NEWSLETTER August 2022

Good Day Everyone, I trust all is well with you.

I seem to be out enjoying myself a lot of the time, hence finding myself in a rush to write this introduction. One day I will get myself organised !

Next month's meeting in the Hungate Centre is primarily to agree, (or otherwise), to purchase some up to date IT equipment, specifically a new projector and a compatible laptop. We need to be future-proof for when we have a visiting speaker who wants to illustrate their presentation electronically, like most do nowadays. If you are unable to attend, and wish your voice to be heard, please contact David or myself before the meeting, so your views can be aired.

Lately I have been messing, but not very successfully, with aluminium 'welding' using the repair rods that I found in a drawer. Following research on the internet (which means reading the instructions), I hope to have another go this week, and might mention my results at the meeting. Who has had much experience with this type of alloy repair rods? Would you like to have 5 minutes letting us know your tips and tricks?

The next few lines about rust are from Colin (Bainbridge), what are your thoughts? I have had good results soaking steel parts in white vinegar (cheap). I have also found the electrolysis method very effective, also cheap! I have also used mechanical removal with a wire brush or sand blasting. For delicate parts I have used baking powder as a blast medium. My experience is based on rusty old motorcycle bits.

Now over to Colin:

"With autumn coming on, our thoughts turn once more to spending time in our workshops. With this thought in mind, I remembered something someone asked me recently; how do you deal with rust? When we were in our youth, rust was a perennial problem for most model engineer's workshops, as insulation was pretty basic. Thinking further made me realise just how far we have come over the years, and maybe how much we now take for granted. One thought leads to another, and so this set me thinking that for some, rust is actually part of their restoration project as it's something that needs to be overcome, and in so doing will dictate how the following engineering solutions will be tackled. For example, if a cover or plate is riddled with rust, can it be saved and patched, or will it need replacing? How does one restore a seized shaft and what decisions go into the final outcome? Will sizes have to be adjusted afterwards? If restoring say, an old lathe, how would you tackle removing established rust on maybe the 'cross-slide' or 'ways', and then bring it back to some form of use and precision?

Might this theme appeal to members and become the basis for a short talk? If rust is your thing and you feel you could tell us something about how you tackled your restoration project, and what decisions you made along the way and why, then please do come forward as I am sure we could all learn from your no-doubt hard fought experiences."

Thanks, Colin.

That's it for now, regards Jonathan

☐ **Forthcoming Events.**

- **Wednesday 7th September: Extraordinary General Meeting** with a motion to allow the procurement of new projector, laptop and associated accessories to support presentations. It is hoped to demonstrate some loan equipment to provide members of an idea of the sort of improvements we might expect.
- **Tuesday 20th September: Workshop Morning.**
- **Wednesday 5th October: Club Meeting:** Ivan Shaw will give a talk on the flight testing of his 'personal' aircraft G-SEKR.
- **Tuesday 18th October: Workshop Morning.**
- **Friday 4th November: 11am to 2pm** at the Hungate Centre**: PEEMS Annual General Meeting** followed by 'Pie and Peas'.
- **Tuesday 15th November: Workshop Morning.**
- **Wednesday 7th December: The Mike Sayers Trophy Evening** (To Be Confirmed).

Further Event: At the last Club Meeting John Nesom let us know about a Vintage Stationary Engine exhibition at Levisham Station on the NYMR in the third week in September. It is part of the '*NYMR Annual Steam Gala'* from Thursday 22nd to Sunday 25th September

Club Evening Wednesday 3rd August.

Chairman Jonathan opened the evening by welcoming everyone including two visitors, Bob Polley from York Engineers, and 'Peter from Cloughton'.

- **Some Business and Notices:**

- **AGM :** The Annual General Meeting will be held in November on a Friday lunchtime rather than a Wednesday evening. This year we decided to have the AGM again at lunchtime after last year's favourable comments. This year the Hungate Centre wasn't free on the Wednesday lunchtime hence moving to Friday lunchtime.

- **N.A.M.E :** The Northern Association of Model Engineers have sent through some information about their *"Young Engineers Award"* and a request for nominations. Until PEEMS' demographics change, this will be a bit difficult. They are currently looking for a new Chairman after Frank Cooper's passing.

- **Nottingham SMEE :** The Nottingham Society of Model and Experimental Engineers is having a *"Narrow Gauge Day"* on Saturday 7th October. If any member would like to go, please let Nottingham SMEE know, so they will know numbers for catering.
  Contact details are at this link: https://www.nsmee.org.uk/

- **Sylatech :** Mike Sayers visited Sylatech (originally Micrometalsmiths) at Kirkbymoorside and said it was fascinating. It's well worth looking at their Website link: https://sylatech.com
  The company deals with castings and CNC machining for aerospace, railways, automobiles and space technology. PEEMS is thinking of going on a visit, and if there are sufficient numbers, we may be invited to have a look around. The visit will probably be on a Friday morning maybe in October. An e-mail will be sent out for members to confirm their interest in the visit.

- **Dick Craven's Collection :** There is an opportunity for PEEMS members to visit *Dick Craven's Collection* at Stockton-on-the Forest on the afternoon of Wednesday 14th September.
  Arrival time is at around 1pm. This visit has been organised by Ted Fletcher, so if you are interested, please contact him so he can let Dick know numbers attending.
  The Collection includes a large number of motorbikes, some 50s/60s cars and also commercial vehicles.
  The website link is here: http://cravencollection.co.uk/

- **Engineering Failures And Lessons Learnt (or 'Tales From The Scrap Bin').**

This was a chance for members to discuss some of their project failures and lessons learnt by those failures.

- **Jonathan Milner ~ An Oil Pump for an Honda Civic Type 'R' Engine Installation In A Renault Clio.**

Jonathan thought it was a good idea to start off with a motor racing story. A friend of a friend told Jonathan about someone who raced. This person raced modified Renault Clio cars which were re-engined with Honda Civic Type 'R' engines. When the engines were installed in the cars, they were then tuned up. It was found that when the engines were revved up too much, they were starved of oil.

This required a modification to the oil pump. Jonathan was asked if he do the modification and he said yes. It was said that the oil 'cavitated'** at full revs. Jonathan thought the cavitation was always on the suction side (the oil can't cavitate at the discharge).

The modification was to make the discharge bigger. The oil pump discharges from a channel 12mm wide, and then the oil passes through a big dowel acting as a port, into the engine.

Jonathan thought he had done a good job. When Jonathan heard back, he was told the first race had gone alright, but on the second race the engine 'blew'.

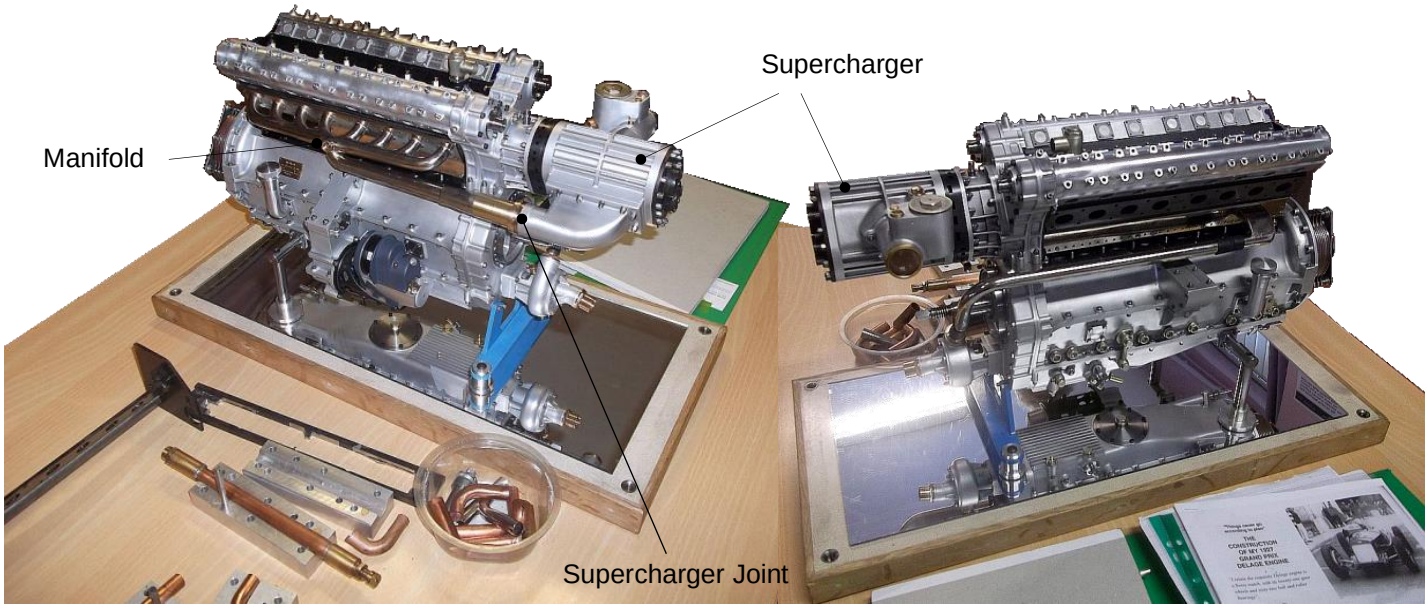
Jonathan thought that he better not go around and see the racer (£5,000 had been invested in the engine!). Later he found out that when the engine blew, the only thing that wasn't damaged was the oil pump! The modified cars' ECUs are reprogrammed so as not to run weak, and if the rev limiter is raised, that is when the standard oil pump can struggle. In the end, it is thought the engine dropped a valve

** *The product of excessive vacuum conditions created at the hydraulic pump's inlet (supply side), cavitation is* ***the formation, and collapse of vapors within a hydraulic pump****. High vacuum creates vapor bubbles within the oil, which are carried to the discharge (pressure) side. These bubbles then collapse, thus cavitation. (reference: www.munciepower.com)*

- **Mike Sayers ~ Problems With The Manifold On His Model Of A 1927 1500cc Delage Engine.**

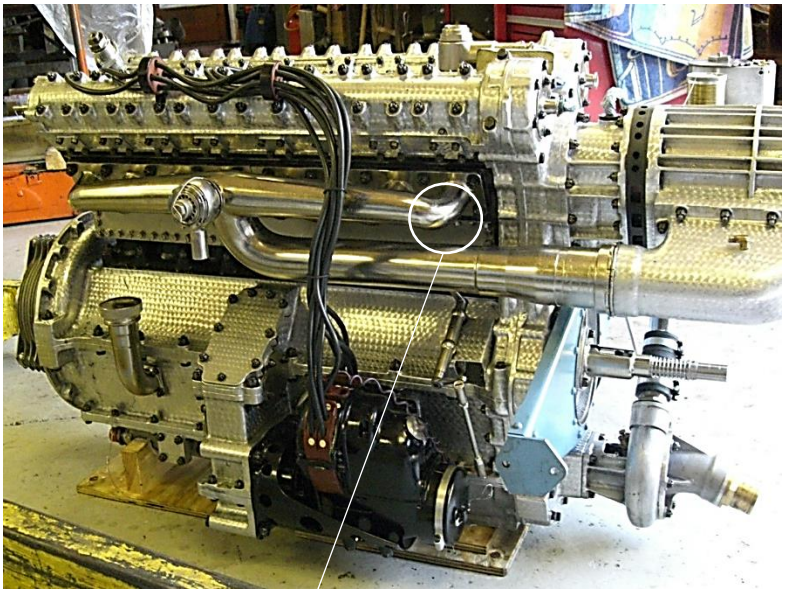
Over the last three years Mike has been keeping PEEMS up to date on the progress on his model *Delage* engine, The progress has been reported in the Newsletter since October 2019.

On this evening Mike gave us a summary of the difficulties in producing the manifold for the engine.



Mike takes up projects that last for years. He doesn't intend it to be like that, but it's just how it happens. To keep his enthusiasm up he sometimes he does 'side projects' which are enjoyable and cheer him up.

Over last winter there was no progress on his *Delage* project and to cheer himself up he decided to work on the inlet manifold which is being modelled in copper, which is a material he likes working with.



Here is the full-size engine in all its glory.

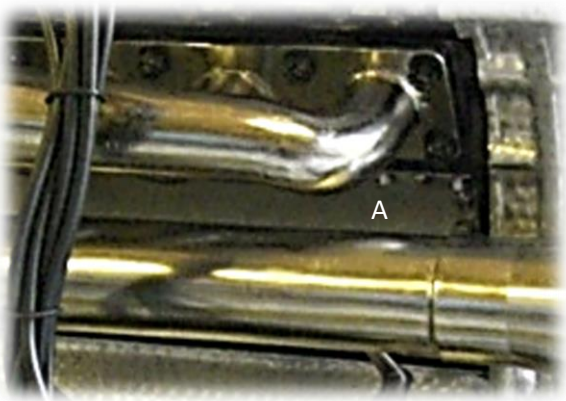
The manifold is a beautiful piece of work with the pipe bending a refined piece of craftsmanship.

The actual manifold is made out of steel, and is prefabricated and nickel plated.

There are no parallel sides or straight forward pieces on it.

Mike felt that if he made progress on the manifold then the model, in his mind, would be much closer to being completed.

After milling pieces of aluminium for so long, he needed something else to enthuse him.

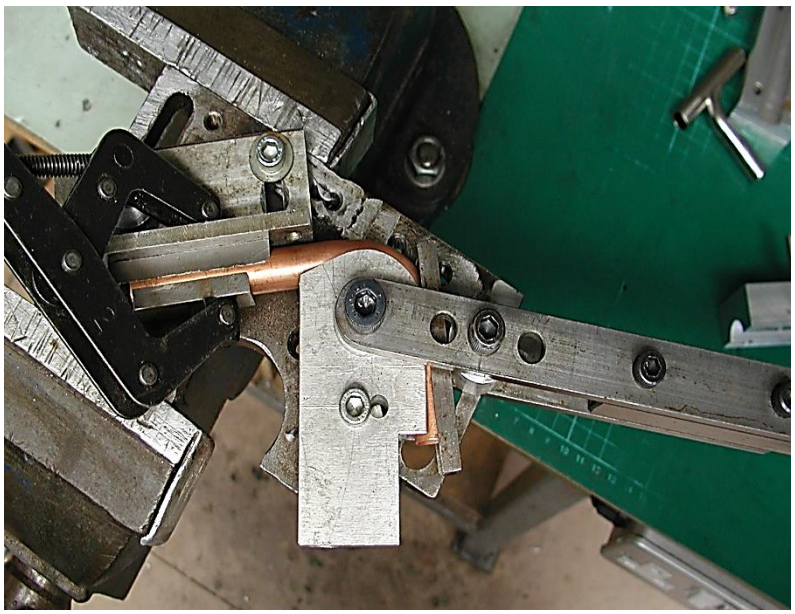


The shape of the model manifold was a compromise, and isn't the same shape as the full-size version.

Try as he might, he couldn't replicate the form of the small pipe at A. He could get the single bend, but couldn't get the second bend in. He even thought about splitting the pipe along its length and then silver soldering it back together once the shape was right, but that didn't work.

All the little vents seen in the top photo have radii less than twice the diameter of the pipes, that is, very tight bends.

The first thing to be done was to figure out what the bend radius was, and then make up a jig to bend the pipes.



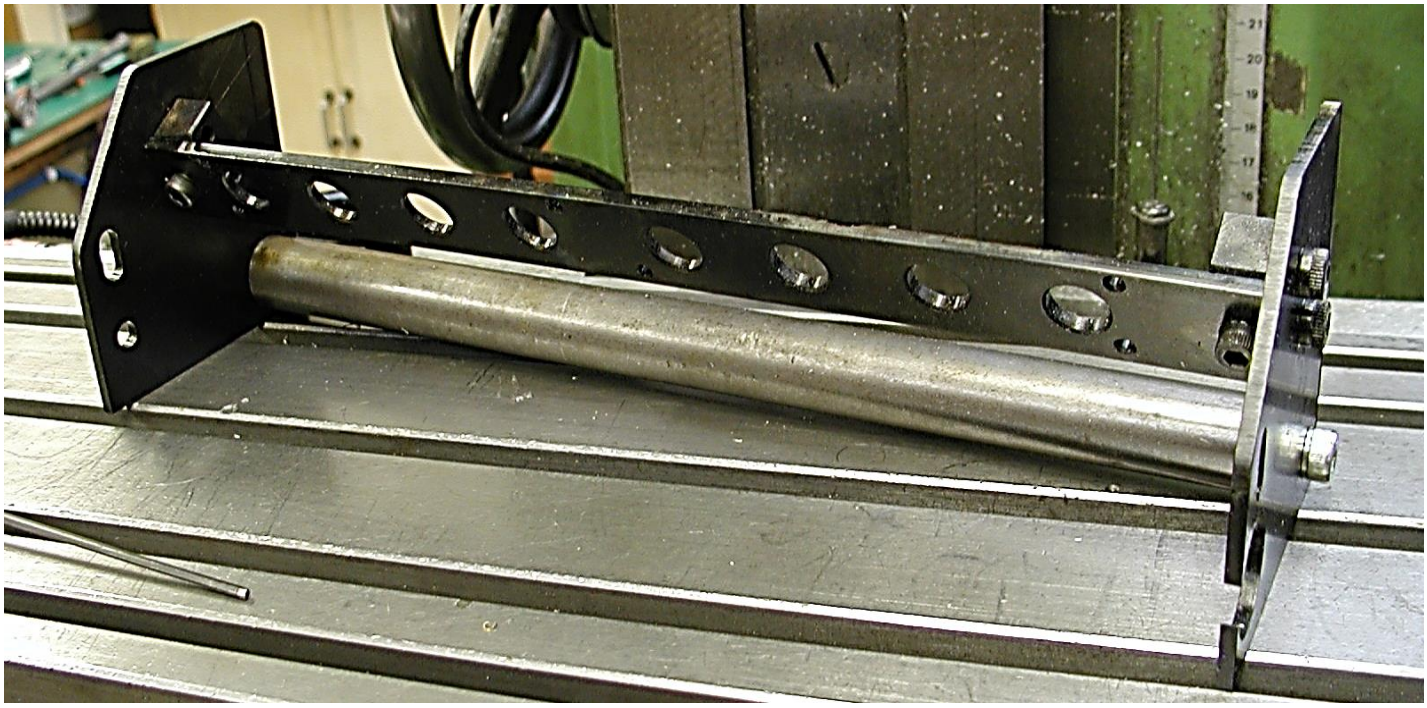
Here is the home-made bend tool. This ‘sort of worked’.

Here, a 12mm copper tube is being formed with the tool. Mike tried bending it with a mandrel inside to keep the section right throughout the radius. The mandrel didn’t work.

He then made an ordinary ‘pull bender’. As can be seen in the photo, the problem is that when bending a piece of pipe, the pipe has to be secured very firmly while the operation is on a very small area of pipe in the radius.

Two metres of pipe were consumed trying to make the nine bends and the tapered tubes required for the manifold, so it was quite a wasteful operation.

Mike also needed a jig to hold all the manifold components in alignment while he was silver soldering the whole assembly.

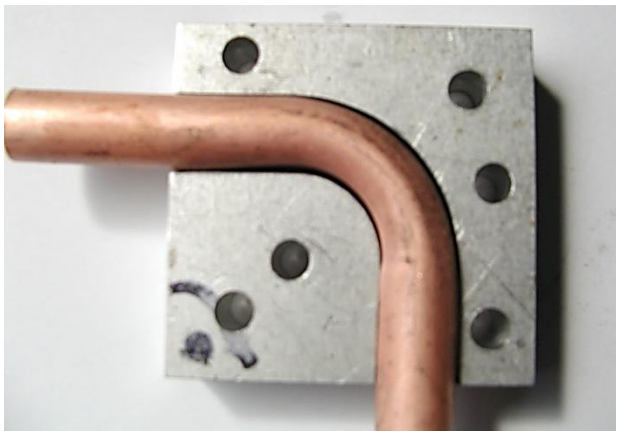


The jig was designed to hold the components in the three stages of silver soldering:

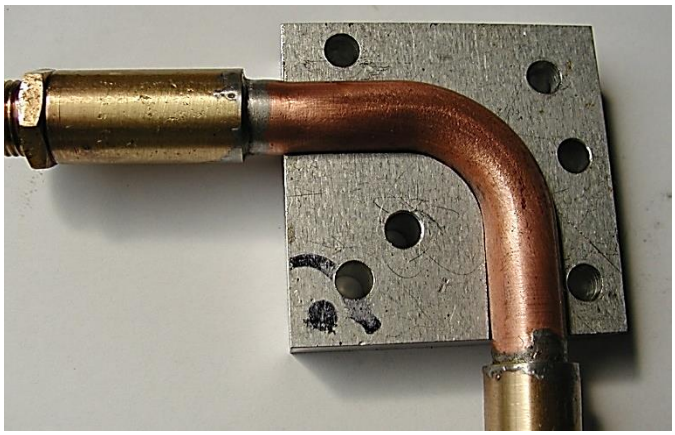
+ The first stage was to solder up the piece serving the front four ports. A tapered rod was screwed to the opposite end plate on the jig to engage in the tapered tube to hold it in line whilst it was being soldered.
+ The second operation was to solder up the part serving the rear four cylinders. The front section was removed from the jig and the tapered guide was then fitted to the opposite end plate in order to support the rear section in the same way as the forward section. The method ensured that the front and rear parts would line up correctly at the centre.
+ A further tapered guide was screwed into the front (right hand as seen on the photo) jig plate to support the third tapered section which is the lower tube connecting to the super charger joint. This ensured that that part was kept in the correct alignment during soldering.

Unlike an exhaust, one end of the manifold is not just ‘waving in the breeze’, every part has to line up and fit exactly at a number of locations. There is no margin for error. At the supercharger joint there is also a fine thread union.

☐ **Improvement In The Pipe Radii After Rework Under Pressure In The Alloy Moulds.**



Tube showing ‘necking’ in the radius



Tube ‘perfectly’ formed

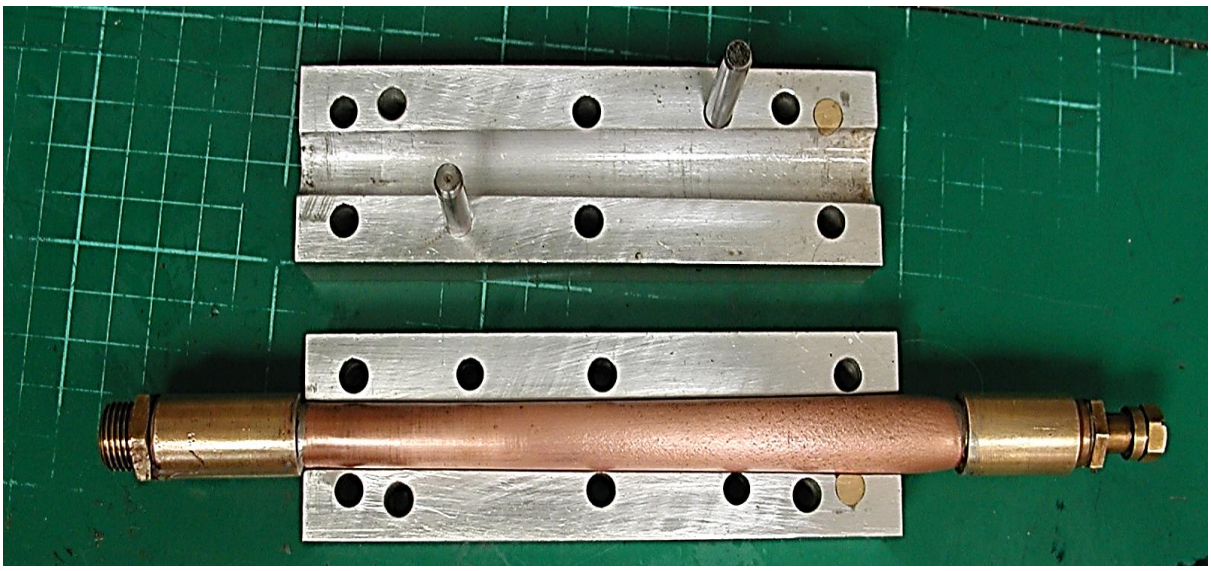
The photos show the improvement in the tube shape in the alloy moulds after rework. The first photo shows a common problem where there is ‘necking’ in the radius while the tube is being formed. The section isn’t truly circular.

As can be seen in the first photograph of the model, all the small pipes are in full view on the side of the engine. Mike wanted to improve the section, so he made the light alloy mould blocks as seen above. He then tried reshaping the pipe to a circular section in the mould, initially by using pressurised water. The water was at 400psi and was pressurised using the PEEMS boiler testing pump. However, more pressure was required to get it right.

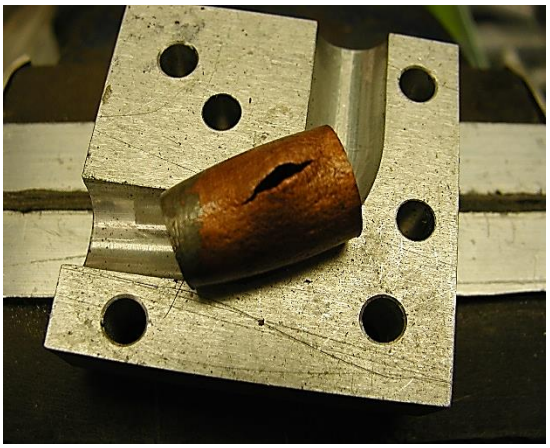
To get the pipe ‘perfectly’ formed, the pipe had to be pressurised up to 2500 psi!

The ‘*Heath Robinson’* arrangement seen above, utilised the pump from an old hydraulic press and used oil on a total loss system. This meant the pump body had to be kept replenished with oil. That system worked, and the section was really improved all the way around as shown in the photo top right.

Mike also used the same pressurisation technique to create the taper in the tubes as shown below.



However, it didn't always go well. There was an explosion. The two mould blocks were held together with 6mm cap screws, and whilst holding the maximum pressure, all the cap screw threads stripped, and the blocks blew apart. Mike thought the gauge had blown to bits because it was right the way around on the stock. However, what had happened was that the pressure had reduced so fast that the pointer had gone all the way back and had jumped over the stop. The gauge had to be taken apart and repaired.



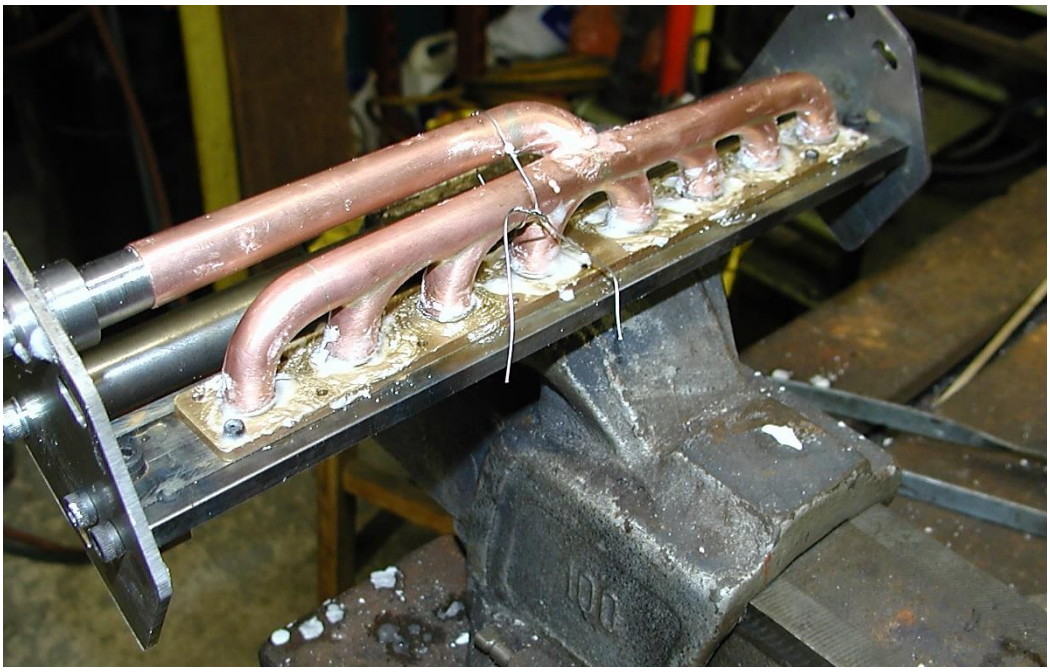
Mike got very oily overalls when this happened.

Q: Did you think about using a spring (mandrel) inside the tube to maintain the circular shape whilst bending the tube?

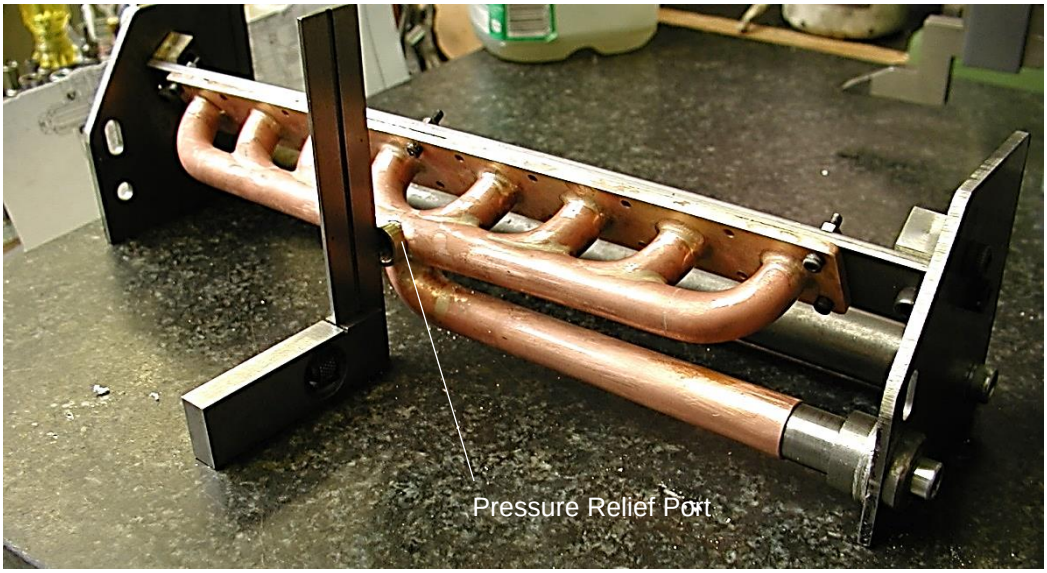
Mike: You can't use that technique with the required radii in the model. The radii are just too tight.

☐ **Silver Soldering.**

The silver soldering went reasonably well. The manifold was soldered up in three stages as explained on page 4.



Unfortunately, Mike had forgotten to include the pressure relief port, so that had to be soldered on. Here the pressure relief port is being set up on the manifold before silver soldering:

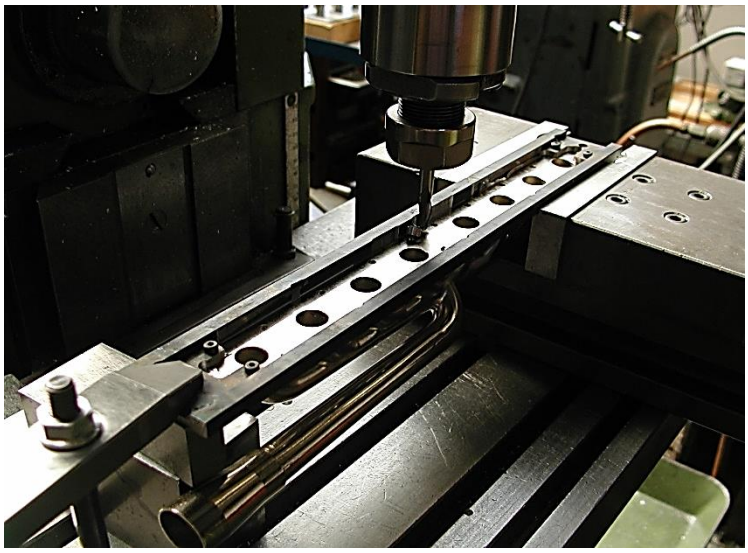


But there was another problem; in spite of all the preparation of the assembly jig, the manifold ended up being soldered to the jig, which was found after Mike tried to remove it from the jig.

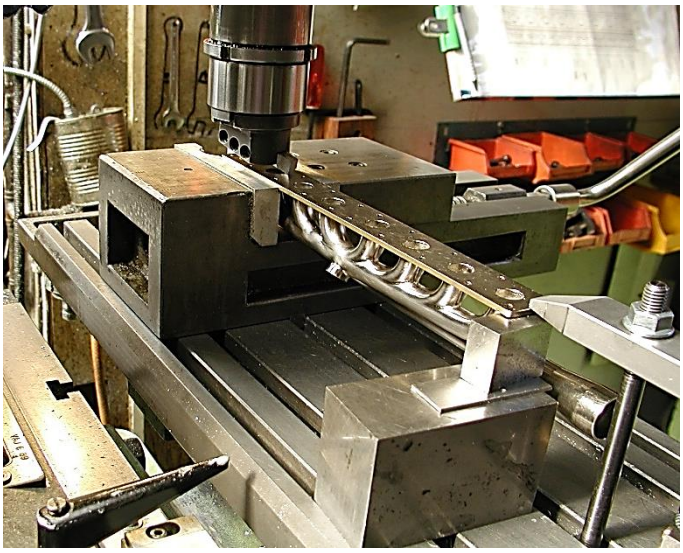
About 40% of the backplate had been soldered to the component and it couldn't be removed.

First the jig plate had to be machined off the back of the manifold, and then the whole of the back of the manifold mounting flange had to be 'fly cut', as it was damaged.

Please Note: The two photos below are for illustrative purposes only, as the manifold had not been nickel plated at this stage of operations, and Mike had not taken photos at every stage of manufacture.



Machining the jig plate off the back of the manifold



Fly cutting the damaged mounting flange.

☐ **Nickel Plating The Manifold.**

The manifold was plated using kit from *Gateros Plating,* and Mike was not only pleased with the result, but also with the help he got from the company. It plated really well the first time, however plating had got down down into the thread of the pressure relief valve, and he couldn't get the component to screw in.

This meant the screw thread had to be tapped out, which was the last intended operation on the manifold. Unfortunately before that could happen……..

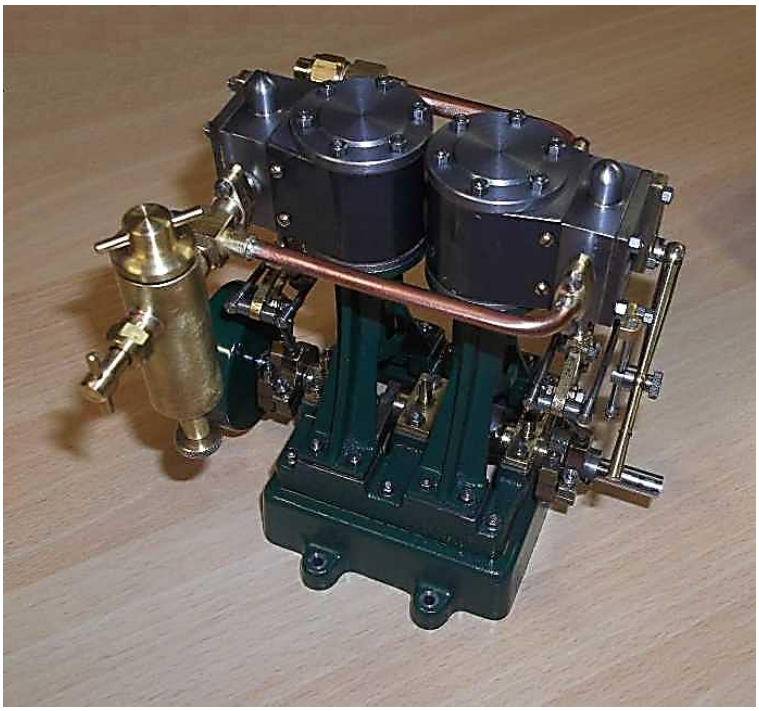
Final <u>intended</u> operation tapping the pressure relief valve boss to remove plating.

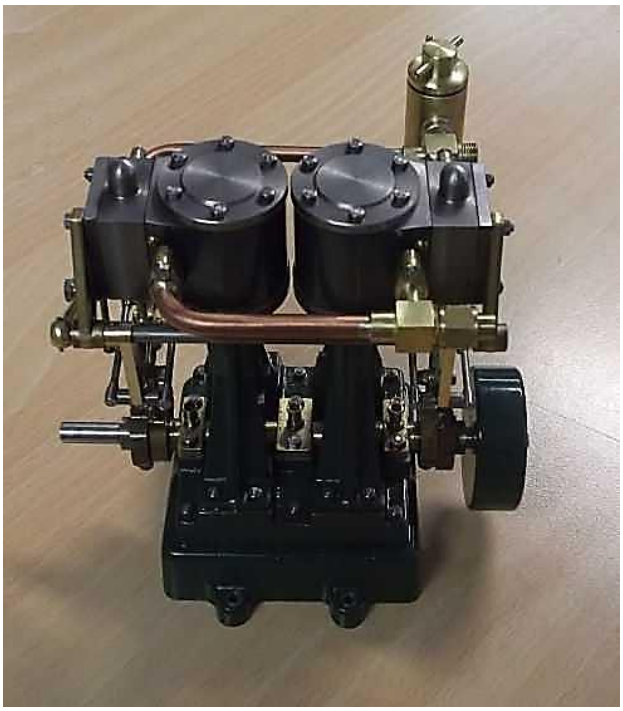
So the manifold ended up as a heap of scrap. Mike tried to do a repair on it. He thought he could strip it back, and solder in a replacement section, but the chemical used to strip the nickel plating off is aggressive and doesn't strip easily. It also eats away at the copper.

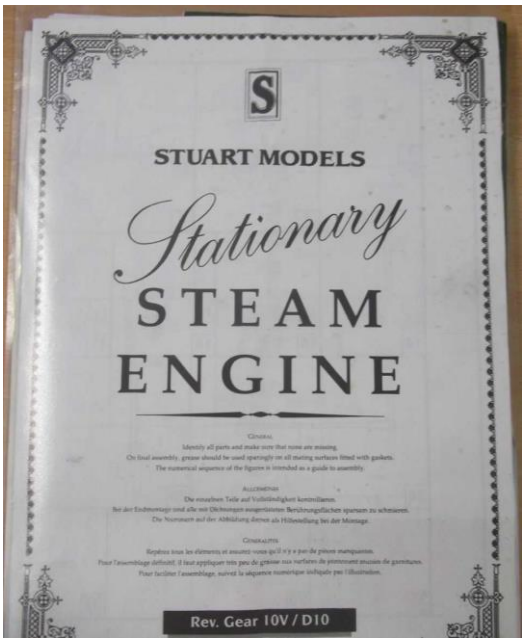
Although the manifold looked 'pretty' Mike wasn't happy with the shape. The metal was also very thin where it had been cleaned and polished. But it will look good on the mantlepiece.

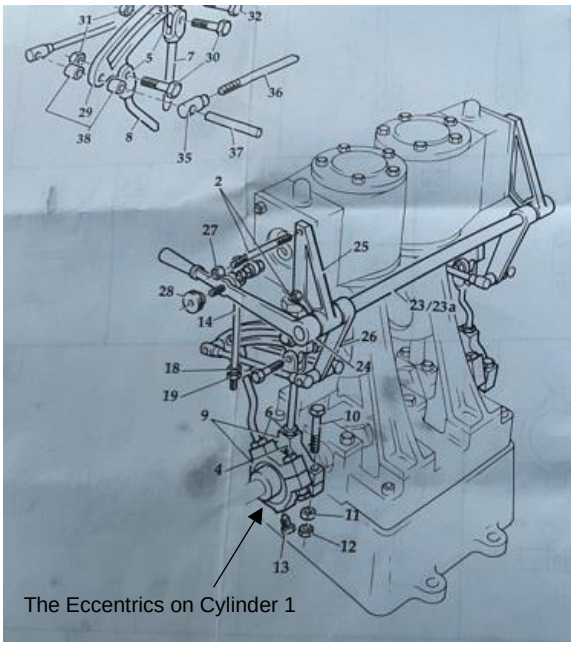
Photographs Used With The Kind Permission Of Mike Sayers

- **Paul Gammon ~ Stuart D10 10v Stationary Steam Engine Drawing Error.**

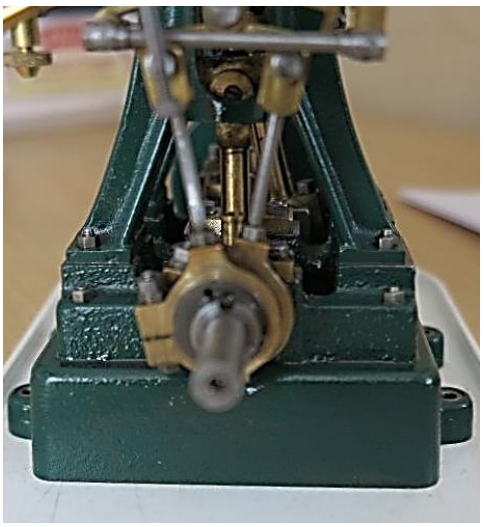


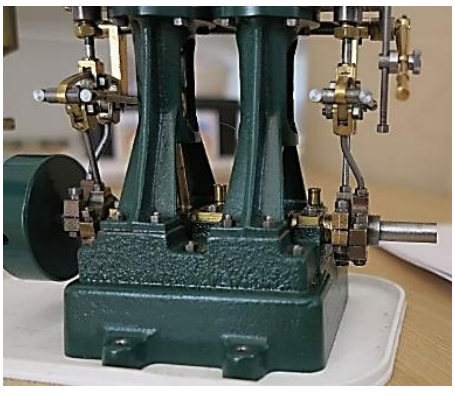






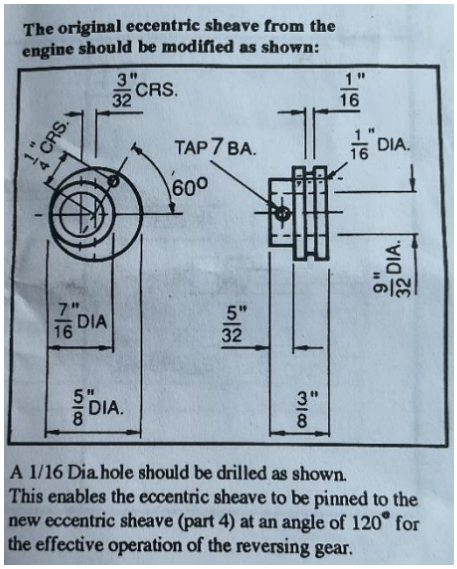
When Stuart designed the engine it just ran one way. But then it was designed to include a reversing gear so there are two eccentrics on each cylinder.

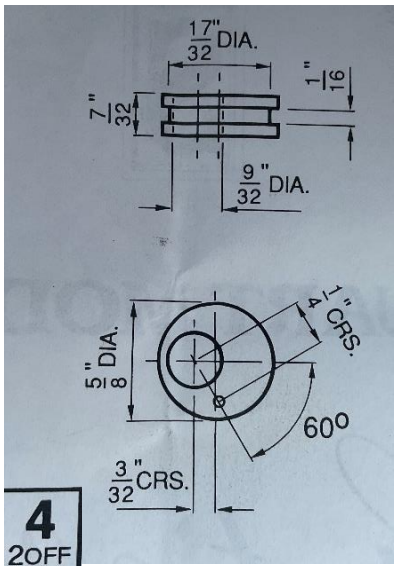




The engine after Paul made the required modifications to the eccentrics to get it to run.

The original drawing is on the left and the new one to be made, is on the right.





There is a difference in the two drawings which causes a snag:

+ The 1/16" hole in the left drawing is off the centreline of the eccentric at 60° on a ¼" centre.

+ The 1/16" hole in the right drawing is off the centreline of the crank at 60° on a ¼" centre.

+ The 1/16" holes are also 120° apart when they should be 180°.

This is what happened when the drawings got transferred to Jersey after the buyout of the original company, and the drawings were transferred onto CAD.

Paul rang the company to let them know about the discrepancies, but they've still to come back to him.

Paul made the model to the drawing just to check what would happen and of course the engine didn't revolve which is what he expected.

He then modified the parts so that the 1/16" holes in the eccentrics were 180° apart. Unfortunately that meant that there wasn't much room for a pin. He did manage eventually to get a 1/16" pin through, but it's very tight because the undercuts are in there too.

Paul managed to get the engine to run forward and reverse, and lessons were learnt.

Q: How many of these engines have been made wrong?

Paul: I don't know but I imagine quite a few.

Q: Without the reversing gear does the engine still run one way.

Paul: Yes, if there's just one eccentric it would run one way, but with two together it won't run.

I tend to make everything on the mill. All the cylinders were done on the mill, and just the valve chests and the crankshaft were made on the lathe. The crank shaft was a steel forging with two singles which were friction welded together

- **Iain Hale ~ Some Engineering Failures That Were Used As Instructional Training At The BBC.**

Iain said that what he was going to talk about were engineering failures in the broadest sense of the word. It should be noted that these were engineering failures that Iain wasn't directly involved in, but were used as lessons learnt for training purposes.

Iain started his career in the 'television business', for the BBC, in the1970s. Before they let people loose in a technical environment, they would be sent away for training. Iain was known as a YIT (Youth In Training). He was sent to the BBC Training Centre at *Wood Norton*. This is a very nice country house in the Cotswolds. It was built by the Duke D'Orleans, and is still there today, but currently it is a hotel. During the war it was used as a regional seat of government, and a lot of broadcasting facilities were moved out of London to be installed underground at *Wood Norton.*

One of the first things he was taught was safety, because inexperienced people cannot be let loose in a technical area, because if they were, they would be a liability. For example, some graduates didn't know positive from negative, and in fact in those days, some of them were even colour blind. When colour TV came in you couldn't be colour blind if you wanted to work there.

Some Incidences :

On *The Billy Cotton Bandshow* there were two 'stooges', one was Alan Breeze who played the piano, and the other was George Chisholm who played the trombone and they used to do funny sketches. One of the sketches was Alan Breeze playing a piano in the middle of a field, and as part of the sketch the piano was to blow apart. There were several takes. 'Stage Maroons' were put into the piano to create a bang, but the production team weren't happy with the effect. They then added flour to the Maroons, which created an explosion. The piano flew apart injuring Alan Breeze. There was a court case, and one of the witnesses was a professor of engineering at Nottingham University who was an expert on explosives. He gave a demonstration of what happens when even a small amount of flour is added to certain chemicals and the explosive effect it can have. That disaster was a lesson to everybody about what happens when you don't follow correct procedures.

The second case was on *"It's A Knockout"*. In the late 1960s it was held on The Stray in Harrogate. A scaffolding tower had been built for the audience and included a camera mount. The tower consisted of zinc coated tubing and also aluminium coated tubing. When the tubes were bolted together, and then loaded, the aluminium coating came off and the tower couldn't carry load. Once the audience and camera were in place, the scaffolding collapsed. Fortunately no-one was killed, but there were several injuries. After that there were directives and training courses to make sure that in future, scaffolding was checked before it was loaded in earnest.

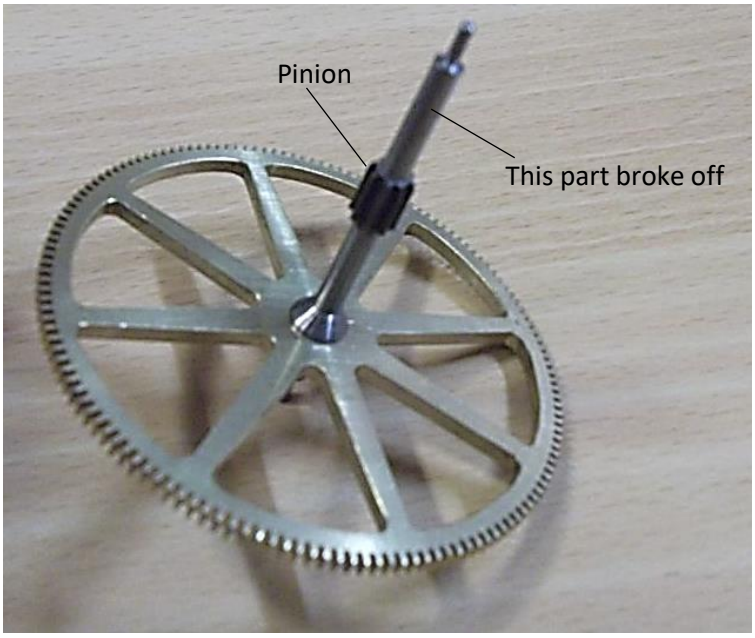
Once Iain qualified as an engineer, one of his jobs was the maintenance of *'The Colour Mobile Control Rooms'.* These were huge vehicles, which couldn't be articulated, because at that time, articulated vehicles with tractor units weren't allowed in central London. All the BBC vehicles had to be rigid. Some of these vehicles are still around today. In the early days of colour television there was a new 'Scanner'. It was called a 'Scanner' because it carried all the scanning waveforms for camera, sound, production etc. and pulse generation. It was based in Cardiff. One of the big events in Wales was the *Eisteddfod* which was a huge operation. One of the events was held in Cardiff Castle which has a very narrow entrance. Unfortunately, the vehicle wouldn't fit through the archway. Nobody had bothered to check the dimensions. The only way they could get it through the archway was to let the tyres down. The same thing had to be done to get the vehicle out again. They had to do this every time they visited the castle until they got a new vehicle.

Q: Were you just on 'Outside Broadcasts"?

Iain: Yes I did OB for about five years. I lived out of a suitcase. When I got married, I got a 'base job'. OB was great because you never spent your salary, you lived off your expenses. I loved the job and I got paid for it. There was great camaraderie, and everyone looked out for everyone else.

- **Mel Doran ~ A Couple Of Mistakes Made During Clock Making.**

Currently, Mel is making a clock, and this is the "Third Wheel':



He thought he would check the wheel by spinning it in his lathe.

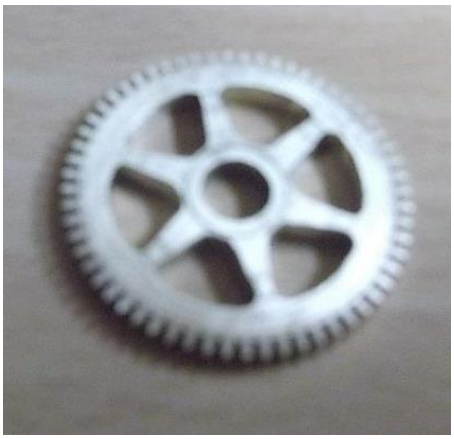
He noticed that there was a little bit of movement on the shaft. He put a piece of brass bar in the lathe, put it behind the pinion, rotated it and gave it a tap, and the end of the shaft snapped off.

The whole piece was made from EN8. Mel had hardened it, but hadn't annealed it enough.

He decided to repair it. He put the wheel back in the lathe in order to drill out the centre of the pinion about ⅔rds of the way through, using a ⅛" tungsten carbide drill. Mel had done this before and realised that a lot of pressure is usually required on the drill, and there is a tendency for the drill and the job to move laterally at the interface under that pressure. To prevent this, he made a support for the drill which was a circular bar, placed in the tailstock and then drilled through from the head stock.

He then put slots in the end which would fit over the pinion. Because the support was held in three directions, it was kept in place while it was spinning. Mel was then able to drill into the pinion to the required depth.

Mel then made a replacement part. The wheel assembly was put in the lathe, with the new piece in the chuck from the tailstock. Mel then pushed the new piece into the pinion and fixed it in with *J-B Weld.* The assembly was held together for 24 hours, and it's turned out fine. It's saved a lot of work too, because if the wheel had to have been taken off and re-bored that would have been a lot of work.



This is the 60 toothed wheel, which is the escape wheel pinion. Mel needed six quadrants in the wheel. To cut out the quadrants to create the spokes, Mel used a 2mm slot mill. Making spokes in the watch and clock making business is called *'crossing out'.*

So the angular displacement for the cutter for a quadrant and a spoke was 60°, and Mel sub-divided that into 48° for the quadrant and 12° for the spoke.

Unfortunately he worked it out wrongly as he assumed the mill was a single point, and ignored the 2mm diameter of the mill. This meant that when the arc was done, the spokes had had an extra 1mm taken off each side.

This wheel was then scrapped, and a new wheel was manufactured.

This time he took into account the diameter of the cutter, and it was perfect and symmetrical.

- **Tony Leeming ~ Some Problems In Assessing Rolled Lengths For A 'Speedy' Locomotive Boiler.**

The boiler on the 'Speedy' locomotive is tapered. It is rolled to shape and there is a strap on the inside. Tony calculated the distance round on the template using pi, etc. This turned out to be more than LBSC said in his commentary, so Tony thought he was on the right side.

He then rolled the boiler walls, but didn't realise that when this particular component is rolled, it effectively shortens. This left a gap on the outside which looked wrong even with the strap in place.

The solution was to put the strap on the outside and not worry about the gap on the inside because it was out of sight. It took a couple of days to come to that conclusion.

Q: I thought if you rolled something it will stretch.

Tony: Yes, but in this case it didn't.

Comment: Unless you have very powerful rollers, it stretches more at the ends than it does in the middle.

- **Paul Windross ~ Further Progress With My Steam Generator.**

My burner set up seems better since I introduced a smaller exhaust and a burner windshield. I am only using a 0.25”Ø hand pressure pump which is the one I made for testing the model generator. The full size one is larger.

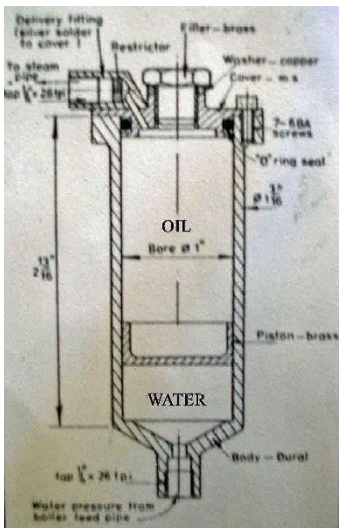
I had early problems trying to keep the generator burners self-starting once they warmed up. I found that the windshield helped to keep things stable, and a smaller generator rear exhaust also concentrated the heat inside the generator. Before, the larger exhaust caused a lot of burner heat to go straight out through it.

I am just waiting for material to make the cylinder head and the piston lubricator, which is an attachment of the smaller version, similar to what was used on the model record steamer.

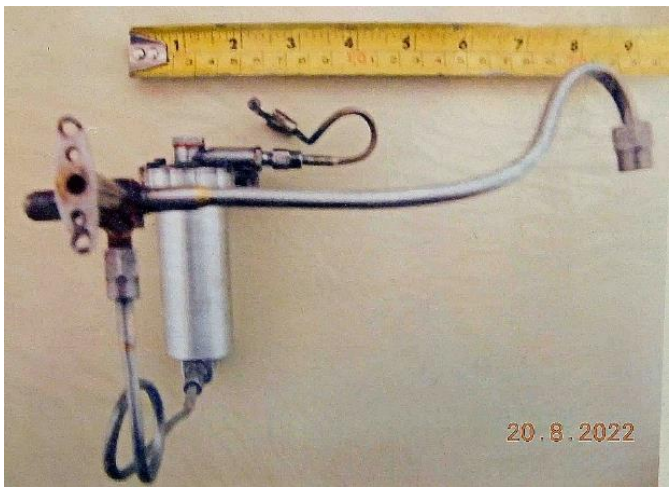
At the moment I am making the generator pressure relief valve, which when closed, pressurises the head lubricator. This is near the water feed pump, so is normally cool.

Attached a photo of my model lubricator with the steam pressure relief valve.

Full size version is with 8 mm bore piping.



BK Model Lubricator



Cylinder and Head Lubricator with Generator Pressure Relief Valve.

Paul Windross ~ A Good Home Required For A Laser Alignment Aid For A Mill.

A few years ago, Paul bought bits to make a laser alignment aid for the mill. A small body still needs to be built for laser module to fit the milling machine chuck. Any club member can have the parts. There is also an article from *Model Engineer’s Workshop* by John Shepherd (February 2012) on how to make it.

Paul will provide you with the article from *Model Engineer’s Workshop.*

If you are interested, please contact Paul through the Members List. It will have to be collected from Paul in York.

Contact:
If you would like to contribute to the Newsletter,
the contact is: Nevile Foster Tel 01751 474137 or e-mail nevf123@outlook.com