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IN THIS ISSUE

Vol. 219 No. 4572 27 Oct - 9 Nov 2017

ON THE COVER...

No apologies for featuring this beautiful example of LBSC's Jenny Lind once again. Peter Wardropper entered in into both LittleLEC and exhibited it at the LBSC Memorial Rally.

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DIANE CARNEY
Editor

LBSC's Centenary

LBSC, the most prolific designer of model live steam locomotives ever, died fifty years ago next week on 4th November 1967. It is fitting, therefore, that we take a little time to remember his life and work in this issue of *Model Engineer.*

I am reluctant to call this a 'Special Issue' but I have certainly tried to bring you a selection of articles that feature more heavily than usual the designs and work of Lillian 'Curly' Lawrence, or LBSC as he became known once his writing career had become established. Many aspects of Curly's life have been covered extensively in magazines and books over the years but I intend to give nothing more than the most fleeting glimpses of the great man's story here.

A retiring fellow by nature, his personal life has often been the subject of much conjecture; he was not without his critics and his inability to tolerate criticism of his work has been well documented but in this magazine, we seek to celebrate his successes and the recent Memorial Rally held at the North West Leicester SME did just that, as did the wonderful display of LBSC designs that was a feature at the Bristol Exhibition in August.

Lillian Lawrence corresponded with *Model Engineer* in the early 1920s, pointedly disagreeing with the prominent model steam locomotive designer of the day, Henry Greenly whose almost universally accepted arrangements and theories had been published by Percival Marshall & Co. (publishers of *M.E.*) and others since 1904. Lawrence rose to the challenge of proving his own theories by demonstrating his model steam locomotive - the famous little *Ayesha* - to the Society of Model and Experimental Engineers (SMEE) in 1922, after which followed forty-four years of successful writing. LBSC constructed

over fifty locomotives and designed well over 160 in all, the vast majority of which were published. His legacy is a catalogue of designs, so many of which may be confidently tackled by the most untutored model maker - for the 'words and music' laid down by LBSC are guidance enough - and upon completion he will have a robust locomotive that will perform well.

Following the death of LBSC in November 1967, two of his contemporaries wrote these fitting tributes to one whom they had evidently admired, albeit often 'from a distance':

Edgar T. Westbury writes:

"In the world of live steam locomotives, the efforts of LBSC in improving them and promoting their popularity over a period of nearly half a century, will be long remembered. I first met LBSC in 1932, when I was employed at the Farringdon Street offices of the M.E. *and he personally delivered his 'column of Live Steam' every week. I was never in complete agreement with his over-simplification of engineering problems, but there is no doubt that they produced results, and induced many M.E. readers to take up locomotive construction, who would otherwise have found these problems too difficult. Though constantly in a maelstrom of controversy, he was always coming out on the crest of the wave, and even the many readers who disagreed with him continued to read and relish his constructional articles and 'lobby chats.' Many of the present model engineering societies owe their existence to his influence, not to mention the individual enthusiasts all over the world whose first attempt at locomotive building was inspired by him."*

K. N. Harris writes:

"I learnt this morning of the death of 'LBSC.' As one who in the past has been highly critical, both of his ideas and of his methods, I would like on this occasion to pay tribute to his achievements. I think few will disagree when I say that his writings in Model Engineer, *particularly between 1924 and 1939, did an enormous amount, not only to stimulate interest in model locomotives, but to bring their construction within the practical range of many people to whom more orthodox methods would never have appealed. In consequence, he gave a tremendous stimulus to model locomotive building, from which it has never looked back. From this work has very largely stemmed the vast proliferation of working model steam locomotives, and the development of Clubs and Societies dedicated to the model locomotive hobby, together with the construction all over the English-speaking world of excellent continuous passenger-carrying tracks which in the aggregate have given and will continue to give great pleasure to many thousands of people young and not so young.*

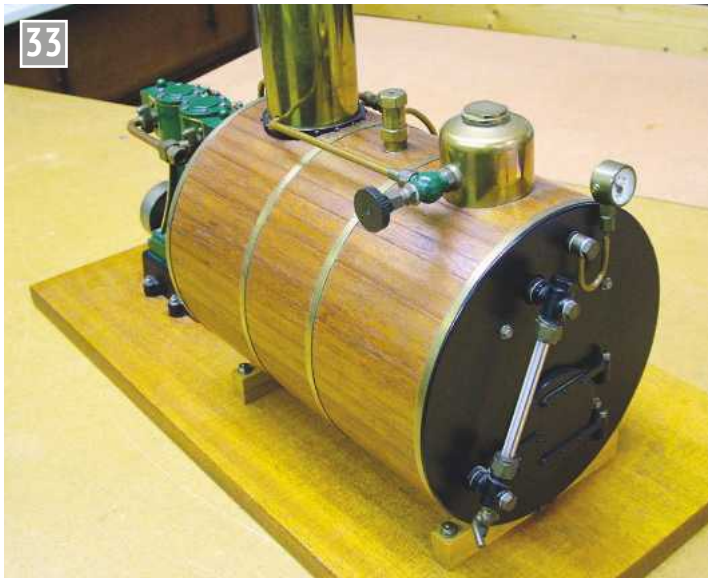
The man who has given pleasure to others has not lived in vain. These things are his memorial. R.I.P."

Ramon Wilson introduces his new series with a look back to his early days of model engineering and his inspiration.

Continued from p.497
M.E. 4570, 29 September 2017

PART 3

Wide-A-Wake



The original boiler as finished in 1972.

***Wide-A-Wake* is a 2 inch scale model of a clinker built steam launch that plied the waters of Lough Erne in Ireland at the turn of the 19th Century. The model, designed by H. Croker and built in similar fashion to the full size, is powered by a Stuart Turner Double Ten engine and was first featured in the February 1972 issue of *Model Boats* magazine.**

A boiler was built by the author to the original design as drawn in the article soon after the article appeared. It was the first real 'model engineering' carried out. No reference was made to the need for pressure testing and, due to the lack of knowledge at that time, none was carried out until much later (**photo 33**).

By today's standards this design could be considered marginal at best - at 6 inches diameter by 8 long it consisted of a 2 inch flue leading into a 90 degree bend and out through the shell top. It had five half inch diameter water tubes alternately set horizontally and vertically through the flue tube and one through the bend. With no knowledge of flanging end plates these were just flat copper sheet and set in with a reinforcing ring soldered in after. Only four stays supported these endplates and whilst the whole thing turned out well it would quickly become unsatisfactory as that steep learning curve was travelled (**photos 34** and **35**).

Upon the first steaming one inaccessible water tube proved to have a pin-hole leak; not enough to prevent steaming but enough to create plenty

Stripped of lagging and fittings the truth is revealed!

The manner of fitting the original end plates – 10swg copper with a reinforcing band.

≫

of steam from the funnel and, of course, once aware of the requirement for testing, rendering the boiler useless as a pressure vessel.

From the outset of building this model it was considered essential then that the boiler be re-built to a modern standard. Describing the building of the hull on the Model Engine Maker forum, I was offered help with the boiler from an obviously very competent and extremely knowledgeable source and gladly accepted. Sandy Campbell has proved not only to have been an inordinate help on this project but we have become good friends too. I am extremely indebted to him for his help for without it things may not have been quite so successful.

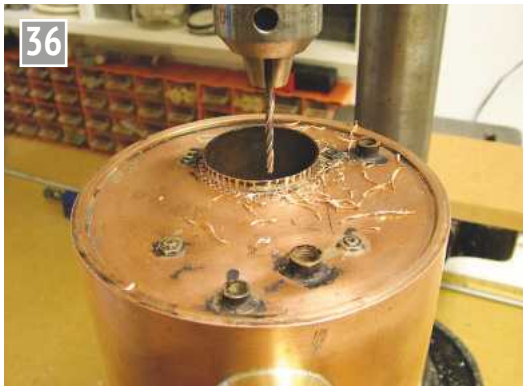
The new boiler is to Sandy's design utilising the original 6 inch diameter shell, all other parts of the boiler save some fittings being discarded.

First up was to remove the offending parts and work began on removing the flue. As the front plates were going to be discarded the flue was relieved by chain drilling around and chiselling free (**photo 36**). The other end on the top of the shell however was cut free inside the boiler using a rotary tool and a cutting disc. This proved to work really well without the anticipated clogging of the disc (**photo 37**).

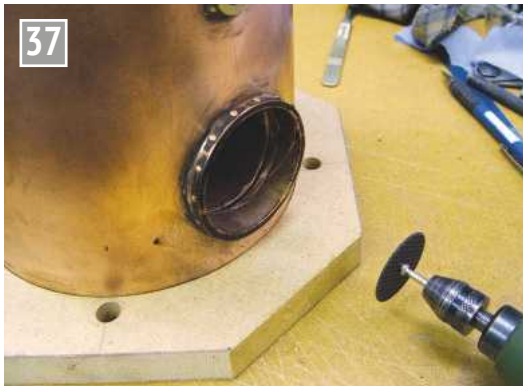
The end plates could now be removed and for this a simple fixture was made from MDF board and an old, scrapped piece of aluminium turning. A good friend offered use of his mill and ten inch rotary table as there was insufficient headroom on mine and, as it turned out, with the table right down and the quill fully up, the cutter still had to be inserted with the job *in situ* to clear the fixture (**photo 38**). Slowly, and with great caution, the endplate was milled out by plunge milling then the inside faces cleaned up as close as possible (**photo 39**).

Back home, a simple fixture for holding it secure was jury rigged and the inside faces cleaned by filing to leave a good surface for soldering (**photo 40**). Once this was clean, it was set up against an angle plate to plunge cut into the top flue outlet ring in four places. This was to enable the four pieces to fall off easily when de-soldering those top fittings (**photo 41**).

With the reclamation of the outer shell successful, attention could now be turned to the forming of new end plates. This procedure was a first for the writer and was tackled with a fair degree of trepidation. It came as



Chain drilling around to release the flue.



Cutting the flue inside the main shell.

Cautious plunge milling took a while but was carried out without any hitches.

Cleaning the inner face as close as dared.

Filing the inner surface, note the protection on the file to prevent scuffing at the far end.

Plunge milling to cut away the flue outlet.

Initial forming of a flanged endplate.

From the outset of building this model it was considered essential then that the boiler be re-built to a modern standard.

quite a surprise to realise just how easy an operation it was providing the copper was annealed the instant any resistance to bending was felt. A former had been turned from steel with a nice radius for the copper to form to without stress, A well annealed disc of 10swg copper was clamped over it with a backing disc and gently tapped to shape (**photo 42**). It took about five annealings to get it formed up neat and firm against the side of the former (**photo 43**).

With the second plate brought to the same condition the former was used as a pressure pad to hold the plate against the faceplate. With a sheet of copy paper behind to augment the grip, and using a very sharp tool, the diameter was carefully turned (**photo 44**) to leave a 2-3 thou annular gap for the solder to flow into and through (**photo 45**).

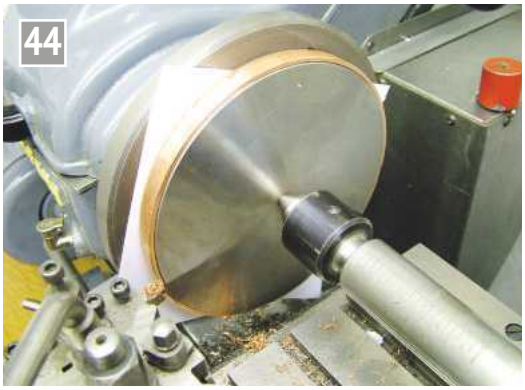
The former was drilled to act as a jig for both end plates and the plates drilled for bush and stay positions (**photo 46**). Once drilled the front plate was clamped to the faceplate for boring for the flue tube - another operation taken very gingerly due to minimal clamping and the ever-present risk of the tool grabbing the soft copper (**photo 47**).

The end plates, as designed by Sandy, were to be strengthened by backing plates of the same thickness. These inner strengthening plates were dot punched to raise a few burs then coated liberally in flux, lightly riveted in place and soldered up, the burrs providing a small gap for the solder to flow through (**photo 48**). These rivets, there to keep the plates in place while soldering, would also serve to prevent them falling away when soldering the end plates into the barrel. The bushes were then soldered in the outer faces ensuring good fillets on the inside. Before these plates (**photo 49**) could be soldered in place, of course, the internal parts would need to be tackled.

●To be continued.

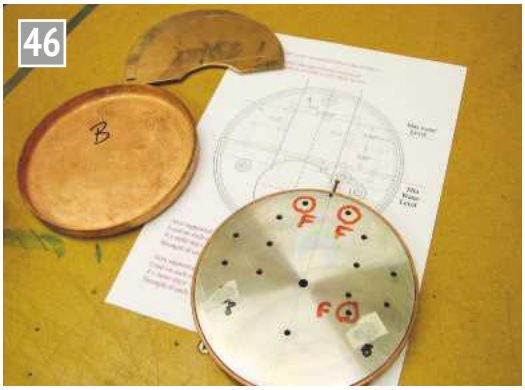
Next time; attention turns to making and testing the flue.

The steel former and the first end plate.



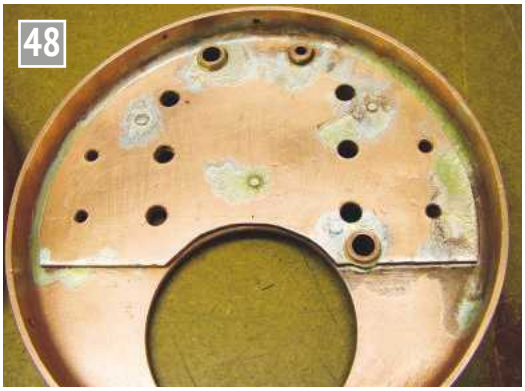
Turning the outer diameter to an easy fit in the barrel.

The endplates were held in position by three rivets to prevent moving while soldering.



The former used as a drill jig. Note one of Sandy's excellent drawings and calculations in the background.

Boring one of the plates to take the flue tube.



The inner strengthening plate note the deep chamfers for the solder to form good fillets.

Finished end plates ready to fit note the three holes in the flange for the locating rivets.

Robert Vine attends an event to mark a famous Locomotive Builder's Semi-Centenary.

Roger and Alan James's Dyak. This was scaled up from the original 2½ inch gauge to 5 inch and is the second of two built by Roger's father, who had wide-ranging interests in model engineering, mainly boats and locomotives. Sadly, he didn't finish the second, which was completed by Roger about 30 years ago. Roger and son Alan were accompanied by grandson Callum, representing the up and coming generation of model engineers.

The LBSC Memorial Golden Jubilee Rally

It was a rather overcast and unpromising looking morning as I approached the track belonging to the North West Leicestershire MES. It's not so easy to find – you have to find your way into a residential close, then down an apparent one-way street the wrong way and then around a dog-leg skirting the 'multi-gauge', multi-purpose tennis court/5-6-7-a-side football ground to the club itself. Early though I was, a pall of smoke already hung heavily over the steaming bays as several locomotives went through the process of steaming up.

The Leicester club track is in the form of a stretched dumb-bell shaped raised track with one end passing the steaming bays and the other entering a tunnel and then emerging to a wide curve leading into the long, clear and very tempting back straight. The temptation, evidently, proved hard to resist and I am quite confident that a number of speed records were broken during the course of the day (I have photographic evidence). The track is triple gauge for 2½, 3½ and 5 inch gauge locomotives, which is ideal for an LBSC rally. Within the raised track there is a 5 inch ground level track with sidings, a turntable and further steaming bays but that was not in use for the rally.

Ten locomotives were in steam, of all three gauges, dominated by two designs in the shape of two Nettas and three Dyaks. These were accompanied by one Britannia, one Maisie, one Canterbury Lamb, one Jenny Lind and one *Ayesha*. Some of the locomotives at the rally were quite aged, with three of them dating back to the 1930s. The oldest present, though, was the original Ayesha which, a little disappointingly (but quite understandably, given her advanced age – over 90), was not steamed up on this occasion.

The author can confirm that the usual culinary standards were maintained in the club hut, as evidenced by a hot bacon roll and a nice sticky doughnut. Normal dietary rules, of course, do not apply at steam events.

I hope you enjoy the photographs and extended captions. Many thanks to the members of the NW Leicestershire club for their hospitality and for hosting a very enjoyable rally.

ME

William Powell brought along two locomotives, including this version of Ayesha, named Freya, and finished in LBSC livery. This locomotive won the Curly Bowl competition last year. It was bought originally as a 'bag of bits', most of which had to be reworked, and is fitted with an 'Ayesha II' boiler.

William also brought along his 3½ inch gauge Canterbury Lamb. Of note are the variegated wheels and the rosebud grate, which may be seen resting in the tender. The cylinders are comparatively big and I wondered whether the boiler would keep up with them. Evidently though, it does and the locomotive is, as the estate agents might say, deceptively strong. She was steamed up only at the end of the day for a brief run.

The Canterbury Lamb is readied for her brief foray onto the track.

Peter Wardropper steams up his 3½ inch gauge Maisie, which dates back to 1938, when construction was started by Dudley Harris. Further work was then carried out by his son Ron (who was in the habit of winning Gold Medals for his work) before being acquired by Peter three-quarters complete in 1999. She was first steamed in 2006, nearly 70 years after the start of construction.

Peter also steamed up his 3½ inch gauge Jenny Lind, with which he won a Gold Medal at last year's Model Engineer Exhibition, soon after her completion in August 2016.

Peter rounds the bend behind his diminutive and very pretty single wheeler. The undulating track at first presented a bit of a challenge for a locomotive of this kind but Jenny Lind was very soon ticking happily along.

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This is Ben Pavier's interpretation of a 5 inch gauge Netta*, which was constructed over a period of 4½ years. The cylinders were machined from billets of cast iron rather than castings and are bored out to 1¾ inch diameter rather than the design size of 1⅝ inch. Cab, splashers and sandboxes are, I am assured, to follow shortly.*

Ben's Netta *has been loaded with plenty of weight so adhesion should never be a problem. These platforms are actually made of 12mm steel plate with the edge machined to look like a valance. They weigh in at 20lbs each, contributing to a total locomotive weight of about 200lb.*

Another 5 inch gauge Netta *was brought along by the Tompkins family; Dave, nephew Paul (official driver) and Paul's son Ollie (assistant driver). Like Ben's Netta, the Tompkins Netta has oversized cylinders, in this case 1⅞ inch diameter, machined from a block of Meehanite (a fine grade of cast iron). The tender is fabricated in aluminium sheet 'borrowed' from defunct printing machinery. The locomotive has two injectors but no hand pump or axle pump and is fitted with PTFE piston rings and two radiant superheaters. She was completed in 2003 and is a frequent runner at IMLEC.*

Hanging on tight while Assistant Driver, Ollie shows what Netta *is made of.*

Three generations of 'Tompkinses' attend to Netta *before departure from the station.*

This is Andy Lawton's 3½ inch gauge Britannia. *She was bought as a chassis from Station Road Steam, about 75% complete, and finished over the period 2010-2012. The brass boiler cladding is actually older than the builder himself (and he is 72!) who finally found a use for the sheet he had acquired second-hand many years ago and hoarded carefully since then.*

Andy's Britannia *is prepared for her run around the track.*

Here is a rather elderly 2½ inch gauge Dyak, *dating back to 1934 and belonging to Chris Almond. She was completed in 1941, rebuilt in 1979 and acquired by Chris in 2013.*

Here is another almost equally ancient Dyak belonging to Dick Bushell. This locomotive was started in 1935 by a lawyer living in London. It was acquired by Dick fifty years later, in 1986, and completed over the next eight years.

The original Ayesha, *the locomotive that started it all.*

Ferrabee Pillar Engine, 1862

PART 7

Anthony Mount continues his construction series; an unusual stationary steam engine.

Continued from p.517
M.E. 4570, 29 September 2017

I was looking through some old technical books and came across an engine exhibited at the International Exhibition of 1862 (not to be confused with the Great Exhibition of 1851); I rather liked the look of it, thinking it would make an attractive model.

Connecting rod bearings (Part 20)

The bearings each end of the connecting rod (**fig 15**) are identical and in two halves and - as they are split with half round and half rectangular sections - making one of each, machining as pairs and splitting them makes up the parts we want.

Use two strips of 9 x 4.5mm bronze and soft solder together, then machine to 8mm square keeping the joint on the centreline. Hold in the self-centring four jaw chuck with very little overhanging to stop the operations forcing open the soft soldered joint and then, after facing off the end, drill and ream 4mm diameter for a depth to make two bearings.

Change to the mill and put in slots for the strap, then back to the lathe to part off. Whilst in the lathe, turn down to 8mm diameter and, with a short parting tool, put in the central groove and part off.

I usually melt this type of bearing apart but, instead, used a drift with a slow taper which easily split the bearings without any discolouration from heat.

The straps (Part 21)

Two connecting rod straps are required and can be made as a pair as shown in **photo 30**. Before sawing in half, machine a length of mild steel bar to 10 x 6mm section and a little longer than required. Clamp in the machine vice and drill a 6mm hole each end; join the holes with a 5mm wide slot using a three flute end mill. Change to a 6mm end mill and complete the slot to finished width. The strap was turned through 90 degrees in the machine vice and the cutter changed to a 2mm one for machining in the gib and cotter slots.

The slots, of course, have rounded ends which need to be squared out. I used a square Swiss file which has been ground down on opposite sides to leave 2mm between the faces. This soon filed the ends square.

The top ends were rounded and the part sawn in two and brought to finished length, either by filing or machining.

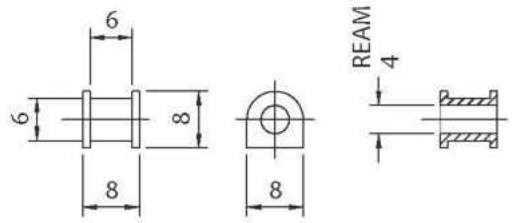
Gibs and cotters (Part 22)

The gibs and cotters can be filed up from 2mm mild steel sheet but I tried another way. A strip of 4mm thick mild steel was machined to 14mm wide and then a groove machined down the middle, 10mm wide by 1.5mm deep, a close fit on the strap.

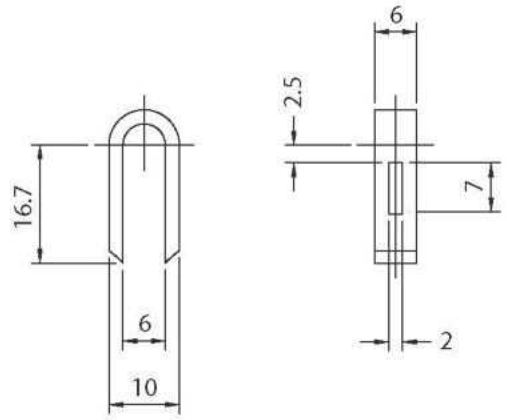
The other face was machined to a slight taper. The machine vice jaws have a 3mm step in both jaws, allowing a thin piece like this to be dropped in with a thin packing underneath on one side to produce the taper. It was then set up in another deep jawed machine vice for sawing up with a slitting saw into 2mm thick gibs; this sawing is in progress in **photo 31**.

Connecting rod straps before separating into two.

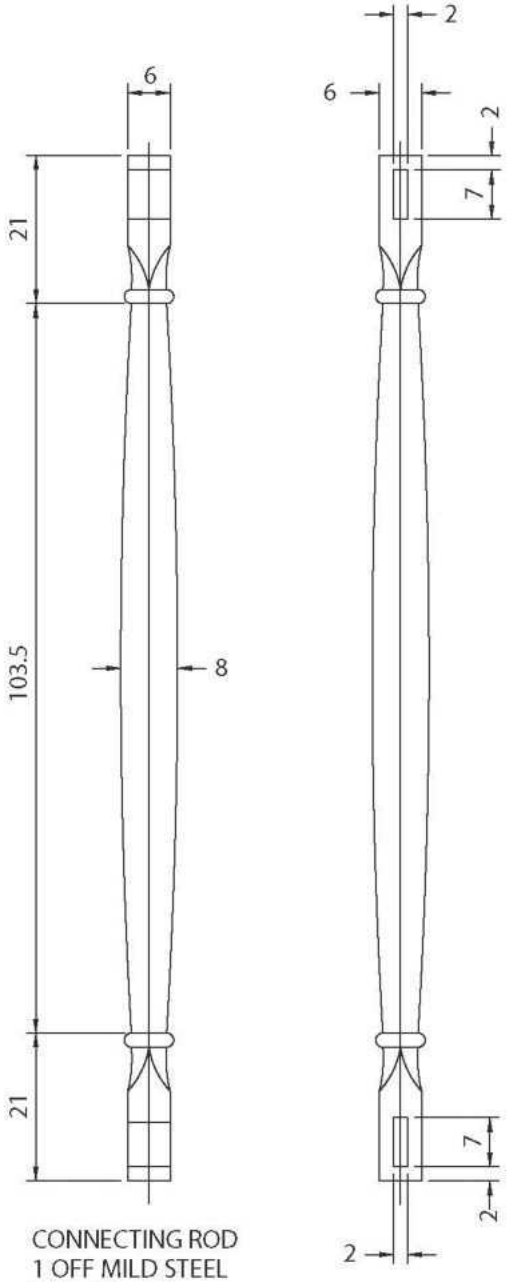
The set up for forming the 2mm thick jibs.



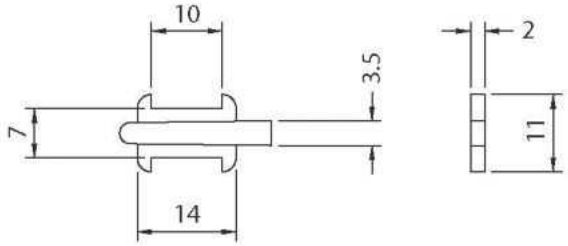
CONNECTING ROD
BEARINGS
2 OFF BRONZE
PART No. 20



BIG AND LITTLE END STRAPS
2 OFF MILD STEEL
PART No. 21



CONNECTING ROD
1 OFF MILD STEEL
PART No. 23



GIBS AND COTTERS
2 SETS MILD STEEL
PART No. 22

FERRABEE'S COLUMN ENGINE 1862	FIRST ANGLE PROJECTION	Historic Engines South West
CONNECTING ROD	DRG NO 15 / REV'	
	SCALE 1:1 / DATE 02-07-13	
Reproduction for any purpose whatsoever without writtem permission is strictly prohibited	z COPYRIGHT A. MOUNT 2013	

Reducing the square section to 6mm.

After some hand work, a handsome connecting rod emerges!

The cotters are just 2mm material filed to a taper and taped into the gap between the two gibs. A reamer can be used to clean up the bearing hole each end when the connecting rod is assembled.

Connecting rod (Part 23)

The connecting rod has straps with gibs and cotters both ends so slots are required each end for the gibs and cotters. I did these first as they probably present the most problems and it is better to get them out of the way before doing the rest of the rod.

Start with a piece of 8mm square mild steel bar and face off each end bringing to finished length. Round bar could be used but using square bar saves indexing problems with the square sections each end. Set up horizontally in the machine vice of the milling machine and, using an edge finder, locate the end and edge of the bar, zeroing the dials.

The end can bear against a stop for relocating as required, then use the tip of a centre drill to spot holes each end of the slot and in the middle; drill through with an undersize drill, say 1.6mm, so that the holes do not run into each other, then open them out to 1.9mm.

Change to a 2mm slot drill and join the holes together to form a slot, going in from both sides as 2mm slot drills are not very long and quite fragile. I prefer to use three flute FC3 type throwaway cutters for jobs like these. Drilling the holes first much reduces the strain on the end mill when cutting.

With the slots completed, hold in the lathe four jaw chuck and put in a small centre each end. Using a form tool machine the transition curve from the square end to the edge of the bead; do this both ends and then change back to the milling machine and reduce the square section each end to 6mm square, as shown in progress in **photo 32.**

Back in the lathe, use a short parting type tool to form the bead; ideally use a little form tool to round the front of the bead. Repeat the other end. Now grip by the square section with one end in the chuck jaws and give tailstock support the other end. Use a knife tool to reduce the length between the two beads from square to round section.

The rod is fish bellied and if slender like the eccentric rod, to be described later, can be machined with an off-set centre but, in this case, the rod is too stiff to bend so set over the top slide about 2 degrees and turn a taper each end leaving a short parallel section in the middle.

Use a fine file to blend the tapers and straight section together and then a very fine file to give a reasonable finish, or what looks like a good finish. Use a piece of about 250 grit abrasive paper and rub it lengthwise along the rod, what looked a nice finish will reveal itself as a series of grooves as the high spots are knocked off. Continue to rub up and down until all the grooves have disappeared.

Restart the lathe and with a length of fine abrasive paper glued to a flat stick and some oil, run it up and down the rod until all the lengthwise marks have disappeared and you should be left with a good looking connecting rod. This part of the operation is seen in **photo 33**.

●To be continued.

Run 1 - Paul Tompkins on Rail Motor.

LittleLEC 17

Reported by **Jim Wilson** of the host club, the Guildford Model Engineering Society.

The tenth Anniversary of LittleLEC, the efficiency competition for 'little' locomotives weighing no more than 50 lb dry, was held at the Guildford Model Engineering Society's site at Stoke Park on the weekend of the 24 & 25 July. The weather was forecast to be dry but overcast, and so it turned out to be, and although there was a breeze it was far from cold.

There was a notable omission from those present when we started. As many of you know Peter Langridge who conceived this competition over ten years ago and who has promoted the concept so vigorously since, has suffered a severe stroke following a fall in his garden last year. A recent relapse had meant that Peter was again in hospital. His highly supportive family had, however, arranged to bring him out for a few hours albeit in a wheelchair so we looked forward to seeing him around 12.00 noon.

1. Saturday was to turn out to be the day of the Tich! Having said that, the first run of the day was by **Paul Tompkins** on his 5 inch gauge Rail Motor which was built by his uncle Dave who had made use of aluminium on some of the non-essential structural parts to get the weight down to 50lb (**photo 1**). This was a good run with six full laps and resulted in an efficiency of 0.314%. Paul had decided to give up his second run in favour of letting the children have a go as the locomotive was due to run again during the day.

2. The second run was **Roy Langridge** driving the first Tich (**photo 2**). This one was built by his father, Peter. After a tentative start the regulator handle broke off and sadly Roy was forced to retire from the competition.

3. Next, another Tich; driving this was **Will Higgs** from the Winchester society and although he made a good start he did not have enough fire to get up the steep inclines of the Guildford track and failed to complete the minimum 15 minute run (**photo 3**).

Run 2 - Roy Langridge in trouble.

Run 3 - Will Higgs makes a start.

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4. Next the Rail Motor was back with six year old **Maisie Tompkins** at the regulator (**photo 4**). With dad Paul behind her as load and possibly giving advice, she finished five full laps with an efficiency of 0.202%. Watch out for this one, chaps! In a few short years she will be challenging you at IMLEC and I don't reckon much of your chances!

5. Back to a Tich again, this time **Scott Gibbs** with his blue locomotive built by his grandfather, Peter Langridge. Scott has run well in the past but this time had trouble with the fire and retired from his run. (No pictures are available for Scott's run.)

6. **Stephen Harrison** from the Birmingham Society was next with his partially completed Rob Roy (**photo 5**). This runs well and Stephen managed six laps, however he selected to try an extra lap as he was not quite up to the 20 minute mark but then ran out of steam and failed to finish within the maximum time of 25 minutes so this run was unfortunately disqualified.

7. **William Powell** from Bournemouth (**photo 6**) was the next to try his luck with his Tich. William completed four laps - which is no mean feat - but failed out on the track and was over the time limit before he got back, which again disqualified the run.

8. This was **Les Prichard**, last year's winner with his 3½ inch Mona, however, the blower tube on this locomotive became blocked right at the start of the run and although he did set off, it was not long before Les required use of the blower and had to retire early (**photo 7**).

9. This was the last of the first attempts and it was back to the Rail Motor, this time with **Dave Tompkins** driving (**photo 8**). Dave gave what I would call a spirited run for three quarters of the track before a pin came out of the motion work and he retired (**photo 9**). Not too downhearted and mindful that his great-nephew, Ollie needed the locomotive later in the day, the fire was dropped, the engine bundled into the car and Dave, who lives locally, was off to his workshop to make a satisfactory repair.

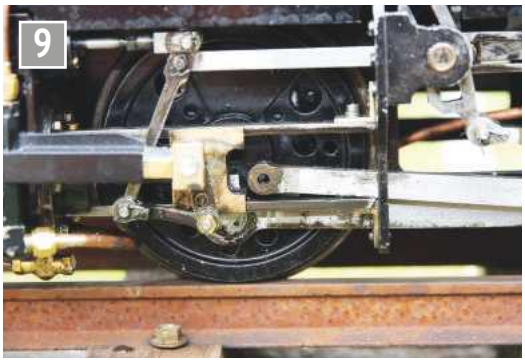
Run 4 - Maisie Tompkins is relaxed, Dad holding the coal.

Run 6 - Stephen Harrison on his Rob Roy.

Run 7 - William Powell prepares his Tich.

Run 8 - Les Pritchard has blower problems.

Run 9 - Dave Tompkins makes a steady start.



Run 9 - Oops, a pin has dropped out of the Rail Motor.

10. This was **Will Higgs'** second run and despite electing to run the engine back to take a flyer at the incline, he still had trouble and eventually retired. (No pictures are available for Will's run.)

11. **Scott Gibbs'** second run gave him no problems this time and it was much more like the run we have come to expect from this young driver (**photo 10**). Scott runs with the blower slightly open which keeps the Tich's small fire going but which, of course, impacts on his efficiency as the engine uses more coal than it probably needs to compete in such a competition. The effect is stunning however with the blue 'flash' of this tiny locomotive taking the difficult Guildford track with ease. Scott completed five laps with an efficiency of 0.213%.

Run 11 - Scott Gibbs on his successful second run with Tich.

12. **Stephen Harrison** again with his Rob Roy and this time he managed to finish within the time having completed seven laps with an efficiency of 0.237%. (No pictures are available for Stephen's run.)

13. **William Powell's** second run repeated the four laps he had previously done but this time managed to finish with a very respectable efficiency of 0.278%; pretty good for a Tich on this track. (No pictures are available for William's run.)

14. Back to the Rail Motor once more and Dave Tompkins had managed the repair and this time it was the turn of eight year old **Ollie Tompkins** with dad Paul as load and mentor to have a go (**photo 11**). Another future contender, Ollie managed six laps and ended up with an efficiency of 0.233%.

15. The final run of the day was **Les Prichard** with the now repaired Mona. By his standards, he claims, he had a terrible run only managing three laps. He finished within the allotted time however, with a recorded efficiency of 0.254% (**photo 12**).

So the end of the first day saw Paul Tompkins in the lead from the results of the first run of the day, followed by William Powell and his Tich in second place.

Day two, now, and the weather was much the same if a little more breezy but a very pleasant temperature. If Saturday was the day of the Tich then Sunday was the turn of Mona.

16. The first run of the day was **Craig Weatherley** from Chichester with his grandfather, Charles' Mona (**photo 13**) which Charles was planning to have a go on later. This locomotive and the two drivers had been present at the first LittleLEC ten years ago so it was particularly gratifying to see them back again. Craig was a junior then but is now a somewhat bigger lad so with one person as load he started the day off with a very satisfactory run, managing seven laps with an efficiency of 0.320%.

Run 14 - Ollie Tompkins makes a good start, with an 'all the Tompkins' load.

Run 15 - A better second run for Les Pritchard.

Run 16 - Craig Weatherley starts the second day on his Grandfather's Mona.

Run 17 - Bill Roebuck weighs his Mona.

Run 17 - Bill Roebuck finishes his winning run.

Run 18 - Young Liam Pritchard confident on Juliet.

17. Next on the track was another Mona, looking very similar to the previous one as they were both finished in Marsh brown. This one is by **Bill Roebuck** from the Swansea Society (**photo 14**).

Bill elected to take a load of two people, a larger load than Craig, and got away to a good start. The run was brisk but steady and from the sound of the engine, it was apparent that Bill had got the valve timing just about right. Bill managed six laps with an efficiency of 0.454%, the best so far (**photo 15**).

18. Another junior competitor this time: **Liam Pritchard** is eleven years old and was driving his grandfather Les' Juliet (**photo 16**). This locomotive is a good runner and has won this competition a couple of times with Les and Paul Tompkins at the controls. Liam had one passenger in the form of Paul Tompkins and completed seven faultless laps to achieve an efficiency of 0.254%. A slightly heavier load and less coal could make this lad a future winner.

19. It was then **Charles Weatherley's** turn to drive his Mona. Charles managed four laps before retiring when he lost his fire altogether (**photo 17**).

20. The last of the first round was **Peter Wardropper** from SMEE with his beautifully finished Jenny Lind (**photo 18**). Peter was bound to struggle with such a light locomotive on the Guildford track but he quickly showed that this engine was not only a show piece by taking some of the stiffest climbs with very little steam. Peter finished three laps with an efficiency of 0.092%.

21. **Bill Roebuck** came back for his second run and again went well apart from a short stop to raise steam (**photo 19**). Nevertheless, he completed seven laps this time but, alas, could not improve on the efficiency of his first run finishing with a figure of 0.395%.

22. **Craig Weatherley** started with the same load as previously but it was not long before it became apparent that all was not well. The problem was with the train coupling system and this run was aborted while the fault was resolved. (No pictures are available for Craig's run.)

23. **Peter Wardropper** came forward for his second run here with Jenny Lind and again was able to finish, this time completing four laps. His achieved efficiency was the same as before. (No pictures are available for Peter's second run.)

24. **Liam Pritchard** started his second run on Juliet (**photo 20**) but almost immediately had to stop as it appeared that all was not well with the locomotive. When investigated it became apparent that the grate had been fitted incorrectly and some damage had been caused. Liam was given the chance of another run but it was obvious from the start that he could not continue and so retired.

25. **Charles Weatherley** decided he did not want to run himself for a second time so offered the locomotive to grandson, Craig. This time there was no problem and the run went well (**photo 21**). Craig completed six laps with an efficiency of 0.270%. Not enough to improve on his first run of the day, however.

Craig's run concluded the competition and the results are summarised in the following table. The three most efficient runs were: Bill Roebuck at 0.454% with his 3½ inch Mona followed by Craig Weatherley at 0.320%, again with a 3½ inch Mona and then Paul Tompkins at 0.314% with the 5 inch gauge Rail Motor.

Run 19 - Charles Weatherley on his Mona.

Run 20 - Peter Wardropper with Jenny Lind.

Run 21 - Bill Roebuck on his second run, takes more coal.

Run 24 - Liam Pritchard starts his second run.

Run 25 - Craig Weatherley runs through smoothly this time.

Bill Roebuck says a word of thanks.

Craig Weatherley views his second prize.

Paul Tompkins gets his third prize from Chairman, Roger Oates.

Peter Wardropper gets his GMES special award.

That completed the weekend's activities apart from the presentations (**photos 22**, **23** and **24**). All cash prizes were generously donated to the competition by *Model Engineer* magazine.

A fourth prize in the form of a novelty clock, donated by the host Society was presented to Peter Wardropper for having the best turned out engine, his Jenny Lind (**photo 25**).

This has been a weekend of fun, very much living up to the aims of its founder when Peter Langridge set out to stage an enjoyable, friendly competition ten years ago. Peter himself joined us in a wheelchair during both days, thanks to the help of his family. He would have been especially delighted to see the youngsters taking part as it bodes well for the future of the competition and the hobby.

Looking to the future of LittleLEC, it is clear that Peter will not be able to promote it or compete as he has done in the past. We at the Guildford Model Engineering Society feel therefore that as it was originally conceived at our track, we should assist it maintaining the future success of the competition. We are therefore going to take possession of the weighing equipment which will then be loaned to any society wishing to hold the competition. We could also make available some of the software used to calculate and tabulate the results if required. We are also hoping to compile a list of competitors who would be contacted when the time comes to send out invitations to attend. We are planning, with Peter's family, to bring the LittleLEC website up to date and keep everyone informed future events.

For the immediate future, the Worthing & District Society of Model Engineers have volunteered to hold the event in 2018 and have selected the weekend of 16th and 17th June.

What we need now are more societies that might consider holding the competition and it would be great to be able to compile a list which will run forward into the next decade. If your Society would like to have a go then please contact us via the e-mail address **littlelec@gmes.org.uk**

All photos by Andrew Neish.

ME

The Sweet Pea and the Rose(bud)

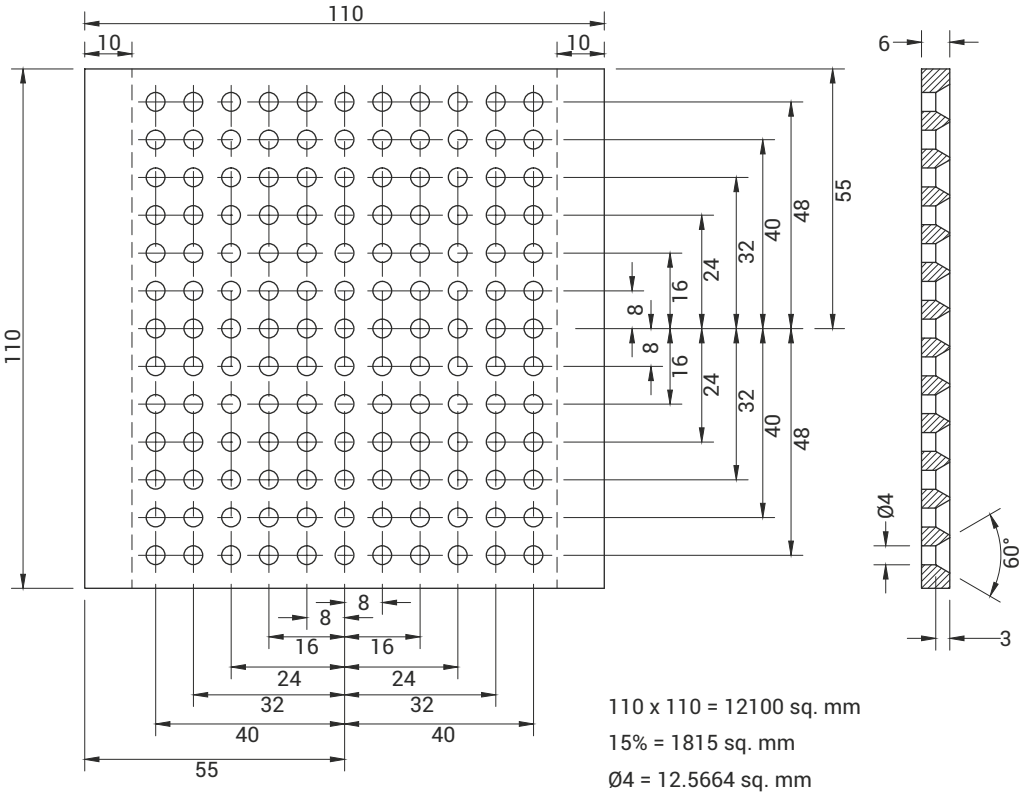
Martin & Linda Gearing assess the results of fitting a Rosebud Grate to a 5 inch Sweet Pea.

As the 2017 Sweet Pea Rally was taking place not a million miles away at Rugby we decided to take one of the two Andover Club Sweet Peas as it was available (which is more than can be said for our Sweet Pea that is in the process of mutating into a Metre Maid!).

Before we collected the locomotive, the opportunity was taken to have a trial run and make sure all was well, conveniently on an Andover Club running day. Doing so highlighted a couple of items that would improve the operation/running if attended to, in addition to Lin having difficulty in maintaining a reasonable fire.

The original grate.

Fig 1



110 x 110 = 12100 sq. mm

15% = 1815 sq. mm

Ø4 = 12.5664 sq. mm

$\frac{1815}{12.5664}$ = 144 holes

11 x 13 matrix on 8mm ctrs = 143 holes

Rodebud Grate 15% Air

All the matters were attended to over the next couple of weeks and the locomotive was run once again to confirm that all was in good order. Whilst the repairs were all successful, maintaining a reasonable fire still proved troublesome but not impossible.

It was in this state we arrived at Rugby and when the time came to run, we got sorted out with a good fire and full head of steam, only to lose virtually all the steam whilst waiting to go onto the track. The fire was rebuilt and steam raised again and this time the engine made it onto the track but after just one circuit of the track we had to come off as there was a distinct lack of steam - it was felt that this was mainly due to what appeared to be a couple of holes in the bed of the fire.

The fire was again rebuilt and as deep a fire as possible was established before going back onto the track.

Looking on the positive side, this time it was a 50% improvement as it made one

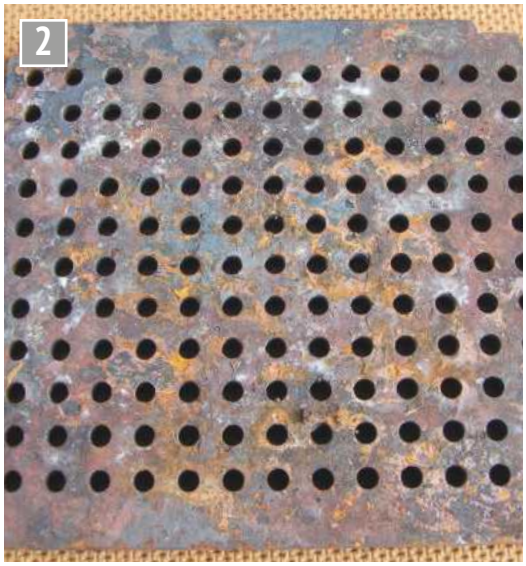
and a half circuits before having to suffer the indignity of being pushed off!

Having made three attempts to fire the locomotive, ably assisted by Graham Lewis, we took his conciliatory offer to Lin of driving *his* Sweet Pea - which ran perfectly - and generally enjoyed the fantastic hospitality and facilities on offer by the Rugby club.

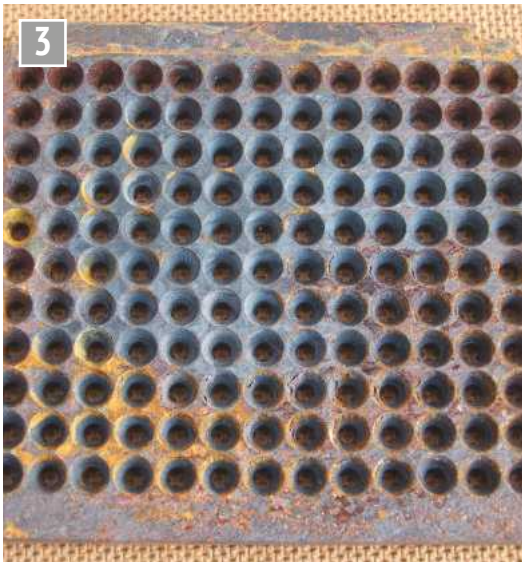
Obviously, something was amiss, so when back home the firebox was given a stern looking at. This resulted in us deciding to make good a couple of places in the box that had become burnt or distorted and also to replace the back heat shield. Most importantly, however, on inspection of the grate - although having the same number of firebars as the currently available commercially version which has 12 bars (instead of the original designed13) - we discovered that the 12 bars, as fitted, were of variable spacing, which demanded the manufacture a new grate (**photo 1**).

Coincidentally the subject became a topic of discussion when we met with Don Searle, whose suggestion it was to forget the idea of replacing the conventional grate and change it to one made to the Rosebud design. This recommendation was based on the success he'd achieved with a locomotive that had suffered similar problems. He also reminded us of the success Nigel Woodham had when he fitted a Rosebud grate to his Silver Pea. Additionally, a Rosebud grate was the subject of an interesting article in the *Model Engineer* that I read the day after!

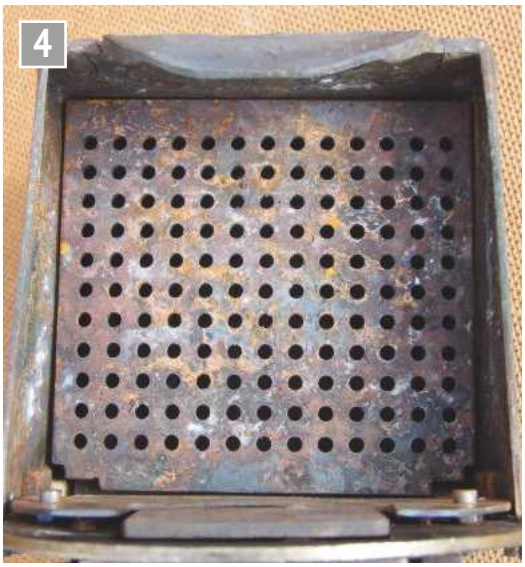
Looking back to the references and after looking at items on the Internet we became confused as when the dimensions/figures quoted were actually worked out, none of them actually added up. On contacting Don, he said that the figures he had found stated that the air to grate area should be between 12 and 17%; in practice he actually worked to 15%.



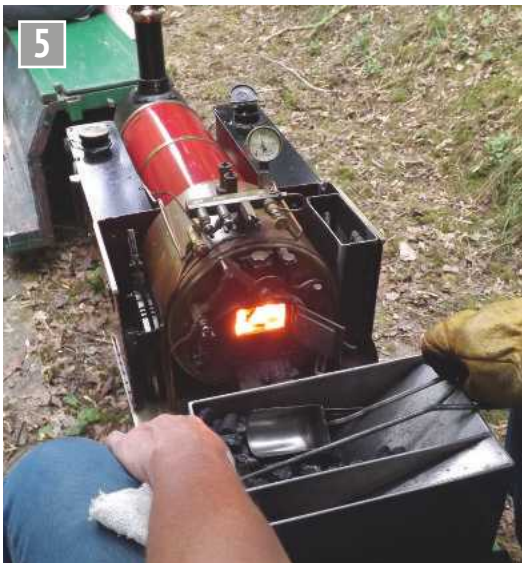
Top side of the Rosebud grate.



Under side of the Rosebud grate.



The new grate installed.



The new grate in action!

Using this figure we arrived at a 11 x 13 matrix of 4mm (5/32 inch) holes (**fig 1**). Rather than reinvent the wheel, we contacted Nigel Woodham to see how our calculations compared with the grate he'd successfully made and, to our astonishment, found they resulted in an identical outcome. (Maths is not either of our greatest subjects!) These dimensions were applied to a piece of 6mm mild steel plate (**photo 2**) - which Don assured us would be more than robust enough and wouldn't suffer burning - followed by countersinking each hole 60 degrees x 3mm deep using a centre drill on what would become the underside (**photo 3**).

Installing the replacement grate into the firebox (**photo 4**) we found that the quality of fire when installed in the locomotive was improved beyond our wildest hopes (**photo 5**). The fact that the locomotive is now able to be driven reliably, regardless of whether lightly loaded or pulling its maximum load, can only be due to the fitting of this design grate.

It has to be said that unless we'd actually made and run with the Rosebud grate both of us would have still remained sceptical, mainly because the original need that drove the design was the ability to burn low grade brown coal - and we were using top quality anthracite! To be brutally honest, we truthfully still can't see why it performs in the way that it does.

It is accepted that to be strictly correct to full size practice, the holes should be tapered from the larger diameter on the underside to the smaller diameter on the topside at a lesser angle and for the full thickness of the grate, however the results at this scale achieved with a centre drill appear to be more than satisfactory.

Generally, when talking about it the comments like, 'the Venturi effect', 'the fire floats just above the grate' and 'an increased velocity of air', get mentioned. Doubtless some or all of these things have an effect but as my father often used to say, 'Actions speak louder than words!'. ME

Making a Special Purpose Laboratory Measuring Device

Dennis Stones follows up on his recent article.

Readers may be familiar with my previous article *Making a Miniature Changeover Valve* published in three issues of *Model Engineer* between March and May 2017 (**ref 1**). You may have wondered when or if I would get around to writing about the tiny force transducer and my entry into the use of strain gauges. Actually, I did too!

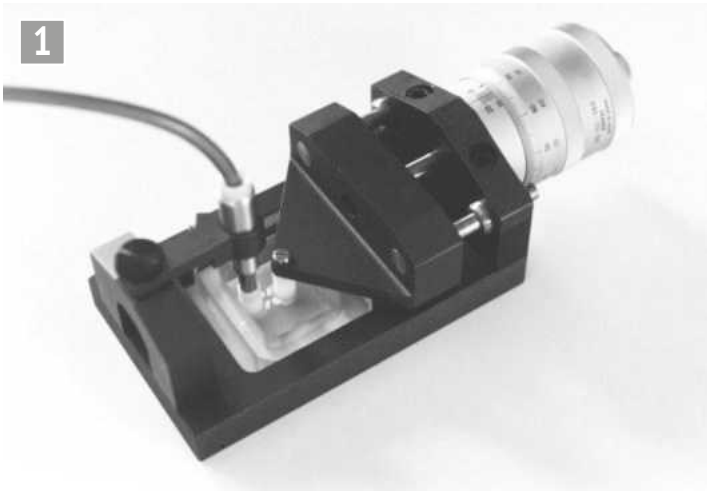
Here therefore, are more of my notes that may, perhaps, find a use in model engineering circles.

It is necessary for me to mention that the original, pre-digital, 35mm film photographic textured paper prints had come out rather an odd colour. This could have been before I understood the need to advise the processor of the type of lighting I had used. I have therefore elected to switch them to black and white. This was a good move insofar as the anodised parts of the first device were concerned. Instead of turning out jet-black as specified, they were a rather unusual rich purple. In addition, photographing textured paper prints required better side lighting than I used, hence the rather grainy appearance.

Background

From what I can gather (and remember) from years ago, building these devices such as the valves and successive pieces of equipment, took place in the mid 1980s. The devices I built formed some of the instrumentation for specific investigations into aspects of cardiology, more particularly hypertension.

The primary objective of this group of devices (including the valves) was to manipulate, stimulate, and measure the behaviour of very tiny samples of smooth muscle tissue (**ref 2**).



First manipulator.

Three distinct devices were required for this series of tasks:-

a) A specimen manipulator,
b) A fluid bath,
c) A force transducer.

Other than some minor improvements, the fluid bath offers no specific detail worth mentioning.

Design parameters – the specimen manipulator

There were several important requirements for this part of the equipment:-

1. The devices needed to be small, appropriate to the tiny size of specimen and the limited working space beneath the microscope.

2. They needed a means to hold and tension the specimen.

3. They needed a smooth micrometer mechanism for positioning the specimen and recording movement.

Within these design parameters also came the need for some basic engineering principles.

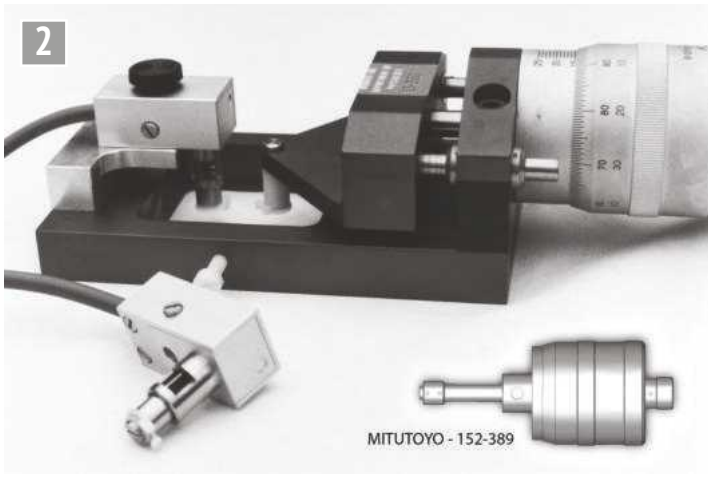
Photograph 1 shows the first of a progression of four versions of specimen manipulator.

General construction

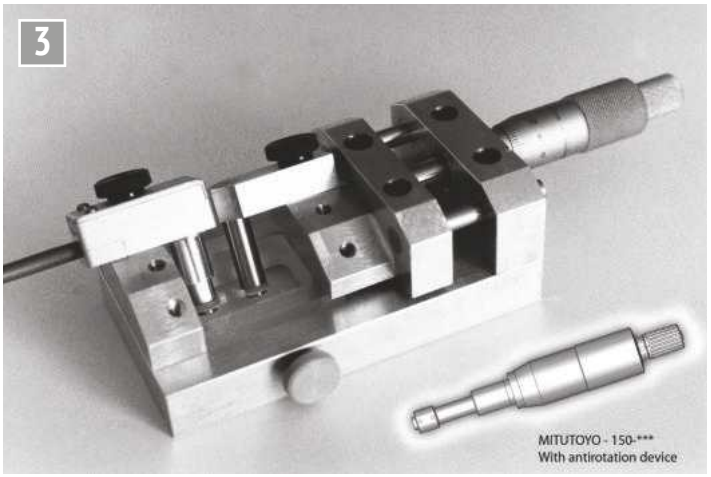
The main sections of the device were aluminium, machined from solid. Stainless steel was preferred for the guide rods and screws, brass for the guide bushes. These days I would probably use polyacetal for the bushes to minimise the potential for stick friction. As it turned out, this latter issue was not a problem.

The large thimble micrometer head was an off-the-shelf unit (**ref 3**). Attached to the end of its spindle was a non-rotating device. This 'floating' section of the micrometer spindle, secured inside the central (moving) block, allowed free rotation of the micrometer spindle. Similarly, an extension of the micrometer barrel was clamped in the end frame.

After initial trials, there were several improvements made to the design. The cable leading vertically out from the force transducer was in the way. Instead, I brought the cable out at right angles,



Manipulator No. 2.



Manipulator No. 3.

while creating a terminal box for access to the wiring. The lower section of this 'box' (actually machined from solid aluminium), provided a rigid arm to grip the transducer, and something for the screws to screw into.

Photograph 2 shows the second version suitably modified to take the 'lower profile' transducer. It seemed appropriate to inset an image of the micrometer head in order to show the anti-rotation end piece. This device was clamped inside the moving block as mentioned above.

Photograph 3 - Compared with the larger version, a smaller barrel micrometer head (**ref 4**) was easier to twirl between finger and thumb. I have difficulty in recalling whether this smaller micrometer head had a non-rotating spindle or had the same 'slip ring' anti-rotation device as shown on the larger version. Whichever it was, it still needed securing to the central moving section of the manipulator.

Incidentally, it would appear, these days, that almost all spindles have tungsten carbide faces.

Having thus selected a smaller micrometer barrel, the overall height of the manipulator was lower. There was also an advantage to being able to attach the force transducer in any of three positions. This allowed better access for both microscope and installation of the specimen under test. A tricky enough job to say the least.

Since the photographs lacked clarity I decided to knock up and include a couple of CAD versions (**fig 1**). The upper image is an earlier version; the lower one shows the progress towards a 'low profile' design suitably refined for easier operation.

Engineering principles

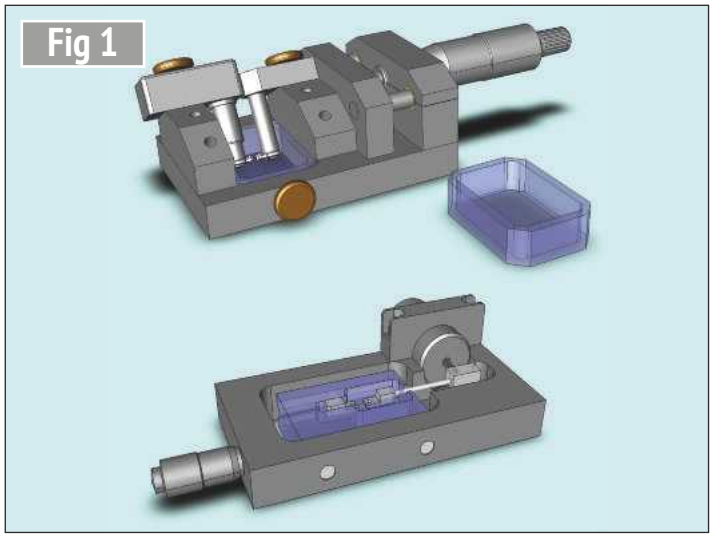
When designing instrumentation (and many other mechanical devices), certain principles of engineering are important. Two that surface for me are 'Six Degrees of Freedom' – and something about 'Kinematic Design', the gist of which (unfortunately) has faded from my memory. **Reference 5** holds some clues. However, the '*narrow guide principle*' (NGP) in particular, comes to mind.

The exploded view (**fig 2**), shown as a CAD image, allows a closer examination in terms of the NGP principle. Shown in particular are a moving block, two brass bushes and two guide pins. The micrometer, which adjusts the position of the block, is in the middle.

Even though the system is balanced (i.e. the micrometer is positioned between the two guide pins), the question becomes – 'can/will the bushes bind or jam on the guide pins?'

Consider therefore, the line diagram (**fig 3**) which represents one part of the sliding section of the manipulator. Consider also that this section of the manipulator is about to slide but if the distance 'x' is too large, the system will jam due to friction. This jamming feature is useful on quick-adjustment clamps etc. but not here. In the case of the manipulator guide system, the opposite is required; i.e. free movement and accurate alignment. A well-designed lathe saddle and bed follow this same principle.

Through a significant amount of use, and despite my fondness for my very old, second hand ML7, it had developed wear between the saddle and the bed's slide ways. This wear introduced a small amount of 'out-of-square' misalignment of the



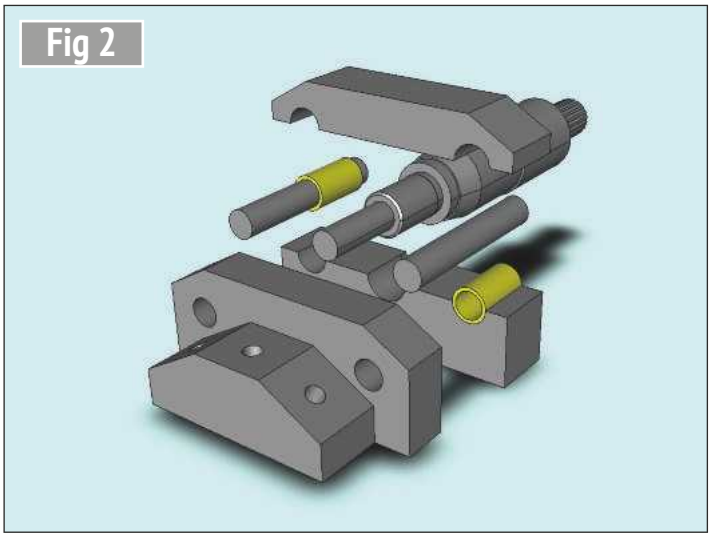
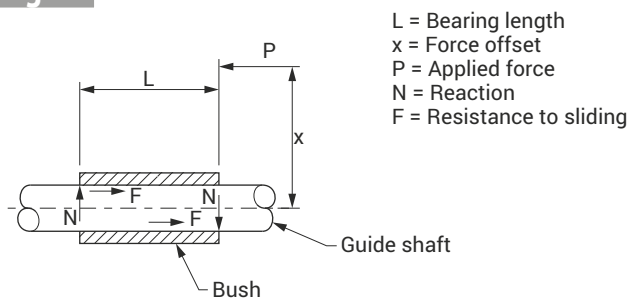
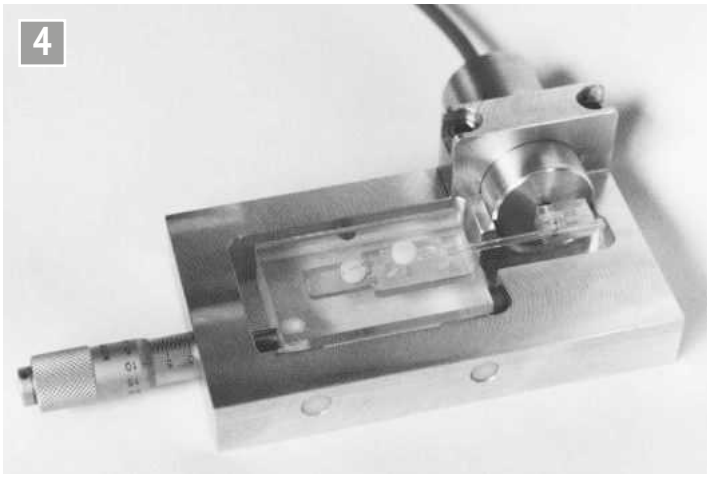


Fig 3



Condition - Bush About To Slide/Jam



Manipulator No. 4.

cross-slide. A certain J. A. Radford offered, through *Model Engineer*, a modification which I never got around to implementing.

See the discussion related to this in the Model Engineer Forum (**ref 6**).

I digress …

The force 'P' (at distance 'x' from the centre of the shaft) forces the manipulator block to slide, producing a turning moment (torque). This in turn produces two resultant forces 'N' at distance 'L' and, because the system is just jamming, it causes a resultant pair of forces 'F'.

Under this condition, we can say that: $2Fx = NL$

We can also say that

$$\frac{F}{N} = \frac{L}{2x}$$

which also equals μ, the coefficient of friction between the sliding surfaces.

Therefore, to avoid jamming, $\frac{L}{2x}$ must be greater than μ, which brings in other factors; i.e. what is the likely value of friction between the two sliding surfaces? Will the surfaces be dry or lubricated?

You may not find it convenient to look up the table (**ref 7** or similar sources), but the value for μ between brass and steel ranges from about 0.35 down to about 0.19, dry versus lubricated.

A point worth noting here is that it is preferable to use dissimilar materials, or at least of dissimilar surface hardnesses. If I were building a manipulator now, especially since sloshing lubricant around was out, I would, instead, prefer polyacetal or one of the proprietary bushings. I would resist the temptation to use low μ (0.05) PTFE (Teflon) in view of its low creep resistance under stress.

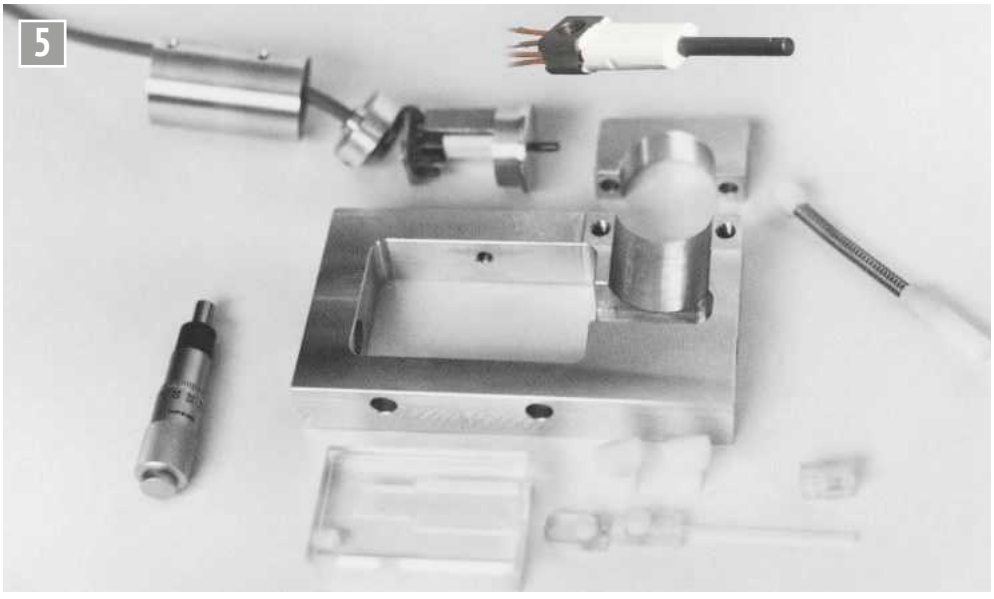
Photographs 4 and **5** show a quite different approach where one end of the specimen is connected to the bath. The difference here was that the bath moves under micrometer control. This was a much more open and accessible design and used a commercial solid-state transducer (see photo 5's inset).

Alignment and guidance for the bath followed typical three-point kinematic design principles, achieved using two Vee shaped polyacetal pads along one side of the bath, and an adjustable guide on the opposite side. These sat in corresponding Vee grooves along the sides of the bath. A compression spring held the bath firmly against the tip of the micrometer spindle.

●To be continued.

In **Part 2** of this article, I describe designing, development, and building a force transducer that can measure forces less than 100mN (1mN ≈ 0.102 grams of force).

It was my first and only hands-on introduction to, and use of, strain gauges.



Manipulator No. 4 stripped down.

REFERENCES

1. Part 1, *Model Engineer* No. 4555, 03 - 19 March 2017, Part 2, *Model Engineer* No. 4557, 31 March - 13 April 2017 Part 3, *Model Engineer* No. 4559, 28 April – 12 May 2017

2. https://www.ncbi.nlm.nih.gov/pubmed/3594751

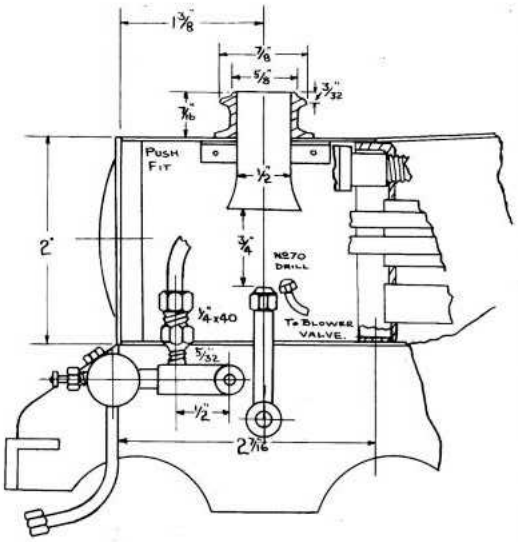
3. Mitutoyo - Series 152-390 with anti-rotating device

4. Mitutoyo - Series 153-205 with non-rotating spindle

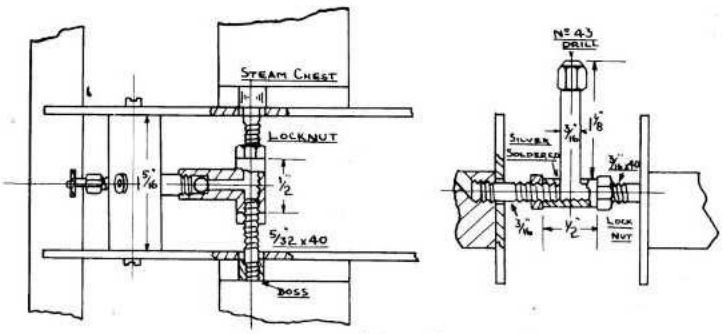
5. https://en.wikipedia.org/wiki/Degrees_of_freedom_(mechanics)

6. http://www.model-engineer.co.uk/forums/postings.asp?th=64457&p=2

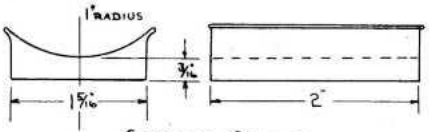
7. http://www.engineeringtoolbox.com/friction-coefficients-d_778.html



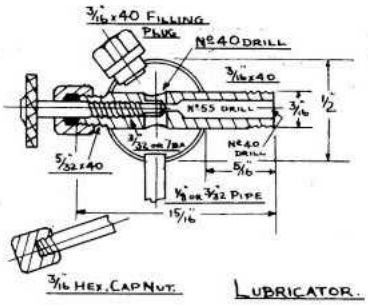
SMOKEBOX DETAILS.



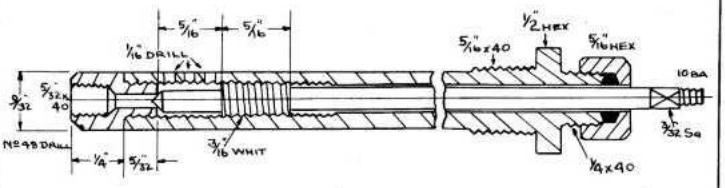
STEAM & EXHAUST PIPES



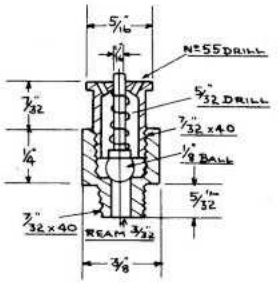
SMOKEBOX SADDLE



LUBRICATOR.



REGULATOR DETAILS.



SAFETY VALVE.

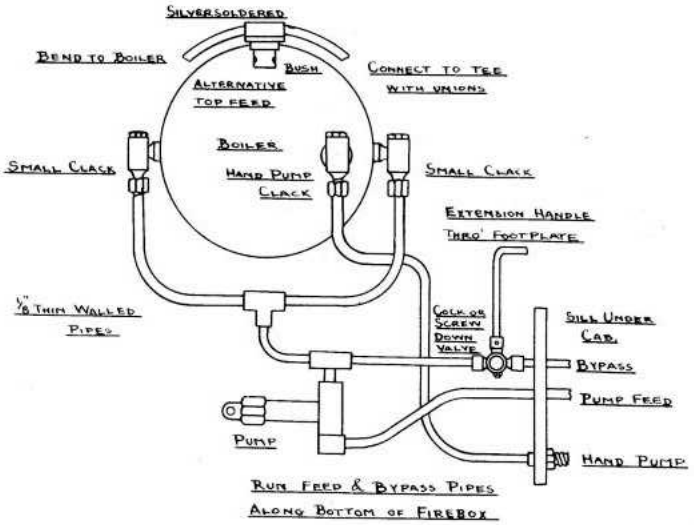
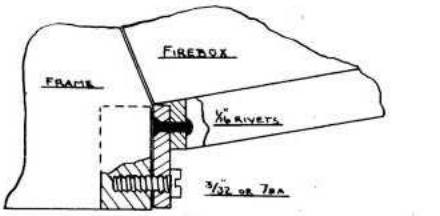
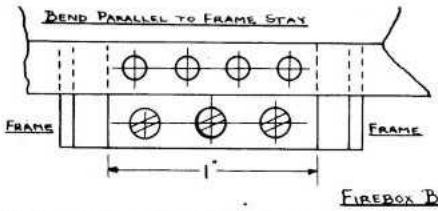
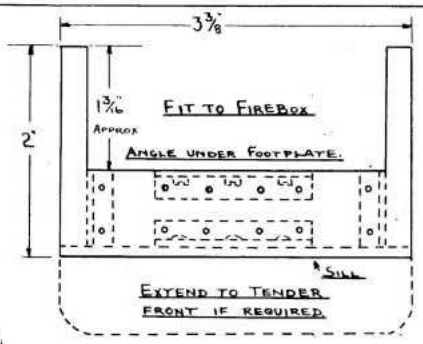


DIAGRAM OF PIPE CONNECTIONS

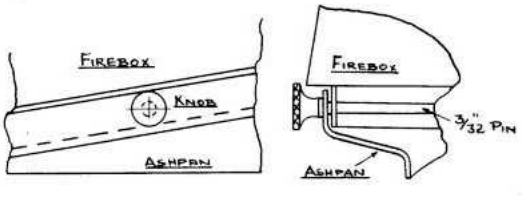




FIREBOX BRACKET



CAB FOOTPLATE.



ASHPAN FIXING

DIANA

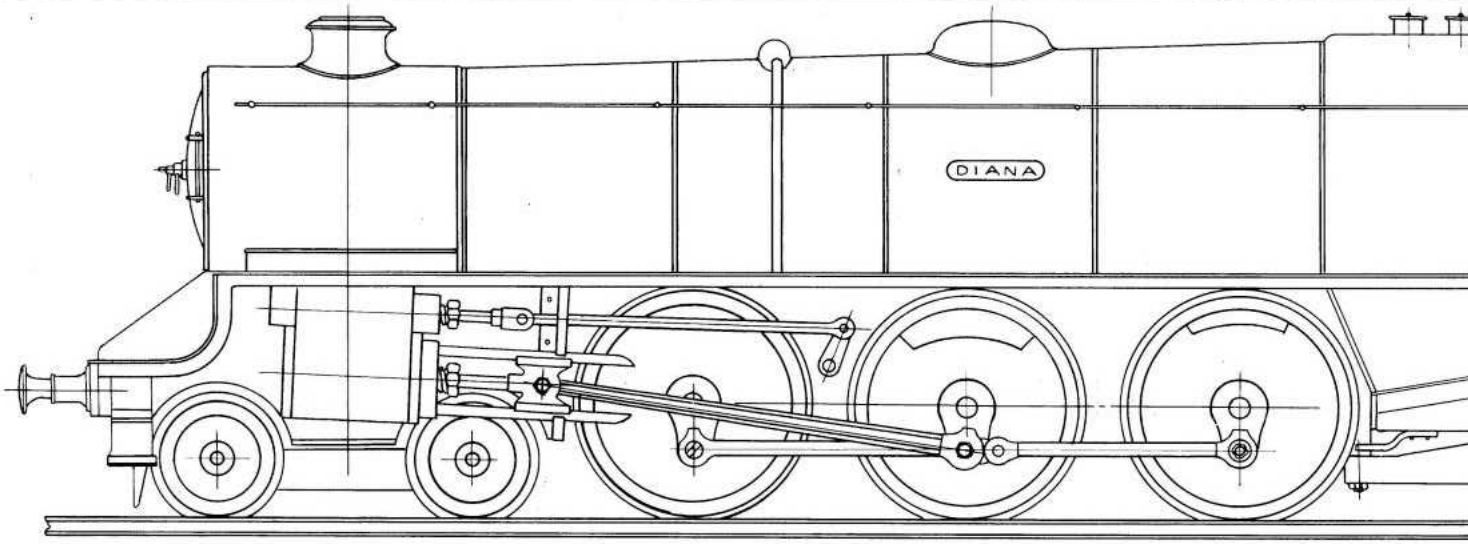
Cl. 4-6-2

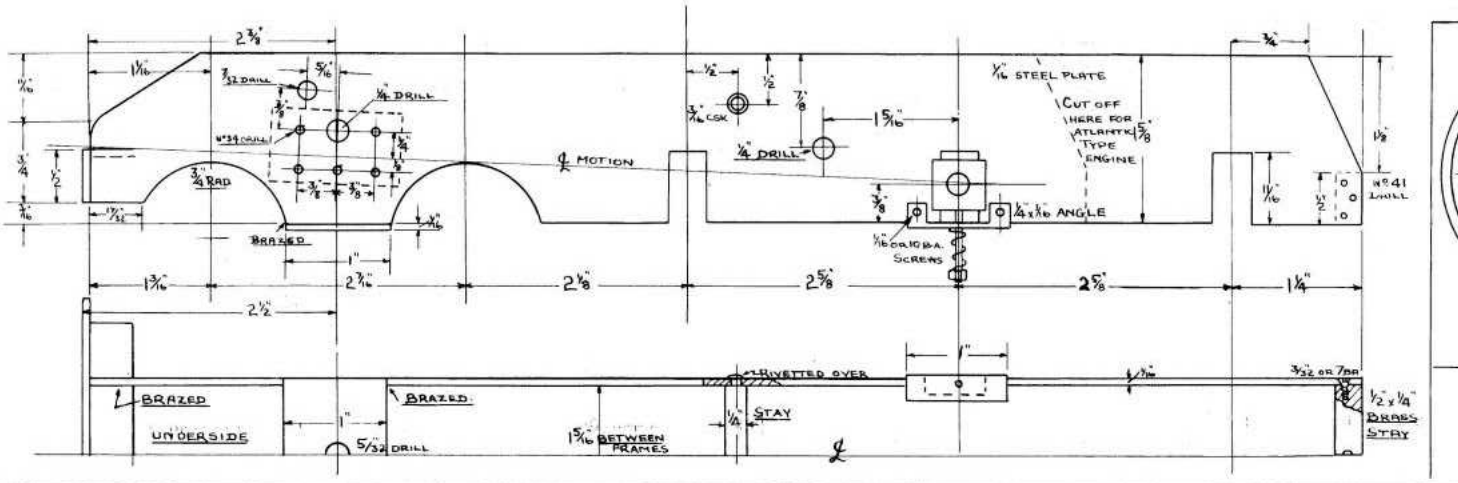
By L B S C

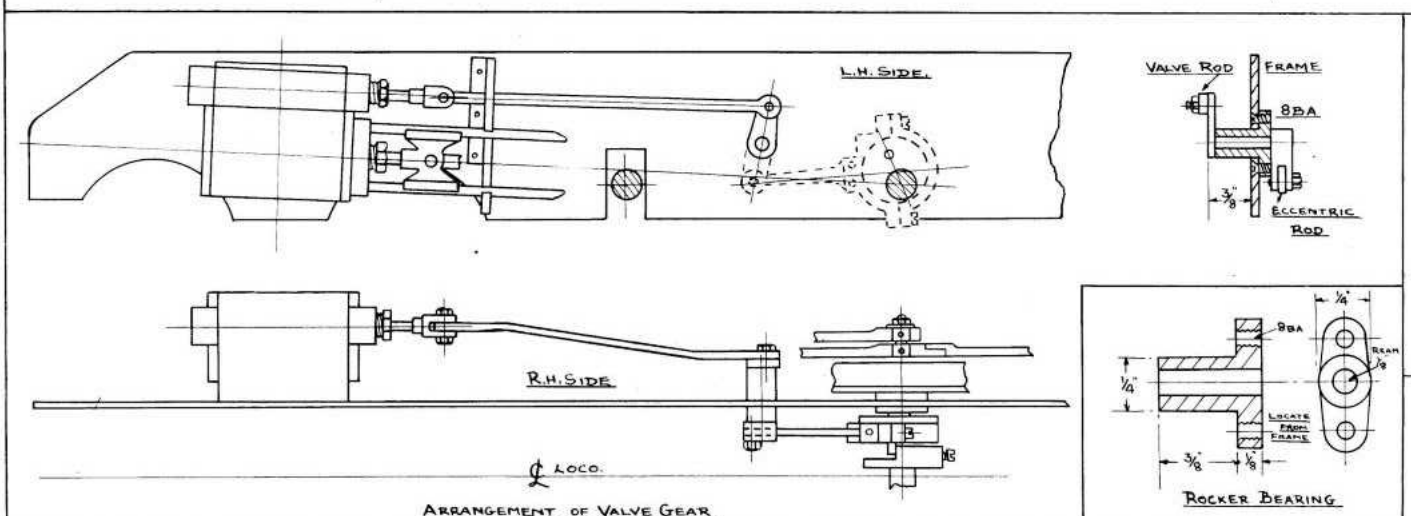
13-35 Bridge St. Hemel Hempstead
Hertfordshire

LO 56
sht. 2

Note: Sheet 3 (boiler) and sheet 4 (tender) will be in printed in issue 4573.

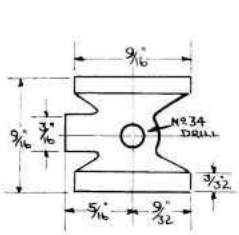




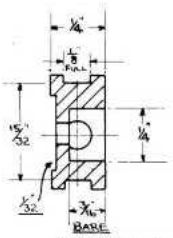


ARRANGEMENT OF VALVE GEAR

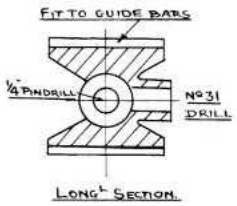
ROCKER BEARING



FRONT

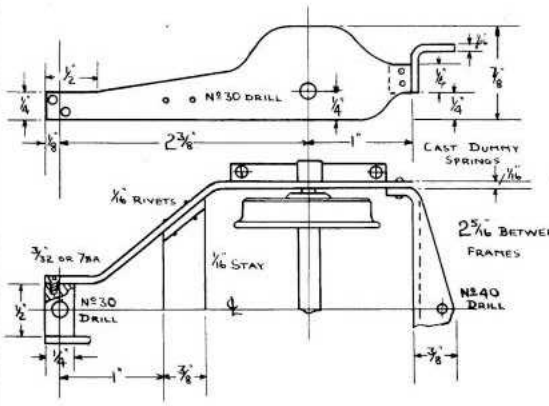


CROSS SECTION.

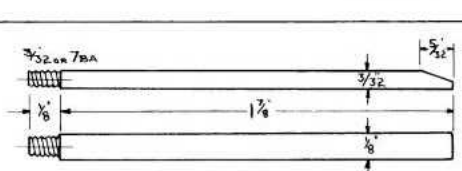


LONG^L SECTION.

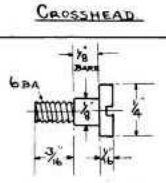
CROSSHEAD



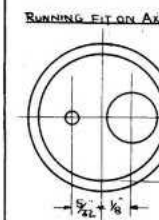
PONY TRUCK.



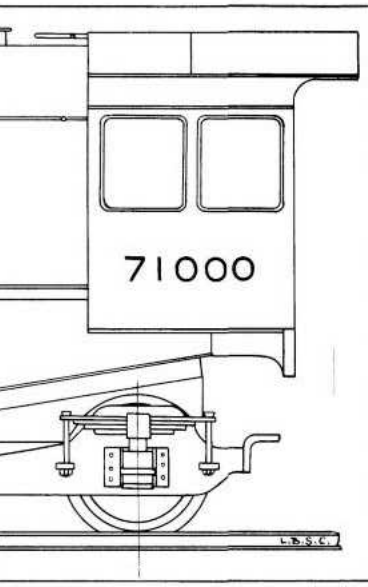
MOTION BARS.

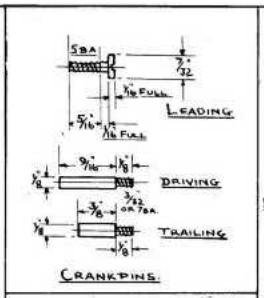


CROSSHEAD PIN.

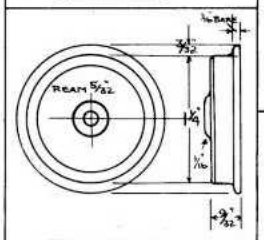


SLIP EC

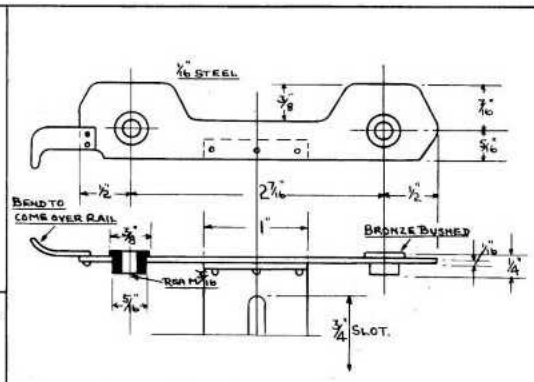


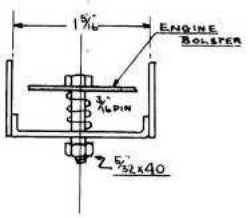


CRANKPINS.

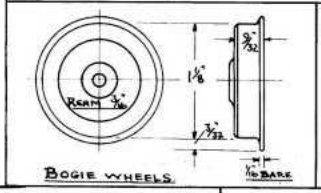


PONY WHEEL.

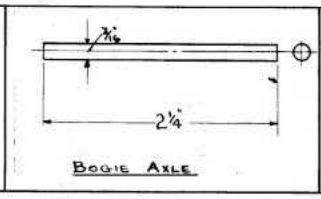




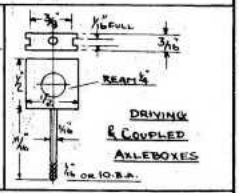
BOGIE DETAILS.

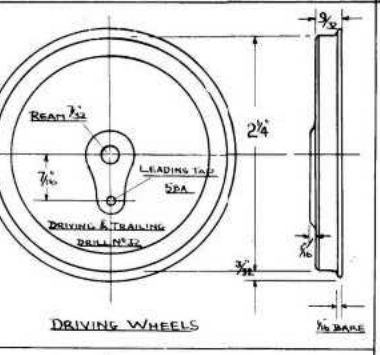


BOGIE WHEELS.

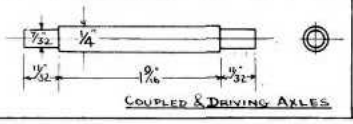


BOGIE AXLE.

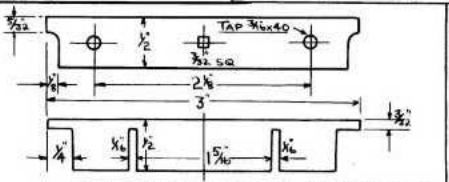




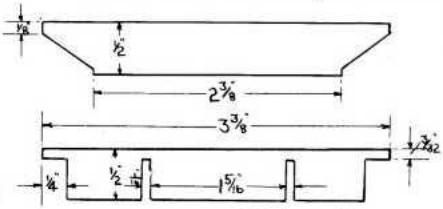
DRIVING WHEELS



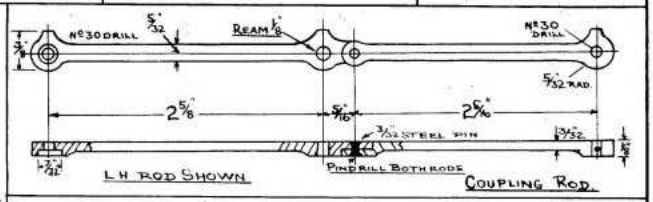
COUPLER & DRIVING AXLES



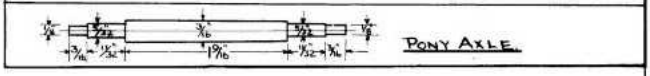
FRONT BUFFER BEAM. (½ x 3/32 ANGLE).



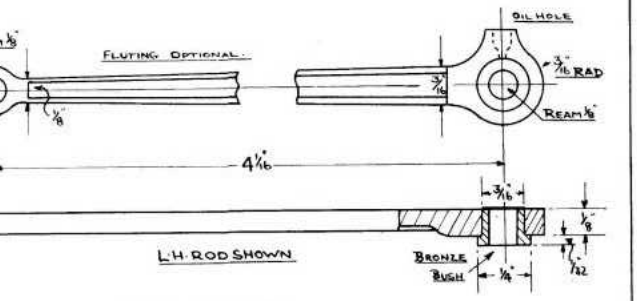
CAB SILL. (½ x 3/32 ANGLE)



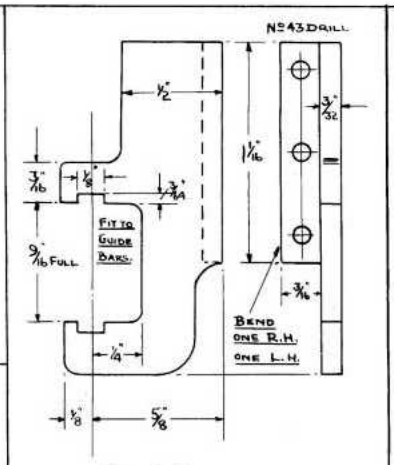
L.H. ROD SHOWN
COUPLING ROD.



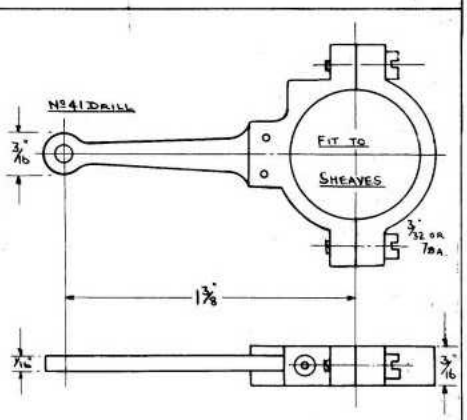
PONY AXLE.



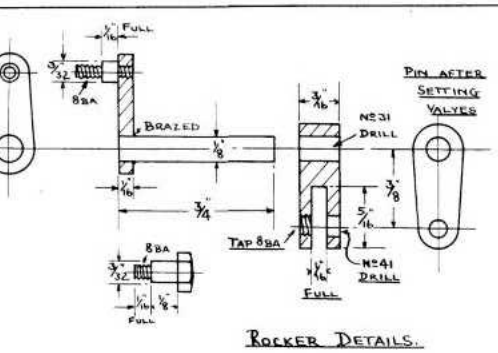
L.H. ROD SHOWN
CONNECTING ROD.



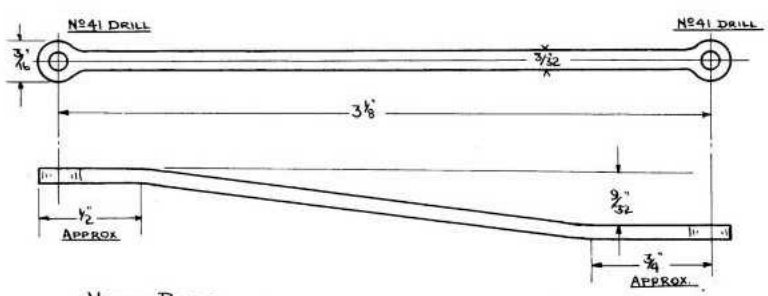
GUIDE YOKE.



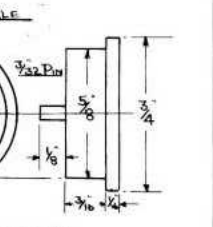
ECCENTRIC STRAP & ROD.



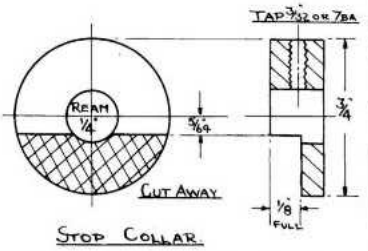
ROCKER DETAILS.



VALVE RODS.



CENTRIC



STOP COLLAR

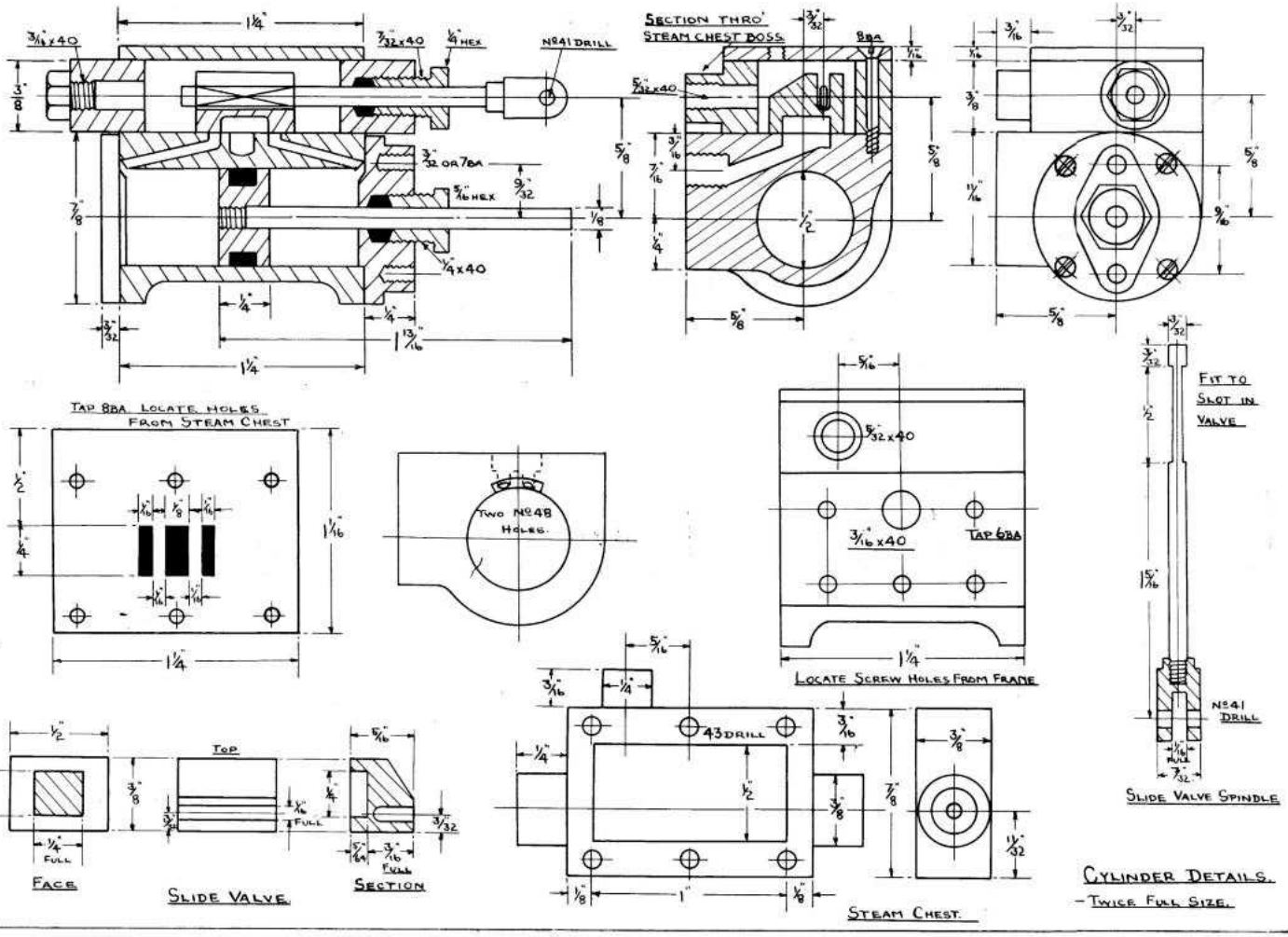
DIANA

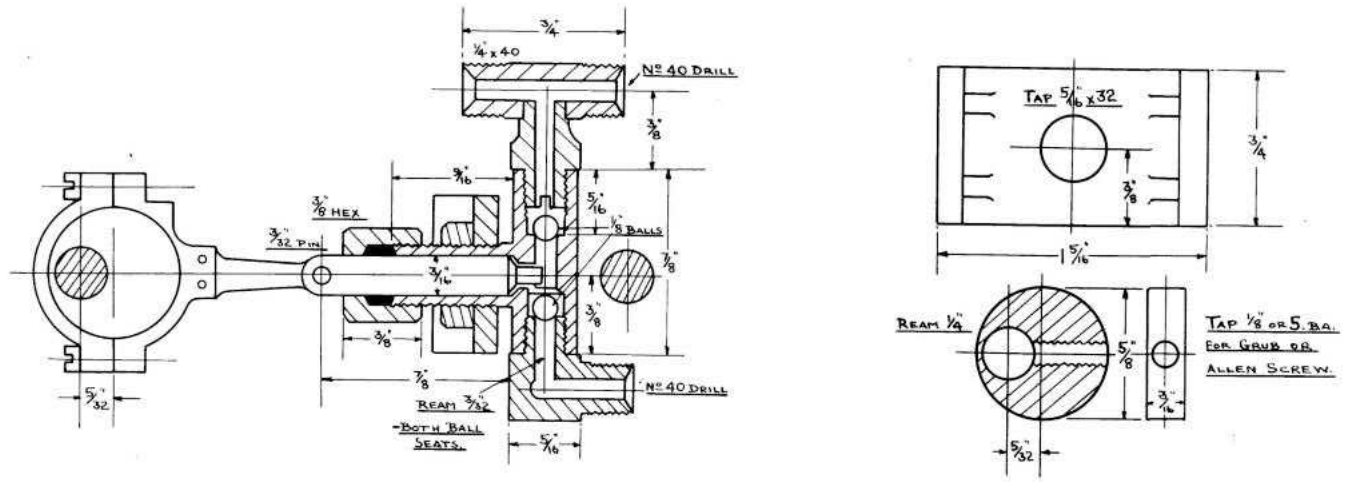
G.I. 4-6-2

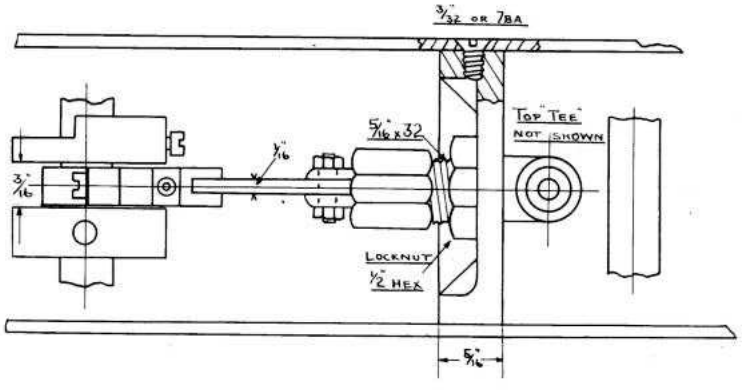
By L.B.S.C.

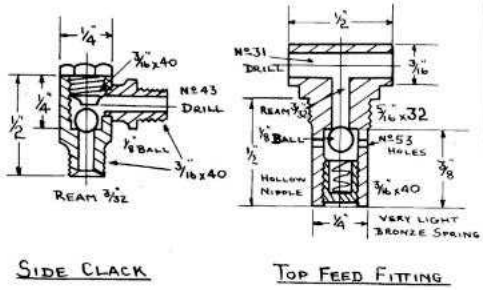
13-35 Bridge st., Hemel Hempstead Herts.

LO 56
sht. 1


SECTION THRO' STEAM CHEST BOSS
TAP 8BA LOCATE HOLES FROM STEAM CHEST
TWO No 48 HOLES.
LOCATE SCREW HOLES FROM FRAME
TAP 6BA
FIT TO SLOT IN VALVE
No 41 DRILL
SLIDE VALVE SPINDLE
43 DRILL
STEAM CHEST.
FACE
SLIDE VALVE.
SECTION
CYLINDER DETAILS.
-TWICE FULL SIZE.


No 40 DRILL
REAM 3/32 -BOTH BALL SEATS.
TAP 5/16 x 32
REAM 1/8
TAP 1/8 OR 5 BA. FOR GRUB OR ALLEN SCREW.
PUMP STAY & ECCENTRIC.


TOP "TEE" NOT SHOWN
LOCKNUT 1/2 HEX
PUMP DETAILS

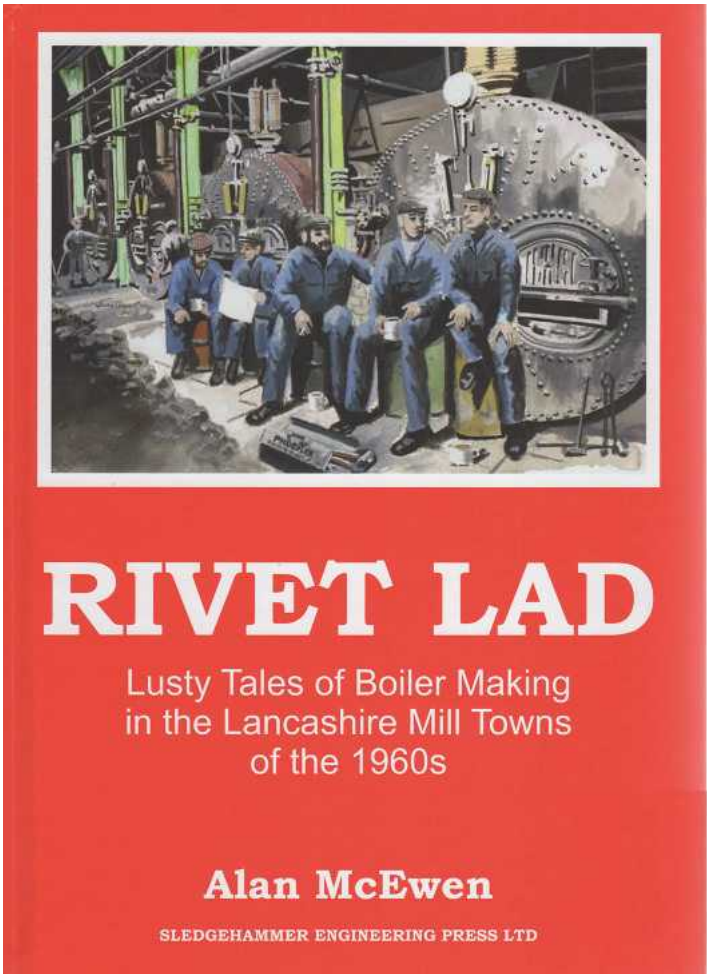

No 43 DRILL
REAM 3/32
No 31 DRILL
No 53 HOLES
HOLLOW NIPPLE
VERY LIGHT BRONZE SPRING
SIDE CLACK
TOP FEED FITTING

Book Review

Rivet Lad

By Alan McEwen

'Until the early 1970s, virtually every northern industrial town would be the home to one or more boiler shop.'



Alan's book, written in his own inimitable style takes the reader back to the exciting days of the 1960s when he was the youngest member of Carrot Crampthorn's squad of boiler makers working on heavy structural repairs on Lancashire and Cornish boilers, a Cochran vertical boiler, a stationary locomotive boiler, a huge steam accumulator converted from a Lancashire Boiler and much more.

This is the story of a squad of Lancastrian craftsman boilermakers plying their trade among the cotton mills, weaving sheds, iron works, manufactories and collieries etc. of north Manchester and surrounding townships and out into the wilds of semi-industrial Lancashire and beyond in the mid 1960s. The men in the story were a team of highly skilled, specialist off-site boiler repairers, part of Phoenix Boilermakers Limited based at Heywood on the banks of the Heywood Canal (known locally as Blue Pits Canal). The story is told by Alan McEwen who was apprenticed to the firm from the age of 15. Alan was the junior hand - the Rivet Lad - in Carrot Crampthorne's squad and the book is an anthology of engaging tales of iron men and their activities.

The book opens with a description of the firm and its undertakings, vivid descriptions of the individuals that were Alan's colleagues and an interesting chapter on the boilermaking firms, both extant at the time and some famous names that, by then, were long gone. It continues with ten chapters, each describing a particular job on which Carrot's team were employed. From an early age, the author has had a passion for industrial archaeology and took whatever opportunity he could to wander away from the job in had to investigate the often hidden activities of the mill or the factory at which they were deployed. The characters he met come to life and we are often treated to an insight into the industry beyond the walls of the boilerhouse.

The book is illustrated with a selection of photographs and drawings by a local artist, but Alan's writing style is highly descriptive and a thousand words are more often used to illustrate the working environment in lieu of pictures - as photography was not really at the forefront of the minds of the team of men as they set to to renew a dozen gusset stays or fit a furnace patch. Working practices are described but this book is much more than an account of the toil, it is a complete narrative about an industrial world that is no longer with us, the likes of which we will never witness again. It covers history, geography and social anthropology; it is a highly entertaining read.

Hard back, 183 A4 pages with 145 monochrome photographs.
£35.00 plus £3.00 p&p to UK addresses only.
Tel. 01535 637153
Email: lankyboilermaker@btconnect.com
www.sledgehammerengineeringpress.co.uk

Trivet Engine PART 2

Tony Bird makes an amusing, inexpensive and unique engine.

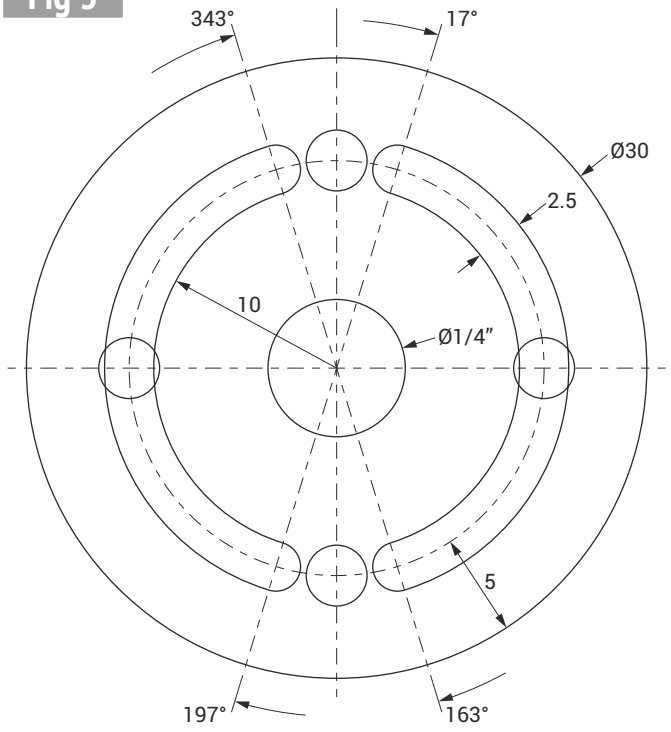
Continued from p.502
M.E. 4570, 29 September 2017

The Trivet Engine - or, as it has four legs maybe it should be called a Quadvet Engine - is loosely based on Stuart Models' Half Beam Engine which is also known as a Grasshopper Engine. The model is partly made from articles bought in charity shops and a lot of the other materials used are recycled.

Parallel motion

Thoughts were given to designing the parallel motion. On studying the second drawing made of the engine it could be seen to what extent the arc described by the beam end would affect the piston rod. Naturally, as the beam end moves up and down it moves the rod a few degrees closer to the beam's pivot point. A thought occurred to me then; could an oscillating cylinder be used? The movement would not be enough to operate a valve but it wouldn't need parallel motion! Another thought; an oscillating valve or semi rotary valve could be fitted on the same axle as the cylinder and share the same spring. It was therefore decided to go down this road and a drawing of a valve was made (**fig 3**).

Fig 3



Oh no! The 'brass' weight is actually filled with lead.

A brass 4oz weight was going to be used to make the valve but then disaster struck. It was filled with lead (**photo 27**)! Other material was sourced for the valve and some brass Tee-section used to make the port block for the cylinder and valve (**photo 28**). The finished port block and valve where held together by a spring and a brass wing nut of unknown origin that had been residing in the bottom of a tool box for many years (**photo 29**). To work out the throw needed to operate the valve another drawing was made (**fig 4**). An eccentric strap was made from some hexagonal stock and located on the eccentric by three screws running in a slot machined in it (**photo 30**).

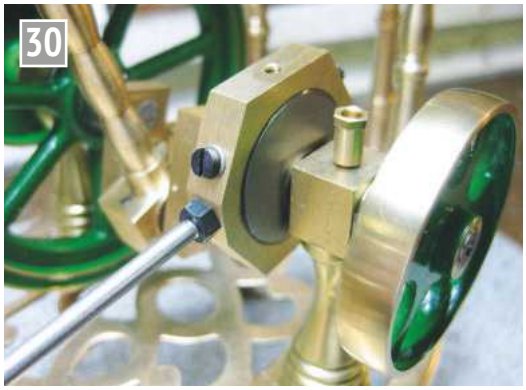
Cylinder

Nothing had come to light from which a cylinder might be made. With a 50mm stroke it needed to be nearly 70mm long. A length of thick wall brass tube was found in which a length of K & S brass tube with an I/D of ½ inch was a sliding fit, which allowed an O-ring to be used (**photo 31**). The last drawing made was of the cylinder (**fig 5**).

Some flanges were made for the ends of the cylinder tube and some hexagonal rod bored to make the cylinder's port face (**photo 32**). The bored brass rod was cut down and fitted between the two flanged ends (**photo 33**) and, after soldering the cylinder parts

Brass Tee-section for the steam chest.

A jobless wing nut finds favour.



The eccentric.

Components of the cylinder.

Cylinder with ends and hexagon port face.

The hexagon section cut down to fit.

Fig 4

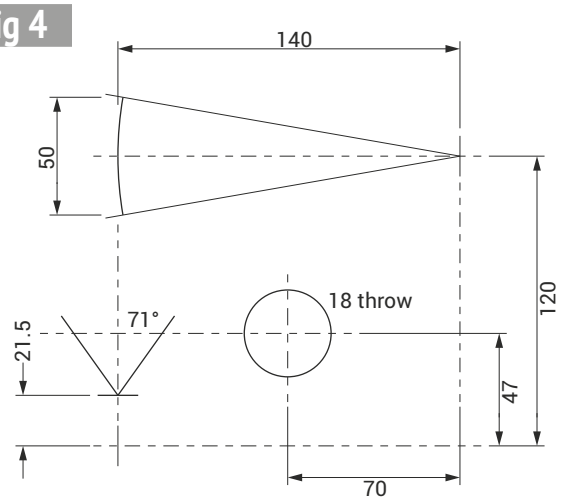
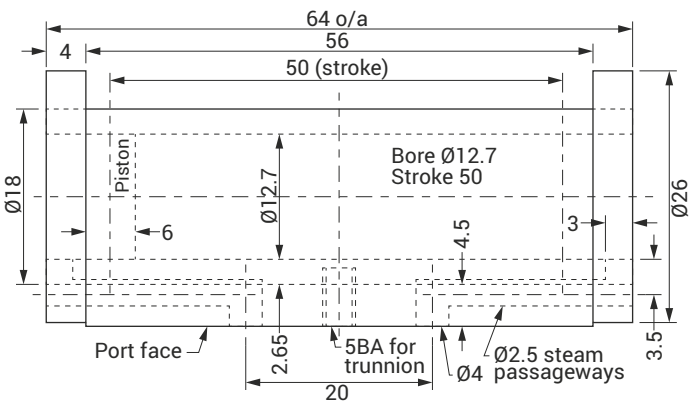


Fig 5

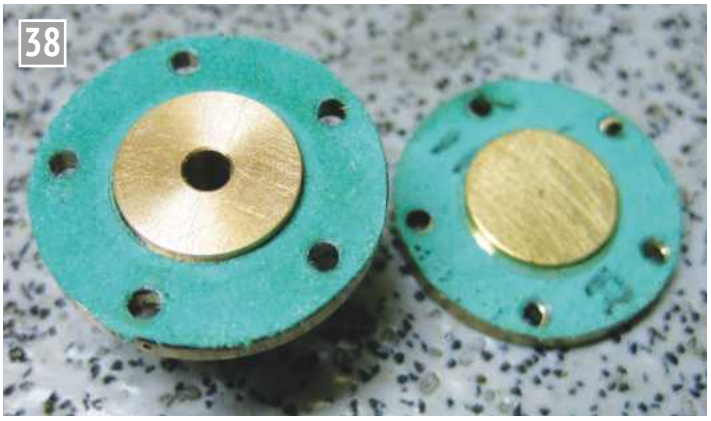


The cylinder assembly is drilled and machined.

The cylinder bore had a good finish.

A closer view of the cylinder end cover.

The cylinder had 'strengthening ribs' added.



End cover gaskets.

Piston with it O-ring.

We were on the home straight now; cylinder covers were made but the cylinder looked a little plain so some D-shaped copper wire was used to make it look as if it had strengthening rings.

together, the cylinder was drilled and machined (**photo 34**). The K & S brass tube used for the cylinder bore is very finely finished, even on the inside, so doesn't really need lapping (**photo 35**).

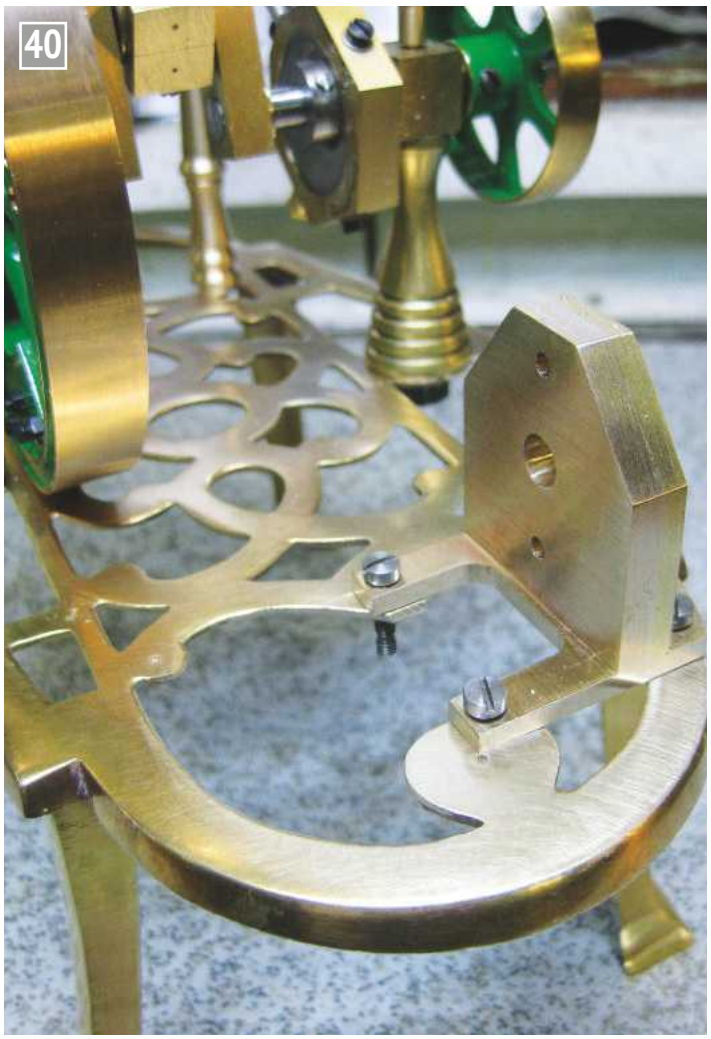
We were on the home straight now; cylinder covers were made (**photo 36**) but the cylinder looked a little plain so some D-shaped copper wire was used to make it look as if it had strengthening rings (**photo 37**). Gaskets were made for the cylinder covers (**photo 38**) and a piston with an O-ring fitted (**photo 39**).

To fit the cylinder to the port block, part of the trivet base needed to be cut away (**photo 40**).

This, then, completed the model. It was first tested with air and then steam. Note my one further charity shop purchase - a brass specimen vase being used as an exhaust oil separator (**photo 41**). The engine runs quite well; if you would like to see it running on steam have a look on YouTube: **https://youtu.be/p8zFU1iXWxQ**

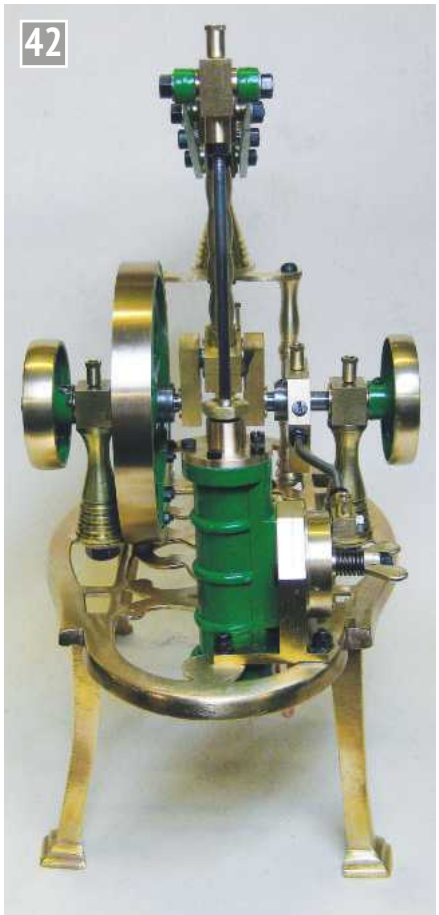
One of the pulleys was replaced by a heavier flywheel and the engine ran a lot slower and more smoothly - but it didn't look right.

It was a fun and inexpensive model to make and I think it looks attractive in its own way (**photos 42, 43** and **44**). It is certainly unique! **ME**

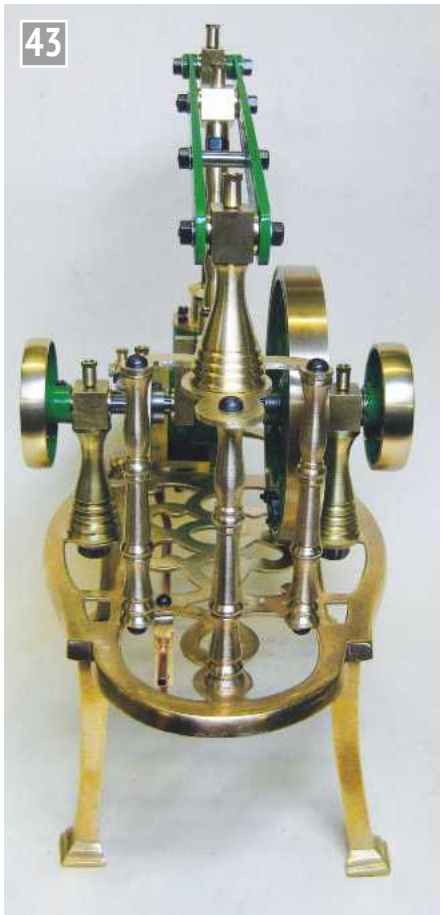


Part of the trivet removed to accommodate the cylinder.

Under test with a rather fancy oil separator.



Centreline view - cylinder end.



Centreline view.

A rather unique engine!

Bristol's Tribute to LBSC

Bernard North reviews a special display at this year's show.

GWR County, Hall, Maisie and Princess Marina on Bristol SMEE stand.

The 2017 Bristol Model Engineering and Model Making Exhibition held in August featured an extended display of model locomotives designed by Lilian 'Curly' Lawrence - or LBSC as he was known - to mark the 50 Anniversary of his passing in November 1967. This short photo feature compiled by Bristol Chairman, Bernard North, with captions augmented in parts by the editor, captures a selection of the models on show. There were over 80 LBSC locomotives in the exhibition, covering some 40 different designs.

A collection of Juliets in different guises including one as a Peckett Saddle Tank stretched to 5 inch gauge. Juliet was first published in M.E. *in 1946.*

A similar collection of Tichs, large boiler and small boiler, and a 7¼ inch gauge version at the back. Tich dates back to 1948.

Running Shed Diorama showing Nigel Dickinson's Netta, Gordon Cackett's Maid of Kent and Speedy. LBSC designed only a handful of locomotives in 5 inch gauge but they have been some of the most popular designs built. I doubt there's a single club in the UK that doesn't count at least one of these three amongst its regular runners!

LMS 4F, Harriett, *also built by LBSC and loaned by Bryan Luxford.*

LBSC's handiwork - an American style Mallett, Annabel *reconditioned by Curly.*

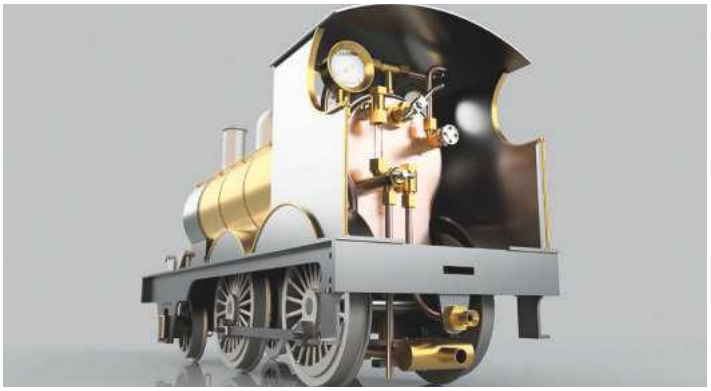
The much travelled Ayesha - the famous little engine that started it all, now in the ownership of the 2½ Inch Gauge Association. In 1922 LBSC argued that live steam model locomotives should have a coal fired, fire tube boiler of similar construction to locomotives on the 'big railway' rather than the, then, conventional spirit fired water tube boilers of the commercially produced models of the day. After demonstrating little Ayesha's efficiency to the Society of Model & Experimental Engineers in the summer of 1922, Curly was asked to describe its construction in the pages of Model Engineer. *The rest, as they say, is history.*

Another LBSC locomotive, Caterpillar, *an unusual 2-12-2. This was reputedly based on a Union Pacific 9000 class and it was offered with three or four cylinders. It was published in* English Mechanics *in 1932.*

Dean da Silva's LBSC Drawings

Dean da Silva lives in Yuma, in the heat of the Arizona desert in the USA. He works full time as a radar technician but in his spare time he also makes up CAD illustrations for Allen Models and Banning Locomotive Works of Las Vegas. He is also a member of the Yuma Territory Live Steamers and the National 2½ Inch Gauge Association.

He is a young designer with a passion for the designs of LBSC. He is occasionally allowed to take a break from official duties and has set himself the target of redrawing as many LBSC locomotives as he can, in the style of those we see illustrated here. Dean is especially interested in those locomotives that are rarely seen. He says; *'There are lots that exist many times over (such as Tich, for example) and I seriously don't foresee those becoming lost, but there are plenty which I am sure have not seen the light of day in decades. What I would like to do is draw them in CAD and somehow ensure that his designs live on for model engineers to enjoy for years to come - rather than just remaining stuffed in a basement somewhere in a stack of old magazines.'*



Fitchburg Northern drawn for Allen Models.

His ultimate aim is to redraw them all (good job he's a *young* chap!) in order to preserve them for the future.

Dean goes on; *'I'm not looking to earn a cent off of this. I've come to admire LBSC greatly, I think that it would be safe to say that he is the father of live steam as we know it today. I'd hate to see the legacy of designs he created fade into obscurity.'*

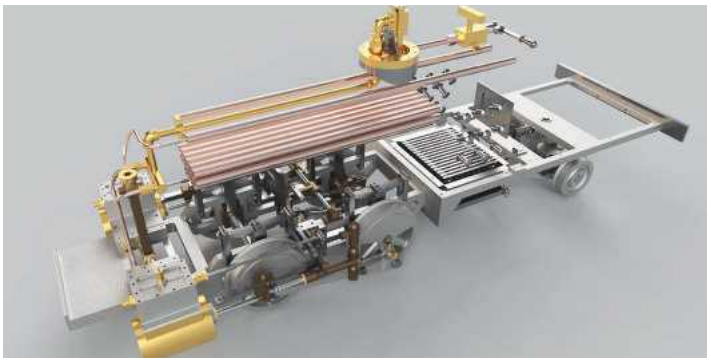
The drawings seen here are external views only but he also 'takes them apart' and draws every last detail of the locomotive's components. I hope to be able to bring you more examples of his illustrations from time to time, but for now, I hope you enjoy this 'new take' on some old work. ME

LBSC's Rose was described in Model Engineer starting on 8th August 1957.

Rose was described as a 'beginner's locomotive'.

LBSC considered this a 'de-luxe version of Pixe'.

Rose had a single inside cylinder for absolute simplicity - yet it captured the North Eastern look.



An exploded view of Chloe - another for Allen Models.

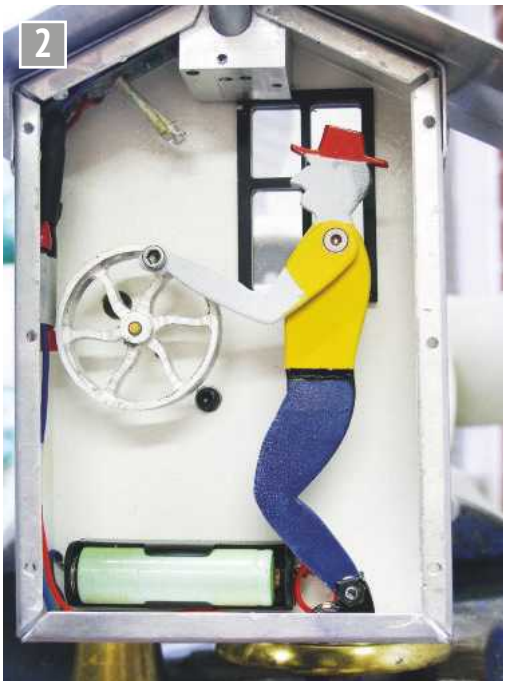
New Gears for Wally

Bob Reeve relates the tale of Wally's rejuvenation and his subsequent new lease of life.

Wally lives a lonely life and works very hard. The work is mundane and very repetitive but his place of work gives a good view of the countryside. He can just be seen in his bespoke accommodation in **photo 1**. Whenever the wind blows Wally can be seen at work and is much loved by No. 1 Nephew's children for whom he was created. In fact, it was the children who named him 'Wally Winder'.

A closer view of Wally in his winding house (with the acrylic cover removed) can be seen in **photo 2**. To ensure Wally can continue his work day or night the winding house has LED lighting and a solar panel on the roof (salvaged from a solar powered garden light) which illuminates Wally after dusk. The rechargeable cell for the solar lighting can be seen at Wally's feet. Since Wally is just outside one of the children's bedroom windows an illuminated Wally is on view at the children's bedtime in the winter months.

Wally's World.



Wally's home.

In search of wind.

The main features of Wally's domain comprise the wind driven turbine (an engine cooling fan from a motor vehicle), some reduction gears actuating two cams that operate the bell cranks and a tail shaft to Wally's winding house to impart motion to Wally himself. In addition, a long boom from the top of the winding house slopes upwards to the tail vane which keeps the turbine pointing into the wind.

Wally needs to keep an eye on the turbine so there is a glazed window with a view of the turbine and any passing birds that stop for a rest on Wally's lofty perch.

The project started life as a test bed for a wind generator (**photo 3**) which was characterised by a distinct lack ≫

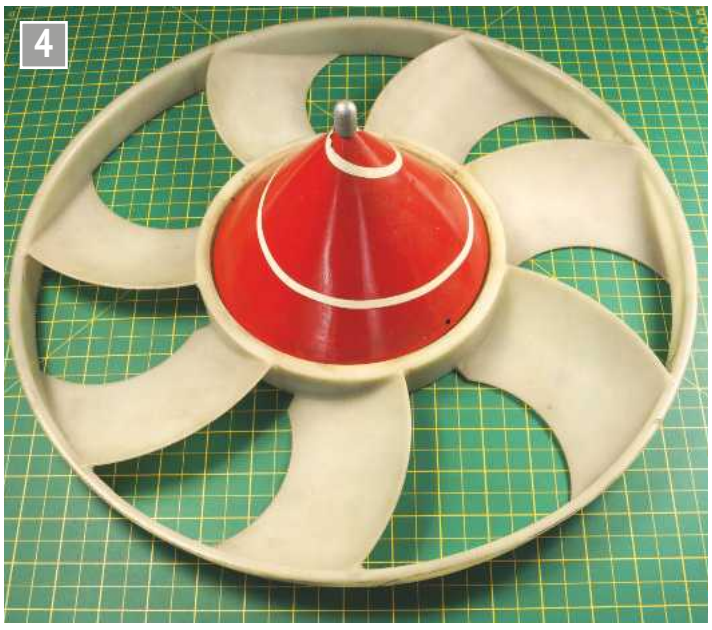
of watts. In fact, it just about managed 5mW in a howling gale! Note the string hanging from the tail. This was not an emergency tether in case of bad weather but a sort of slip angle indicator to show that the turbine was facing into the wind as it should.

This was an idea that resulted from a chance conversation which took place in an aircraft hangar, with me sitting in the passenger seat of a helicopter. The proprietor of a pilot training school was explaining the business case for expansion when I spotted a piece of string hanging down the outside of the cockpit canopy. I contained my curiosity until the discussion finished then asked what it was for. The explanation was that student pilots had difficulty ensuring the helicopter flew nose first as it should. In the event that it was flying slightly askew then the string would move to one side or the other. If it moved to the right the student was instructed to press the right pedal and *vice versa.* A good idea is a good idea, no matter where it comes from.

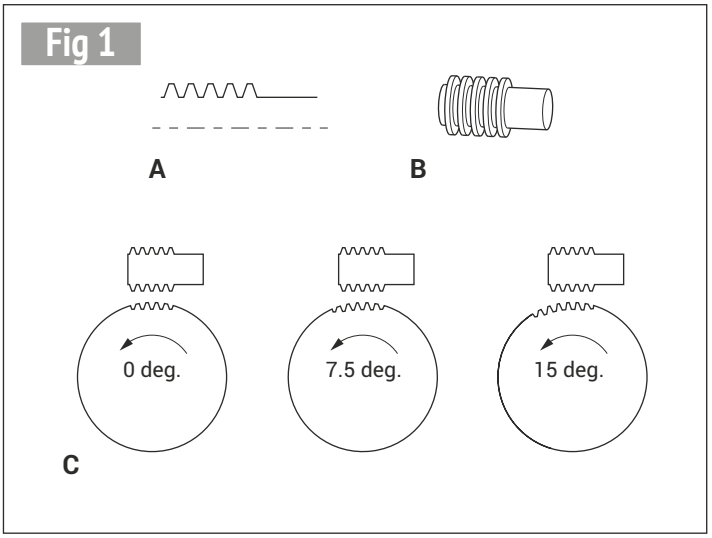
As a result of this facility I noticed that, as the load on the turbine increased, so did the deviation away from the correct angle for the turbine. I'm no aerodynamicist but it seemed that the increased load increased the drag from the turbine and the system reacted to reduce this drag by moving the turbine axis away from the wind direction. The situation was not helped by the flat(-ish) face on the front of the turbine which was likely to be further increasing the drag.

A longer tail boom or a larger tail vane would have helped but I decided to borrow an idea from the front end of a modern turbofan engine (with apologies to Rolls-Royce). I incorporated a conical nose on the turbine to reduce drag from the flat face (**photo 4**). I also increased the height of the tail vane to take it further out of the turbulent wake of the turbine. These two changes resulted in a satisfactory improvement in keeping the turbine facing into the wind but no improvement in its ability to generate electricity.

It seemed that this was a good point at which to end my attempts at power generation and see if the project could be steered in a more promising direction. That turned out to be an attempt at a conversion to a toy windmill. Not the stick man and blades, made from an old packing case, but something more relevant to the second millennium. What follows is an account of the trials and tribulations that accompanied the conversion.



Turbine with nose cone.



By way of a start I removed the generator then added the bells and Wally's winding house, as shown in photo 1. Note that the bells are rocked from side to side and have free hanging clappers inside them.

This was installed at my home to be left running for three months to ensure it was robust and reliable enough. It passed the test with flying colours and was duly installed at the home of No. 1 Nephew. Alas, it ran for less than two weeks before the children reported that Wally was sometimes seen to be not working, even though the blades were turning.

An examination of the internal parts showed that the module 0.5 moulded gears I had used were not up to the job. The 12-tooth input pinion had lost most of its teeth! How had that happened so quickly despite a prolonged test? A quick repair was effected with a replacement moulded gear. I had not found the cause but obviously something more substantial would be needed in the near future.

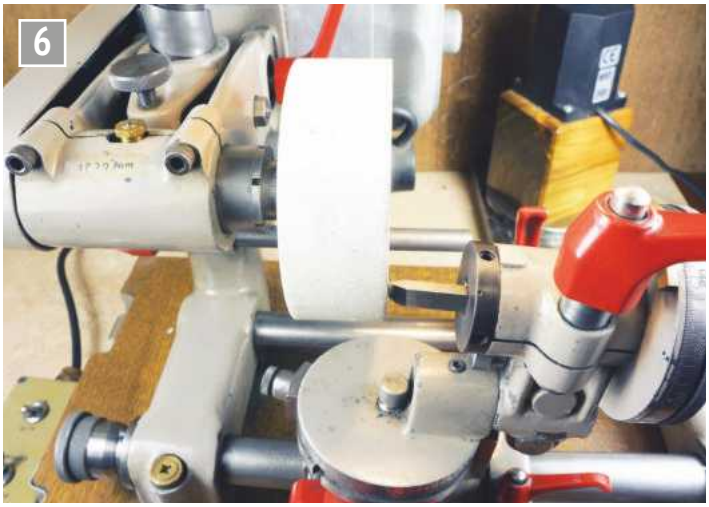
By chance I happened to be at the Nephew's house one blustery winter's day and observed the windmill turning at high speed and violently shaking the mounting pole. Wally was dancing about like a thing demented with the turbine running much faster than it ever had at my home. I could see that it would not be too long before the contraption destroyed itself.

The cause of the gear problem was obviously the excessive speed. The root cause, however, needed more thought and a little help from the Ordnance Survey map. The Nephew's house was on the windward side of The Ridgeway, about 100 feet higher up than mine, with an open prospect to the prevailing wind from the southwest. A winter storm blowing inland from the Bristol Channel was going to give both the gear train and Wally a hard time of it.

Wally needed new gears; more robust and with a greater overall reduction ratio. In addition, the turbine needed balancing. The latter was easy - just a nut and bolt in the right place as a balance weight. The gears were more problematic. They could not be much larger if they were to fit in the existing housing so metal gears seemed the way forward. I could have purchased commercial gears but there would have been no challenge in that. I could have made the gears, as I have in the past, with the appropriate cutters. However, for small numbers of gears the cost of the cutters was likely to exceed that of the purchased gears - the usual dilemma for the model engineer.

Coincidentally, friend Pete had drawn my attention to an approximate method of making gears using rack-form cutters, which were easy to make. I had been looking for an excuse to try it out for a while. However,

Grinding the side relief.



Grinding the end relief.

it occurred to me that the published information could be updated, especially if a CNC mill with a fourth axis was available. This was beginning to sound more of a challenge.

The basis of the gear cutting method for involute gears that I proposed to use has been well documented (**ref 1** and **ref 2**) so I shall provide just a brief summary of the theory and put a little more emphasis on the practical aspects.

A short length of 0.5 module rack is shown (magnified) in **fig 1A**. The solid of revolution forms the rack form cutter in **fig 1B** (without flutes at this stage). It is rather like a hob, but with no helix, and is used to cut the teeth (48 in this example) in a gear blank.

Since the hob teeth are straight sided and have flat tops and roots it might be expected to only be of use for cutting racks. The clever bit is that, unlike conventional gear cutters, the rack form cutter has rows of teeth (typically 5). After a tooth is cut on the blank the blank rotates by one tooth and the next tooth is cut as in normal gear cutting practice. However, as this happens, the blank is being cut either side of the centre (**fig 1C**) so that the straight sided form is modified to an approximation of the correct form. If the blank is rotated anti clockwise the gear teeth left of the cutter are modified so as to no longer have straight sides. After a complete revolution of the blank the result is a usable gear from a rack form cutter that is simple to make.

I decided to stay with 0.5 module gears, mainly because they would fit the existing enclosure and I would not have to change the drive-line centres. So, the first task was to create the rack form cutter. This was to be mainly a turning job in silver steel with some cutting flutes milled in before hardening and tempering. At that point it occurred to me that, with a 4th axis on the mill, spiral flutes were nearly as easy as straight ones.

Spiral flutes have the advantage of reducing the cutting loads when the cutter is in use. The cutting teeth impact the work piece sequentially and not simultaneously as in the case of straight flutes.

A form tool similar to a screw cutting tool was used to cut the grooves. The simple V-form had the sides inclined at the pressure angle - in this case 20 degrees. The Quorn tool and cutter grinder (**photo 5**) made this a simple job even with some side relief. Without a helix to allow for this could be small and I allowed 3 degrees. The tool is initially ground to a point then cut back accurately to the correct tip width. Dimensional details for this tool can be found in **ref 3** (page 88). Again, the Quorn allows a relief angle to be ground (**photo 6**).

However, there is an argument for not using a flat tip. If the grooving tool is left sharp it provides an accurate means of judging the depth of cut without having to calculate a correction for the flat tip. The lack of flat tip allows the teeth on the rotary tool to be pointed which would result in extra clearance at the root of the gear to be cut. Not a bad thing in some circumstances.

Some of the completed grooving tools can be seen in **photo 7**. Clockwise from the top are a 20 degree pressure angle tool with flat tip tool (used in photo 9), a 20 degree pressure angle tool left sharp and a 14.5 degree pressure angle tool also left sharp.

With the tool at 90 degrees to the lathe axis (**photo 8**) and the silver steel running true then, for five teeth, six grooves will be required if the form tool is used to provide the clearance on the outside of the two outer teeth.

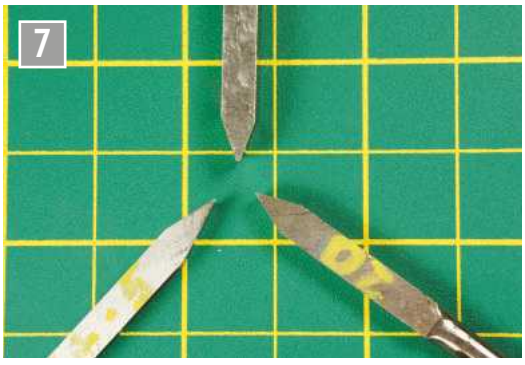
The groove spacing was given by:

(module) * π = 0.5 * 3.1416 = 1.571mm
The rack tooth depth is:
(module) * 2 = 0.5 * 2 = 1.0mm

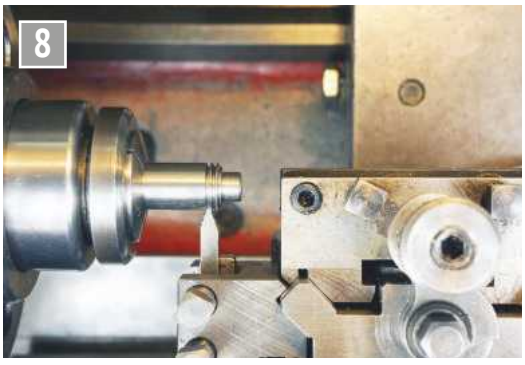
In addition, there needs to be an allowance for clearance at the tips of the teeth equal to 5% of the linear rack pitch, which is given by:

5% * (module * π) = 5% * 0.5 * 3.1416 = 0.079mm
The total tooth depth is therefore 1.0 + 0.079 = 1.079mm.

Since I opted for the CNC approach a set up something like that shown in **photo 9** was



Grooving tools.



Cutting the grooves.

≫

required with the rotary table providing a 4th axis parallel to the X-axis. For milling the flutes I programmed a helical cut which would also provide some rake on the cutting face by going slightly over centre. **Fig 2** illustrates the way the flutes are cut to achieve this.

I hardened and tempered the tool in the usual way, heating to cherry red then quenching vertically in water with the tool rotating. Tempering to pale straw colour was also done with the tool rotating.

The result can be seen in **photo 10**.

●To be continued.

CNC milling helical grooves.

Completed tool.

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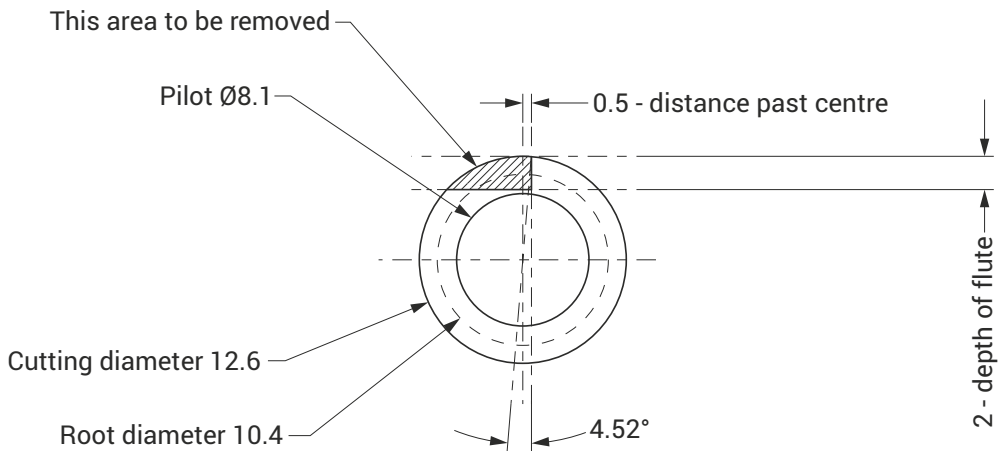
2. http://homepage.ntlworld.com/peter_harrison/workshop/gearcutting/index.htm
A practical guide unfortunately now only available on archive sites since Virgin Media pulled the plug on the homepage site. Try https://web.archive.org/web/*/homepage/ntlworld

3. Gears and Gear Cutting, Ivan Law, Special Interest Books Ltd ISBN 978-185242-911-2

Fig 2



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Recreating LBSC's

Neil Heppenstall gives a brief overview of some of the work of the National 2½ Inch Gauge Association

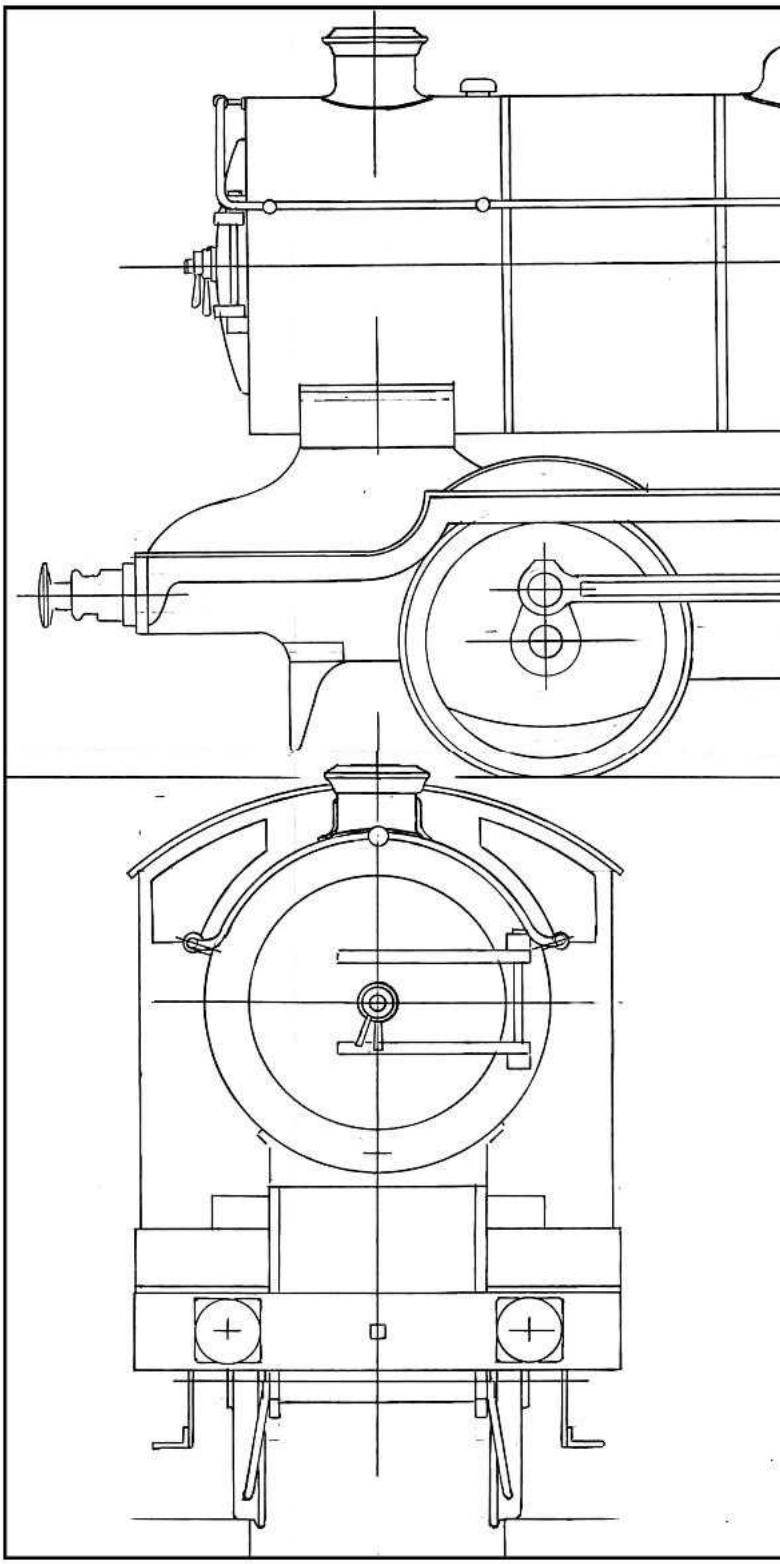
The master drawings of many of LBSC's pre-war designs for locomotives were kept in the London office of the *Model Engineer* magazine. They were destroyed during the Second World War when so much damage was done to the buildings in the capital. Luckily, LBSC's construction notes and many diagrams had already been published in the magazine, so they are still available to us today.

Members of the National 2½ Inch Gauge Association are working to recreate some of LBSC's drawings, using whatever information is available.

The two locomotive designs that I have been working on are Annie Boddie (*Model Engineer,* 1933) and Mary Ann (*Model Engineer,* 1934). Both are for 2½ inch gauge, which was the popular size during the 1920s and 1930s. The first of these is a 4-4-0 tender locomotive with two outside cylinders. It is loosely based on the Midland compounds. There are fifteen A2 size sheets in the set. This was necessary as our Vice President, Des Adeley suggested, as an alternative, adapting the front end of the engine to accommodate the cylinder arrangement of Ayesha. This was LBSC's first successful 2½ inch gauge coal-fired locomotive. The advantage of this design is that the steam chest, between the frames, can be machined using only a lathe. LBSC rightly assumed that few beginners would have a milling machine at that time.

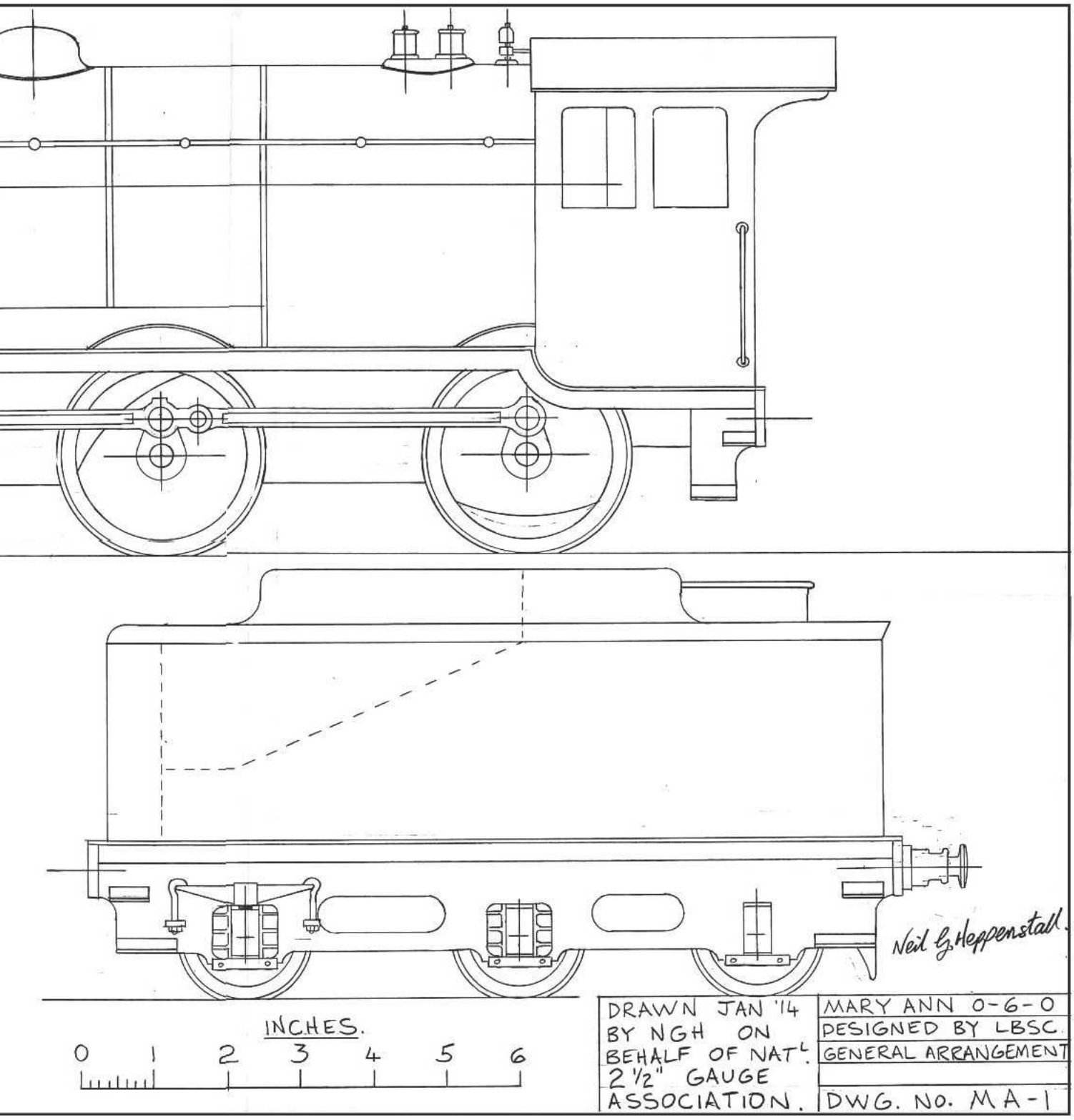
Mary Ann (see the composite drawing, the original having been drawn A2) is an 0-6-0 J39 tender locomotive of the LNER, with two inside cylinders. My work on this continues.

The construction of the locomotive, Ayesha has been described by Tony Weale in this magazine during 2007. Water-jet cut frames and motion rods are available from SCISS Ltd. at Staplehurst in Kent. Castings are available through the Association.



Another team has been working on LBSC's version of the GWR King class locomotive, known as Kingette in this scale. This is a serious project for anyone and the drawings have been prepared by Paul Dewstowe.

Lost Drawings



Computer aided assistance on the design of the valve gear was provided by our National Secretary, John Baguley. A set of thirty-two mostly A2 size drawings is now available.

We just need a brave soul to complete the construction of one of these engines in order to 'prove' the design.

The National 2½ Inch Gauge Association can offer castings for a wide range of 2½ inch gauge locomotives, many designed by LBSC himself. Trade suppliers, such as GLR Kennions Ltd. offer materials for several of LBSC's designs.

In a world where rising material costs are becoming a problem, there is good reason once again for LBSC's choice of 2½ inch gauge, which he adopted for much of his work. ME

Garrett 4CD Tractor in 6 inch scale

PART 36

Chris Gunn completes the steering mechanism.

Continued from p.491
M.E. 4570, 29 September 2017

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

It made sense to finalise the steering assembly at this stage so I needed to make the chain anchors that fitted through the front axle. These are not shown on the drawings but I did have some pictures of a full size engine which showed what is probably a forged eye, secured by a nut and a castle locknut, to which the steering chain is connected. **Photograph 335** shows an example of what I presume is an original eye.

Full size steering eye.

Amongst my 'come in handy one day' bin, I had a number of lifting eyes of various styles. Some had a male thread and some a female thread. I had some lifting eyes that had been salvaged from various old electric motors and these looked as if they would fit the bill. I managed to find a pair of the same style but the ones that I had selected, of course, had male threads rather than female. The first step was to cut off the male thread and drill and tap them M8. I did this in the four jaw independent chuck, first gripping the thread of the eye in a drill chuck in the tailstock, then tightening the lathe chuck jaws around the eye. The first one ran true so I turned off the stud and faced the eye and drilled and tapped it. The second was treated in the same way and I now had my two eyes. These were fitted to the front axle with a piece of M8 studding and the job was done, looking reasonably like the full size version.

I then fitted one end of the chain, using a shackle to connect the chain to the eye, and fed the chain over the steering shaft, wrapping it round a turn or two. I slipped a pin through the centre of the steering shaft and the chain link and then fed the other end towards the front axle. With the front axle in mid position, I connected the chain to the turnbuckle at an appropriate link using another shackle. I checked the movement of the front axle and the chain and took up the slack with the turnbuckle. When I was happy, I cut the chain and tidied everything up.

I fitted a turnbuckle to tension the chain, as per the full size engine. I have pictures of several engines and in some cases the turnbuckle is fitted on the right and some on the left. Mine is on the left. **Photographs 336** and **337** shown the connections on the model.

If you have a motor rewind business in your area, this could be a source of lifting eyes.

In the absence of any lifting eyes to modify, it would be possible to make an eye from 8mm bar, welding the end of the bend to make a loop, or a clevis could be turned up from

Right hand connection.

Left hand connection and turnbuckle.

square bar, drilling a hole in the square end to take the bolt of a shackle.

Whilst working on this side of the engine, I decided to fit the flywheel and the flywheel brake. In fact, the flywheel had been made earlier while I had access to my friend's Triumph 2000 lathe but I will describe how I did it now. The observant reader will pick up from the pictures that some parts have appeared in the pictures before the description of their manufacture appears in the text. Parts manufacture will sometimes depend on the availability of castings or the opportunity to make them and not perhaps in a logical sequence. For the sake of the narrative, it seems sensible to describe the construction of items group by group, rather than jump about from here to there and back again.

Drawing No. 19 from A. N. Engineering shows the section through the crankshaft and this also includes the dimensions required to machine the flywheel.

●To be continued.

CLUB NEWS

Geoff Theasby reports on the latest news from the Clubs.

I spent 25 minutes yesterday looking for Platform 0 at Doncaster. I know it's there, 'cos I read it on the Internet! Unlike Platform 9¾ at Kings Cross, or Miller's Dale, or Buggleskelly. Anyway, after tramping back and forth several times between the railway station, the bus station and Frenchgate shopping centre, I asked at the enquiry desk. 'Oh yes, there is one somewhere'. Ah … but where, oh where can he be...? (No, it's not the Scarlet Pimpernel...) At the end of Platform 3, of course. Where else? Up the lift or stairs, along a dog-leg corridor, down again and there it is! Clean, new ... and empty. Big enough only for a 2-car DMU. No access to Frenchgate or the bus station, although it is right alongside, and no level access to the rest of the station save the aforementioned lift or stairs (**photo 1**).

I give up! I've met my match. On social media my beliefs were dismissed as irrational by someone claiming to practise yogic flying! My work on this Earth is done.

In this issue: a happy President, canal widening, a battery-powered battery locomotive, rabbits, a failure, Peugeot 306, an electric car, sharpening scissors and a passenger-carrying Gauge 1 locomotive.

On Track, August, from **Richmond Hill Live Steamers** has little to report this time but Walter Reid did spot this 25 minute film on making railroad ties (sleepers) in 1920s Missouri. www.youtube.com/watch?v=51AX8w9bt2I&feature=youtu.be

W. www.richmond-hill-live-steamers.tripod.com

The Oily Rag, August, from **Taunton Model Engineers** says they may have to leave their site at Creech St. Michael in the near future; more details later. The recent Steam Gala saw nine steam, three electric and one pedal-powered locomotive. A visit to XYZ Tools in Burlescombe was very enjoyable. The machinery is from Taiwan but all controls, programming and design is carried out in the UK. A training lathe the size of a Colchester Student was at one end of the product range, whilst at the other was a machine that could swallow a small workshop! Their guide said it was a pleasure to show the group around - such a collection of interested and knowledgeable people asking intelligent questions. John Pickering, scornful of battery-powered 'steam' or 'diesel' locomotives, resolved to build a battery-powered model of a battery-powered original, of which there are many examples still in use and being constructed. Using a 1kW bicycle motor and a double reduction sprocket set obtained online, work has reached a hiatus due to the imminent move. Fireman (MN) sailed to South Africa via the Suez canal, which was being widened after the war with Israel. Would you believe just an ancient, steam dragline crane and hordes of male and female labourers with shallow baskets?

W. www.tauntonme.org.uk

Blast Pipe, August, from **Hutt Valley MES** & **Maidstone MES** has Ross Johnson discussing the difficulty of using hex spanners between the frames of the smaller locomotives. He found a set of open-ended ratchet spanners but balked at the cost of NZ$49. When the price was reduced to $29 and then $19, he bought it. David Turner is making another of Brian Rupnow's designs, this time a compact 'rocker' engine, with the crankshaft below the cylinder. The question of David Brownlow's Fairlie livery which has been extant since 2012 has currently been decided in favour of red. This has met with general approval.

W. www.hvmes.com

Ryedale Society of Model Engineers' *Monthly Newsheet* for July is another rather light on content. Too busy running trains! Editor, Bill Putman reports that a rabbit hole has appeared in the car park embankment and the committee are looking into it. (Perhaps they should send for the Borough Surveyor – Geoff)

W. www.rsme.org.uk

Modelling Ways, August, from **Fareham & District Society of Model Engineers** begins with details of the Chinook helicopter, which began life ten years after the Westland Belvedere but was bigger and more powerful and was developed much further. The Open Weekend was a great success; the boating lake had a good choice of vessels from motor cruisers to a variety of naval craft. There were crowds on site all day and the ravenous hordes consumed all in their path except a few meagre crusts with which to sustain the inner modellers afterwards. Martin Gearing took along his 'Seagull'-powered locomotive, to show the flag for I/C engines (**photos 2** and **3**) at the Andover club Invitation Day. I'm afraid that the drive belt going 'round the corner' to the flywheel, reminds me of my Peugeot 306, in which not only was the starter motor constantly loose but the air cleaner had to come off to get at the plugs which were between the sideways engine and the bulkhead! Not a car for the home mechanic! Anyway, upon request I had a page full of information on his various I/C engined attempts to demonstrate to beginners that even discarded engines could still prove useful. It's not all magnificent prize-winning models you know! I am

Platform 0 Doncaster.

Seagull 1 scratch built I/C locomotive. (Photo courtesy of Martin Gearing.)

Seagull 2. (Photo courtesy of Martin Gearing.)

surprised to find that very few have taken any interest. The basic 'test bed' is a jackshaft drive 0-4-0 chassis, which has had variously hung upon its capable frame two Villiers engines (too big), a Suffolk Punch lawnmower engine with the usual Suffolk carburettor problems, a 32cc strimmer engine which sounded like a Messerschmidt and was very thirsty, a Robin four-stroke coupled to an alternator driving two car heater fan motors - which turned into a successful drive system for a friend's locomotive - and the Seagull. This drives an angle grinder gearbox obtained from a brand new Duratool machine costing only £9 brand new but which has been very reliable. The weird drive belt arrangement is to keep the dimensions compact. It contains its own limiter system, since at speeds in excess of 7 mph the belt is thrown off the flywheel. I recall 'Blaster' Bates having an old van with a defunct speedometer. He could tell his speed by observing the Ammeter...). The padded bag contains spare drive belts.

Bradford Model Engineering Society's *Monthly Bulletin*, August/September reports an evening well spent on the Shipley Glen tramway. The 'works' were explained and demonstrated, there was a conducted tour of the museum and the ticket office at the top did good business and sold a lot of traditional sweets. Unfortunately, the fare is no longer one (old) penny up and a half penny down. Road Vehicle News went to the Great Yorkshire Show, which was celebrating a century of Fordson tractors. After 1964 they were just Fords. Every farmer seems to hang on to his old tractor but not many are preserved and rallied. Conversely, the traction engines they ousted are worshipped and admired. John Hawkes reports on the Diesel Day. One of the entrants was a 'Dash-9 -ish' from Brighouse club. '-ish' because it was made to fit three scales. The width to fit the driver, the height to fit the engine and the length to fit its trailer! Mid-afternoon, the battery went flat, whereupon it was surrounded by nine model engineers, each with a different idea how to fix it (**photo 4**). John also writes on the Stephenson Link valve gear on the Adams radial tank, of which he is constructing a model, and understands how the gear is arranged on the right hand side but not on the left. He now has an answer.
W. www.bradfordmes.co.uk

Anthony Mount casts doubt on my claims regarding I. I. Polzunov in *M.E.* 4566. To clarify, that engineer created the first steam engine in Russia in 1766 and the first two-cylinder steam engine in the world.

John Bryant from **Ottawa Valley Live Steamers and Model Engineers** sends an aerial photograph of the planned deviation to avoid the serious landslip. The slip occurred almost at the point where the track goes three ways in a 'Tee' layout so it was not simple to arrange.

Plymouth Miniature Steam, in *Goodwin Park News*, Summer, offers us 32 pages of content. I won't say good reading as I haven't read it yet! An item on the Lynton & Barnstaple Gala, including coverage of new-build *Lyn* at Alan Keef's works, is followed by one on the Dial Hill Railway, a recreation of the L&B in miniature between Chelfham and Bratton Fleming. It is on YouTube - search 'L&B in 16mm'. John Briggs writes on having owned a Nissan Leaf electric car as his only transport for the last six months. It will accommodate a locomotive, driving trolley and tools, plus two people so that's the main thing! All the practical considerations are covered, bad and good; he has 120 miles per day available every morning, plus whatever top-ups are required, if any. His overall conclusion is that he wouldn't be without it! A good read? Yes!
W. www.plymouthminiaturesteam.co.uk

Port Bay Express, August, from **Portarlington Bayside Miniature Railway** says that, due to redevelopment work at Point Richards, the railway will not operate from 6th August, to be reopened 3rd September.

The other '*Oily Rag*', August, from **City of Sunderland Model Engineering Society** has pictures of Noel's 'secret weapon', a differential gear for his traction engine. This will ease the steering. Noel also recounts an escapade with Strontium 90 in the early 1950s. In those days radioactivity was less well understood and such practices would not

BMES puzzle. (Photo courtesy of Frederick Bilney.)

>>

President Les Dawson and Tin Turtle at Reading SME. (Photo courtesy of Mike Manners.)

be tolerated now. The Open Day report featured Steve Dunn's quarter scale, one-man miniature Land Rover, several times! This is said to be related to whether the photographer was brought up under film or digital photography.
W. www.csmes.co.uk

The Journal, August, from the **Society of Model & Experimental Engineers** looks at scissors. An item by Neil Read remembered from his childhood a pair of broken old scissors being repaired and sharpened by an itinerant grinder with a suitably adapted bicycle. Thinking recently about how to sharpen them properly, he found that there is little literature on the subject, despite searching right back to the days of Charles Holtzapffel before he located anything really useful. The requirements are quite precise and should be observed when sharpening. Scissors are not a throw-away item. Adrian Garner woke in the small hours having had a vision. Experiencing oil drips from his various machine tools over the years and trying several unsuccessful remedies, he finally had the solution. Magnetic drip catchers! Lined with kitchen towel and easily removable for cleaning, they work. Peter Haycock describes SMEE Model 52 for a, possibly unique, coal-fired, steam-operated, Gauge 1 passenger-carrying locomotive. The passenger was only two but no matter. This was demonstrated at the 1924 Model Engineer Exhibition. The model is of an indicator and crosshead, for a model locomotive now in the NRM. A rather different item featured in 'Work on the Table', 3rd June, a Sterling Silver Christening Spoon by Mel Martin for his granddaughter.
W. www.sm-ee.co.uk

B&DSME News, August, from **Bournemouth & District Society of Model Engineers** says that this year's Charity Day was in favour of the John Egging Trust, set up in 2011 in memory of the Red Arrows pilot killed in that year's Bournemouth Air Festival. They raised £115.
W. www.littledownrailway.co.uk

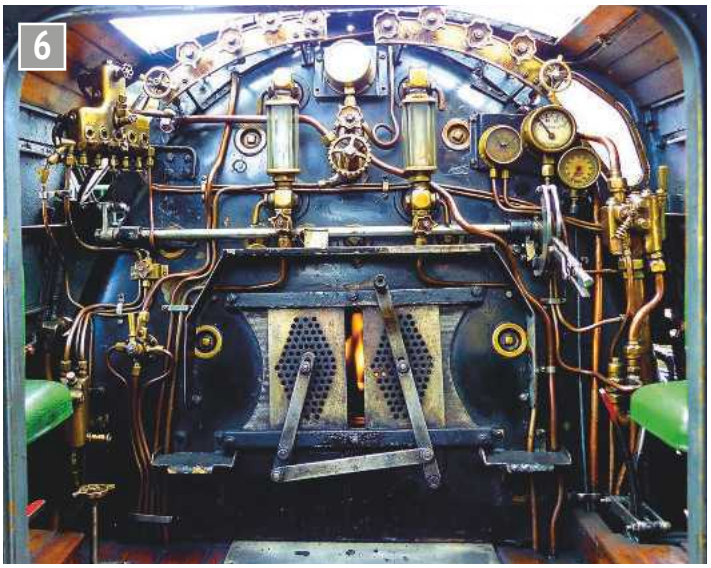
The Prospectus, August, from **Reading Society of Model Engineers**, has a picture of a very smart President, Les Dawson, enjoying (look at that smile! - **photo 5**) a ride behind Des Adeley's 2½ inch gauge Simplex trench locomotive, which is also very smart. '61249' has further thoughts on nationalised railways, being quondam MD of Thameslink. They were a young, dynamic and keen company, set up and able to RUN and IMPROVE the railway but were required to SELL it. By dint of hard work and 24 hour days, they just about managed. This was the most enjoyable period of his business life, however. (I recall that I was once involved in a start-up. There was the Founder, his Chief Engineer and me! My list of titles was endless; I did everything not fiercely technical or requiring high-level contacts. It was the best job I ever had! Great fun.) 'Wolverton Pug' enjoyed a LCGB railway trip 'bashing' rare bits of the big railway not normally traversed by everyday trains. One bit rejoiced in the name of Wapping Down Gullet, on the Bootle branch, I think. *(Neither Google nor Google Maps has heard of it! - Ed.)*
W. www.rsme.co.uk

Claude Poulsen writes on my use of the word 'Waikikamukau', in *M.E.* 4562. My apologies to all Kiwis for the spelling error. I got the word from Deborah, whose formative years were spent in NZ. Neither of us realised that it is now regarded as non-PC by some so please accept my apologies. That being said, I have no wish to denigrate the indigenous people of any country but a little innocent word play surely is not offensive?

The Blower, August, from **Grimsby & Cleethorpes Model Engineering Society** opens with this pic of a South Africa Railways 15F firebox and cab. Is it full size or a model and what brings you to that conclusion (**photo 6**)? Barry Green has been working hard on fundraising but with little effect. Maybe the time has come for the Society to reconsider its status? Editor, Neil Chamberlain has introduced an item called Locomotive Focus, featuring … guess what? Clubs often print details of members' workshops but not very often a detailed item about what they make in them.
W. www.gcmes.org.uk

And finally, I went to a 'Stealth' lecture at Kelham Island museum in Sheffield. I was the only attendee, that is, unless the others were practising their skills...

Contact:
geofftheasby@gmail.com



Is this SAR 15F full size, or a model? (Photo courtesy of Dennis Hammond.)

OCTOBER

25 **Bedford MES.** Public running for Half Term. Contact 07498 869902.

26 **Sutton MEC.** Afternoon running from noon/ Rod Dean: The Meteor and its development. Contact Jo Milan: 01737 352686.

27-29 **Vale of Rheidol Railway.** Halloween Events. Contact: 01970 625819.

28 **Basingstoke DMES.** Public running for Halloween at the Viables Craft Centre. 2 - 8pm. Contact: Austin Lewis: 01256 764765.

28 **Cardiff MES.** Halloween Steam up and open day (no public running). Contact Rob Matthews: 02920 255000.

28 **Frimley & Ascot LC.** Public running for Halloween, 6.30pm - 8.30pm. Contact John Evans: 01276 34970.

29 **Grimsby & Cleethorpes MES.** Public running, noon - 4pm. Waltham Windmill site. Contact Dave Smith: 01507 605901.

29 **Rochdale SMEE.** Halloween Running from 2pm at Springfield Park. Contact Len Uff: 0161 928 5012.

31 **Lancaster & Morecambe MES.** Halloween public running. Contact Mike Glegg: 01995 606767.

NOVEMBER

1 **Bradford MES.** Club Auction (members only can bid). Contact: Russ Coppin, 07815 048999.

1 **Bristol SMEE.** Phill Lovell: Investment casting. Contact Dave Gray: 01275 857746.

1 **Leeds SMEE.** Bonfire Night steam-up. Running from 3pm with Pie & Peas. Contact Geoff Shackleton: 01977 798138.

2 **Cardiff MES.** Robin Williams: Ebbw Vale, 1813 - 2013. Contact Rob Matthews: 02920 255000.

2 **Sutton MEC.** Bits & Pieces night. Contact Jo Milan: 01737 352686.

3 **North London SME.** Meeting t.b.c. Contact Ian Johnston: 0208 449 0693.

3 **Rochdale SMEE.** Bits and pieces. Castleton Community Centre, 7pm. Contact Len Uff: 0161 928 5012.

3 **Stockport DSME.** Bits & pieces. Contact Dave Waggett: 0161 430 8963.

4 **Grimsby & Cleethorpes MES.** Public running and fireworks display, 5 - 9pm. Waltham Windmill site. Weather permitting. Contact Dave Smith: 01507 605901.

4/5 **Vale of Rheidol Railway.** Autumn Colours event. Contact: 01970 625819.

5 **Ellenroad Engine House,** Elizabethan Way, Milnrow, Rochdale. Engines in Steam, 11am - 4pm. Enquiries: 01706 881952.

5 **Frimley & Ascot LC.** Public running, 11am - 4pm. Contact John Evans: 01276 34970.

5 **NW Leicestershire SME.** Members and visitors steam up. Contact Den Swain: 01530 412048.

6 **Lancaster & Morecambe MES.** Informal meeting. Contact Mike Glegg: 01995 606767.

6 **Peterborough SME.** Bits & Pieces. Contact Terry Midgley: 01733 348385.

11 **Westland & Yeovil DMES.** Track running day, 11am - 4.30pm. Contact Bob Perkins: 07984 931 993.

12 **Sutton MEC.** Afternoon running from noon. Bonfire and Soup! Contact Jo Milan: 01737 352686.

15 **Leeds SMEE.** Richard Hanes: Seeking the Light. Contact Geoff Shackleton: 01977 798138.

15 **Salisbury DMES.** Mike Orman: An update on Salisbury's own pair of Steam Cars. Contact Jonathan Maxwell: 01722 320848.

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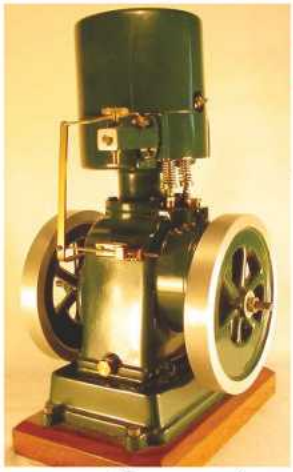

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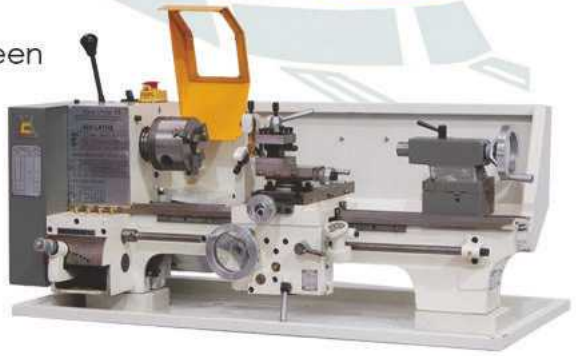

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