GOLDSMITH

THE PYRENEES HERITAGE PRESERVATION MAGAZINE

Edition 163 Dec 2021 & Feb & April 2022 Lake Goldsmith Steam Preservation Association

AN INVITATION TO THE LAKE GOLDSMITH AUTUMN RALLY IN 2022

1234 Lake Goldsmith-Carngham Road Lake Goldsmith Vic 3373

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All being well we hope you can share the day.

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Our Mission Statement

To foster, nurture, encourage and demonstrate technical, agricultural and life skills associated with the Industrial Era.

To provide a quality environment where these skills may be used to educate and entertain members and visitors.

To run two weekend rallies each year, and be available at convenient time for other interested groups or individuals.

To conserve and develop a heritage collection.

Find us on the net at:- **www.lakegoldsmithsteamrally.org.au**

Contact us at:- **info@lakegoldsmithsteamrally.org.au** **or** **The Secretary P.O. Box 21 Beaufort 3373**

Note:- The February and August editions are normally email only. (subject to Covid restrictions)

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Lake Goldsmith Steam Preservation Association Inc.

Registration:- A0032895 Correspondence to:- The Secretary PO Box 21 Beaufort 3373

COVID NOTE

Visitors to the 119th rally on April 29 & May 1 can check for any last minute COVID requirements before leaving home. <u>All visitors must be double vaccinated,</u>

Welcome to Goldsmith Edition 163 February 2022

It was disappointing to see last years November rally fall victim to Covid which had already seen the loss of 2 previous rallies in 2020 at Lake Goldsmith.

The next Rally is due and Autumn 2021 on April 30 and May 1 and whilst we hope that the current Covid infections peak and plateau as anticipated, there is still a lot of water to flow under the bridge before we can be certain that conditions will be OK.

The 2021 May Rally went ahead and was a great success, which provides some optimism that the Sun will again shine on an unrestricted Autumn Rally for 2022.

The theme planned for the 2021 Spring rally was “Made In America”, and this theme has carried over to this Autumn Rally.

This Theme is open to almost anything made in America, which over the years has included most of the Industrial revolution that got underway in the Britain and Europe in the 1700’s. America was, even then, a vast market as the population spread West they developed transport and infrastructure that suited the circumstances of wide open spaces, navigable rivers and huge distances remote from support.

Industry and entrepreneurs responded with solutions to every problem, creating a wealth that supported new resourceful to offer high production machinery that spread around the world, Australia had much in common with America such as long distances, an agricultural base and a common language that readily absorbed much of what America had to offer. Many American companies set up manufacturing and sales offices here, which over a long period have left us with a enormous range of products from the past and present, many of which we have seen at our rallies, and I have no doubt that there will be many more at the May and future Rallies.

Agricultural machinery, light and heavy vehicles, domestic products, Construction equipment and Military vehicles and equipment are all favourites with our visitors, and it is great to see an increasing numbers of these machines restored to working order to give modern generations into the evolution of our modern lifestyle.

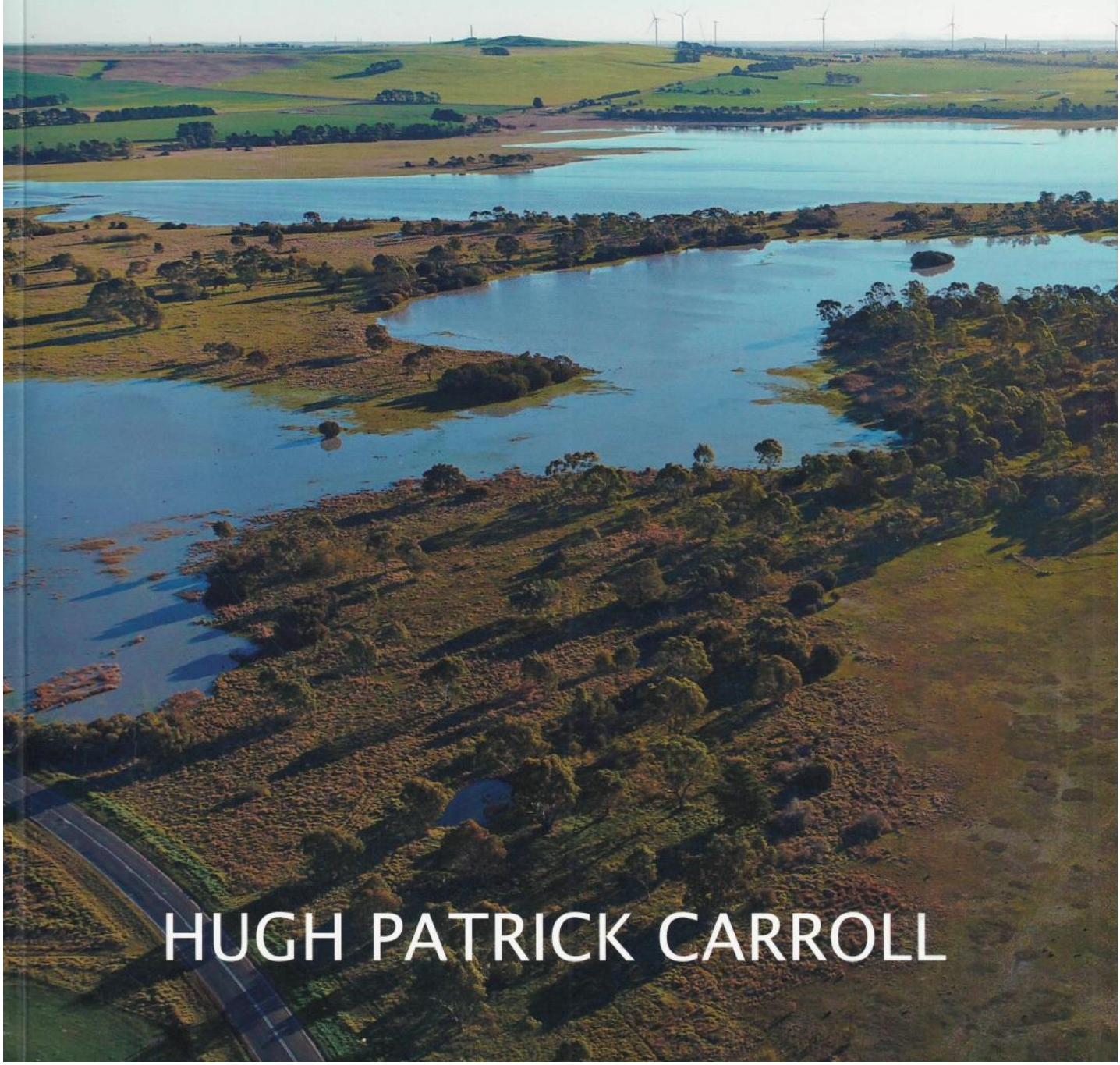
All exhibits, irrespective of origin are welcome showpieces, the show is not limited to American Made, but we hope that conditions will permit that members and visitors to show their proud exhibits and allow us to reflect the gear that help forge our nation.

The last to editions of Goldsmith there were stories to recognise Captain Cooks mapping of Australia’s East Coast on the 250th anniversary of his birth. The story concentrated on the Navigation and Survey Instruments and methods that he developed to make Maps that were a vast improvement on those made before his time.

We also touched on Sir Joseph Banks, who had accompanied Cook, and looked at two Atmospheric Steam pumping engines that were used in his Lead Mine at Overton. For this edition we follow up on the pumps that worked in those mines. Ed.

GOLDSMITH COUNTRY

A Social History of
Stockyard Hill & Lake Goldsmith



HUGH PATRICK CARROLL

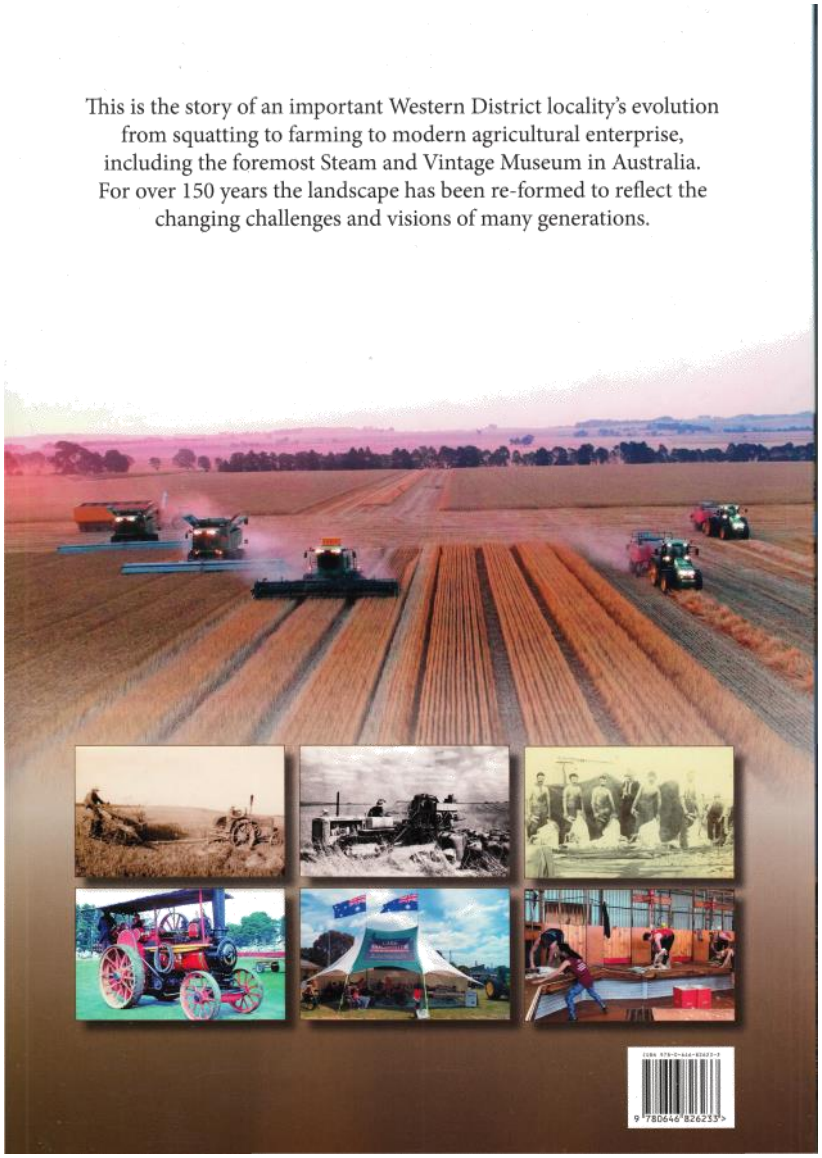
New Book Release

Goldsmith Country is Hugh Carroll's latest release on the History Victoria's Western Districts.

For Members and visitors to the biannual rallies at Lake Goldsmith this book will have a lot of interest as chapter 1 covers the history of the rally from its early days when local farmers joined together to keep the local history of steam alive and demonstrate it to the public. It is thanks to their interest and forthought that we are able to see steam and other machinery demonstrated on properties where it has worked since it was first introduced into the area. As the book reveals steam arrived at nearby Stockyard hill very early in the age of steam.

Of interest to all is the revelation of the trials and tribulations of the early squatters who were licenced to use large areas for grazing and the gradual opening up of the land for the development of mixed freehold farms for agriculture.

Crops needed roads for transport, in this case connections to Geelong Ballarat and Portland were important.



Railways, and the selection of routs for them to best serve the community provided a lot of interest at the time.

With an increasing population social events were needed which led to the establishment of horse racing, ploughing contests and Agricultural shows where stock was judged and stud Sires recognised.

For all Victorians this book is a must see fascinating window into our distant and recent past .

The book will be on sale at John Kirkpatrick's "Pioneer Shed 5" and in the Founders Building.

There is a lot of reading here and the book is great value at $60. Enjoy the read. Ed.

MELBOURNE STEAMFEST MARCH 2022

For the first time in many many years I was not able to get to Steamfest , and it would appear that I missed a great event .

As fortune has it Jo Lloyd was able to help out with some late pictures, so the event can at least take its place in our records.

As the pictures show there were some active demonstrations of Stone Crushing (above left), Hay Baling (above right)

Peter Jackman's Fowler Ploughing Engine "Suzy Jane" takes a lap around the circuit.

On the right the display of stationary engines is always a good feature, for quantity and variety. Many years and volunteers have made this an educational collection.

For anyone who has not been to see what the Melbourne Steam Traction Engine Club has on offer at the National Steam Centre it is worth a visit.

Timber milling was a theme of the show, with a variety of powered saws, and in the background some timber for the steam powered sawbench (not shown) at the end of the rail. Thanks Jo for the pictures. Ed.

A follow up on Our Father, Sir Joseph Banks and his "Fire" Engines

In edition 162 of Goldsmith featured Sir Joseph Banks Overton Hall Estate near Ashover in Derbyshire England, and in particular the Lead Mine on the Overton and Gregory veins which in 1768 commissioned a Newcomen Atmospheric "Fire" Engine to pump water from a new deep shaft up to the exiting underground drain (or Slough) which drained seepage to the Amber River about a mile away.

ATMOSPHERIC STEAM ENGINES

AND DEEP MINE WATER PUMPING.

AT OVERTON HALL, ASHOVER, DERBYSHIRE in the late18th Century.

To me Banks involvement with the predecessors of the Trevithick high pressure steam engines was a total surprise. Some further reading has revealed that in addition to the Newcomen and Watts style linear pumping engines, there was also a double acting Newcomen type "Whimsey" rotary engine, patented by Francis Thompson, raising spoil and lead ore from the Gregory mine. Information on this engine is elusive, so it will not be part of this months feature.

For those who missed the previous feature, Sir Joseph Banks (pictured on right) is best known as a Naturalist who accompanied Capt. James Cook on the first of his three voyages of discovery in the Pacific Ocean. On that trip, in addition to his Naturalist discoveries, he was involved with Cook in the observations of the transit of Venus from Tahiti, which lead to the first calculation of the distance between the Earth and the Sun. He was also involved with the first Survey of New Zealand and the East Coast of Australia. He was always a strong and influential advocate for the settlement of Australia, a cause that he was actively engaged in until his death in 1820.

Of course he is better known for his interests in Botany and Natural History , his 40+ year role as President of the Royal Society and his role in establishing Gardens and Museums and his support for others to further the cause of science.

His Estates at Revesby Abbey in Lincolnshire and at Overton Hall in Derbyshire provided him with the means to support many associated causes, and his

involvement with the authorities at home and abroad enabled him to gain further influence, and in some cases provide safe passage for those involved, even during times of the frequent wars of the period.

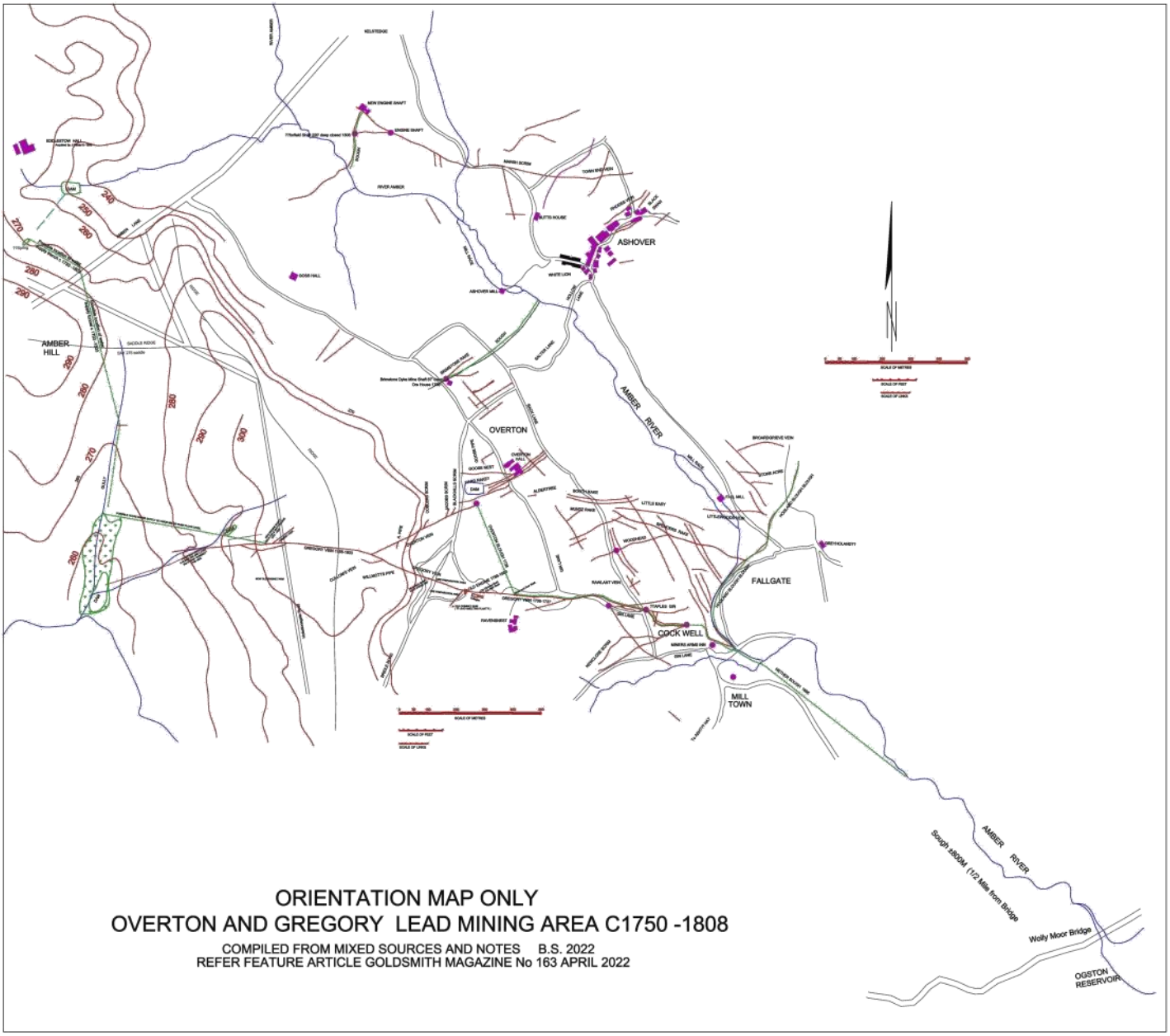
The focus of this feature is the pumps used to dewater the mines using the atmospheric engines, water Wheels, Gins (or whims) and hand pumps. Information is scarce on much that was actually used in Gregory Mine, but there seems to be much that was semi standardised, in principle at least. Each location had its own peculiarities .

Much information is drawn from the 1820's book by John Farey " A Treatise on the Steam Engine" . With about 800 pages this book recorded much of the early development and use of the Steam engine. Farey was also interested in Geology and Agriculture. Sir Joseph Banks commissioned Farey to prepare maps and Geological sections of Derbshire at Banks expense. Similarly he had his surveyor Nuttall prepare plans of Ashover, including the nearby Alton area where he had inspected coal deposits.

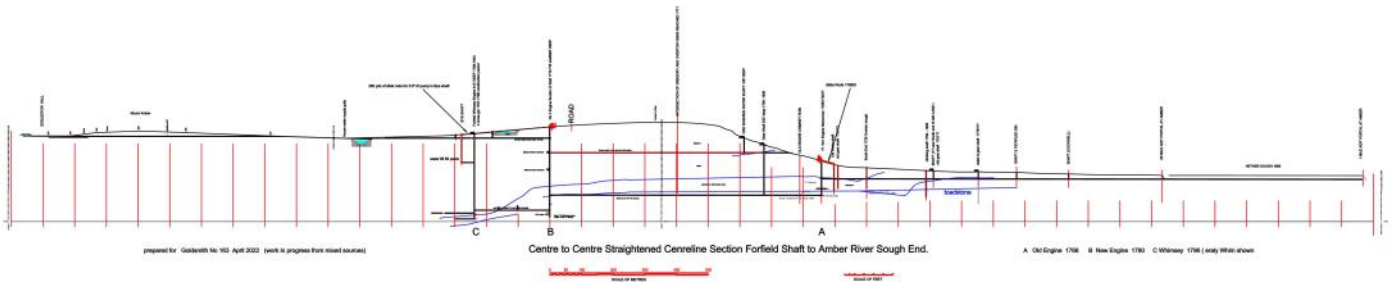
Lead had been mined in the area since Roman times. During the period of the operation of deep mining at the Gregory mine, the Overton Hall Estate was owned by Robert Banks-Hodgkinson, (see picture on right) who, on the death of his brother William Banks of Revesby Abby in Lincolnshire, shared the guardianship of his nephew Joseph Banks until his 21st birthday in 1764 when he could inherit his fathers estate.

Joseph Banks spent much of his youth at Overton Hall where his uncle developed a sound business background which served him well through his life. His uncle was a lifelong friend and business partner to Joseph. Joseph was knighted in 1795.

Prior to power mechanical pumping, Lead Ore (mainly Galena) in the Cockwell, Gregory and Overton Veins was mined at levels above the water table controlled by the level of the Cockwell Sough (local terminology for an underground drain) which drained water into the Amber river below Milltown.



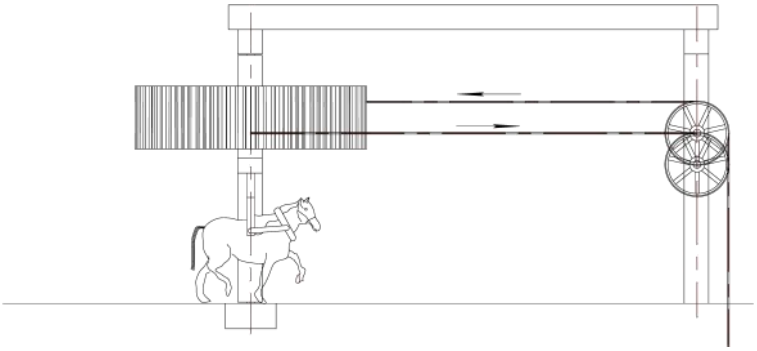
The Nether Sough, (lower right on the plan above, and right below) as it was



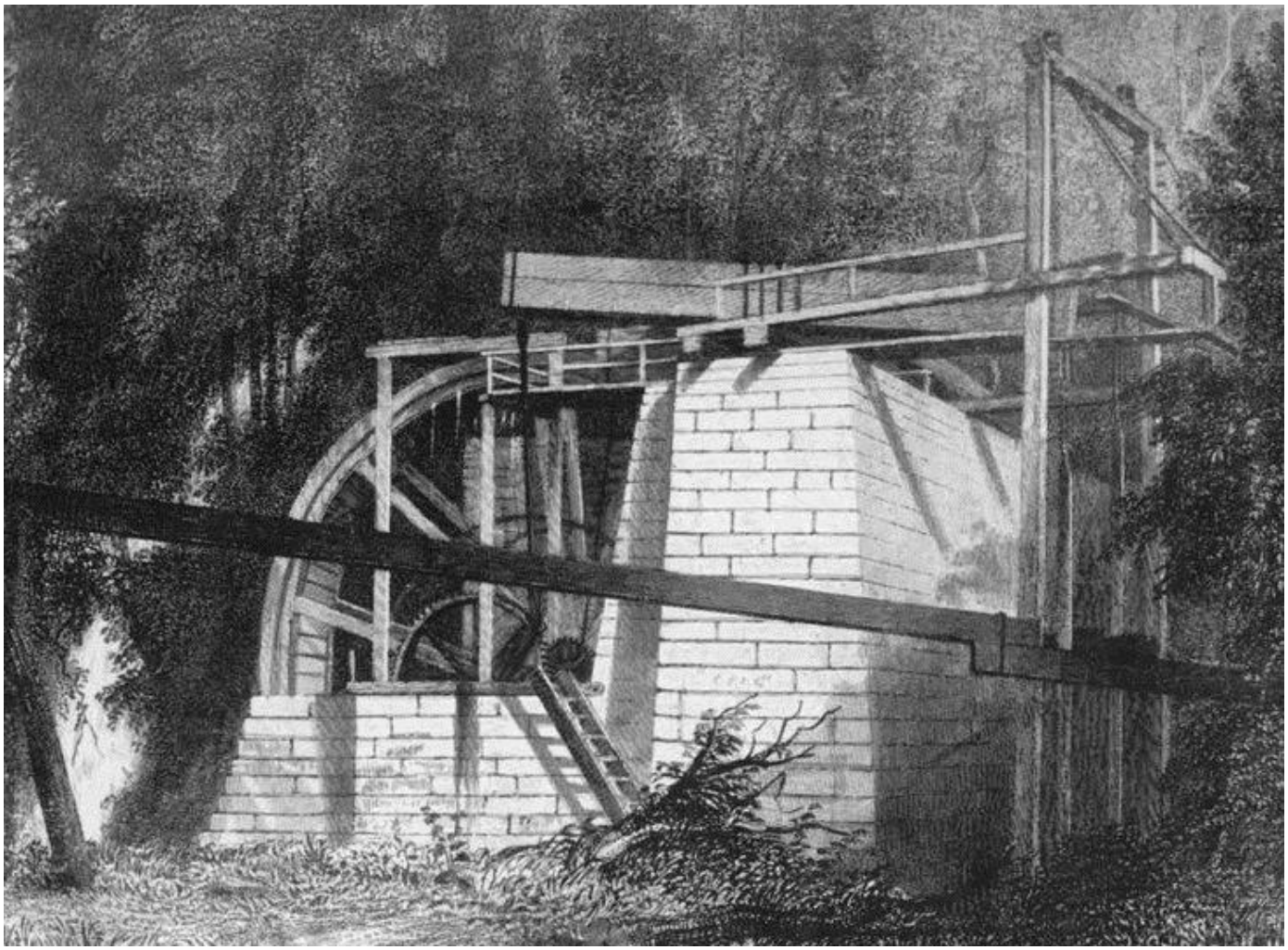
(an electronic copy of the magazine may help clarify the images above showing a plan of the mine area and a section through the ore veins and water passages. Refer magazine 163 on our website at www.lakegoldsmithsteamrally.org.au /magazine)

called, was started in 1695 commencing on the Amber river downstream of Milltown about half a mile upstream from Wooley Bridge, initially to serve the Cockwell mines near Milltown. The Sough extended North & West to connect the Eastern extremity of the Gregory vein, which started a hundred metres above

the Miners Inn in Milltown, and eventually it reached a point just North of Ravensnest Farm house, where the Sough was now very near the top of the Limestone which contained the veins of lead ore. From the this shaft a new sough headed North to connect the workings on the North end of the Overton Vein, near Overton Hall, to the Sough in 1738. This allowed work to continue to a lower level. Along the way mines on various other small veins were connected to the sough. Shafts of varying depths were dotted along the sough. Some were climbing shafts for the miners, others were gear shafts where ore and spoil were removed. The Gear shafts generally had some sort of hand powered winch, and larger workings were fitted with Horse powered Whim's or Gins (right) for ore removal, and to supply timber and other gear used in the mine.



One shaft near the Cockwell vein was believed to be fitted with a Water Wheel powered Beam operated Pump, but no detail has turned up yet. A typical over shot water wheel operating a pump via a beam is shown below. The rod driving the pump can be seen on the right, and the beam is across the top, being driven from the wheel shaft by a connecting rod.



Once it was in place the sough reduced the cost of hand or horse powered pumping to the surface. The practical depth of gravity drains and pumping was soon reached.

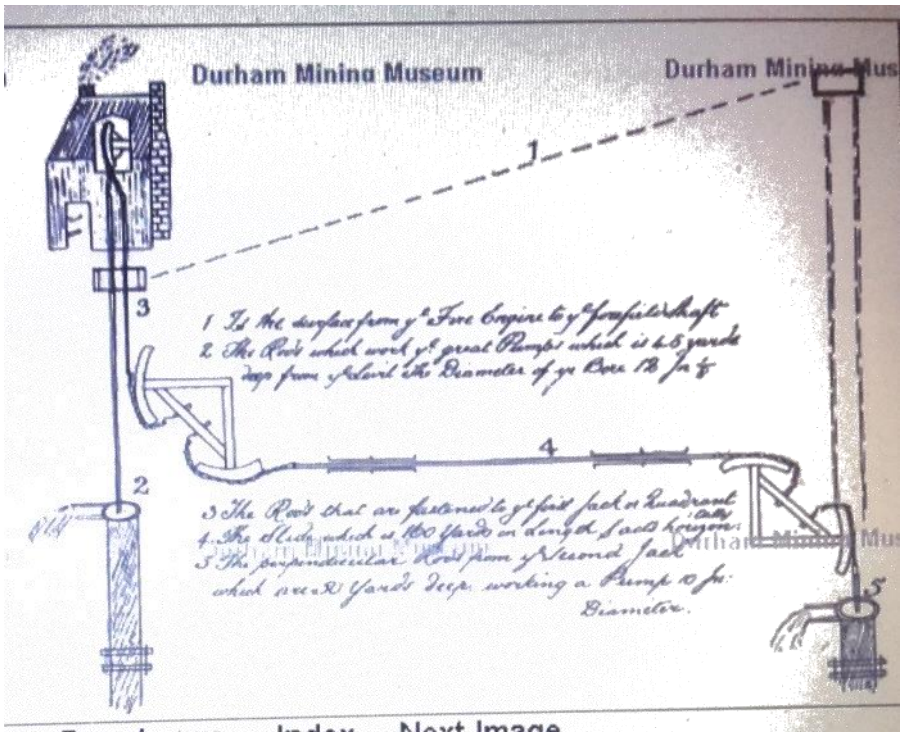
The Sough, or level as they were referred to in other areas, became a limit for natural drainage below which pumping could be used to gain access to lower sections of the ore veins. In some places more water was encountered at greater depths which made the problem worse. In order to find and exploit any new veins the mine had to be deepened into the limestone.

In order to keep the mine open, the Gregory Mine lease changed hands and a new partnership was set up in the late 1750's to finance the project. There were 44 shares in the partnerships, 12 were owned by Robert Banks Hodgkinsen and Joseph Banks (in 1767, a year before he left for the Pacific trip). William and John Milnes (related via the Hodgkinsen line) were part involved via a lead smelting Company which had 11 shares. Much of the recorded information derives from the excellent records made by John Milnes who was Banks agent at Overton and keeper of the mine reckoning books. The Milnes & Hodgkinsen families had been involved in the lead industry for generations and remained so after the Gregory Mine closed. They had mines close by at West Edge across the Amber River, and lived in Ashover at the "Butts House". (above right) There were various other small shareholders.

The Peak District Mines Historical Society have done extensive research to piece together the mining history of the area, and in particular one Stuart Band published a series of articles in the mid 1970's without which this feature could not have been started.

New shafts were dug near Ravensnest Farm (right) and the mine became profitable until the late 1760's when water

again became a limiting factor, and the decision to acquire a "Fire Engine" powered pump was made.



The engine chosen was a second hand engine and pump which had been installed at the Mill Close Mine at nearby Darley Dale in1748. It was decommissioned in 1760's when it could no longer cope with the increased water and the mine was temporarily closed. (Much later it was reopened and became one of the UK's largest lead mines.)

The Installation at the Mill Close drew water from 2 shafts which were about 120 yards apart as depicted in the schematic arrangement above in the Durham Mining Museum. The remote pump on the right was connected via a series of horizontal slide rods laid (presumably) along a sough between the shafts connected to vertical rods by pivoting quadrants. The water was pumped up to the sough which transferred it to the main water shaft where it was pick up again and delivered to another sough.

Francis Thompson was chosen to move and erect the engine at the Gregory mine. Thompson's family was already involved at the Gregory mine and his brother would become involved with running the engine.

The engine was sited on a new shaft to the West of the Cottages. This shaft would become the water shaft to pump all the water from the Gregory and Overton mines to the existing sough.

The engine installation was completed before the shaft was completed, so slide rods were used to pump water from the existing water shaft North of the cottages at Ravensnest Farm to the sough which drained to the Amber river.

The engine was a Newcomen open top cylinder atmospheric engine with a 42.5" Ø cylinder and a stroke of 5'. The engine normally ran at 6 or 7 strokes per minute and consumed 26 Tons of coal per week. The water was pumped by two 12"Ø pumps set about 30 yards apart vertically The shaft was 120 yards deep and the pump lifted water 64 yards to the sough in two stages.

Coal for the engine was carried in by trains of packhorses from as far away as

Oakerthorpe about 7 miles South of the mine. Coal also came in from collieries at Ainmoor, Grassmoor, Tibshelf and Swanwick to the North and East of Ashover . Each horse carried around 300 pounds of coal in its panniers. To achieve this it would need about 195 horse loads, which may well have the been the origin of the track up the last hill being called Bridle Road. The coal was about 9/6d per ton delivered.

Atmospheric engines used very low pressure (2 to 3 psi) steam to evacuate air from the power cylinder. To achieve their power they then sprayed water into the cylinder cavity which collapsed the steam back to water creating a vacuum . The pressure of the atmosphere (about 14.7PSI) then forced the piston down the cylinder. If they had been able to achieve a perfect vacuum the total force on the piston would have been about 9 tons pulling the end of the beam down and lifting the pump piston and rods to deliver a charge of mine water to the sough.

Then as now, a lot of water was mineralised, particularly the water being pumped up from the mines. The engines need water for the boiler to generate steam, and they also needed a stream of water to spray into the cylinder to chill and collapse the steam back to water to create the required vacuum. The spray, on large engines could use 6 gallons of water per shot, so at say 10 strokes per minute they would need 60 gallons per minute.

In the main rainwater was collected and pumped to a header tank over the engine to provide a constant feed pressure to the spray water.

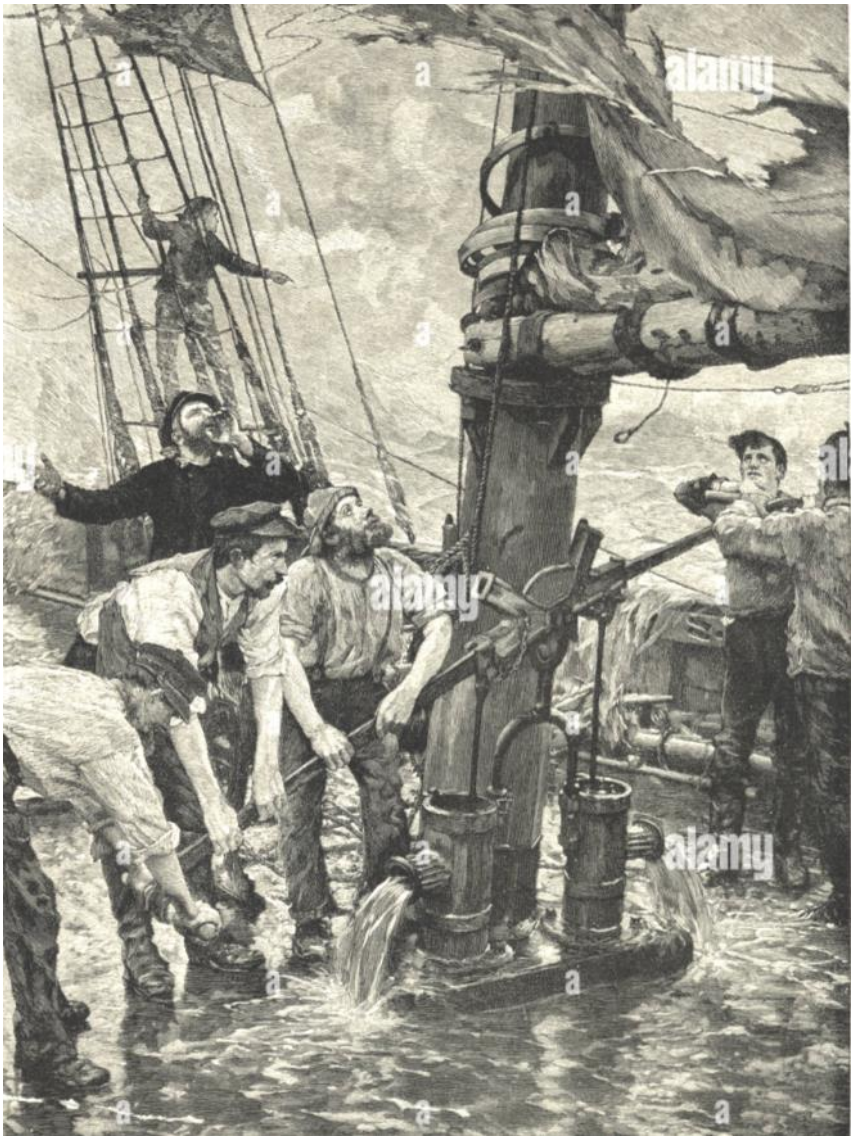
We will get to the engine details in a later issue, but an overview may help as the pump and engine cycle rate is 1 to1. This engine was about 45HP and it could run at over 15 strokes per minute, so although it was not the largest it still needed a huge supple of clean water to minimise deposits in the boiler and cylinder.

There was no chemical treatment available, just Mr Muscle with hammers and chisels. Fortunately the boilers were more like large kettles which would certainly have made cleaning a lot easier.

Water also has air dissolved in it which is released or forced out of solution before the water boils. This air weakens the vacuum , so it must be removed with the used spray water and steam condensate by a pump.

The boiler and spray supply water was referred to as house water, and used water was stored in a hotwell for use by the boiler. Cold spray water was stored in a cistern high on the engine frame to provide a constant feed pressure.

"Fresh" water was available from a spring uphill of the engine.

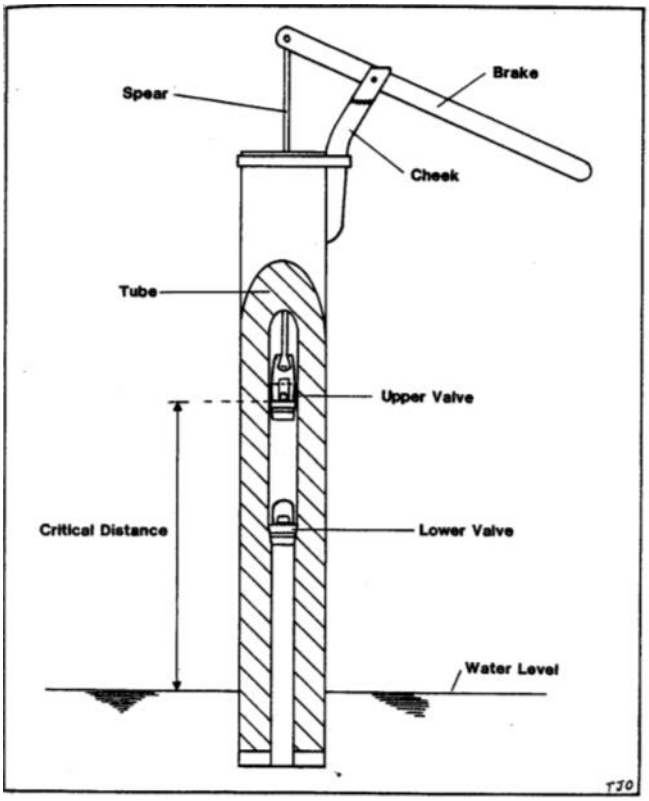


Pumps were a familiar sight at the mines long before the arrival of the first steam engine. So far specific detail on the pumps used at the Gregory and Overton mines has not come to light..

Some water was lifted in buckets or barrels by the horse powered Gins, or whims which were used on various shafts. Hand pumps seem to have been used frequently, for delivering water to soughs, and for lifting water between levels in the mine workings.

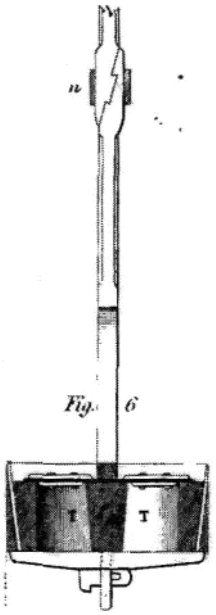
Ships and mines had similar circumstances with flooding water in that the working parts of the pump, such as the piston (or bucket as it was referred to then) and the check valves (or "clacks") could be located a great depth below the surface of flood water, particularly if the pump or engine had been stopped for some time. If repairs had to be made, they had to be made under water, which meant that all components had to be able to be withdrawn by an operator above the water. A winch or man powered whim was located at the surface over the shaft opening which could be used to remove the rod and piston from the extended pump body

which also functioned as the delivery pipe, if the rod had broken in the pump, the piston was fitted with an iron "hoop" which could he fished out using a rope and hook and brought.



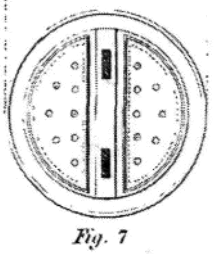
The general arrangement of a pump of the times can be seen on the left. The indicated Critical Distance indicates the maximum distance that the piston can rise above the water level without losing suction, which is dependent on the maximum vacuum that the pump can raise. The distance between the upper and lower valve is the stroke of the pump. In this area a smooth bore is required for the leather cup washer on the piston to form an effective seal while it moves.

The lower valve body can be seen sitting in its tapered seat and the hoop can be seen above it. If the main pump bore is, say 12"Ø, the bore of the suction bore below it may be say 11"Ø. The piston has a similar valve arrangement to the clack and the diameter above the piston may be 12.5 or 13"Ø so that the piston may be lowered down the vertical discharge pipe.



The pump piston or bucket shown on the right has been taken from John Farey's 1820's book. The piston was secured to the vertical pump rods by a bolt to allow easy removal from the keyed joint. The hoop is shown from the side to show the water passages and leather hinges through the piston. A tapered leather cup seals against the pump cylinder bore. These pistons had to be changed fairly frequently due to wear and loss of seal.

Early pumps had timber bodies, sometimes as a single tree trunk bored through, others had iron hoops holding a set of barrel like staves in place as can be seen on the manual ships pump on the previous page..



The lower suction valve or clack, as mentioned above was almost identical to the piston but sat in a non locking tapered seat using the leather cup washer as a gasket seal . It was secured by gravity and water pressure as the piston descended, forcing the tapered body into its seat. The body was fitted with an iron hoop

similar to the piston, but without the rod connection so that it could be "fished out" with the rope, hook and a lot of patience. With delivery pipes 150' long, patience would, I imagine, be an essential.

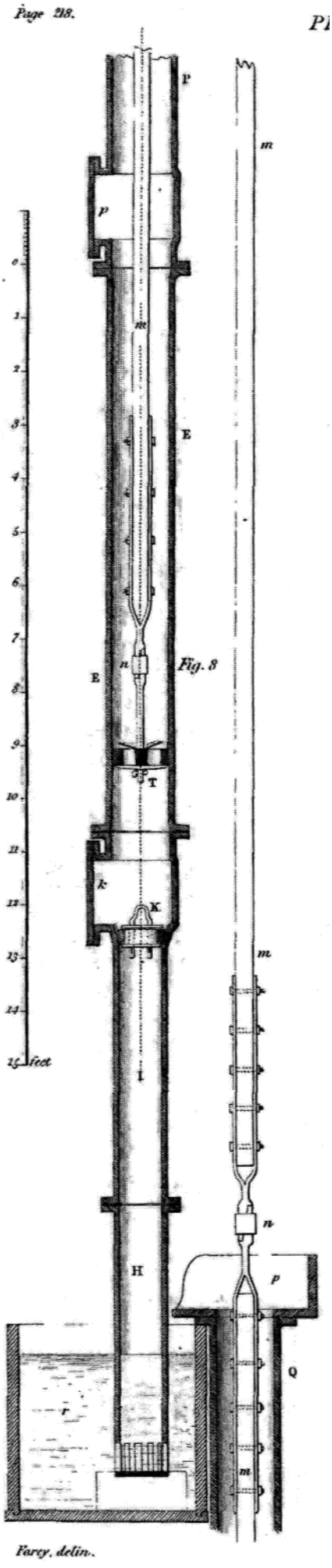
As mentioned before I have not seen any pump drawings specifically relating to the Gregory mine. However John Farey, mentioned on the previous page, has provided some detailed drawings and arrangements used in deep mines in the late 1700's. When these are compared with list s of material used in the Gregory mines for their pumps it seems safe assume that common designs were in use until new materials and new pump designs became available in the 1800's. Displacement plunger pumps had been designed and patented in the late 1600's, but they did not lend themselves to locations where an underwater repair, or the water that they were pumping was subject to the inclusion of grit that could damage or block the pump valves.

The "fire Engine" installed in 1768 was over a shaft 120yards deep, and raised water 64yards to the sough.

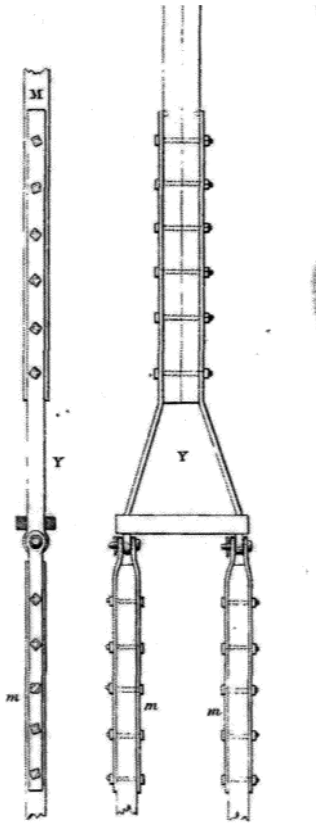
The seal gaskets and pressure limitations of the day required the water to be raised in two stages, which required two virtually identical pumps set at different levels and driven by their own rods which were attached to a "tree" attached to the arch head of the the engine beam.

The lower pump raised water to a holding cistern about 32 yards up, and the second pump picked up water from the cistern and discharged it to the sough. The drawing on the right, again from John Farey, shows the pump arrangement at the midlift cistern.

The pump suction pipe is submerged and fitted with a slotted strainer inside a grit wall chamber. The suction lift is quite high, as the pump at the bottom of the shaft (se page 20) sits in a deeper sump to allow water to rise up the stem during repairs. Regular maintenance, which usually means changing the "Clack" and or the piston can be done through the flanged access



openings on the side of the pump body. If the water rises above the pump the rods must be removed and the clack fished out and replaced by gravity. The pumps installed at the Gregory Mine seem to have had Cast Iron bodies and stand pipe. John Farey was a confident of Banks and was engaged by him to prepare extensive Geological and Agricultural survey maps of the area, He would have been aware of the mine workings as he also worked with Nuttall, the mine surveyor at Gregory and Overton.



The drawing on the right shows the arrangement of the tree to drive both pumps from the single upper connecting rod. Bolts or pins are used to connect the iron plates attached to the tree and the timber rods. Tapered iron plates are used to join the lengths of Fir or Ash timber rods which were in lengths up to 60'. These rods could be detached and raised up using a hand powered winch at the top of the shaft until they were clear of the pump riser pipework.

The timber connecting rods between the engine beam and the No 1 engine at Gregory mine ("A" on the earlier cross section) 12" by 7" at the top end and 9" by 5" at the tree which was above the addit (entrance) of the sough. Below the tree each pump was connected by a 5" by 4" lift rod. Both pumps were 12"Ø with a stroke of 5'. During construction of the new shaft the pumps were temporally installed in an earlier water shaft and driven by slide rods until the new water shaft was completed at which point the pumps were relocated and the slide rods were eliminated. When installed it ran at 6 or 7 strokes a minute which increased to about 12 strokes per minute in winter and about 9 in summer running for about 17 hours a day when water from 2 later pumps and the South end of the Overton mine (which was joined to the lower level at the junction of the veins).

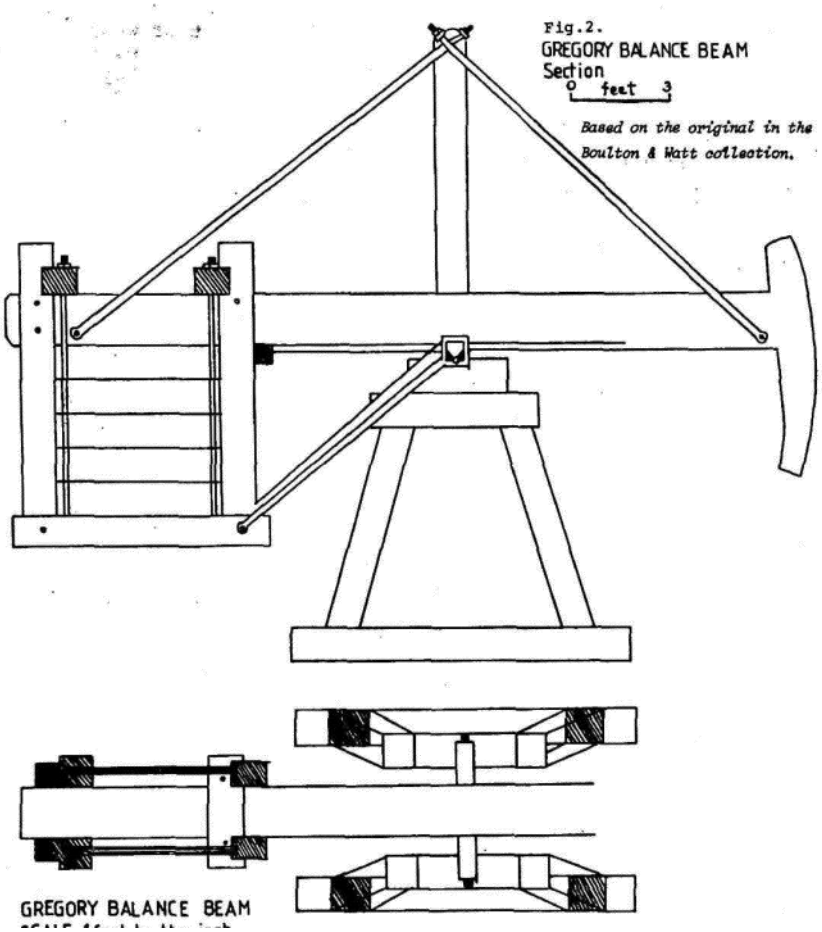
It also raised all of the water from the pumps in shaft B an C added at later dates (1782 & 1796) which transferred water to it via a launder 12" * 12" in the floor of the wagon way that ran between the main shafts"A" an "B". It appears to have worked well for its 25 years in service which ended in 1803. It is believed to have been transferred to the nearby West Edge mines which were apparently owned by the Milnes family.

The second engine erected at shaft "B" in 1782. It raised water 90yards from the bottom of the shaft which was over 300yards deep. Again it raised the water in 2 stages of about 45yards each using 13"Ø pumps with a 6' stroke.

In addition to the main mine water pumps this engine also raised "house" water to the engine from a "level" or tunnel 40yards below the engine using an 8"Ø pump with a 6' stroke. This water was used as feed water for the boiler and spray water for the condenser on the Boulton & Watts 3 valve atmospheric steam engine.. This water appears to have been sourced from a stream to the West of the mine workings. Water from this source was transferred to the "Old" engine on shaft "A" via a separate level which also supplied water to be used to wash ore on the surface, presumably raised the 156' via a horse gin.

The connecting rods for the house water pump were 1 1/4"Ø iron rods. The upper connecting rod for the main pumps were timber beams 12" * 8.5" at the top and 8.5" * 6" at the tree.

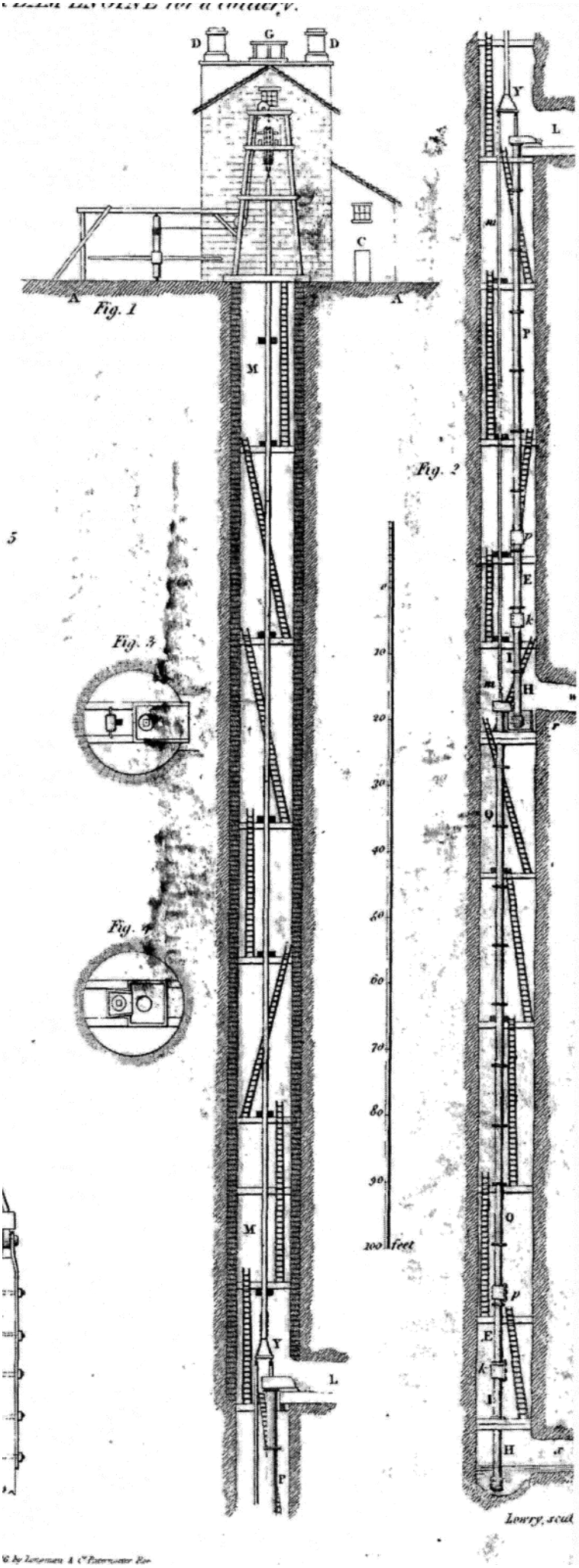
The great weight of the rods and pumps required 2 counterweight on canter lever beams between the engine beam and the tree. These structures were erected in large cavities dug on the side of the shaft.



In addition to the 3 pumps in the shaft this engine also operated a pair of 6"Ø pumps in a Bye shaft which was being dug as part of a project to use a steam powered gin, or "Whimsey" as it was referred too, in shaft "C" known then as the fore field shaft.

The pumps lifted lifted the water 67 yards in 2 stages (presumably to the surface?) with a stroke of 5'6" using 3" square timber rods.

When the fore field shaft was deep enough, which was near completion a level was dug to connect it to the "B" shaft. When the Whimsey engine was installed its main function was to raise spoil and ore to the surface, As there was not a lot of water in this shaft, the Whimsy was used to lift water to the new "level" from where it flowed East to the New Engine shaft where the pumps lifted it to the launder Level where it flowed East again to the No 1 engine which raised it to the Sough which let it flow further East to the Amber via the original sough.



This pair of 6” pumps was powered by 260yards of 4” square slide rods (which were later converted to roller rods to reduce the engine load. This new shaft took about 5 years to dig, it was in hard stone in places and at 912’ was the deepest shaft at the Gregory /Overton mine. The slide rods were removed when the new level was completed and the pumps were remove. During construction of the shaft for the whimsy engine the spoil was removed using 3 teams of 4 horses. I suspect that they may have lifted some water when the depth got beyond the rach of the 6 inch pumps. The 10HP Whimsy engine made a huge improvement

The drawing on the left, from John Farey’s book, shows a typical arrangement of a mine water shaft. This example which uses multiple “trees” and pumps is in a coal pit, so the shaft wall is lined, in the upper levels at least.

Timber beams had to be set in the wall to support the service landings and to support the weight of the cast iron pumps which could weigh up to 8 Tons. The cast iron pipes were generally short at about 9’ long with flanges which allowed them to be bolted together. Joints were sealed with lead ring gaskets wrapped in puttied cloth.

The miners must have been very fit, having to decend 900’ in the morning on ladders was one thing,

but climbing back after 8 hours swinging a pick at the pitface would have been something else.

The engines needed a lot of water to stay in operation, particularly when their were 3 engines running led to problems during a drought in the late 1790's when it became necessary to dig a trench and tunnel to bring additional water to the mine via the stream to the West. This was initiated as a temporary measure but stayed in use until 1803 when the 3 engines at the Gregory mine when shut down and removed. The old & New pumping engines seem to have been transferred over the river to West Edge and the Whimsey engine was sold.

Water entering the systeem from the spring on the West and leaving via the Sough on the East had travelled over 4 kilometres . Overton Mine continued on until 1807 reworking veins above the level of the Sough.

Banks and Milnes were keen to continue using newer methods to locate ore veins, but it appears that the other partners had a more traditional outlook.

The Milnes family continued on in the lead business and Banks looked to introduce steam pumping to lower the ground fen water level at Revesby Abbey.

These atmospheric engines were massive in size, but they suited the materials, technology and skills available at the time.

Hopefully in future editions we can take a look at the details of the engines.

On the left above is a view of the ore washing area above the Gregory mine looking East over the Amber valley. On the right is the Miners Inn at Miilltown near the South Eastern extremity of the Gregory and Cockwell vein.

Joseph Banks became a partner in the Gregory Mine venture in 1767, before he the first engine was operational in the year that he left for his 3 year Pacific adventure at age 24 with James Cook. He was an early advocate of Steam. Ed.

MECHANICAL WONDERS

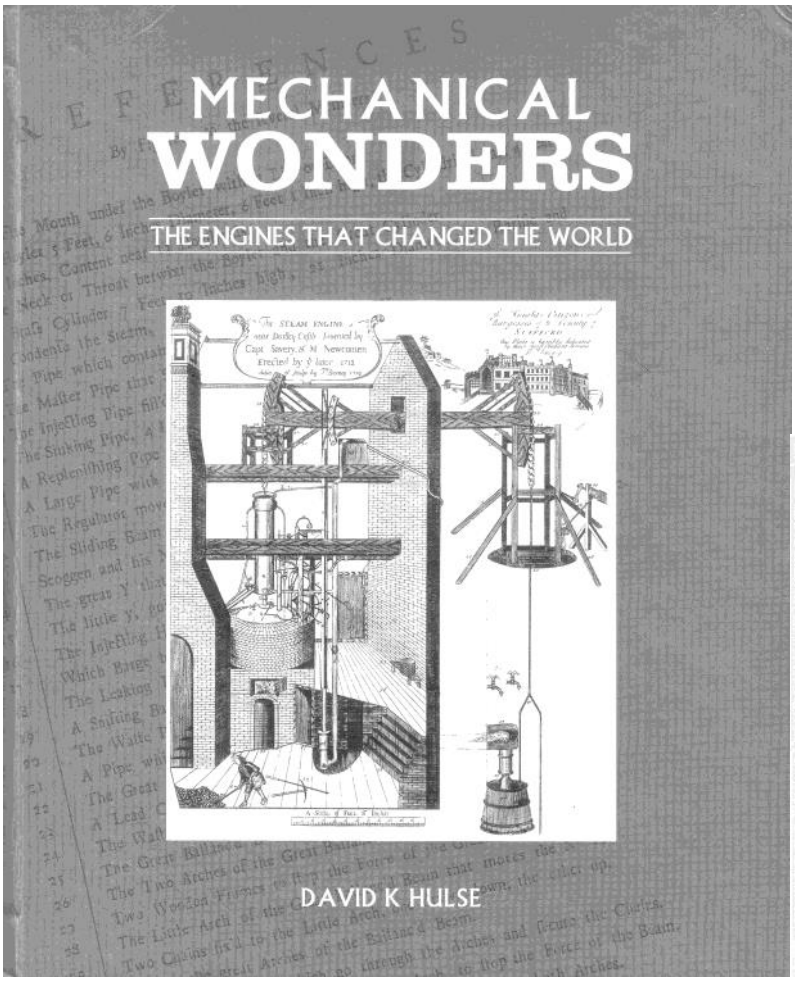
This book by David Hulsie is a must for anybody interested in the early development of the steam power that fired up the industrial revolution which had nearly exhausted what was available from using water wheels to power machinery.

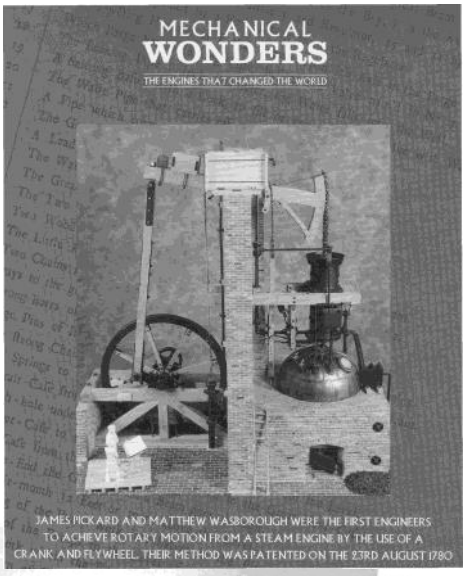
David has spent 40 years collecting information to recreate these engines in miniature (1/16 th scale) with as much authenticity as possible, including the manufacture of scale bricks, thousands of them.

These engines include those made by Francis Thompson who installed the engines at Gregory Mine and designed and patented the "Whimsey" rotary winding engine used on the 912' deep Forefield Shaft.

Davids Models include engines by Savory/Newcomen, Boulton & Watts, Francis Thompsen, Adam Heslop and Richard Trevithick who introduced high pressure steam engines. With more than 450 pages there is a lot of information including plans and pictures.

The copy that I have is no 123 of 210, so I hope that there a some left. Much of the information is available in an earlier series of paperbacks, but this book is a comprehensive classic. Look him up on the net, and again enjoy the read of this well researched book. Ed.





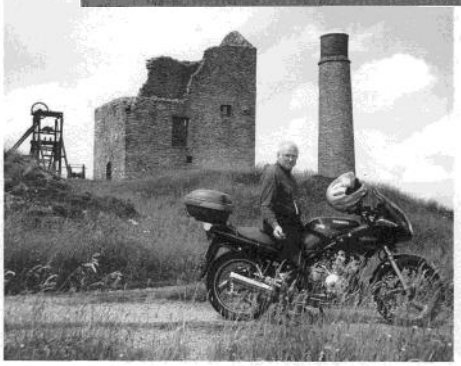


Figure 271: *The author on one of his many visits to Derbyshire researching the activities of Francis Thompson. Above are the remains of the building at the Magpie Mine which once housed the atmospheric engine designed by Joseph Thompson in 1824/5.*

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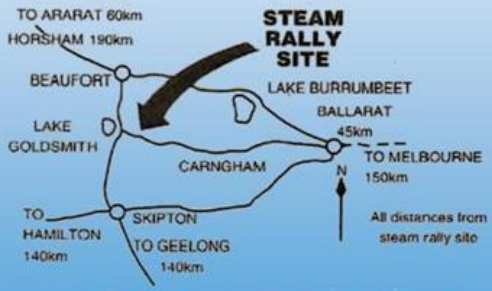

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