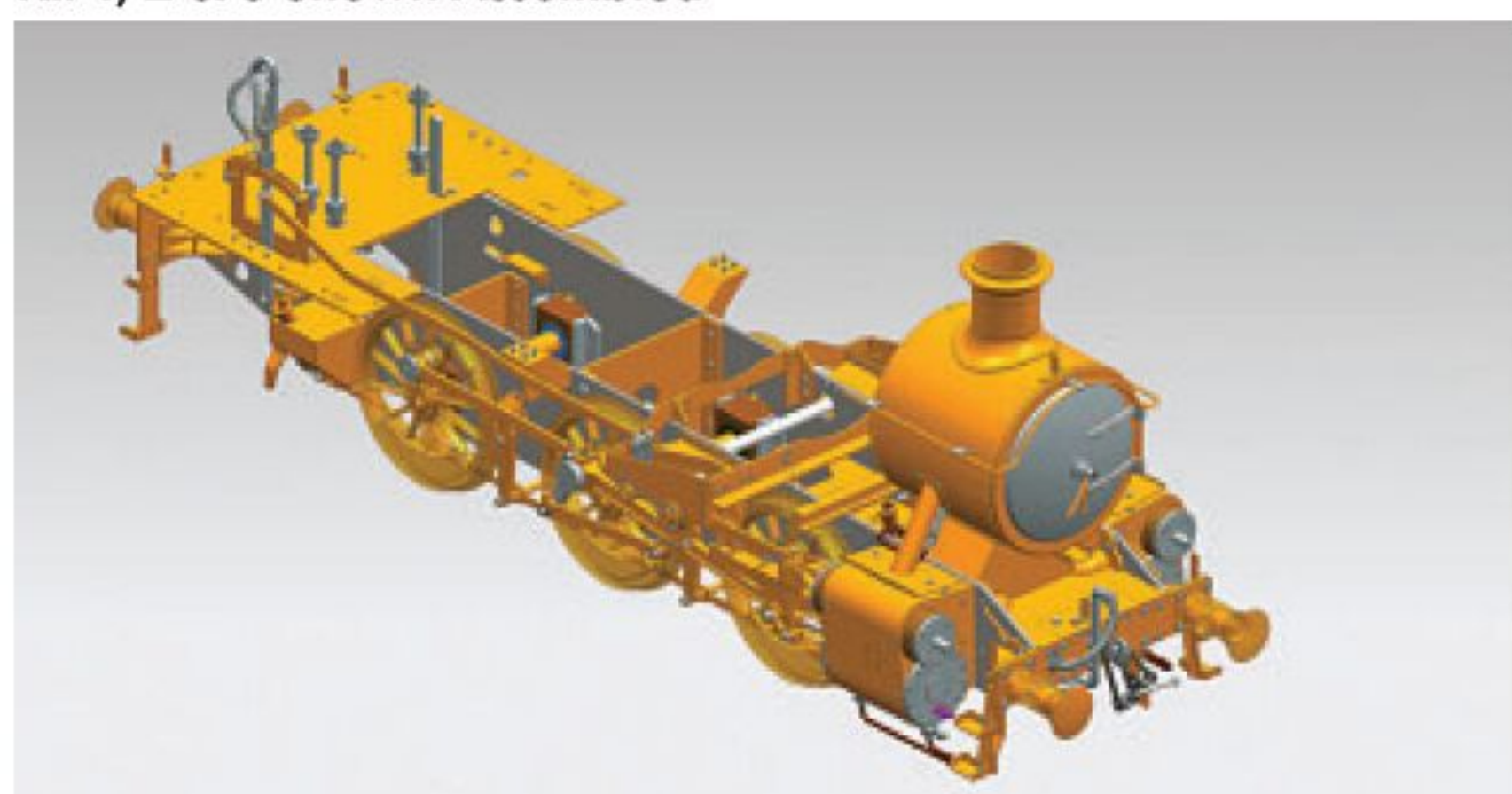
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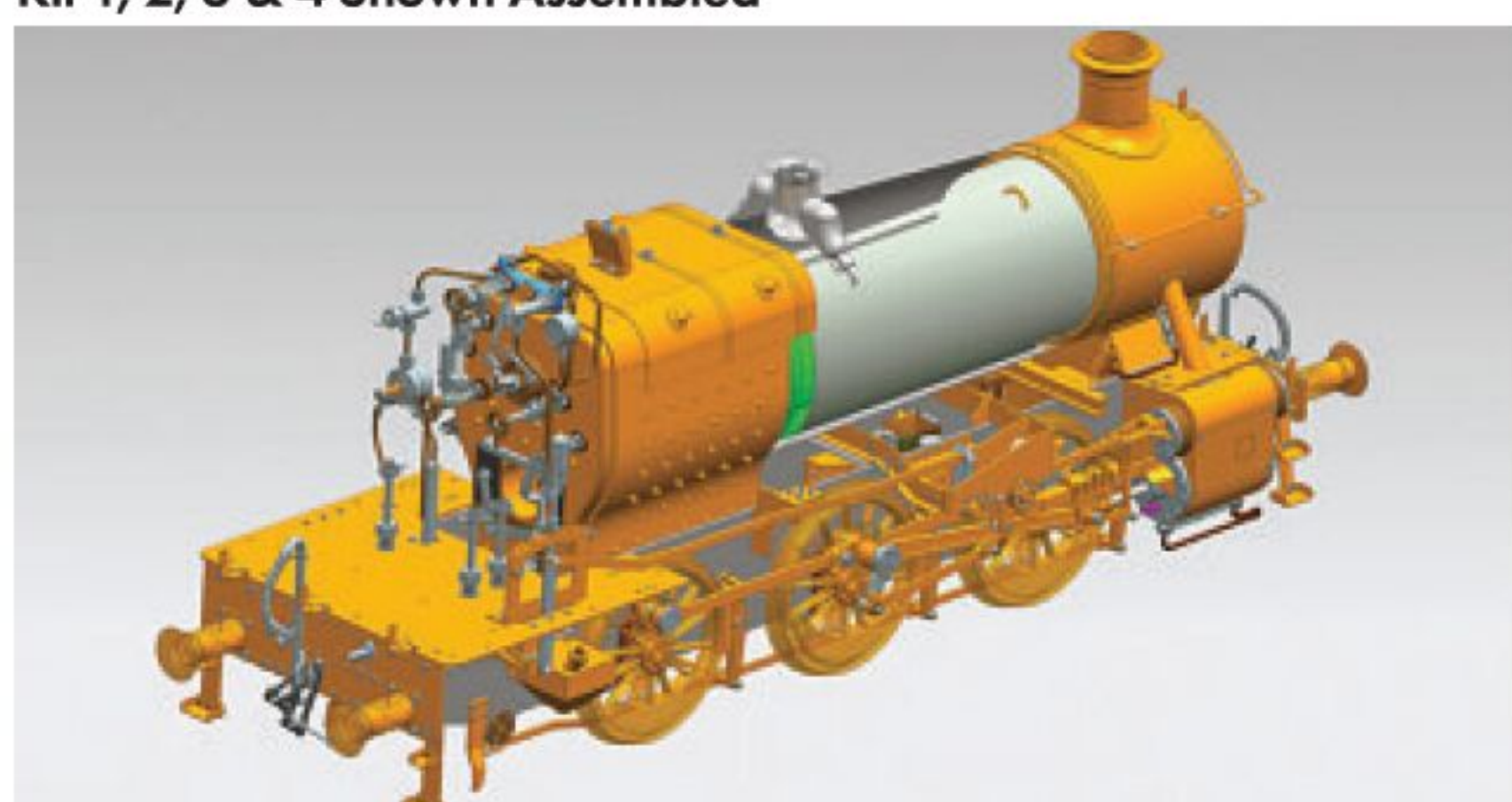
Kit 1 & 2 Shown Assembled



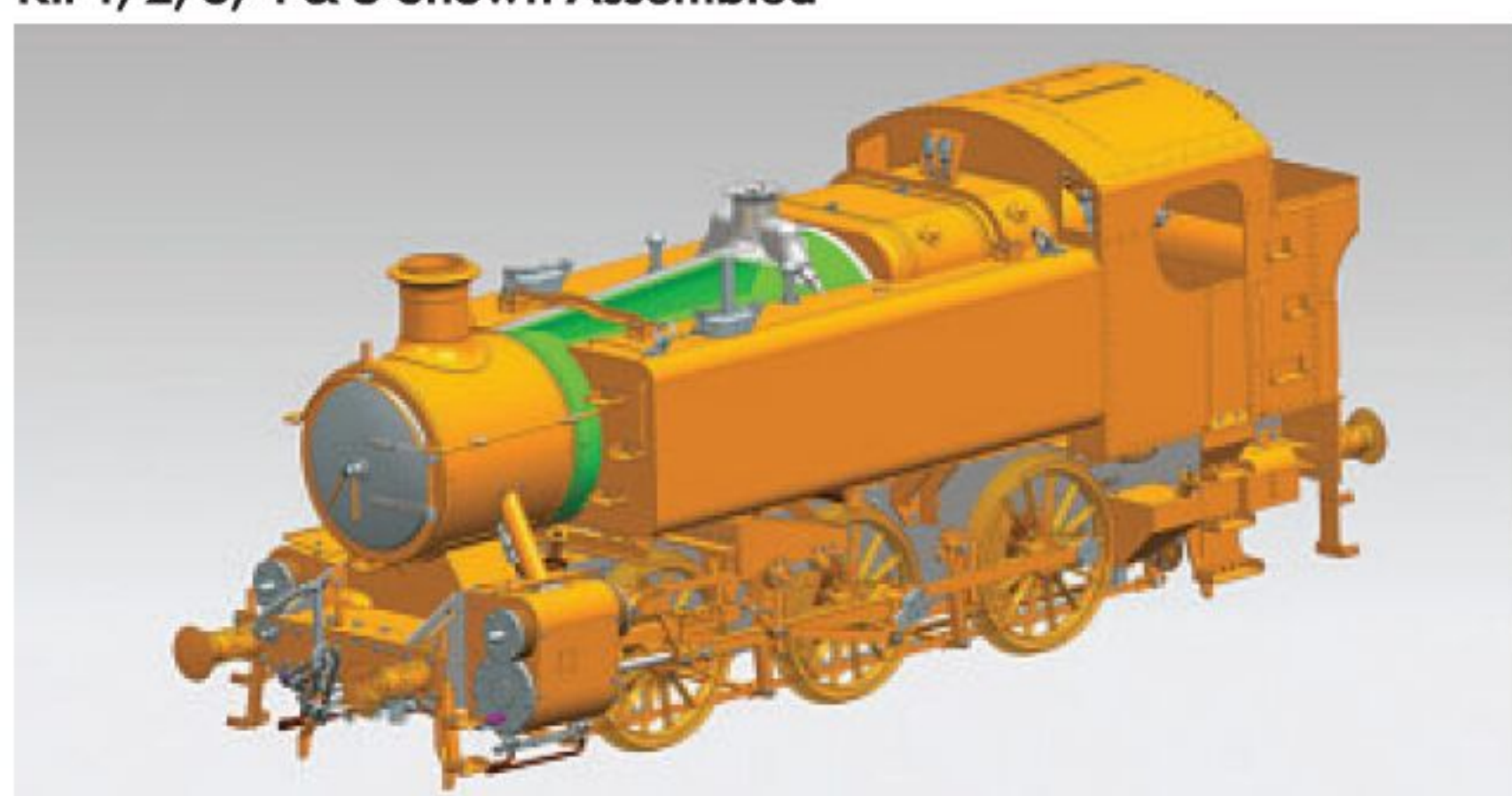
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Kit 1, 2, 3 & 4 Shown Assembled



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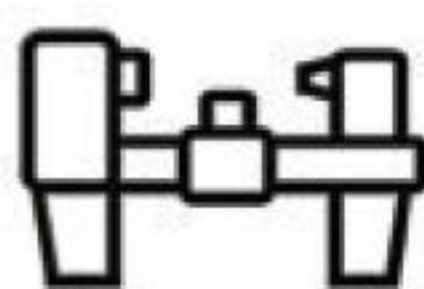
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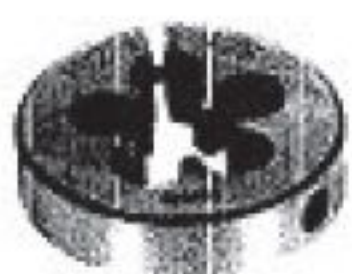
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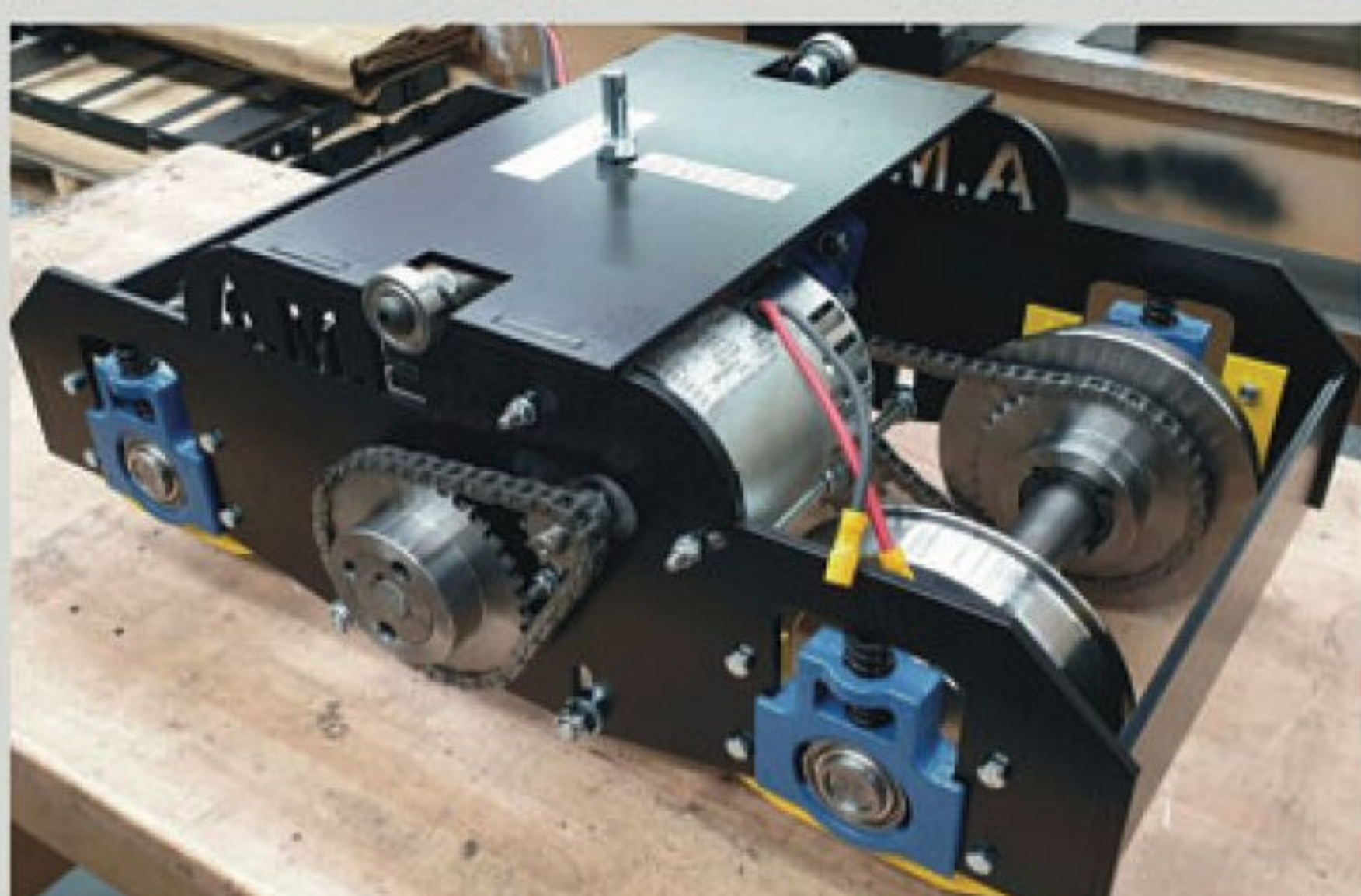
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