# THE TREVITHICK SOCIETY

## KOWETHAS TREVITHICK

NEWSLETTER 191 SPRING 2021

Unusual images of drilling equipment from the Holman archive.

Reg. Charity No. 1,159,639

# CHAIRMAN'S PIECE

A big thank you and well done to all those who managed to negotiate the complexities and technical vagaries of Zoom conferencing to join us for our recent virtual AGM, thus enabling us to fulfil our constitutional obligations for 2020, albeit rather belatedly.

Of course, like most things in life, it did not go completely according to plan. There were one or two unforeseen technical problems and the odd administrative error. However, on balance the business of the day went through fairly swiftly so I am going to call it a success. The link concluded with a sort of open forum providing a wonderful opportunity for members to interact with each other, as well as providing a certain amount of constructive feedback to Council for them to consider.

In respect of that feedback, I can report that Council have met and as well as (hopefully) ironing out one or two technical problems, we have sought to initiate a series of meetings via Zoom some of which will be lectures. However, where it is not possible to engage a lecturer it is intended to use the normal meeting slot to provide a sort of social forum for the membership. By the time you read this it is hoped that this programme will be underway and is expected to continue for the time being, as it is still not known when physical meetings can or will practically become part of the mix again.

Likewise, for this reason the 2021 AGM will again be scheduled as a Zoom meeting and will be held in its traditional slot on the third weekend in May. You should have received the agenda for that meeting by now and I hope as many of you as possible will choose to accept the invitation to attend the meeting.

**Brian Jones**

## EDITORIAL

The Trevithick Society Council have now met twice using Zoom. During the latest meeting Mark Newman switched on the subtitle facility which labelled the screen as each of us spoke. It was interesting to watch the words as they appeared, most of which accurately depicted what had been said. However, the program struggled with the word Trevithick. When talking about the 250th anniversary of Trevithick this became the '250th anniversary of Trivia' and on a second occasion became the '250th anniversary of Traumatic'. Pleasingly the Society also became the 'Terrific Society'. At one point in the meeting Kingsley was talking about Harveys of Hayle and mentioned Penpol Terrace which became 'Paul Terrorists'. The villagers of Paul have never been the same since the Spaniards ransacked the place in 1595!

**Copy date for next newsletter:**

**June 30th 2021**

TM

Established 1935

## NEW MEMBERS

The Society gives a very warm welcome to the following new members and looks forward to meeting them at any Society events:

| | |
|---|---|
| James Biscoe | Stithians |
| Roger Churm | Luton |
| John Goodyear | Troon |
| Nadav Pantanowitz | Israel |
| Terence Wootton | Solihull |

## DECEASED MEMBER

The Society is saddened to report the passing of a long standing member, Arthur Fairhurst from Maidenhead. Our condolences to his family.

## LETTER TO THE EDITOR

Dear Editor,

I started to write the following as a short note, my memory being prompted by the photos in the Redruth and Chasewater Railway publication. I have never seen or found any reference to this 1970s scheme, but perhaps there will still be Trevithick Society members who remember it, for good or ill!

The Society's new publication about the Redruth and Chasewater Railway has some fascinating photos of substantial vessels tied up at the Devoran quays, indicating a much greater depth and navigability than is evident today. In the late 1970s there was a proposal to dredge the accumulated muddy sediment from the creek and pump it up to Wheal Jane to process it for the extraction of the residual tin that it contains. Although this would have resulted in a deeper, navigable creek in place of the mud flats there was strong opposition from the creekside property owners who understandably did not relish years of noisy dredging on their doorsteps. The plan was to start at the head of the creek, for the shortest pumping distance, and to work seawards, but there was concern that the increased tidal volume would increase tidal velocities and erode the downstream sediments before the dredging got to them. I was working at the Hydraulics Research Station, Wallingford, researching the erodibility of estuary muds so was asked to test Restronguet Creek mud to see what velocities it would withstand. We had a long laboratory flume in which we could settle out a mud bed, allow it to consolidate and then subject it to increasing water flows. Usually, above some fairly low threshold velocity a mud bed would start to erode progressively, but the Restronguet Creek mud was not like that. It was quite thixotropic and simply vibrated as a mass under the flowing water until, at a relatively high velocity, the whole bed failed as chunks were plucked from it. We subsequently experienced one sediment with similar behaviour from the settling lagoon of a copper mine in the Peruvian Andes. Clearly the presence of metal residues somehow affects the physical strength of the sediment. In any event, as the objections rose the price of tin fell and the whole Restronguet Creek Tin Prospect project was abruptly cancelled, so I think little record of it remains.

**Michael Thorn**
mfcthorn@supanet.com

Dear Editor,

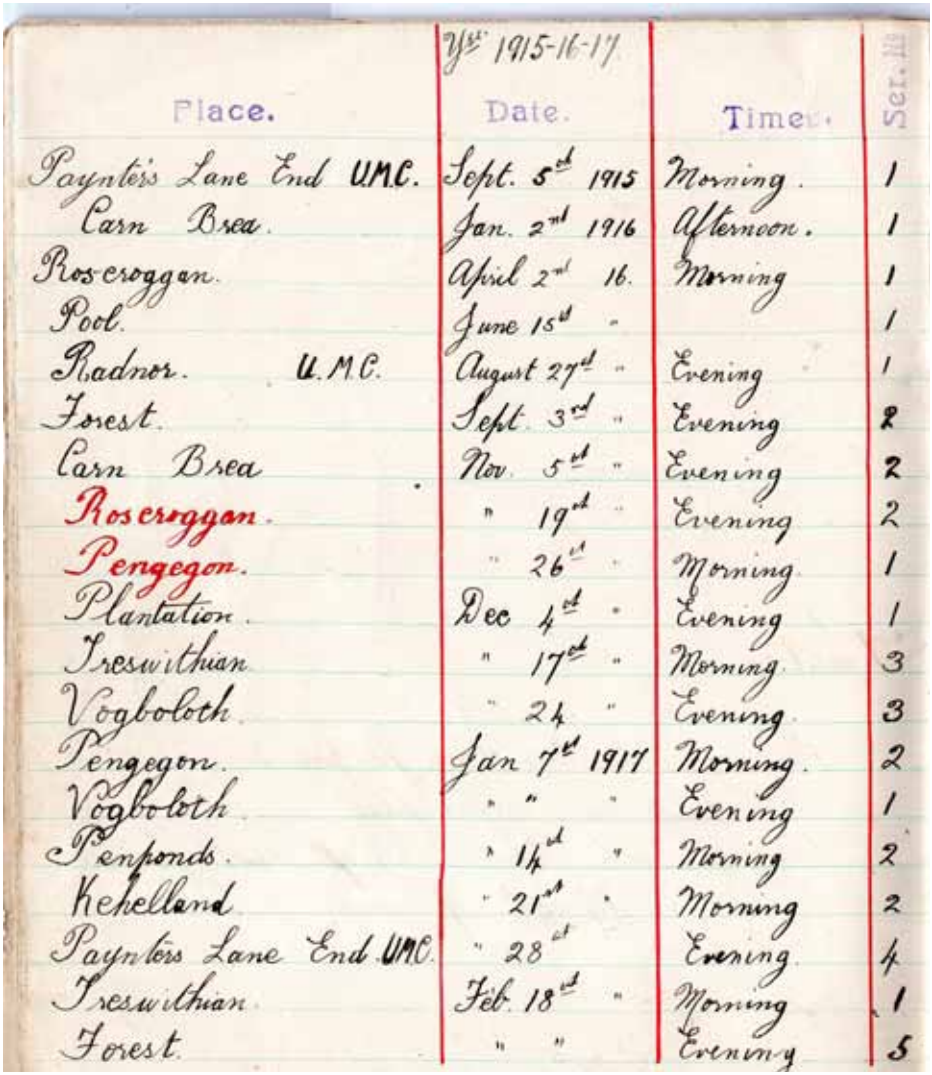
I have been wondering if the following might be of interest to anyone - there have been quite a few references to Trevithick, Mining, Camborne and Methodism in programmes recently.

My father, the Rev. R.F. Trevithick was born in Pool in 1896, and was brought up as a Methodist in the local chapel. He had elder brothers and a sister, all but one of whom emigrated to America. Following the early death of his parents he served an apprenticeship in Holmans, with his eldest brother, John (also an employee of Holmans), signing his Indentures as his guardian.

He had always wanted to preach, and started to train as a Methodist local preacher in 1915 taking services in the many chapels that there were then. At the end of his engineering apprenticeship he became a candidate for the ministry, and following ordination served in circuits across England and Wales including Fore Street Methodist chapel in Redruth (the 'Flowerpot Chapel') and the Mint Chapel in Exeter, where he died in 1949. Most Ministers were in a circuit for just three years in those days, and we had a happy time in Redruth and at the Manse in Albany Road.

Here is a copy of his Indenture paper and the first pages from his preaching appointment record book. Many of these no longer exist of course - including Fore Street Redruth and the Mint in Exeter.

**Kenneth F. Trevithick**



| Place. | Date. | Time. | Ser. No. |
|---|---|---|---|
| | Yr. 1915-16-17 | | |
| Paynter's Lane End UMC. | Sept. 5th 1915 | Morning. | 1 |
| Carn Brea. | Jan. 2nd 1916 | Afternoon. | 1 |
| Roscroggan. | April 2nd 16. | Morning | 1 |
| Pool. | June 15th " | | 1 |
| Radnor. U.M.C. | August 27th " | Evening | 1 |
| Forest. | Sept. 3rd " | Evening | 2 |
| Carn Brea | Nov. 5th " | Evening | 2 |
| Roscroggan. | " 19th " | Evening | 2 |
| Pengegon. | " 26th " | Morning | 1 |
| Plantation. | Dec 4th " | Evening | 1 |
| Treswithian | " 17th " | Morning | 3 |
| Vogboloth. | " 24 " | Evening | 3 |
| Pengegon. | Jan 7th 1917 | Morning. | 2 |
| Vogboloth | " " " | Evening | 1 |
| Penponds. | " 14th " | Morning | 2 |
| Kehelland | " 21st " | Morning | 2 |
| Paynters Lane End UMC. | " 28th | Evening | 4 |
| Treswithian | Feb. 18th " | Morning | 1 |
| Forest. | " " | Evening | 5 |

TWO SHILLINGS & SIX PENCE

**This Indenture** made the 11th day of February One thousand nine hundred and thirteen BETWEEN Richard Francis Trevithick of Pool in the County of Cornwall of the same place under the Guardianship of his brother John Trevithick hereinafter called "the Apprentice") of the first part, the said John Trevithick, his brother of the second part, and HOLMAN BROS., LIMITED, of Camborne, in the County of Cornwall, Engineers and Ironfounders (hereinafter called "the Masters") of the third part

**Witnesseth** that the Apprentice of his own free will, by and with the consent and approbation of the said John Trevithick testified by his executing these presents, doth put and bind himself Apprentice to the Masters to learn the Art, Trade or Business of Engineering as carried on in their shops at Camborne, in the County of Cornwall, and with them after the manner of an Apprentice to serve for the term of Five years from the ~~Second~~ Seventh day of ~~September~~ August One thousand nine hundred and twelve and fully to be complete and ended; during which term the Apprentice his Masters faithfully shall serve, their secrets keep, and their lawful commands obey;—He shall do no damage to his Masters or to their Goods, nor suffer such to be done by others, and shall forthwith give notice to his Masters of the same when necessary;—He shall not waste the Goods of his Masters nor lend them unlawfully to any person, nor do any act whereby his Masters may sustain any loss;—And shall not without the consent of his Masters buy nor sell during his Apprenticeship, nor absent himself from his Masters' service unlawfully;—But in all things as a faithful Apprentice shall behave himself towards his Masters and others having authority over him during the said term. The Masters shall take and receive the Apprentice during the said term and by the best means in their power shall teach and instruct or cause to be taught and instructed the Apprentice in all the branches of their art, trade or business as aforesaid, and in all things incident or relating thereto and the Masters shall pay the Apprentice the following wages during the said term Four shillings per month for the first year, Six shillings per month for the second year, Eight shilling per month for the third year, Ten shilling per month for the fourth year and Fifteen shilling per month for the fifth and last year of the said term.

The wages above mentioned shall not be paid for any period of time that the said Apprentice shall be absent from the business of his said Masters either from illness, accident or holiday. If absent without permission except in case of illness, or if he fails to comply with the rules of the works, the Masters reserve the right of instant dismissal. All lost time to be made up at the end of the term at the rate of Fifteen shillings per month, excepting time lost through sickness or authorised holidays.

The said Masters further agree that, in consideration of an arrangement made between them and the Committee of the School of Metalliferous Mining (Cornwall), Camborne, the said Apprentice shall have the privilege and be eligible to attend the Evening Classes at such School, during the said term of apprenticeship, up to and including the number of four, ENTIRELY FREE OF COST, provided always that the said privilege may be withdrawn or cancelled by the said Masters at any time during the said apprenticeship if in their opinion the said Apprentice is not giving sufficient attention to such classes to warrant the securing of this concession by the said Masters for their Apprentices.

**This Indenture** shall be delivered to the Apprentice on the completion of the term of Apprenticeship with a Certificate of such service entered thereon AND for the true performance of all and every of the said Covenants and Agreements the said parties bind themselves by these presents. **In Witness** whereof the said parties to these presents have hereunto set their Hands and Seals the day and year first above written.

**Signed**, Sealed and Delivered by the said Richard Francis Trevithick John Trevithick (Guardian) and Holman Bros Ltd.

in the presence of Mrs. Edwards Wh. Camborne

Richard Francis Trevithick

John Trevithick

FOR HOLMAN BROS. LTD

J. G. Holman

Director

## DONATIONS

Two members have very kindly made donations towards the running of the Society. We have received very generous donations from John Kennedy (specifically for the Puffing Devil) and from Mrs Jenny Nicholls together with a very interesting letter we thought we would share with you.

Jenny had been a past member of the Water Wheel Society and her father, Alexander Lloyd George, born and brought up in Truro, had been an early member of the Cornish Engine Preservation Society (which became the Trevithick Society). So, her family has had a very long connection with the Society.

Mr George was a long-time member of the Royal Institute of Cornwall, the Old Cornwall Society, Cornwall Archaeological Society, Carn Brea Mining Society, World Ship Society and Retired Civil Servants Association. He was a chartered engineer and member of the Institute of Marine Engineers and trained at Falmouth Docks. Pre-war he was on the 'Ahel King' taking goods around the world including both sides of Russia, many tropical islands, China, Japan and the U.S.A. He kept diaries and many photos of his adventures. He always said he would die before his time as he went round the world more in one direction than the other, including as a 'Cape Horner'. During the war he was shift engineer at Falmouth Docks Power Station. One day whilst going to work, as he got to the bottom of Penryn he was stopped by police. The road was end to end with military vehicles - it was the beginning of 'D Day'. On learning of his job he had a police escort overtaking them to the docks.

In the 1950s he joined Trinity House, as an engineer on the 'Satalite' at Penzance and stations around England. This gave him a chance to explore many aspects of Industrial Archaeology outside the Duchy. When Trinity House had three new tenders built on the Isle of Wight, about 1960, he had to guarantee to stay with the first one for six years afterwards. Called T.H.V. Mermaid, she was stationed at Great Yarmouth. Later he met Mike Tarrant, her captain, when he was again stationed there. They became firm friends with similar interests. Mike retired to Penzance and also became a member of the Trevithick Society and took on the role of Membership Secretary. Mr George retired as chief engineer, after 22 years at sea.

Mr Kenwyn George (son) became a civil engineer, who was the youngest person to design and oversee the building of a sewage works (for Luton). He did many interesting jobs including developing a clean water system for Doha, where working with people with three religions made Fridays, Saturdays and Sundays awkwardly challenging. His last job was a Waste Water Management Officer for Alaska, dealing with past, present and future mine wastes. His main concern was with three potential gold mines and their potential impact on valuable salmon waters as well as on timber and pulp works.

Jenny Nicholls was farming when she was younger but wanted to be an engineer. She was told "she would have to go to Russia to do that". How times have changed! Her donation was a 'thank you' to the Society's work in this field, much appreciated by an 'onlooker'!

**Sheila Saunders**

## EARLY ENGINES

The following link is to a draft paper written by John Kanefsky of Exeter University. It refers to steam cylinders produced by Coalbrookdale for Cornwall, before 1850, for such mines as Wheal Fortune and North Downs. Remarkably the paper also mentions that William Lemon "was also invoiced in 1742 for a small cylinder etc. 'for his Dwelling House' costing £12.17.3. This is surely too large to have been merely a model or toy, assuming it was bored work charged at 30/- and therefore weighed around 8½ cwt, and suggests it was a small working Newcomen engine of perhaps 10-12" cylinder designed to pump water for his house in Truro, *The Princes House*, which still exists."

**Chris Hodrien**
chodrien@blueyonder.co.uk

More unusual images of drilling equipment from the Holman archive.

https://www.earlyengines.org/early-engines-early-access-kanefsky-coalbrookdale-cornwall-and-cylinders-new-light-from-the-norris-files/

## PUBLICATIONS

Although sales of our books are restricted by lockdown as I write this in mid-February, we continue to receive orders from Members and those interested in our work. It is worthwhile then to draw your attention to a number of our books which are now down to small stocks and are unlikely to be reprinted. In this category are *Tin and Diamonds*; *Drawings of the Levant Whim*; *Hard Graft*; and *Great Wheal Vor* in both hard and soft cover editions. Don't miss out.

We have also had a steady number of requests for back issues of the Journal and in consequence almost a third of the series is now out of stock – Numbers 1, 6, 8, 9, 11, 12, 13, 14, 15, 17, 19, 20, 21, 27 and 29. Stocks of some others are very low. Remaining issues are available at £7 for Numbers 2 to 33 and £12 for Numbers 34 to date. Prices include postage. We can supply digital copies of individual articles in Journals from Number 33 to date.

A full Index is on our website; paper copies are available on request. Can I appeal to any Members decluttering or down sizing to give us first refusal on any sets or issues of the Journal.

**Graham Thorne**

## TIN MOULD QUERY

During the past year of lockdowns I have been transcribing various ledgers and documents that the St. Ives Museum hold, and have come across the details relating to a new 'Tin Mould' for Williams, Harvey & Co. in a Holman's Day Book for 22nd May 1908, (details on facing page). Could I ask our members if they know of any tin ingot from this particular mould on display around Cornwall?

By consulting *A History of Tin Mining and Smelting in Cornwall* by D.B.Barton, I find on pages 77 and 78 that there are illustrations of various smelters' tin ingots. Also page 245 reveals that due to a closure 'in 1905, three years later (1908) Williams Harvey decided to follow suit and erected a new works close by that of the Penpoll Company'. Would this be the purpose of this 1908 mould? Are tin ingots identifiable by the year of manufacture?

My interest is that perhaps this was the last tin ingot mould made for a Cornish Smelter? I personally find that this entry in the Day Book, is a valuable link with the art of the mould makers and foundry workers, who finalised the process of mining tin to produce a marketable identifiable tin ingot for worldwide sale. Thanking you in anticipation of any help you may come forward with.

**Brian Stevens**
St. Ives Museum Archivist
simuvols@gmail.com

## PUFFING DEVIL

There is nothing to report about the Puffing Devil replica as it is locked down like the rest of us. However, it was interesting to discover that engineering students at Cornwall College St Austell have made sizeable model for Edward Rowe, aka the Kernow King, for him to use in his informative show on Cornish Mining history. This show, a reworked version of his "Trevithick" play, was touring schools throughout Cornwall and no doubt greatly benefitted from having such a well made prop. It even puffs as it has a smoke machine inside.

The photograph opposite and associated article were posted online in January 2020.

**CNF**

# Holman Ledger 22nd May 1908

Page 609

Williams, Harvey & Co.

1 Cast Iron Tin Mould machined & faces scrapped where necessary & fitted together as per drawing sent, including part cost of Drawn Pattern.
Total Cost = £24 - 6s - 8d.

Details of above Tin Mould

| | | Cwt | qu | lbs |
|---|---|---|---|---|
| C.I. Mould Machined | | 2 | 2 | 25 |
| 2 C.I. Weights | | | 2 | 4 |
| Wrought Iron Work | | | | 26 |
| 9 G.M. Plugs | | | | 5½ |
| 2 - ⅜" Galvanised Crosses; | Cost 1/6 each Less 55% | | | |
| 8 - ⅜" Barrel Nipples; | Cost 5d each | | | |
| 4 - ⅜" Galvanised Round Elbows; | Cost 11d each Less 55% | | | |
| 4 - ⅜" Long screws & Nuts; | Cost 7d each Less 55% | | | |
| 1 foot of ⅜" Galvanised Pipe; | Cost 10d less 55% | | | |

Workmen's hours: -

| | |
|---|---|
| H. A. Miller | 58 |
| C. Crocker | 6½ |
| Walsey | 17 |
| H. Lean | 16 |
| T. Delbridge | 94½ |
| E. Williams | 16½ |
| Oliver | 22 |
| J. Trezora | 6 |
| Total | 236½ |

## LEVANT LOW PRESSURE STEAM MAIN

At the same time as the new high pressure steam main was installed, the following work was done to the low pressure pipe.

Due to lack of drainage, a cup full of standing water was accumulating approximately 12" past the pressure reduction valve. Every time the engine was started, this water would be picked up and hurtled down the pipe at 200m/sec. It then collided with the first obstruction in its way, in this case being the inside of the regulator. This outcome is known as 'water hammer' and will cause damage to whatever it hits. The pipe has now been fitted with a drain and condensate return float bowl together with a new low pressure gauge.

On dismantling, the low pressure safety valve was found to be damaged beyond repair. An incorrectly fitted drain had caused a large quantity of standing water to accumulate on the discharge side. In addition, the old valve had been fitted with the same size inlet and discharge pipe. The correct arrangement should be that the discharge is 50% larger capacity than the inlet. Therefore, a new pipe of the appropriate size has now been fitted.

**John Woodward**

## TREVITHICK 250

The year 2021 is the 250th anniversary of Richard Trevithick's birth. This was due to be well celebrated on Trevithick Day this year, but as a result of coronavirus, this event has been cancelled. Instead, the Trevithick Day Committee (TDC) are going to use social media to commemorate this anniversary with a series of videos reflecting Trevithick's achievements. The TDC and ourselves have also been involved with the design of a first day cover to be issued on 13th April (R.T.s birth date) see https://buckinghamcovers.com/. Coincidentally, the Royal Mail will be issuing a stamp depicting the Penydarren locomotive as a part of an unrelated series this summer.

There are a number of other covid-safe commemorations being planned by the TDC and others, which will help the cause and provide some compensation for the loss of Trevithick Day and other public events.

**CNF**

## MEMBERS' BENEFITS

Trevithick Society members are entitled to free entry (on production of the membership card) to the following attractions:

- King Edward Mine
- Cornish Engines at Pool (East Pool Mine and Michell's Whim)
- Levant
- Geevor Museum
- Poldark – free entry to site and reduced fee for underground mine tour

Also:

- 10% off book purchases at Tormark.
- 10% off purchases at KEM shop.

## FROM THE PAST

A Trevithick Society visit to Harveys at Hayle in 1973. Clearly visible are Jim Hodge and Jack Trounson.

# BEAM ENGINES IN NORTH AMERICA XIV: McCULLOCK GOLD MILL, NORTH CAROLINA

Just off State Road 1113 (Kivett Drive) near High Point in Guilford County, North Carolina, some 17 kilometres SW of the city of Greensboro (Fig. 1), stands a restored but much-modified engine house with a substantial 70-foot square stack. Now known as Castle McCulloch and used primarily as a wedding and events venue (Fig. 2), the building is one of just a handful of surviving engine houses in North America, an interesting account of which was published by Elizabeth Hines in 1995 (*Material Culture*, v. 27, p. 1-28). It is from this article and a 1977 report by the Historic American Engineering Record (HAER), updated with information graciously provided by the current owner, Richard Harris (who was responsible for the property's restoration in 1987-89; Fig. 3), that much of the following summary has been drawn.

The house, which was built in 1832, is likely to have been for an all-enclosed rotative engine and was erected to drive Chilean mills for processing gold ore mined from lodes in nearby granitic bodies in the Carolina slate belt (Fig. 4). However, rather than being erected by an individual mining company or consortium, the crusher was the entrepreneurial idea of South Carolina planter, Charles T. McCulloch, who envisaged a profitable central milling facility for processing the ore from the half dozen or so gold mines that were then active in SW Guilford County and which were increasingly exploiting resistant vein quartz rather than placer deposits as they deepened. To ensure a plentiful supply of building stone, water, labour and ore for his milling and retorting complex, McCulloch chose a 100-acre site with exposed granite bedrock on the Copper Branch tributary of Deep River near the settlement of Jamestown in the heart of the goldfield. Built under the supervision of Cornishman and Quaker, Elizier Kersey, whom McCulloch hired for the purpose in 1831, the mill was completed the following year, the tributary having been dammed to pond water for the engine and for processing the ore.

The engine house, which reflects this Cornish influence, is a dry-stone, ashlar structure built of rough-hewn blocks of granite quarried on-site. Early photographs show it to have been originally covered with a shingled, hip roof (Fig. 5). The house faces due south with the stack attached to its NW corner. Drawings made by HAER before its renovation show it to


Figure 1: Location of McCulloch Gold Mill between Greensboro and High Point in NW North Carolina.

Figure 2: McCulloch Gold Mill in its present form as an events and wedding venue known as Castle McCulloch (2017 - photo Mark Connar).

be slightly elongate (26½ ft by 19 ft inside) with two floors and walls of the same thickness (3 ft at base decreasing to 2¼ ft at a height of about 10 feet) on three sides (Fig. 6). The rear (north) wall flush with the stack had largely fallen, but had the same thickness profile. The front (south) wall contains an elaborate, gothic-arched doorway (Fig. 7), which would have served as the cylinder opening and originally bore the date 1832 in its keystone. It is rumoured that the stonework for the arch, which is believed to be the oldest surviving Gothic structure in the country, was reused from an earlier building (the date on the keystone having been added). But it is more likely to have been the work of Kersey, who was a stonemason, since the refractory greenstone used in the arch and keystone is the same as that used to line the boiler and chimney. The side walls were mirror images of each other (see Fig. 5), containing a centrally placed window in the upper chamber, and two openings level with the lower chamber floor – a doorway flush with the rear wall and an elongate opening just rear of centre for the drive shafts (or belts) operating the mills on either side (Fig. 7). Across the rear of the engine house stood a building that functioned both as the boiler house, the boiler being aligned east-west immediately behind the north wall, and as the furnace room for the retorting process used to retrieve the gold and the mercury employed to separate it. The square, all-stone stack attached to the building's NW corner (see Fig. 6) served both the boiler and furnace.

Nothing is known for certain of the engine the house was built to accommodate beyond that which can be discerned from the engine house itself, the size and construction of which strongly supports the generally held belief that it was a beam engine. If so, the engine,

Figure 3: Engine house and attached stack before and after its 1985-87 restoration (as Castle McCulloch) by the present owner Richard Harris (1985 and 1988; Preservation North Carolina, Tim Buchman Photographs, buch1043 and bh1211pnc003, NC State University Libraries' Digital Collections: Rare and Unique Materials).

flywheel(s) and gearing for the drive shafts were all enclosed within the house. The absence in the HAER drawings (Fig. 8) of any opening or recess in the side walls for a main girder (unless the upper chamber windows served this function) further suggests that the engine was not "house-built" like that preserved at the Levant Mine (see cover of The Journal of the Trevithick Society, no. 22, 1995, by Courtney Rowe), but rather was an entablature engine like the 30-inch double-acting A-frame engine that Henry Ford salvaged from the Vaucluse gold mine in neighbouring Virginia (Fig. 9), which also drove Chilean mills and now resides at the Western Museum of Mining and Industry in Colorado Springs (see Newsletter 127, p. 4-8).

It is possible that such an engine could have been obtained from a domestic source. The West Point Foundry on the Hudson River north of New York, for example, was producing such engines in the 1830s (see Newsletter 127, p. 7) and Nicholas J. Roosevelt's Soho Works on the Passaic River in New Jersey was quoting a price of $7450 for a 24-inch double-acting engine complete with beam, flywheel, gearing and boilers as early as 1804. However, the McCulloch engine is much more likely to have been imported from England, and most probably Cornwall, as was the case for the three entablature engines built by Harvey's of Hayle in 1835 for the Union gold mine in Virginia, and possibly also the Vaucluse engine, the working history of which can be traced back to at least 1844.

The McCulloch engine was erected to drive a pair of Chilean mills like the one preserved at North Carolina's

Figure 4: Photo of McCulloch Gold Mill from the SE taken by Randall Page for the Historic American Engineering Record in 1977 (Library of Congress; HAER NC,41-JAMTO.V,1-2; https://www.loc.gov/resource/hhh.nc0043.photos/?sp=2).

Gold Hill Mines Historic Park, some 60 kilometres to the SW (Fig. 10). These were arranged on either side of the engine house and were presumably driven by way of geared drive shafts or belts that passed through the central openings (now windows) on the ground floor. The milling stones (two pairs) were turned directly on the bedrock in circular beds 9 feet in diameter, both of which survive. On the west side of the engine house, two further mills with 9-foot diameter beds were subsequently added beyond the first, whilst on the east side a second, much larger mill was added with a bed diameter of 14 feet.

The vein quartz gold ore brought to the complex was first crushed by these mills, from which the lighter material was flushed, leaving the heavier gold-bearing material as residue. This was then washed down a channel to a pit cut into the bedrock where mercury was added to form a liquid amalgam that was collected in iron crucibles and heated in the furnace during the retorting process. This caused the mercury and gold to separate, whilst the lighter slag was skimmed off. The mercury vapour produced was condensed and recovered for reuse whilst the gold was poured into casts to make ingots. The slag pile produced by this process survives a short distance SE of the engine house.

A report of the operation is described in the October 21st 1836 issue of the *Carolina Beacon* and reads as follows "During the past week we [the editors] treated ourselves to a ride of some eleven or twelve miles south-west from our town, to view the operations of an extensive steam gold-mill, built by Mr. McCulloch some few years back, and which has been quite successfully and profitably employed upon the ore of neighboring mines. The engine is of a very large class – the ore is first crushed by large circular stones, propelled around in beds of solid rock, and after being literally ground up, undergoes the usual washing with quicksilver. Mr. McCulloch gives it as his opinion, that by this process of cleaning,

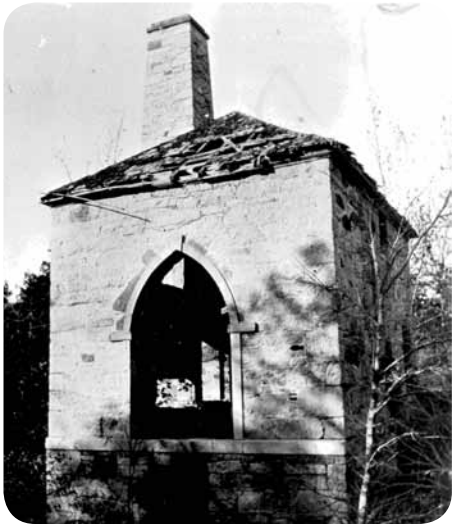


Figure 5: Archival photograph of McCulloch Gold Mill with its original roof, probably taken around 1900 (North Carolina Office of Archives and History).

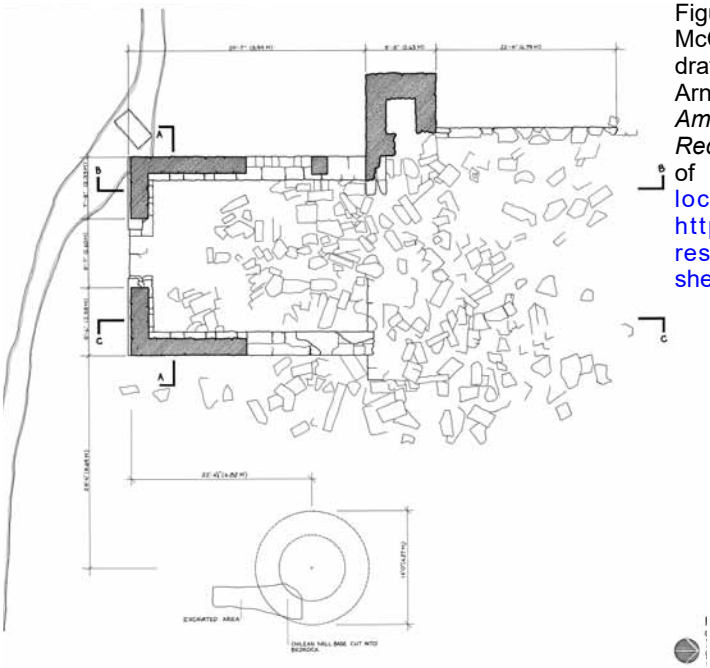


Figure 6: Plan of McCulloch Gold Mill drafted by Rebecca Arnold for the *Historic American Engineering Record* in 1977 (Library of Congress; www.loc.gov/item/nc0043; https://www.loc.gov/resource/hhh.nc0043.sheet/?sp=2).

but a small percentage of the pure metal is saved; and in order, if possible to obviate this, he intends introducing the process of smelting the ore in furnaces. The preparations at this establishment are very extensive, and it is only to be hoped that the mines will prove sufficiently rich to warrant its enterprising proprietor fully to complete his undertaking, and repay him for the vast trouble and expense he has undergone. Our visit was necessarily a short one, and we were not able, in the few hours we enjoyed the hospitality of the worthy proprietor, to make any particular examination of the ore or the mines worked".

There is no record of the mill's productivity but in Sallie W. Stockard's *The History of Guilford County, North Carolina* (1902), the mines are said to have been worked to depths of 50 to 350 feet exploiting quartz veins 1 to 12 feet in thickness, from which free milling gold ores were produced varying in value from $2.00 to $100.00 per ton (i.e., ca. 0.1 to 5 oz of gold per ton at mid-1830s prices). Given that Chilean mills are estimated to have been capable of processing one to two tons of ore per day, the plant's productivity with two mills in operation could have ranged from a little as 1½ oz to as much as 140 oz of gold per week, the latter being valued in today's market at about $275,000.

McCulloch operated the mill profitably from 1832 until 1848, processing ore from the nearby Lindsay, Deep River, Gardner Hill and North State (later McCulloch) mines. In 1848, however, he sold the property to John C. Gluyas, a Cornish mining engineer from the Gold Hill mining district, who, in turn, sold it to the Central Gold and Copper Company of Norfolk, Virginia, in 1855. But with the California gold rush of 1848-55, it is uncertain whether either Gluyas or the Central Company ever worked the mill, and it was likely abandoned when Central Gold and Copper sold the property to the North State Mining Company in 1860. In 1911, North State sold the property to William Ragsdale, whose widow later donated it to Preservation North Carolina,

Figure 7: South and west exterior elevations of McCulloch Gold Mill drafted by Patti Stammer for the *Historic American Engineering Record* in 1977 (Library of Congress; www.loc.gov/item/nc0043; https://www.loc.gov/resource/hhh.nc0043.sheet/?sp=3).

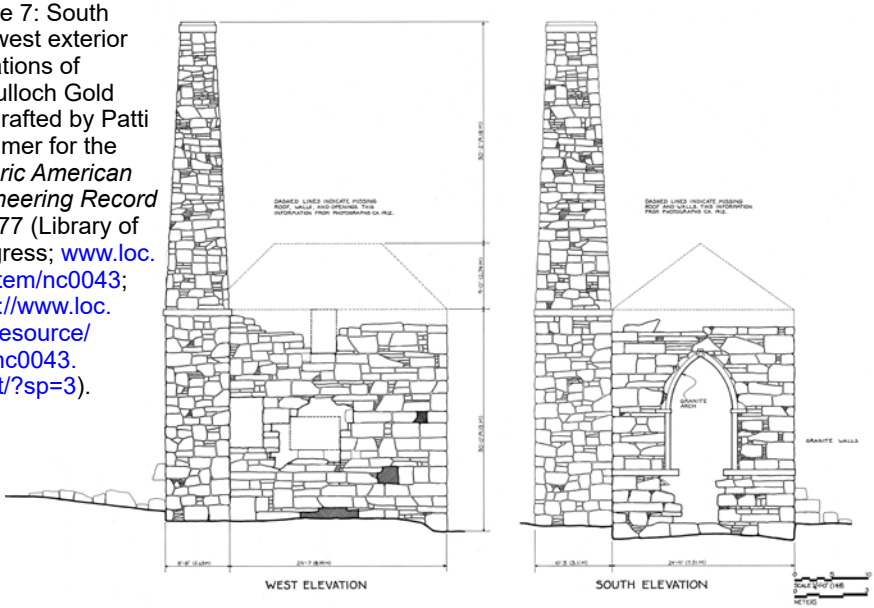
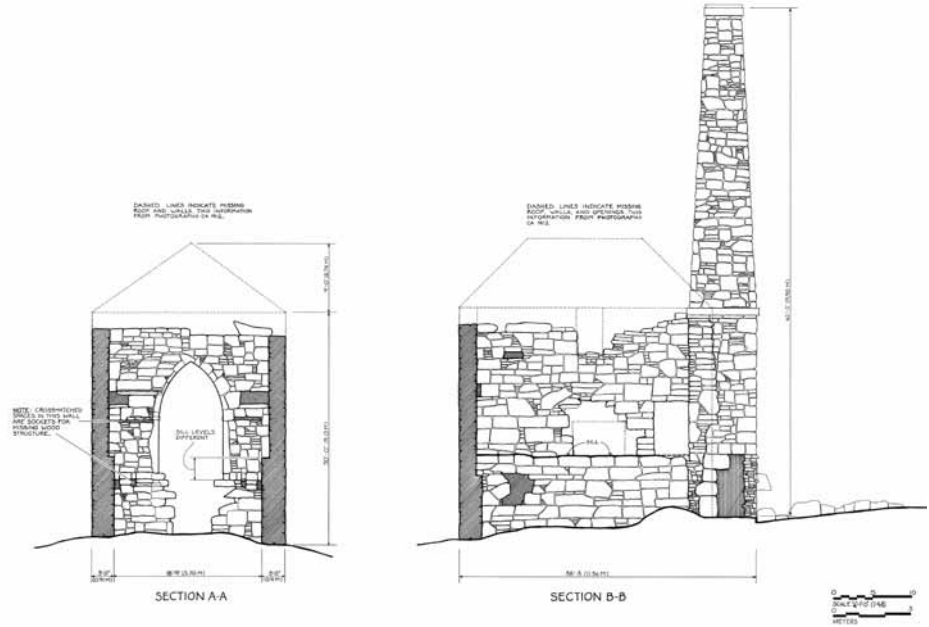



Figure 8: South and west interior elevations of McCulloch Gold Mill drafted by Patti Stammer for the *Historic American Engineering Record* in 1977 (Library of Congress; www.loc.gov/item/nc0043; https://www.loc.gov/resource/hhh.nc0043.sheet/?sp=5).



an organisation founded in 1939 to protect and promote buildings, landscapes and sites important to the heritage of the state. All surviving metalwork, however, was salvaged for scrap during the First World War. The site was listed on the National Register of Historic Places in 1979. The current owner, Richard Harris, acquired the property in 1987 and restored it over the next two years with the aid of local stone and photographs from the early 1900s. Replete with a wooden addition and embellished with a moat, stone pathways and steps, the site now boasts 7000 square feet of functional indoor space suitable for weddings and a variety of other social events for up to 350 people (Fig. 11).

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Figure 9: 30-inch, A-frame beam engine on-site at the Vaucluse gold mine in Orange County, Virginia, at the time of its salvage by the Henry Ford Museum in 1931 (photo courtesy of Terry Girouard, Western Museum of Mining and Industry, Colorado Springs).

Figure 10: Operational double-wheel Chilean mill preserved at the Gold Hill Mines Historic Park, near Salisbury, North Carolina (2016 - photo Charlie Connell).

Figure 11: Interior view of engine house and cylinder opening viewed through former rear wall from site of boiler house following conversion of the gold mill to an events venue (2017 - photo Bert Reed Photography).

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The Trevithick Society, a registered charity, is a recognised body of the study of industrial archaeology in Cornwall. Membership is open to all who are interested in the region's great industrial past, whether or not they live in Cornwall. The Society takes its name from one of Britain's foremost inventors and pioneers of the Industrial Revolution, Richard Trevithick, a Cornishman whose name is inseparable from the development of steam power. This newsletter is published quarterly and, together with the annual journal, is distributed free to members. Letters and contributions are always welcome and should be sent direct to the editor.

The views expressed in this newsletter are those of the authors and not necessarily those of the Trevithick Society.

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