NEWSLETTER October 2024

Good morning all. They say there is no such thing as a free lunch, but if you attend the AGM in the Hungate Centre on Friday 15th November, the *Pie and Peas* lunch is free, all you have to do is raise your hand when prompted! Seriously though, the more input you have, the more the Committee will get an idea about which direction you want the Club to go in.

At the moment, we still do not have a Treasurer, and no one has expressed an interest in taking on the Secretary's job. David has given us ample notice of his forthcoming relocation, so we need some volunteers soon. A Club cannot function correctly without those two posts. Indeed, it could be argued that a Club is not viable without these personnel. We will survive, there is no doubt about that, but it will mean more work for the present Committee. Work in this context is time, and it's not fair to expect someone already on the Committee to increase their workload to keep things running smoothly.

Please note that the usual meeting will not be on the first Wednesday in November, because the AGM replaces it on Friday 15th. If you have any special dietary requirements, please let us know asap, thank you.

Subscriptions will be due in November, and now we have electronic banking, there is the opportunity to easily transfer funds if that suits you. We will let you know our bank details nearer the time, although we will still accept cheques and cash, (sorry no discount for cash!)

The *Mike Sayers Trophy* night went well, and the evening passed very quickly. Congratulations to Richard Gretton, Brian and Chris. There is as usual, a full report in the Newsletter. The inclusion of a '*Bring and Brag'* extended the night and created a good bit of interaction.

We are always looking for topics and speakers for our meetings, they say everyone has a book in them, so how about you? Do you know someone who we could ask to be a guest speaker? Our last two speakers were not engineers, but we had very interesting talks relating to engineering.

The new website has been running for a few months, and one or two 'tweaks' have been made to it, although I have not had much feedback from Club members as to what you think about it. If you have any photos you want to put in the Gallery, or have items to sell, please let me know. The site isn't built to allow you to post your own content. The old website is due to close down sometime in the near future.

Our journey to *Leeds Industrial Museum* was pretty uneventful, apart from me going round in circles in some roadworks in the city; flippin' satnavs !!

That's about all for now, see you at the AGM. *Jonathan*.

- **Forthcoming Events.**

- **Friday 15th November 2024. Annual General Meeting** (at lunchtime with a *"Pie and Peas"* lunch).
  Doors Open 11.00am for 11.30am start
- **Tuesday 19th November 2024. Workshop Morning.**
- **Wednesday 4th December 2024. Pre-Christmas Social and 'Bring and Brag'.**

- **Club Evening 2nd October 2024. Mike Sayers Trophy Evening and Autumn 'Bring and Brag'.**

Jonathan welcomed everyone to the meeting.

Before starting the trophy competition, there were some announcements.

- **The Annual General Meeting (AGM) Friday 15th November.**

  Doors will open at 11.0am for an 11.30am start. Any items you want to discuss, please let us know in advance and we will put it on the agenda so everyone can join in. There will be a "pie and peas" lunch.

  As usual, all the Committee be resigning and will put themselves up for re-election. If anyone would like to volunteer for the Committee, please do.

- **Visits.**

  The recent visit to the *Leeds Industrial Museum* was very good, and had been recommended by a member. If anyone has any suggestions for a PEEMS visit, or a speaker, please let us know.

- **The Bradford Challenge.**

  The next Bradford Challenge is in June 2025. PEEMS intend entering a monorail model, but if anyone else would like to enter with their own model they will be able to.

  If anyone else would like to join the monorail project itself, they will be welcome.

- **Model Plans.**

  Kevin Hudson from Ebberston has supplied PEEMS with some model plans. Kevin was a professional model engineering supplier, and he had some model plans left over. The plans are collated in book form and will be kept in the PEEMS workshop. If any member would like to build a model with any of these plans, just ask.

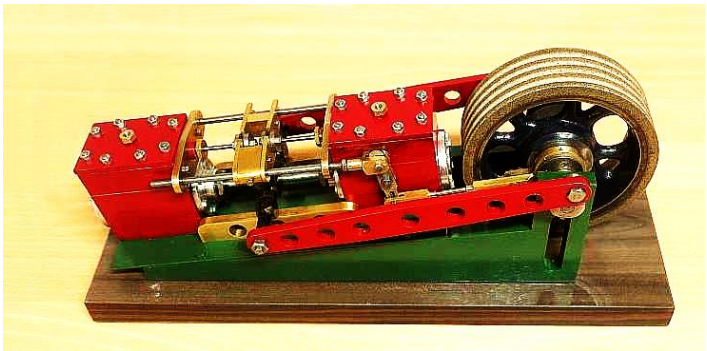
- **The '*Mike Sayers Trophy'* and Autumn 'Bring and Brag'.**

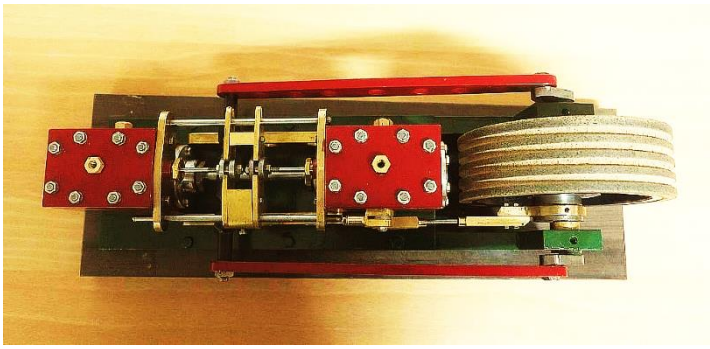
- **The Mike Sayers Trophy.**

  The entries for the '*Mike Sayers Trophy'* were to be judged by the membership, in a secret ballot. The exhibits should have been presented with a label, and an explanatory note, which didn't seem to have happened this year. The rules were that the models were to have been judged without any previous verbal explanation or presentation. However, as there were only three entries this year, an exception was made. Members were to vote for their first, second and third choice and fill in their voting form. The scores from the voting forms would be added up and the first, second and third place decided. In the event of a tie, Mike would decide the winner.

  Following the vote, there was to be a break for tea and biscuits, before the 'Bring and Brag'.

i) Brian Stephenson. A Conceptual Model of a 'Textile Mill Steam Engine'.



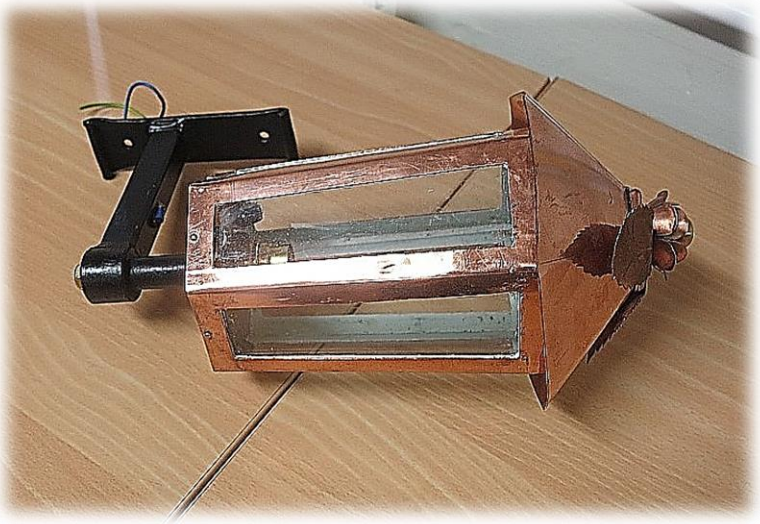


Brian said that most people will be aware that his models are designed by Bob Middleton. For this model, Bob had two large wheels like the one on this model. When Brian went to Bob's house a few months ago, Bob said he was going to design a model engine around the wheel. The full-size engine doesn't exist, but the model represents a steam engine in a textile factory, for driving a loom or similar.

This is an unusual design because both pistons are at each end of the central drive shaft, with the pistons operating in valve chests at each end. When the piston on one end of the drive shaft is at top dead centre, so is the piston on the other end of the shaft.

Brian hadn't had the model running on air just yet. He has made a gadget to run the engine on air like his other models, but currently, there isn't enough power to get the model running. Some more work is required.

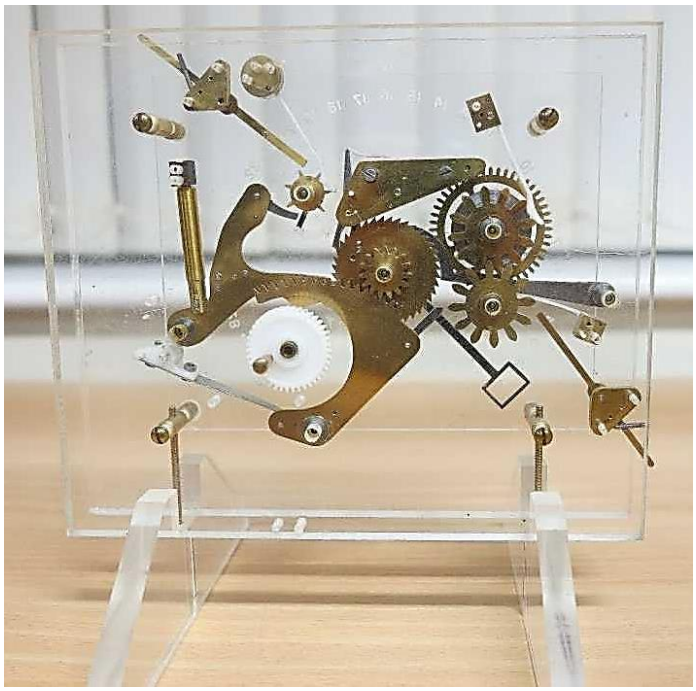
ii) **Chris Bramley. A Copper Outside Wall Lamp.**



Sixty years ago, Chris served part time as a decorative coppersmith. When he was in business, he used to do quite a lot of copper smithing, but in the 1980s, the amount of copper work dropped off.

When he retired, he had quite a bit of copper sheet available, so he decided to make an outside wall lamp. Quite a few hours have been spent making the lamp. The outside frame is made from one sheet, with the apertures milled out. The sheet was then formed into the hexagonal shape as shown, and then joined. This lamp could be mounted outside someone's front door. It's weather proof and electric proof.

iii) Richard Gretton. A 'Proof Of Concept' Experimental 'Perpetual' Desk Calendar.



For anyone with a watch with a perpetual calendar in it, this is a greatly scaled up version of that. Richard calls this his "experimental desk calendar".

He has always wanted to build a "perpetual calendar" for one of his clocks, but he thought it would be better to first build an experimental version, to see if he could get it to work.

The way this works, is that each day, the white gear wheel on the back of the calendar is turned to advance one day. The calendar then gives the day of the week and the month of the year. The important thing about this calendar is that it works on a 4-year cycle. In normal years, the February date will go to 28 days, and then return to the first of March. In a Leap Year, it will go to 29 days before returning to the first of March.

The membership then voted for the entries.

Mike Sayers Trophy Voting:

1st Place: Richard Gretton with his 'Proof Of Concept' *Experimental 'Perpetual' Desk Calendar*. (Trophy +£25).

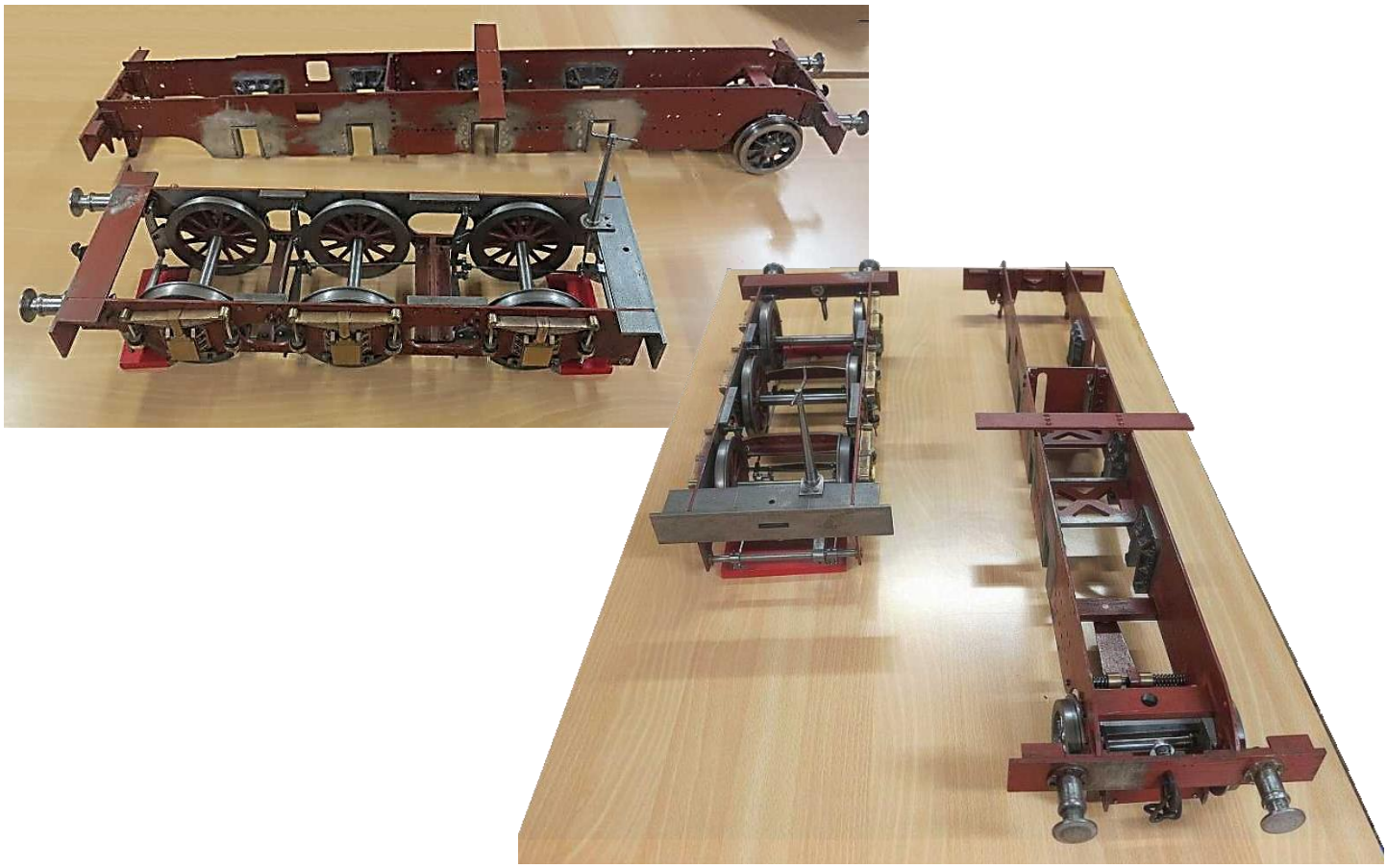
2nd Place: Brian Stephenson with his Conceptual Model of a *"Textile Mill Steam Engine".* (£20).

3rd Place: Chris Bramley with his copper outside *Door Lamp*. (£15).

- **The Autumn 'Bring and Brag'.**

After tea and biscuits, the second half of the evening began, with the Autumn 'Bring and Brag'.

i) William Burrell ~ A 5" gauge *Nigel Gresley* 2-8-0 BR Power Class 8F Freight Locomotive.



It was in about 1980, when William decided he would build himself a model steam locomotive. When he was away at sea, he wrote off to 'Model Engineer' magazine to say that he wanted to build a steam engine of either 3½" or 5" gauge, "something like a "*Nigel Gresley*"". *The magazine wrote back to say they had plans for a "Nigel Gresley".*

Unknown to William, they sent plans to his home for a 2-8-0 which was designed by Nigel Gresley when he was Chief Engineer of the Great Northern Railway (GNR). This was a 2-8-0 GNR Class O2 freight locomotive (later designated BR power class 8F). William thought he had received plans for a 4-6-2 A4 Pacific Class locomotive until he saw them.

William started building the model in 1980 when he was at sea, and built a few small parts. Then life got in the way with family and jobs. He restarted the project about two years ago. Just after Covid, he joined *Scarborough Mates* where he met Ted Fletcher and Brian Stephenson. Ted told William about PEEMS, and he started attending meetings. That gave him the impetus to restart work on the locomotive. William would like to complete the model in 2026.

George Gibbs has persuaded him not to build a boiler, but to buy a professional commercial boiler. William has ordered a boiler from *Mason Engineering*. They are going to build a TIG welded copper boiler. He is going to build the rest. Most of the castings he gets from *Blackgates*, but to save costs, rather than buy expensive cast stretchers across the tender chassis between the longitudinal frames, he has fabricated them.

ii) John Heeley ~ Admiral's Barge.

John started by saying that most of us had seen this boat before, or one very similar to it. It has been heavily modified to turn it into an “Admiral’s Barge”, which is a 45-foot version of a 50-foot steam picket boat. During the First World War, these boats used to steam around Scapa Flow taking the Admiral and his staff from one battleship to another. A lot of these boats were sold into civilian service during the 1920s, when a lot of battleships were scrapped.

This is one of John’s “quick builds”, and is an “instant hull job” using plywood from *Wickes* costing £12.50. The engine is spirit fired, and has a very simple boiler. It’s a twin cylinder (‘V’ twin) driving a variable pitch propeller, which means John has complete control of the boat going forwards and backwards. The engine just runs and runs.

“Missionary Work” and Low-Cost Model Making.

The basic principle behind John’s models is to make them as simply and as cheaply as possible. John is engaged in “missionary work” trying to “sell low-cost model engineering” to his Club in Huddersfield. And it is working. There were five model steam boats on the Huddersfield Pond the previous Saturday.

There are still commercial parts in them, John’s not quite there yet, although people are doing a bit of “metal bashing”. John thinks he is slowly getting people interested in making their own models using non-commercial parts.

John has five steam launches, and they are all slightly different. They have slightly different engines, and different propeller setups. A wire cage can be seen around the propeller of the Admiral’s barge, which says a lot about the state of the pond. The problem isn’t algae on the top, but leaves from the surrounding trees. The leaves float on the surface for a week or two, then sink, start rotting on the bottom and then come to the surface again. The three boats that John runs on a regular basis, have wire mesh protection around the propeller. It slows down the boat slightly, but not to a great extent.

The main reason for sticking with this and similar projects, is to try and “push the idea” that serviceable models can be made at low cost with even scrap materials. The total bill for the hull, as mentioned was £12.50, the engine was made out of scrap metal, and the boiler’s just a tube with two flanges, and tubes either through it, under it or both.

These models are exactly what could have been built a hundred years ago in the 1920s. People were building these in sheds without any machine tools. John is trying to sell the low-cost idea of model engineering and that’s why he has been sticking to these serviceable projects for the last seven years. The little oscillating engines are good for 12 hours running, and they have been built from scrap material.

iii) Rob Davey ~ Three-Jaw Chuck, Index Plunger Made For It, and Adjustment.

Looking at the chuck lower circumference, it has holes running around it offering 24 or 25 divisions. This means you can do quarters, thirds, fifths etc.

The indexing tool shown is designed for a Myford Lathe. On the Myford, at the rear of the headstock, is a threaded hole which is intended for mounting a chuck guard. To mount the indexing plunger, a length of square steel bar about 5" long was turned down to 5/8" diameter for about 4" of its length. A hole was drilled in the remaining square portion to enable it to be mounted in the threaded hole. This is permanently mounted on the lathe.

The indexing fixture is the mounted on the 5/8" round portion as and when required.

There’s a detent here.

The indexing tool plunger can then locate in the holes in the chuck.
The chuck can then be turned and indexing can be carried out.

The indexing tool goes on the fixture and can be adjusted.

Rob has a tool post milling attachment…….

That holds it up if you want to do a bit of milling

There is a tiny saw cut in the top. It doesn't do anything, but if the machine is switched on by mistake, the tip is broken off rather than the whole tool spinning in the machine.

The Adjustment of The Three-Jaw Chuck.

This looks just like a chuck on a backplate, but it's not a normal backplate.

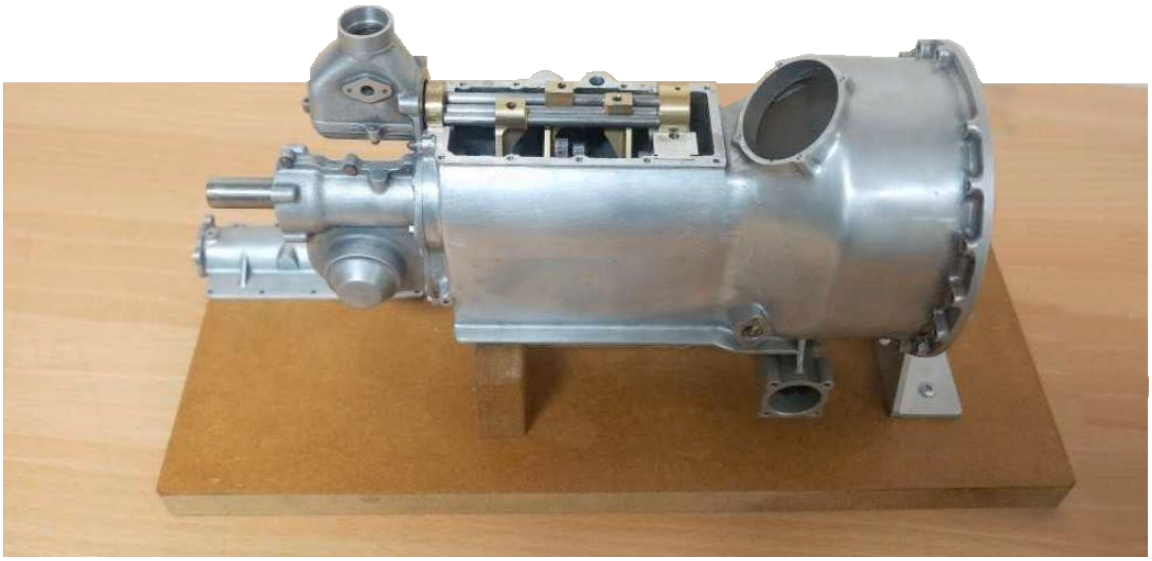
This backplate is loosely attached by three nuts which are in oversized holes. There are also four screws on the outside circumference of the chuck. So those nuts can be loosened off, something can be gripped in the chuck jaws and a dial gauge put on it, and then the nuts can be tightened up.

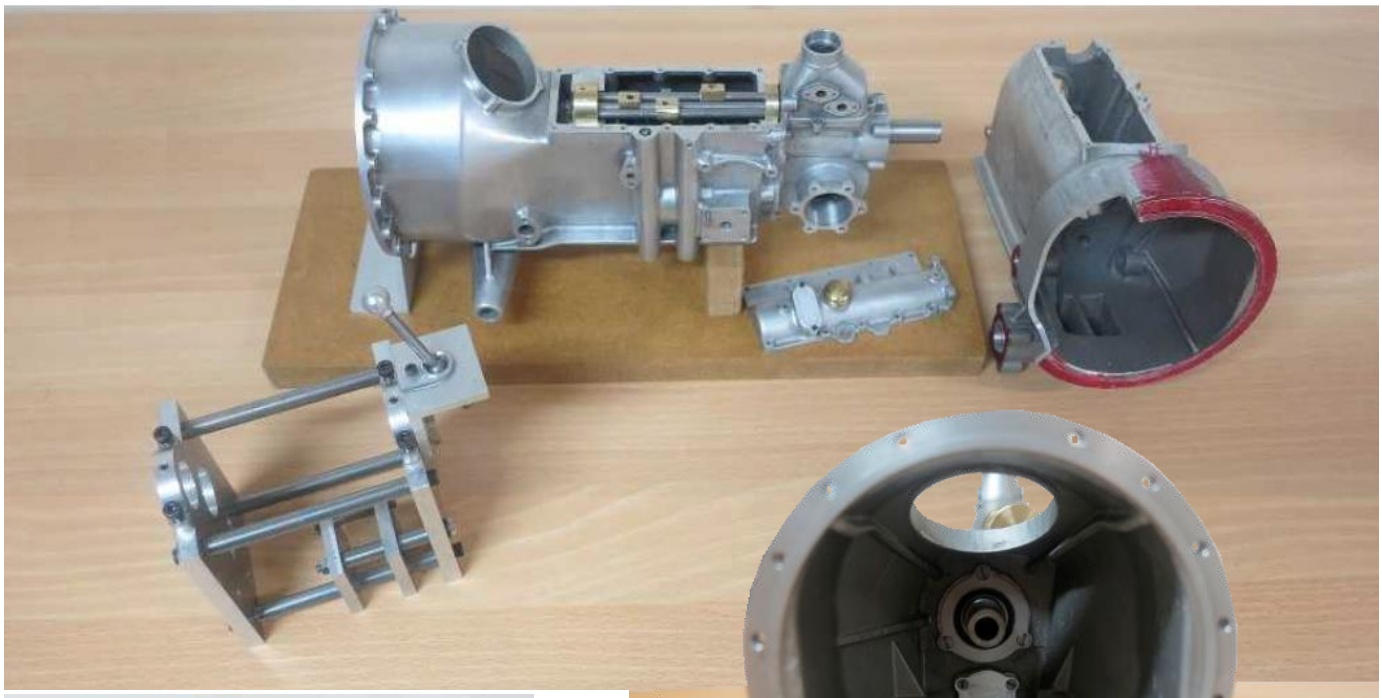
This means that if any repetitive machining is being done, with the same size diameter, the three-jaw chuck can run true. This saves having to use a four jaw chuck all the time.

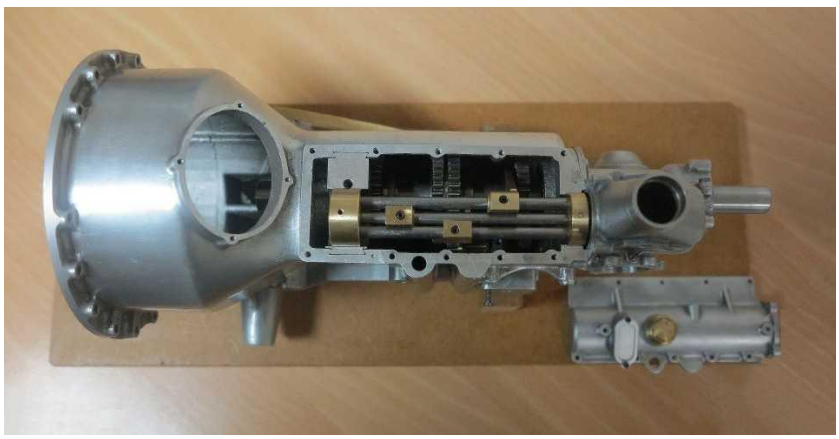
iv) Mike Sayers ~ The 40% Scale *Delage* Gearbox Model – The Continuing Story.

The last time the gearbox was presented to the Club was at the Spring *'Bring and Brag'* in May, a few months ago. That was written up in the PEEMS May newsletter. At that time, the casting of the gearbox casing had not been cast successfully. There was a part missing from the bell housing, thought to be caused by the pouring temperature of the metal being too low. For that reason, the metal could not fill the whole of the mould. The finish on the casting was also very rough.

For the Autumn '*Bring and Brag'*, a second gearbox casing was shown, which is complete. Some details were omitted, to be machined in later, to simplify the moulding.







Mike said that he had been working on this gearbox for a long time, and thought he was ‘on a winner’ when Sylatech offered to cast the gearbox casing for him. The project got there in the end, but it has been a real trial to get a satisfactory casting fit for use.

At the Spring ‘*Bring and Brag’* last May, we saw “the best of the failed castings”. This was displayed at this Autumn ‘*Bring and Brag’* and is seen above, marked with the red dye. The surface was completely covered in ‘warts’ and there was a bit missing in the bell housing. It required a lot of work to improve the surface finish.

There was another ‘failed’ casting with an even poorer surface finish, but that one was at least complete. It took days of filing to make it look as good as it does. This is the casting used for the final gearbox, and is shown above.

Whilst waiting for a satisfactory gearbox casing, Mike was busy making all the internals. With all the gears and shafts made, they were set up between two plates at the correct pitch centres to check that all rotated correctly in a similar manner to a clock mechanism. This also allowed the correct shape of the selectors to be determined. The tooling used was on display. It can be seen in the photo above on the left. That work went reasonably well. But there was an extra trial trying to fit the gearing into the casing. If you look carefully at the gear casing, you can see where Mike had to make one piece of the casting removable, to facilitate the installation of the gears. You can spot it because it is ‘dovetailed’ into place. The space inside the casing was just too tight to avoid this modification. Mike could then just slide the piece out and slide in the first and second gears. The removable piece is held in place by the gear casing cover seen in the photos.

The next difficult part will be the transverse worm gear set, which drives the brake servo. This fits in the transverse housing at the left-hand bottom end of the rear casing.

There is the worm gear on the gearbox output shaft, and a matching gearwheel on the transverse shaft, which drives the servo brake drum. This drum rotates when the car is moving. The brake pedal operates the shoes inside the drum, and the resultant torque on the backplate is used to apply the rod and cable brakes. This only works when the car is going forward!!!

Because of the scaled dimension between the centre of the main shaft (seen emerging from the end of the casing) and the centre of the worm gear housing, the worm gear has to be made to fit in that scaled dimension, rather than using standard calculations. The calculation of the sizes of the worm and wheel set to fit this odd dimension were a puzzle for some time. It was thanks to Richard Gretton's offer of a worked example of the method of calculation, that it was possible to work out the final size. (Since the Club meeting, these components have been successfully completed. Thanks Richard).

Questions and Answers.

Q: How many gears are there?

Mike: There's five forward gears and one reverse. The fifth gear is an overdrive. All the gears are in there now, albeit a bit stiff.

Q: Are you going to produce a model like those for the Bentleys where you include the chassis, cockpit and radiator?

Mike: There are no plans to do that at the moment. The engine is complete now and there are a lot of components to be installed on the outside of the gearbox, for example all of the handbrake lever, usual pedal arrangement on the bell housing, ignition control, oil pressure regulation, and idle speed control for the engine. All that will take some time. Once that is complete, the model will go to the Brooklands Museum, to be displayed next to the actual car.

Q: What has been the hardest part, the engine or the gearbox?

Mike: The advantage with the engine was that I had access to the full-size dismantled engine at Brooklands Transport Museum. I could take measurements and photograph each component, and could make all the necessary drawings.

For the gearbox, all I had was a print of a tracing of the longitudinal section, and whatever photographs of the exterior that I could find. The one and only *Delage* in this country is at Brooklands. This has a preselector gearbox fitted, so no details of the original manual unit could be had from there.

The only car with an original engine and complete manual gearbox, is in America at the *Revs Institute* in Naples, Florida. All the rest of the *Delage* GP team cars have been converted to hydraulic brakes, and have had the servo assembly removed.

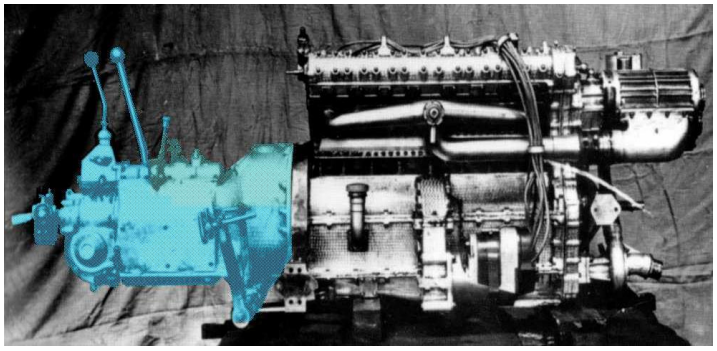
I managed to acquire photos from the various owners, restorers and museums from the USA, France, New Zealand and the UK. I am very grateful for all their support.

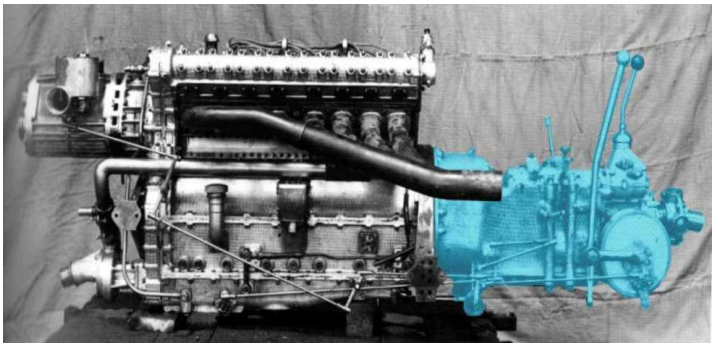
With these and the section drawing, which showed dimensioned shaft centres and tooth numbers for all the gears, we have been able to arrive at an accurate representation of the original gearbox. The internals have had to be slightly modified to suit standard ball races and available gear cutters, and also to allow full size fingers to assemble it all as mentioned earlier.

Paul, my stepson has done an incredible amount of CAD work to enable me to get where we are now.

Note: The whole story of getting a serviceable gear casing is described in the May Newsletter.

The Editor thanks Mike for proof reading this article and also providing clarification for some of the details discussed at the Club meeting.





v) Richard Gretton ~ "Slave" Clock Mockup.

"Master" and "Slave" clocks were an innovation in their time that allowed a series of clocks to be accurate and in sync. This system consisted of a single precision master clock that would provide timing signals to synchronise a series of slave clocks as part of a network. These series of electric clocks were connected via wires to the master clock and were adopted widely by institutions like factories, offices and schools during the 1900s. Unlike conventional clocks of the time that needed to be wound by hand and could easily become out of sync with each other, the master and slave system meant that all the clocks moved together and kept time accurately.
Reference: Glasgow School Of Art Website

Richard's wife bought him a "Gentleman's Master Clock". These "Master" clocks were used at the beginning of the 19th century and they sent an electric signal out to a network of "slave" clocks arranged around the building. All the "Slave" clocks followed the "Master" clock. If you remember them, they would 'jump on' a half minute at a time.

Richard thought that his "Master" clock should have a "Slave" clock or two. He has built two "Slave" clocks and brought along a mockup of one to the meeting. At the back of the clock is the mechanism, battery and a microswitch, which when pressed moves the clock on, illustrating how the "Slave" works.

The "Master" clock is just a "one second" pendulum which is about a metre long with a heavy 'bob' at the bottom. The mechanism at the top consists of a "count wheel" which is a very light wheel with fifteen serrations on it. On the pendulum there is a light lever which moves the "count wheel" around once every full swing, which will be 1 second one way and 1 second the other way, so it 'pushes and pulls'. On the "count wheel" there is one notch that is deeper than the rest, and when it gets to that point it operates a solenoid; an arm drops (which gives the pendulum a push to keep it going) and at the same time an electric pulse is sent out to the "Slave" clocks.

The other "Slave" clock is in Richard's other workshop and is working. This one is going on the outside of Richard's house so he can see it from the garden. He just has to work out how to make it waterproof.

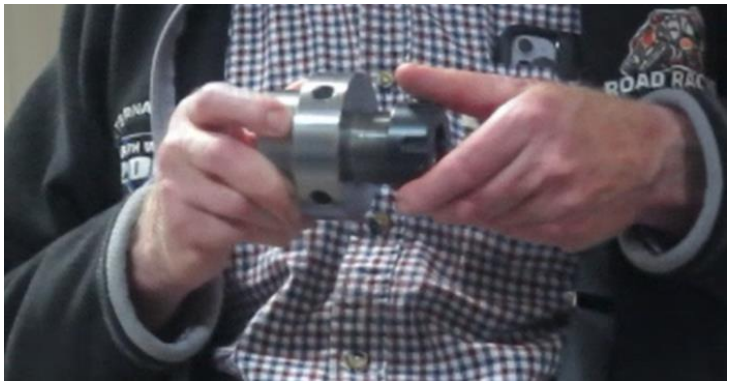
vi) Jonathan Milner ~ Metric Thread on a ER32 Lathe Collet

Jonathan wasn't bragging, but he has cut a metric thread on an imperial lathe collet. He wanted to make an ER32 collet chuck to fit his imperial lathe. There was no problem cutting the internal imperial thread to fit the spindle nose, but he wanted to use a commercial collet clamping nut which has a 40mm thread.

He doesn't have a 127t gear, but managed to cut the metric thread using some odd gears he has, and thanks to an online lathe gear calculator. (There is no gearbox on his lathe).

A practice piece proved it to be about spot on. Overall he is pleased with himself because the collet nut screws on very nicely and the run out is next to nothing. Mike mentioned that he should not make the nut a perfect fit, as it might affect the concentricity, and indeed that was the case. A little shave with a thread chaser fixed that.

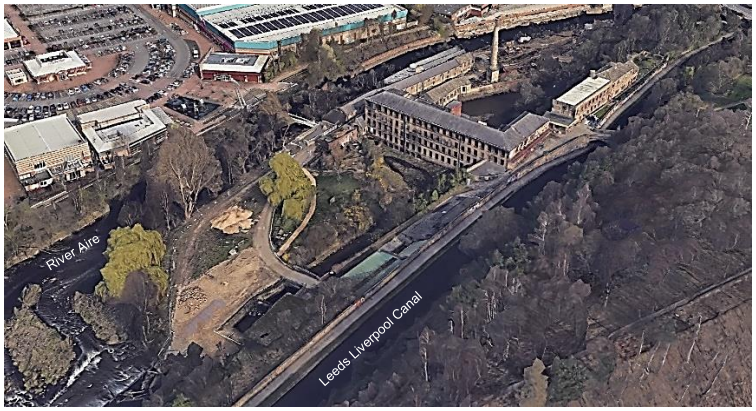
The slitting saw holder was his exhibit in the "warts and all" section, as a reminder to tighten the milling vice up!!



PEEMS Visit To Leeds Industrial Museum on Tuesday 1st October 2024.

Introduction

Seven PEEMS members visited the Leeds Industrial Museum in Armley Leeds. The building housing the museum was once the world's largest woollen mill (with 18 fulling stocks and 50 looms). It is described as the *'Museum Of A Thousand Trades'*.

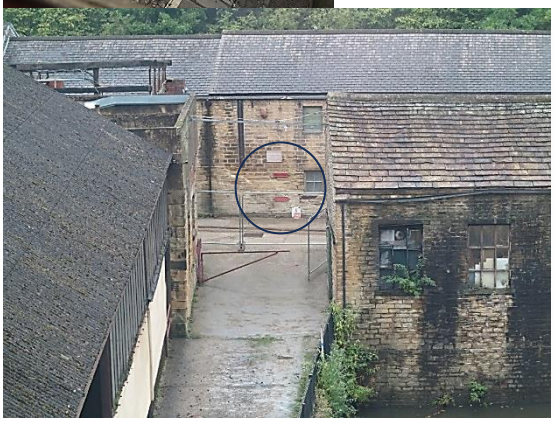


Like Kelham Island Industrial Museum, which PEEMS visited in September 2023, the mill sits between a canal and a river. In the case of The Leeds Industrial Museum these were The Leeds and Liverpool canal and River Aire respectively.

The current structures were built in 1805 and closed as a commercial mill in 1969. The buildings were taken over by Leeds City Council and reopened as a museum of industrial heritage in 1982. In the mill building there are four floors of exhibits, although some rooms were undergoing renovations.

The Mill Chimney was built in 1854. It is constructed from ashlar stone with a brick top.

Because of the river flood alleviation works being carried out in the area, parts of the museum were off limits until 2025. This meant that the engine shed containing the locomotive collection was not accessible. Other areas within the mill were undergoing renovations.



This photo gives an idea of the levels of flooding in the area of the mill in the last 160 years.

The flood, due to the River Aire overflowing, occurred on December 27th 2015, and reached 8 feet high and is commemorated by a plaque.

This is almost three times higher than the previous flooding on the 16th November 1866, which is also commemorated by a plaque.

The whole area has had flooding throughout the history of the mill.

The Textile Machinery Exhibition.

The museum did not disappoint however, because the excellent textile machinery and exhibits were still available to view. PEEMS spent a few hours examining what was on display, including large stationary engines.

The Spinning Mule.

The first stop was the spinning mule, which was running. We were informed that all the woollen mills were in Yorkshire because the environment favoured sheep farming, whereas the cotton mills were in Lancashire, where the imported cotton could be worked in its warmer humid climate.

The Spinning Mule was the result of a lot of innovation and development that had occurred between the 14th and the 18th Centuries.

This took the original *Spinning Wheel* c. 1300, through to the *Saxony Wheel* (1555) and then the *Spinning Jenny* (1767), and then the *Spinning Mule*.

The original *Spinning Wheel* (or Great Wheel) c.1300, was used for the basic spinning of yarn. This involved taking a clump of fibres and teasing a bit of them out, then twisting them into a basic string shape. The spinner continued pulling and twisting the yarn in this manner, to make it longer and longer, while also controlling the thickness. These were used in the spinner's own home. One hand was used to turn the wheel and the other was used to draw out the fibres.

The next development was the *Saxony Wheel* in 1555. This spinning wheel was treadle driven, the advantage being that the spinner had both hands free to manipulate the fibres.

In 1767, the Hargreave's *Spinning Jenny* was introduced. Whereas the *Spinning Wheel* could only spin one thread at a time, the first Spinning Jenny could spin eight threads.

Some interesting facts about the Jennies:

i) The *Spinning Jenny* proved so successful that workers in Blackburn, fearing for their jobs, rioted and smashed many of the Jennies in their local mills.

ii) The soft thread produced by the Jennies was only good for the weft* running across the material.

iii) James Hargreaves, the inventor of the *Spinning Jenny.* Hargreaves didn't patent the Jenny until 1770, and then sued Lancashire manufacturers for using illegal machines. He demanded £7000, they offered £3000, until they found he had been manufacturing machines without a patent for two years. He lost!

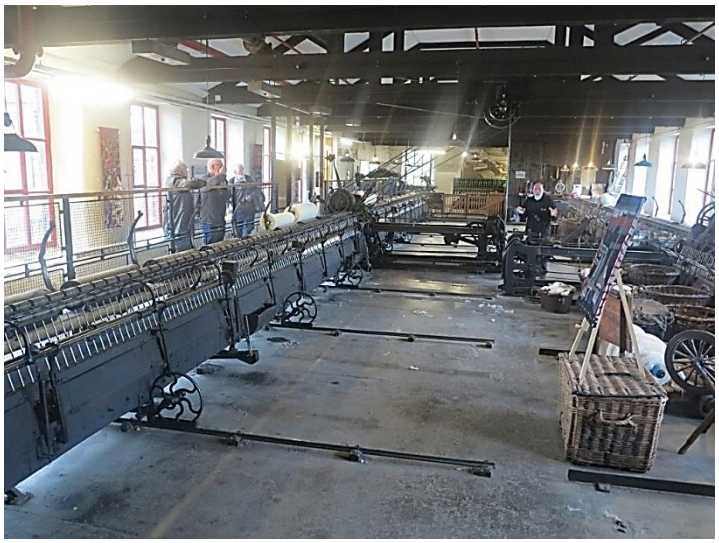
***The warp fibres** are the straight fibres running along the length of a roll of material. **The weft fibres** pass over and under the warp fibres as they run across the width of the roll.

In 1769 came Richard Arkwright's *Water Frame.* This was powered by a waterwheel and used the principle of '*roller drafting'.* Four rollers, each running at a different speed, stretched the thread as it was twisted. This made a suitable coarse strong thread for the straight warp fibres along the roll.

In 1779 came *Crompton's Mule.* Frustrated by the shortcomings of the *Spinning Jenny* he had used as a boy, 21 year old Samuel Crompton decided to invent a better machine. It took him nearly six years to produce one that could spin the soft strong thread, suitable for both the warp and the weft.

The Automatic Mule.

Mechanical engineer Richard Roberts, was asked to produce an automatic *Spinning Mule* by a group of mill owners. Roberts took up the challenge and within a year produced a mule that could spin 2,000 threads at once, and did not need to be operated by a skilled spinner.



This Spinning Mule above, was made in 1904 in Oldham by Platt Brothers. Before its arrival at the Leeds Industrial Museum, this mule was used by James Ives and Sons, at Leafield Mills in Yeadon. The company finally closed down in 1980 after 132 years of manufacturing fine woollen cloth.

'Spun Out': After being de-commissioned from use in England, many mules such as this were exported to textile companies in India. Many are still used to produce high quality and soft woollen yarns.

The Process Of Creating The Warp and Weft Threads For Weaving Using The *Spinning Mule.*

a) **Blending:** After the raw wool was delivered to the mill, it was sorted, dyed and blended through a blending machine. The various colours of dyed wool were blended by continually passing them through a blower in the "Willey House".

b) **Carding:** The next part of the process was carding. The carding machine consisted of a series of large and small revolving cylinders. These were covered with closely set wire teeth, which teased the wool into a fine web of intermingled fibres. This web of fibres was then condensed and divided into loose threads, which were wound onto bobbins.

c) Spinning: The threads produced by the carding machine are not strong enough to be woven. In order for the threads to be robust enough for weaving they must be spun, as had been done with the original spinning wheels. This means that the carded threads have to be drawn out and given a twist.

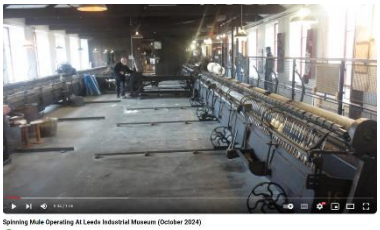
In the video below, the carded thread or roving can be seen on rollers (bobbins) on the right-hand side of the machine, near the operator and observers.

This thread is connected through the headstock, to a carriage with the spindles running on tracks.

On the outward motion, the roving is paid out through attenuating rollers and twisted. On the return, the roving is clamped and the spindles are reversed to take up the newly spun thread.

Different thicknesses and strength of yarns were spun for different purposes.

The video is at this link ~ https://youtu.be/Xc2SXbIwVXM



To view video, press on link. To return to newsletter press the back arrow at the top left-hand side of the screen.

The video shows the operation of the mule. Only some of the positions are loaded, at the centre of the machine each side of the belt drive, as can be seen above. A more detailed video is shown below of a similar mule.

Reference Wikipedia. (wiki Creative Commons license):

https://ca.wikipedia.org/wiki/Fitxer:Spinning_Mule_1897_-_Mueller_Woollen_Cloth_Mill.ogv

To view video, press on link. To return to newsletter press the back arrow at the top left-hand side of the screen.

Children In The Process: Since the threads often broke during the spinning process, it was necessary to reconnect them. This was done by a 'piercer' who joined the broken threads by hand. 'Piercers' were often children.

It was pointed out by staff that these children weren't paid. In fact it was child slavery**.**

Whilst Britain abolished slavery in 1833, child slavery in the woollen and cotton mills continued.

Further information about the *Spinning Mule.*

The earliest version of the mule, was a semi-automatic machine called a *'Mule Jenny',* invented in 1770 by Samuel Crompton. It combined features from the *Spinning Jenny* and Richard Arkwright's 'roller drafting'. Ten years later a prototype mule called a '*Slubbing Billy'* was being used in Leeds mills. By 1900, mules were up to 150 feet long and had up to 1300 spindles.

Advances in technology caused a decline in demand for skilled workers. By 1830, Richard Roberts had mechanised every function of the mule, and the spinner's role was reduced to that of an operator.

The Warping Frame.

The *warper* is the machine that prepares the warp, so that it can be used on the loom, through the operation called "warping".

This process consists in placing the bobbins of spun thread onto the frame (creel) on the right.

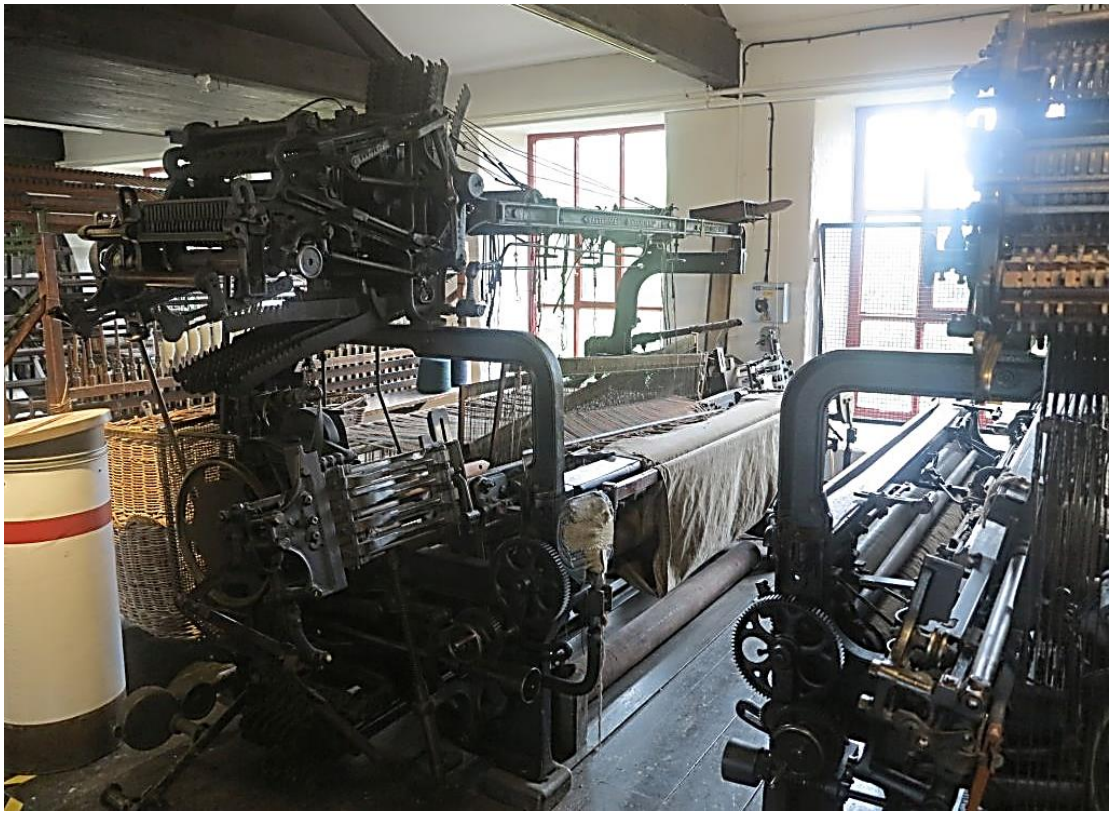
The weaver, operating the warper with a crank, wraps the threads on it. It is used to sort the pattern and threads for the warp, before transferring it to the loom.

The 73" loom has 1606 individual warp threads that must be wound (warped) tidily.

The Hattersley 'Standard' Loom.

The Hattersley 'Standard' power loom was made by the oldest loom making firm in the world, George Hattersley and Sons of Keighley in 1789. The loom shown overleaf was manufactured in 1933, and is equipped with the 'Dobby' mechanism which was invented by the firm in 1867.

The device utilises a series of pegs and cams to enable repeat patterns to be woven by automatically selecting the healds** and up to four shuttles. It was ideal for the production of tartans, and was used for this purpose at the mills of James Ives of Yeadon until 1980.



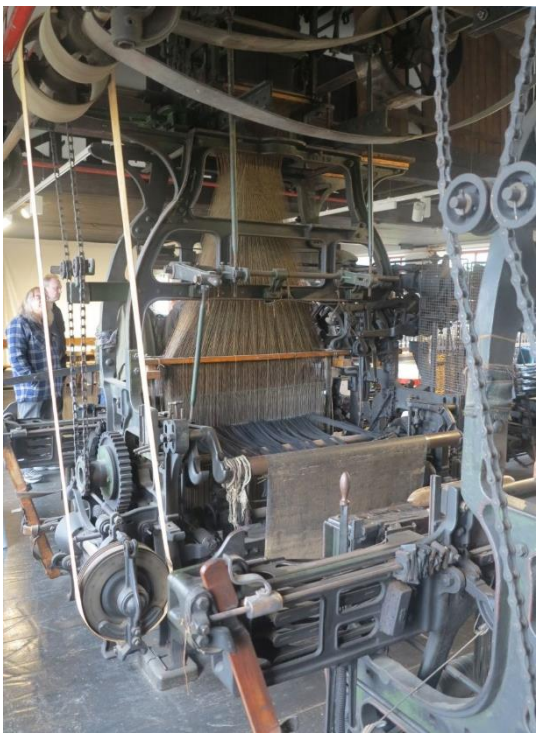
** **A Heald** (or Heddle) is an integral part of a loom. Each thread in the warp passes through a heald, which is used to separate the warp threads for the passage of the weft. The typical heald is made of cord or wire and is suspended on a shaft of a loom.

The Jacquard Loom.

The looms below were made by Hollingsworth Knowles of Dobsworth to the design of their 1909 patent.

They included 'Jacquard mechanisms', named after their inventor, an 18th century straw hat manufacturer from Lyons. Extremely complex and pictorial designs could be woven on these looms. Each warp thread could be independently raised as required by individual healds.

Punched cards were used to programme the loom, with the required threads selected automatically without further assistance from the operator. The looms shown below came from Kaye and Stewart of Huddersfield, where they were in use until 1980.



A Teasle Frame.

This teasle frame was used for raising the ‘nap’ on woollen cloth. Since Roman times or earlier, the process of ‘raising’ the surface of woven woollen cloth was used to ‘soften’ the surface. The cloth would be stretched over a frame and brushed with teasels that had been fixed into some sort of wooden holder.

Teasles grow wild, and are 2 metre high with egg shaped flowers on spiky stems.

It’s the ‘soft but spiky’ nature of the dry flowerheads – in particular the large central one called the ‘king’ – that made this plant so useful.

Burling and Mending.

Burling and mending were usually carried out by women and young girls. Working in a well lit room at large sloping top mending tables, they would pick out burrs and knots from the cloth and replace any damaged threads.

Men and women known as ‘perchers’ were responsible for checking the cloth for faults, and marking them for mending. This was one of the most important jobs in the mill. The job required much skill, as few pieces of cloth were perfect, and few so bad that they would be rejected. It required a discerning eye, to appreciate what must be repaired and what could be passed.

Counting The Cost: A length of cloth could be mended more than once, as new faults could show up at each stage of manufacturing. This was an expensive process, as each mend could add up to 20% to the cost of a cloth particularly with high quality or coloured cloths.

Cropping.

Fibres raised by teasles are uneven in length, so must be trimmed to make them level. This ‘cropping’ must be carried out to different degrees of closeness, depending on the quality of cloth and the finish required.

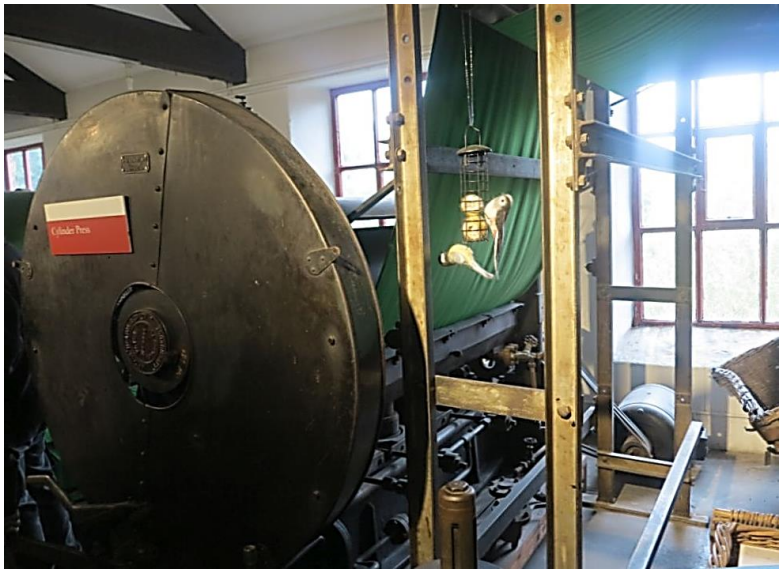
A single operation of raising and cropping would not usually be sufficient to give the desired finish, so the process was often repeated two or three times.

The Cropping Frame shown below has a cutter similar to that on a lawn mower. One gentleman made his fortune after being inspired to create such a machine after seeing a cropping blade in action,

Hand Cropping: Like many other processes, cropping was originally carried out by hand, using a large pair of shears.

The Rotary Press.

For many years, pressing was the final process in the manufacture of high-quality woollen cloths. It removes creases and gives the cloth a more serviceable glazed finish. The cloth was fed under a continuously rolling heated steam roller, with different thicknesses of cloth being accommodated by adjusting the space between the roller and base plate (known as a ‘flat’).

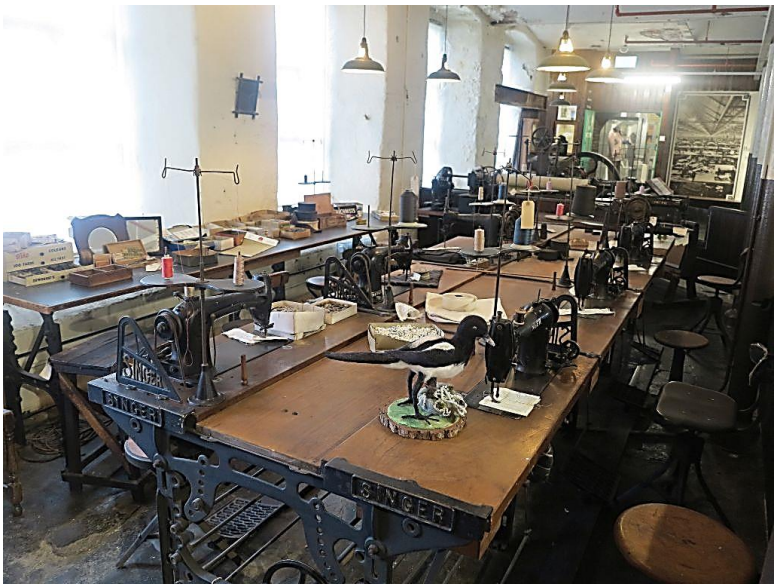


This rotary press was made by Arthur Heaton and Co. Ltd. Of Liversedge. It was supplied new to James Ives and Sons, Yeadon in 1929, and was still in use until the firm closed in 1980.

There were two types of press. The hot plate press which was also an exhibit on the ground floor of the museum, and later the hydraulic rotary press as exhibited here.

The rotary press had an advantage over the traditional press in that the operation was continuous.

Making Trimmings.



Each worker had their own specialist job in the large factories.

In order to speed up production, the various elements of making a suit were divided up and given to separate departments to work on.

In the trimmings department, collars, canvas linings, pockets, button tabs, shoulder pads and under-collars were all prepared.

Specialist equipment was used to help each specific task. The Furnival press cut out collars whilst the rotary trimmer cut strips of cloth for use as stiffeners and bindings.

An experienced female worker may have spent one day machining only pocket flaps.

Layup Table.

On the layup table cloth is unrolled and a suit pattern set out, on top ready for cutting.

A skilled cutter draws around the pattern with chalk to mark out each piece needed for a suit.

An automatic layup machine can be used to layup layers of cloth. After clamping together, several suit parts can be cut in one go.

In factories, vast rooms would be full of many layup tables. The cutters were always men, the women would do the less skilled job of operating the automatic layup machine.

Several Leeds tailoring firms, including J. Hepworth’s were amongst the first users of the *‘Marsden Patent Process’,* for pattern making. This process made it possible for the less skilled marker to cut out garments perfectly.

Clothing Factories In Leeds.

The 20th century saw Leeds as a leader in the tailoring industry. Employing the vast majority of the city's population, Leeds tailors produced nearly every one of two suits worn by British men.

In the 19th century, Leeds tailors like John Barren, Montague Burton, and Joseph Hepworth radically changed their industry. By adopting new machinery, and using innovative production techniques, they began to produce suits on a mass scale.

Through their success, the Leeds tailors significantly reduced the cost of a suit, making it affordable for most men.

Many large-scale factories sprung up across Leeds, employing a huge number of people. The tailoring industry was of great importance to the economic success of the industry. By the 1980s, increased competition from overseas and the change in fashion for wearing suits, saw the demise of the Leeds tailoring industry.

In Conclusion.

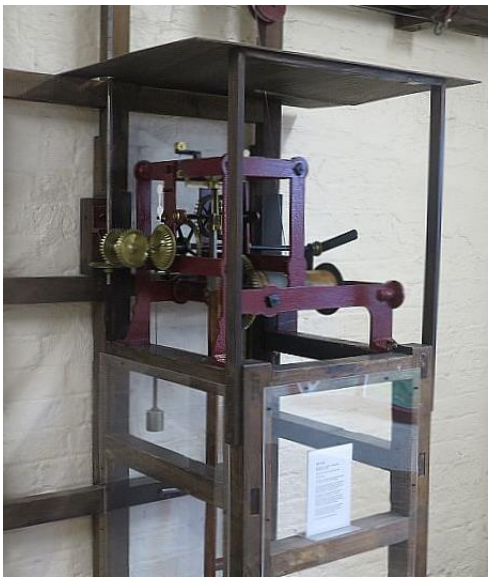
PEEMS had an excellent time at the museum, with many large engines to view. There was also a cinematography section with old cinema projectors, and an old-style cinema on site showing films from the early years.

PEEMS would like to thank the staff of the Leeds Industrial Museum for all their help and for explaining the various machines and processes.

We especially thank them for allowing photography on site.

Please note: Much of the descriptive text in this article has been copied from the excellent display boards in the museum.

Some Scenes Around The Museum.

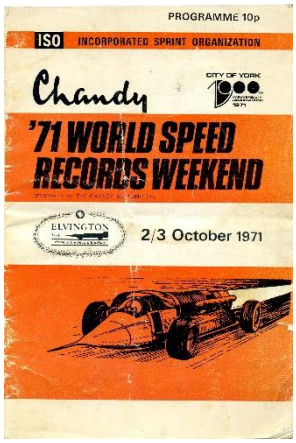


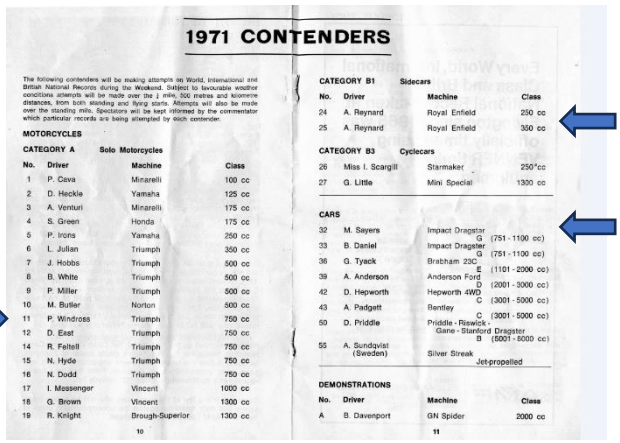
Mill Clock 1810-1840: The clock has a double framed cage type movement known as an "Armchair" timepiece.
The movement is weight driven and includes a pin head dead- beat escapement which has 27 teeth. The pendulum has an effective length of 63" and beats 47.25 beats/minute.
The hands on the outside of the dial are Sapele mahogany and are replicas of the original.

News From Elvington Straightliners ~ Paul Windross.

I was at Elvington on Wednesday September 18th until Sunday, watching various two wheeled up to 4 wheeled vehicles attempting speed records or personal best speeds.

- Adrian Reynard with his streamlined Honda Turbocharged 250cc motorcycle did 170mph. In a copy of the 1971 Elvington program record attempts, Adrian is riding a *Royal Enfield*. Have a look at [Adrian Reynard - Wikipedia] A very interesting engineer.





- *"Rocket Man"* Richard Brown had a new pilot getting used to driving his thrust driven streamliner.

- Graham Sykes' *Steam Rocket* bike had a test run on the Saturday. I understand the initial acceleration was over 4G and was not on a full tank of water. The data logger said 170mph at the end of a standing start eighth mile.

Graham's *Steam Rocket* broke Melbourne's timed track record Saturday 4th October, and then on the Sunday. It's having a larger pressure vessel for next year and the machine will be longer.

- Trevor Duckworth's Renault 5 three-wheeler special did 100mph. Trevor's engine was an earlier model of my Renault 5.
- Beccy Ellis's *Hayabusa* was having runs to check things over after a turbo rebuild.
- Jack Frost did 250mph on his *Hayabusa*.

Paul.

Some Of The Bikes And Trikes:

Contact: If you would like to contribute to the Newsletter, the contact is:
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