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THE MECHANISATION OF THE GRASSINGTON MINES, YORKSHIRE

M.C. Gill

SYNOPSIS
The mechanisation of the Grassington Mines was first outlined in some detail by Dr. A. Raistrlck in 1955. This paper seeks to clarify and expand on the subject, particularly in relation to the extensive haulage system employed on the Moor. In addition. the writer contrasts the Grassington haulage system with similar layouts used in other areas.

Even a relatively cursory examination of the surface remains on Grassington Moor soon reveals a complex network of leats, dams and waterwheel pits. More detailed examination, both in the field and of aerial photographs, also reveals a number of linear features running from some of the wheel pits towards certain of the deep shafts on the eastern part of the Out Moor. What are we to make of this palimpsest, which represents the accumulation of continuous mining activity between, at least 1603 and 1881, plus various periods of tip removal in the present century, which have obliterated parts of the pattern?

The first attempt to make anything of this sequence of development was made by Dr. Raistrick, in his paper *The Mechanisation of the Grassington Moor Mines, Yorkshire,* which was read to members of the Newcomen Society in February 1955.

During my re-examination of Raistrick's pioneering paper, it became evident that a satisfactory chronology was missing. He had concentrated on describing the various features of the complex and had split them into three areas, viz., Priest Tam Watercourse, The Duke's High (D.H.W.C.) and Low Watercourses (D.L.W.C.) and the Yarnbury – Hebden Moor Mines. I intend to ignore the first of these, as it represents an eighteenth century development, associated with a number of scattered dressing floors. I will also ignore the physically unrelated system associated with the Hebden Moor Mining Company, and concentrate on what may be loosely termed the Cornish Period, 1818-1881. This includes the period of influence of four "big men": John Taylor, John Barratt, Stephen Eddy and his son James Ray Eddy.

As noted in my article on the Duke's Level, Taylor's arrival at Grassington in 1818, marked a new paradigm in mining operations. With his Agent, Captain John Barratt of St. Austell, he was able to formulate a dynamic approach towards the systematic exploitation of the veins. This involved the completion of the Duke's Level, the installation of waterwheel-powered pumps and the rationalisation of ore dressing procedures and methods.

Writing of his early works at Grassington, Taylor tells us that "I collected together some small streams of water into extensive reservoirs, erected a water-wheel of fifty feet in diameter, and in two or three years the mines were actively working, and some of them were profitable ..". Thus, we can date the construction of the Duke's Low Water Course, Blea Beck Dams, Sand Haw Reservoir and the Brake House Wheel to

c1820. There are indications that the construction of the three Blea Beck dams was not synchronous with that of the Deep Cut. This is a deep by-pass channel, which was probably required to take the great surges in flow to which the beck is prone.

Taylor's Shaft, near the junction of Burnt Ling, Ripley and Coalgrovebeck Veins, was sunk at this time and was also wound by the Brake House Wheel. It is possible that the addition of this winding facility may have been an after-thought, as the winding drum for Taylor's Shaft was in an annex to the main wheel house.

The two mines equipped with pumps were: Coalgrove Beck (Engine Shaft) and Old Moss, both of which had formerly been rich. 1u early as 1776, John Summers had written "there has been very little work wrought at Coalgrove Beck for 5 or 6 years last past, and the engines (horse whims?) are taken down, also the pumps taken out of the shaft, and the works covered with water and so must remain until a level be driven up or an engine erected ... at this time there is not one mine of consequence upon the moor but what is surrendered except Coalgrovehead, all things are quiet at present respecting the mineral matter" .

Following this revival of mines on the High Moor, Barratt appears to have concentrated his efforts on the Low Moor, at Yarnbury. Here, he was able to take the earliest advantage of the Duke's Level, which provided drainage to a nominal depth of 50 Fms from surface.

A series of shafts were either sunk or extended, and were connected, by railroads to new dressing mills which used the latest techniques. Barratt's, Tonkin's and Mason's Shafts were interconnected at the 20 Fathom horizon and, c1828, an incline was sunk to it and used for drawing ore. Both Mason's and the incline, were connected by railroad to the Low Grinding Mill, Yarnbury, which was completed by Barratt in 1828. In 1831, Taylor was able to write of Barratt's efforts; "One of the best instances of arrangement of this sort connected by well constructed railroads, is to be [45] seen at the Mines belonging to the Duke of Devonshire at Grassington, in Yorkshire, and which reflects much credit upon Captain Barratt, the resident agent, who has laid out the most systematic plan of ore dressing that I know of". Also, about the innovations in the dressing mill itself, where brake sieves had been introduced; "This has been admirably accomplished by Captain Barratt, at Grassington, where several are worked by one small water-wheel, and the effect is excellent, and the expense of the process is so much reduced, that very poor work is now returning with profit, that would not have paid upon the old plan".

We must also feel justified in dating the extension of the Duke's Watercourse from Coalgrove Beck to Yarnbury, to this period, i.e. the mid 1820s. Further support of this is given by the similarity in construction of the D.L.W.C. and its extension around the head of Hebden Gill to Yarnbury; both of them having a flagged base and sides, whilst the latter D.H.W.C. is lined with puddle clay. It is thus likely that the leat from Blea Beck to Yarnbury represents a continuous phase of construction, linked to a general plan of rationalisation.

The precise nature of the transition from Barratt's to Eddy's management remains unclear. Stephen Eddy, from Taylor's Mold Mines in Flintshire, was present at Grassington from 1832 and, by 1834, had moved his family there. Meanwhile, Captain Barratt was commuting to the Coniston Copper Mine where he took complete charge from 1833. It was Eddy and his son James Ray, who were responsible for the major phase of deeper mining on the High Moor and for the subsequent alterations to the Cupola smelting mill.

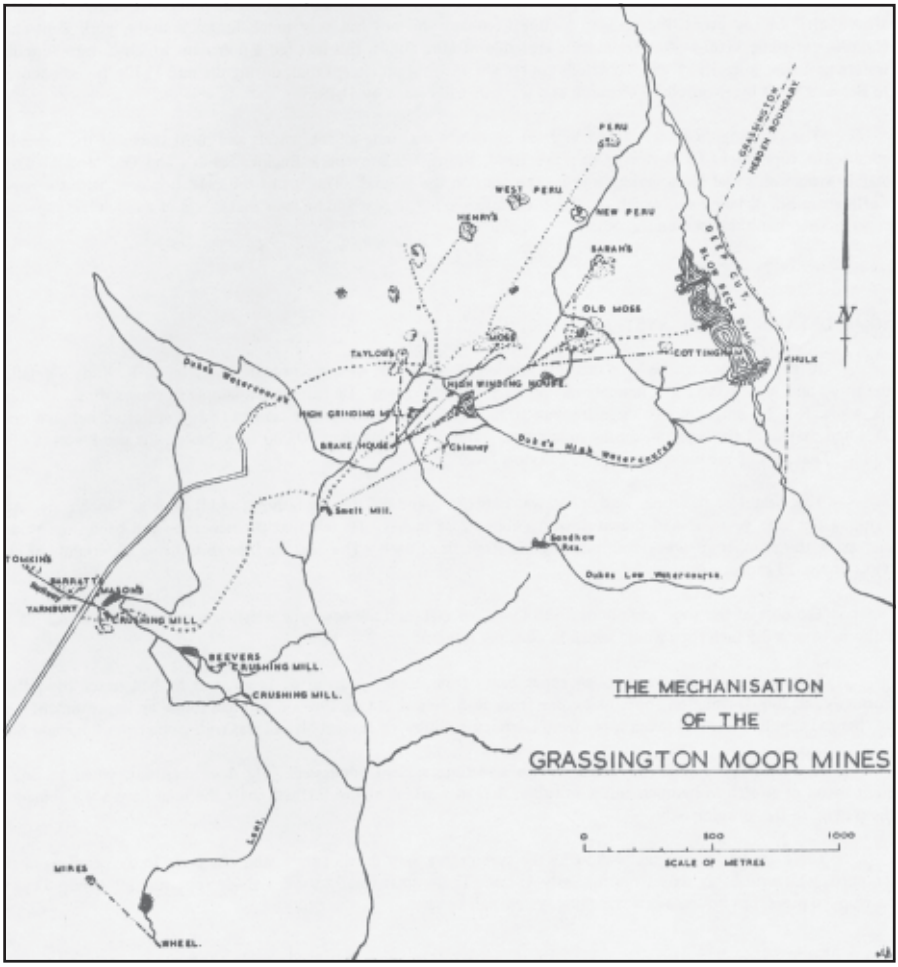
The date for construction of the High Grinding Mill at Coalgrove Beck, remains unclear. It is, however, most reasonably placed in the mid 1830s, for by this time, Pit (Old) Moss and Coalgrove Beck Mines were of increasing importance. Also, Low Ringleton and Richards Shaft, at the much older Bycliffe Mine, were sunk between 1835 and 1838 as precursors to the new phase of deep sinkings on the High Moor. Because the new mill was above the level of the original watercourse, a new one – the D.H.W.C. – was brought from the Blea Beck Dams to the first phase of the Coalgrove Beck Reservoir immediately to the north of Brunt Shaft. The tail water from both operations being either directed into Coalgrove Beck, for use at the smelt mill, or into the D.W.C. leading to Yarnbury.

One rope-track can be seen running from a turn-pulley just north of the Brake House, to Coalgrove Head (Moss) Shaft some 620 metres away. This agrees with J. R. Eddy's distances for the use of a hempen rope, at a time before he remembered. By reference to the low production figures for this mine between 1820 and 1833, we can safely date this short-lived operation to the boom years between the late 18308 and early 40s.

By the time of the first Ordnance Survey 1,10560 County Sheet, surveyed 1848-50, we are able to note the incorporation, into the D.H.W.C., of an older leat, taking dressing water from Blea Beck to the Old Moss floors. There are also a number of diversions to facilitate the Switching of flows. There was also a trial, Hulk Shaft, proceeding on the Middle Vein at the east boundary of the moor, against the Hebden Liberty, which had its own waterwheel. At Yarnbury, two other "crushing machines" have been added. One is at Beever's Mine and the other at the Eller Beck floors.

The 1850s opened with healthy lead prices, which were further encouraged by the Crimean War (1854-56) and saw a fmal upturn in production. Associated with this activity was a re-alignment of the ropes from the Brake House. The rope to Engine Shaft was moved across to Brunt's and the original pumping/winding arrangement to Old Moss abandoned in favour of a direct rope. Two other ropes ran alongside the new one to Old Moss for about 610 metres, to turn pulleys, from whence they went to Sarah's and Cottingham Shafts respectively.

On the 1st of June 1854 an agreement was signed, with the Hebden Moor Mining Company, which permitted the Duke to work a strip of ground 150 yards wide on the Hebden side of the boundary. The Duke undertook: to keep six men driving the 60 Fm. levels eastwards on Cavendish and Eddy's veins, six men in driving up the 72 Fm. (adit) level and to sink a new shaft to the 60 Fm. level. On the basis of this agreement and the 1850 O.S. sheet, the sinking of Sarah's Shaft, possibly named



after Stephen Eddy's wife – Sarah Noble Eddy, can be best dated to the early 1850s, and that of Cottingham's Shaft to later the same decade.

Also in 1854, Stephen Eddy wrote of a trial being conducted beneath a shale bed in the limestone. This was the deepening of Brunt's shaft to 21 Fms below adit, which appears to have been abandoned in 1856 after a short drive on the vein.

It is uncertain when Taylor's Shaft was removed from the system, except that it was pre-1863, for at that time J.R. Eddy gave evidence, which included the hoisting arrangements, to the Kinnaird Commission. From this, it is clear that the shafts being wound were: Sarah's, Old Moss and Cottingham.

In the late 1860s the mines were well into a crisis period and were suffering both from the steadily falling price of lead and the depletion of workable reserves. We again see a number of deeper trials and crosscuts being made. [46] The most important of these on the High Moor was the revival of Coalgrove Head Shaft, and its deepening to the 109 Fm. level. To achieve this, the High Winding House was built and equipped with a wheel about 45ft. diameter, by 6ft. wide; the tail water being returned into the leat feeding the High Grinding Mill. The Coalgrove Beck Reservoir appears to have been extended at this time to provide additional capacity. This wheel was used to both wind and pump the Coalgrove Head Shaft, until early 1879, when a report by Thomas Trevethan tells us that about 12 Fms of wooden pump rods remained to be drawn out.

The other major new shaft sunk in this period was Mires Shaft, which we can date from solicitors' letters relating to the Hebden Moor Mining Co. In 1869, this company became alarmed at the Duke's work to divert the Yarnbury tail water in Eller Beck away from its own dressing floors to a new wheel then in construction for pumping Mire Shaft. In any event, the Hebden Mining Company did not last very much longer and the work went ahead. Running for some 1100 metres around the east side of Mire Ridge, this leat fed a new dam which in turn supplied a waterwheel near Mire Hill Well. No details are known of this shaft except that, during the mid 1870s, it was connected to Beever's Shaft by an adit level crosscut, and working had ceased by 1879.

The Grassington mines closed in 1881 and since that date all the wheels and most traces of the ropes have gone. The rope-tracks to Taylors, Coalgrove Head, Brunt, Coalgrovebeck Engine, Sarah's and Old Moss Shafts are plainly visible on aerial photographs, and can be seen on the ground. This is not the case, however, with the rope to Cottingham Shaft, lengths of which Dr. Raistrick detected in the peat and he feels that it was of a much less substantial construction than that used on the others.

SOME DETAILS OF THE SYSTEM

In the evidence to the Kinnaird Commission March 1863, we are fortunate in having J.R. Eddy's details of the ropes and some sobering comments on the duty done by them! He exhibited a sample of rope with six strands of six wires, No.12 gauge; in two opposite wire strands had been inserted wire centres (Eddy preferred hempen ones). This had drawn, at Grassington, during nine years, certainly not less than 10,000 tons, beside the dead weight of the kibble. That part of the mine is exhausted (Taylors Shaft?).

The weight of the rope, when new, was between 6 and 6.5 lbs. per fathom, and it came as 3 inch rope. After working for nine years, it had drawn down to about 2.25 inches. He felt that the new rope had been improved by increasing the number of wires and reducing the strength of each. The new configuration being six strands of eight wires of No.13 gauge.

The cost of the rope was about 38 shillings per cwt. and the new type weighed between 7.25 and 7.5 lbs. per fathom. A new 3.5 inch rope would weigh 9.5 lbs. per fathom.

Eddy said that all the Cornish ropes came from Henry Morton of Leeds, but he had never tried them. Formerly, all the Grassington ropes had come from R.S. Newall & Co., Dundee, but had found an improvement when he changed supplier. He had taken ropes from Garnock & Bibby, of Liverpool, and was trying one from Edge and Sons.

Regrettably, he gives no detail of the signalling system employed. He does mention, when talking of comparison of stretch in hempen and wire ropes, that in working at the furthest shaft the men have a signal made to them twice in the morning only.

There are two photographs showing the system in a very derelict state, and obviously in the process of being scrapped, which probably date from the early 1880s. These quite clearly show a single rope running over pulleys set on wooden posts, but no trace of a signalling system can be seen.

SOME SIMILAR DEVELOPMENTS IN OTHER AREAS

The concept of waterwheels working more than one shaft was of course, not restricted to the Grassington Mines, nor were the distances involved significantly different from those achieved elsewhere. It does, however, appear that the Grassington Mines were one of the earliest users of large amounts of wire rope.

John Taylor's first knowledge of wire rope was gained in 1838, when he read a paper, at Newcastle upon Tyne, to the British Association on behalf of Count Augustus Breuner, Oberberg Hauptman, of Hungary.

Maybe because they had heard Breuner's paper read at Newcastle, colliery owners appear to have been quicker to introduce wire rope than their metalliferous counterparts. From the early 18408, we get references to its use in the pits of Derbyshire, Lancashire and the Great Northern Coalfield. Even here, its use was met with disaffection amongst the men. A legal case, in respect of Wingate Colliery, entitled "Backhouse versus Cargill and others" was heard at Durham on July 27th, 1844, and questioned its use for winding. The evidence adduced, fully demonstrating its superiority over hempen rope, and appears to have decided the question.

We do not know when wire rope first replaced hemp at Grassington, but it was (presumably) subsequent to 1842, when Taylor reported on his visit to the Hartz Mines, and noted that "some (wire ropes) are now in use in Cornwall, and there may now have been time enough to have gained a certain degree of knowledge of the value of this invention". By 1844, one of Newall's ropes had been installed at the Duke of Devonshire's Burlington Slate Quarries where it worked for 14 years before "we took it off thinking that it had done enough duty"! In 1861, some three years after Taylor took over the management of Dylife Mine, Montgomeryshire, he erected a waterwheel, 50ft. diameter by 6ft. wide, for drawing, by wire rope. from the Old Engine and Boundary Shafts which were about one mile away. Dick records that the system of signalling employed here was (by repute) a wire rope and knocker. The

Red Wheel, 63ft. diameter by 3.5 feet wide, operated three shafts: Alfred's, Llechwedd Ddu – pumping and drawing – and Bradford's – winding.

Notwithstanding Taylor's comments, in 1842, Cornwall appears to have been somewhat conservative in its adoption of wire rope. For instance, Levant Mine experimented with it during the early 1860s, but abandoned it and reverted to hemp ropes until 1873. It was noted as being recently introduced at Devon Great Consols in 1863, and even a great mine like Dolcoath did not use it for the first time until 1868!

Note: The name Blea Beck has been erroneously applied by the Ordnance Survey to Blow Beck. Regrettably, this is not a singular example of such corruption of names on the Moor.

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I would also like to thank Dr. Raistrick for being prepared to talk over his original work and give his comments and suggestions, on my thoughts.

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