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THE WHITE GRIT LEAD MINE, 1783

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SYNOPSIS

From material held by the Birmingham Reference Library, the early installation of a Boulton & Watt pumping engine at the White Grit Mine is outlined. After a very brief career, the engine was dismantled and sold to a mine at Wanlockhead, Scotland. The subsequent reworking of White Grit necessitated alterations to the old engine house to accommodate a larger engine. These modifications are examined by the writer.

The West Shropshire lead mines are to be found in the wild and formerly remote hills around the Stiperstones near the village of Shelve. The field is 3 miles wide by 6 miles long, lying 12 miles south of Shrewsbury. Among these mines are to be found some of the best metal mining remains outside Cornwall. Because of the coalfield around Pontesbury on the North edge of the field, steam power was used at most of these lead mines and the engine houses form a prominent part of the structural remains. The earliest engine house left is the one dated to 1783 at the White Grit Mine and must be one of the oldest Watt type engine houses left in the country.

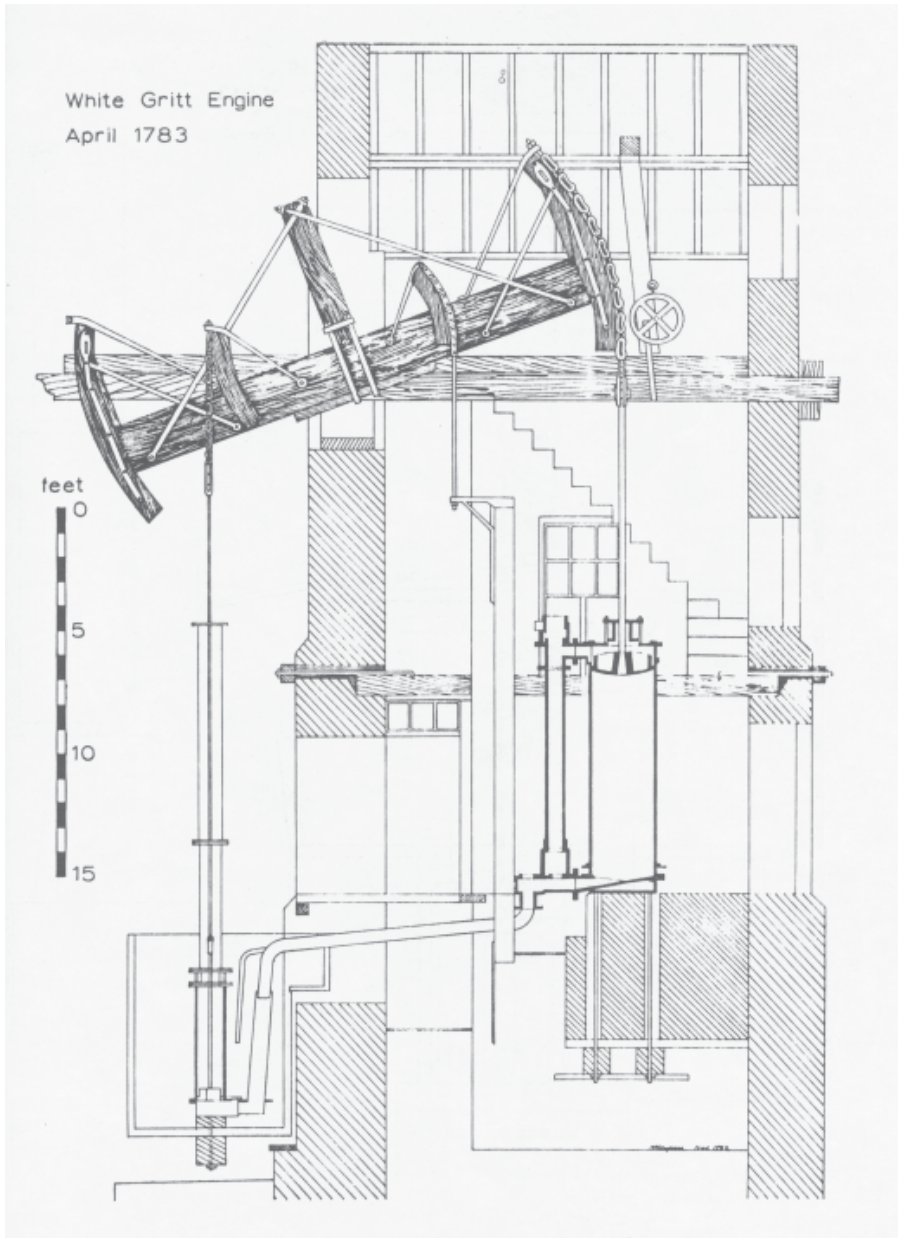
Our story starts with a letter of January 18th 1783 from Mr. J. Lawrence of the White Grit Mining Co., to Messrs. Boulton and Watt of Birmingham, saying they were going to erect an engine and wanted one of their construction. An estimate of the coal consumption every 24 hours was required. The shaft on which the engine was to be built was only 10 yards deep and it was proposed to use the engine to sink to 60 yards.

Watt replied that the engine could either be of 37½" cylinder diameter costing about £1,100 or if the pumps were smaller, a 30" diameter engine at £900 would be adequate. He gives the following details of coal consumption and the resulting premium to be paid to his company for using their invention.

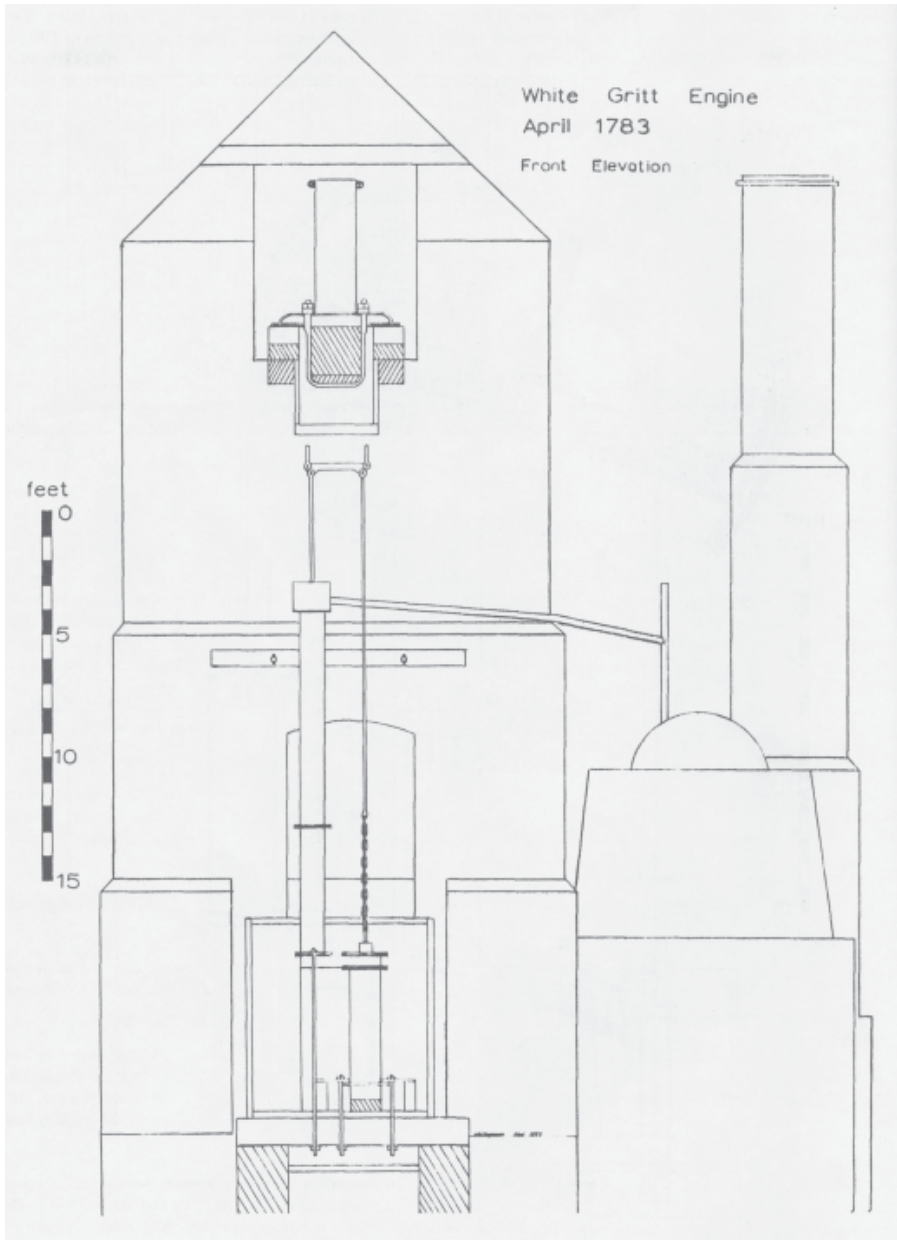
Coal consumption at 10 strokes/min	=	136 lbs/hour
Consumption of a Newcomen type engine to give the same duty being about 3 times as much	=	408 lbs/hour
Saving by difference	=	272 lbs/hour
Premium due to Boulton & Watt	=	$\frac{272}{3} = 90$ lbs/hour
		$\frac{90 \times 24 \times 365}{2240}$ tons/year
		391 tons/year

At the then price of coal premium – £90 per year.

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In February 1783 Mr. Blakeway told Messrs. Boulton and Watt that the water at that time to be raised was approximately 120 g.p.m. but might be more as the work went deeper. The depth was only 19 Yards 1 in from the surface and the water was raised by a horse gin, using two horses at a time, and a barrel of 72 gallon capacity



which was usually filled except for 5 or 6 gallons. Blakeway suggests an engine with an 8ft. stroke, the same size as the one at the Bog Mine which was not far away. The latter had been supplied by Boulton and Watt in 1777. Coal for the proposed engine would be supplied from some of the neighbouring collieries. Mr.

the plan of the boiler, nor find a boiler-maker that could work by the plan. He requests Mr. Watt to send a comprehensible plan!

An equally unsatisfactory model was obviously sent as on May 23rd 1783 Blakeway wrote to Watt to say he had received the model of the boiler and would at the first opportunity send it to Mr. Oram who was to make the boiler but Lawrence gained no information from the model "as it was the inside he wished to understand". The present plans were as different from the original sketches that the mason and timber-work already done needed much alteration, creating more expense than there would have been had the former plans been as clear as the present ones. Blakeway adds that "you never saw a better beam".

On 12th June Lawrence reported that the engine house would be completed on or about the 16th but he required a pattern of 3 links for chains. He had obtained a "great deal" of coal.

However on 3rd July a Mr. J. Wigley wrote "I wrote you some time since to inform you that we were in great want of everything Mr. Lawrence gave you orders to make for White Gritt mine to which I have had no answer. I desire you will forward the plans as fast as possible and push forward every material, article, with the greatest speed as delaying the time is a very great disappointment to us"

By 23rd July Blakeway said that although they had hoped to have the engine working by that time they still required items from Soho.

Castings were sent to White Grit on 30th August and Watt was requested to "send your man on receipt of this". By 25th October Lawrence complained that Watt had delayed the piston rods and had everything been provided at the proper time the engine could have been working for some time.

The engine was working by 13th November 1783 and Lawrence was able to write and tell Watt that they had removed the water from the mine although the boiler was not very good. Watt's friend Wilkinson had sent a cylinder. This is the famous John Wilkinson who had developed a method of boring accurate cylinders for steam engines. He added that Mr. Low, who was one of Boulton and Watts engineers who had been sent to erect the engine, had finished his work exceedingly well and he was very happy with him.

On 31st December Lawrence wrote to Watt "I take the freedom of acquainting you that we go on very prosperously with our engine at White Gritt mine and everything belonging to the engine is air and steam tight". He continued that they could not give the engine full use until the boiler was replaced and he asked Watt's opinion of having another round boiler, the same as the old one, as round ones were easier to work. Lawrence said that "I would not attempt it without your approbation". However the company meant to have it by Lady Day. It was to be made on the spot.

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By the 1st March 1784 Lawrence wrote to tell Watt that they were still not pleased with the old boiler but had accepted Watt's last plan for a new one. Up to that time they had only sunk the shaft to a depth of 31 yards and although they intended sinking to a depth of 60 yards their prospects were not as good as expected.

On 27th November 1784 Lawrence wrote to Watt about the engine at Gravels Lead Mine and asked at the same time if Watt had been paid for the White Grit engine as the Company had made funds available to pay all expense!! regarding the engine. He adds "If you are not paid you may make use of my letter, but so as to keep it a profound secret, please to direct to J. Lawrence, Upper Sheffield."

On 7th January 1785 Lawrence wrote telling Watt that the engine at White Grit Mine had been stopped on 31st December 1784 and the company would give written notice before working it again.

It was not until 10th April 1785 at about 4 p.m. that the engine was started with the intention of continuing working for "some time".

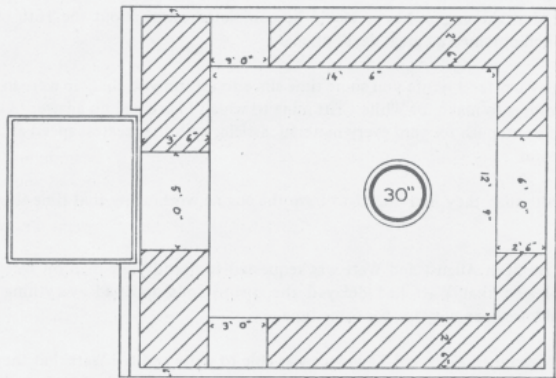
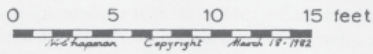
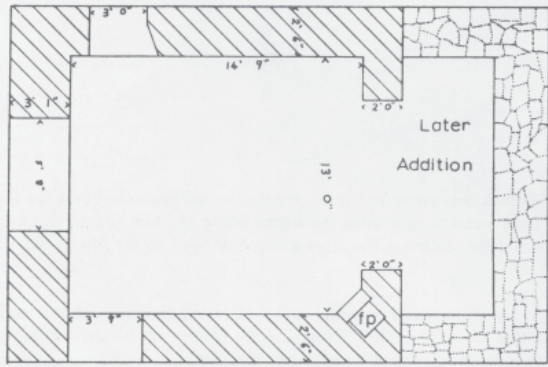
On 10th June 1785 Watt was notified that White Grit was worked out and the engine would consequently stop working the following day. On 11th November Lawrence wrote that the company were willing to sell the engine to anyone Watt recommended.

On 6th April 1786 a Mr. Southern requested a drawing of White Grit engine to assist him in dismantling it. The engine was dismantled on 3rd May when Lawrence told Watt "I will send one load to Shrewsbury and deliver it upon Frankwell Quarry under the care of Ovoner Fields."

The engine was shipped off to Wanlockhead Lead Mine in Scotland and received a new cylinder. Then it was not heard of again until 1804 when it received a further cylinder.

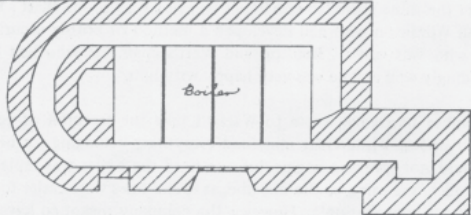
Among the papers of the Watt Collection in Birmingham Reference Library are located the above letters plus a number of scale drawings of this engine house, all dated to April 1783. From these, new drawings have been produced and are reproduced here. Prior to this, a survey was undertaken of the existing engine house at White Grit and measured drawings were produced. As can be seen from the comparative drawing the plans of the building are very similar and only differ in terms of a few inches. Unfortunately the elevations are different as regards the wall shaping but apart from the ground floor being completely buried in rubbish they have a strong likeness to each other. One reason for the difference being that the drawings of 1783 existed before the engine house had been started as foundations, so we are looking at how the structure was envisaged and not necessarily as built. Mr. Lawrence refers to alterations in a later series of drawings and complains about the extra expense, so it can only be expected that the completed house would differ from the drawings. Yet in terms of the plan they are remarkably similar.

White Grit Engine house 1979



Ground plan of
White Gritt Engine
April 1783

H. Chapman 18. 2. 1982



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The chamfer courses on the outside of the walls in the drawings was a method of thinning them as they rose in height. This would have required large squared blocks of sandstone or limestone which was not available at White Grit. Instead, the walls were tapered on the outer face to achieve the same effect.

During the 1840s the engine house was heightened by 6 feet and altered to contain a larger beam pump. This raising of the walls is noted by the rougher work done, also the front wall beam opening was blocked and a new opening created at a higher level. The rear wall was broken through and an extension was built on to the house to accommodate the longer beam of the new engine, which means that the steam cylinder of the new engine was placed further back in the house and very close to the rear wall, hence the need to extend the building. This extension has a straight joint against the old rear wall but is keyed in with the stonework of the wall heightening, so both these alterations were done at the same date. The extension having now fallen to about 3' high, required some excavation to locate it. The internal floor levels were all raised to fit in with the taller engine and the old floor joist holes were blocked with bricks.

In addition, the slightly offset position of the ground floor opening to the condenser tank is very similar to the arrangement as shown in the drawings.

From a close study of the Mytton shale-built walls of the building, the original construction of small thin slabs laid in plenty of cement and then well pointed is noted. At a later stage rough irregular shaped blocks of Mytton shale were used to construct the heightening of the walls which has left such a distinct division between the two periods of building. This division is less well marked on the front wall apart from the beam opening which, with its attendant slot for the long timber cill beam, is well shown.

When the mines were again being worked in the 19th century. the longest period of steady output was in the period of 1851-6.

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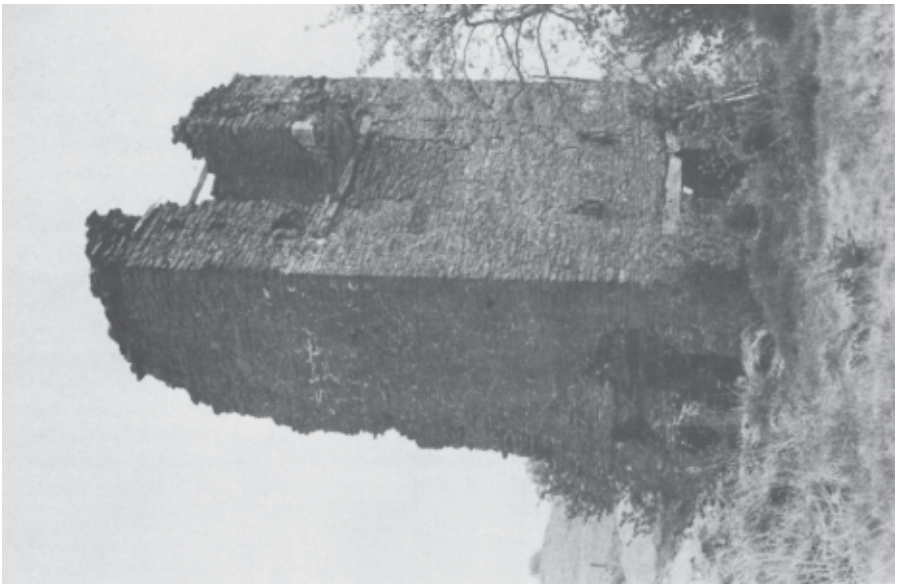
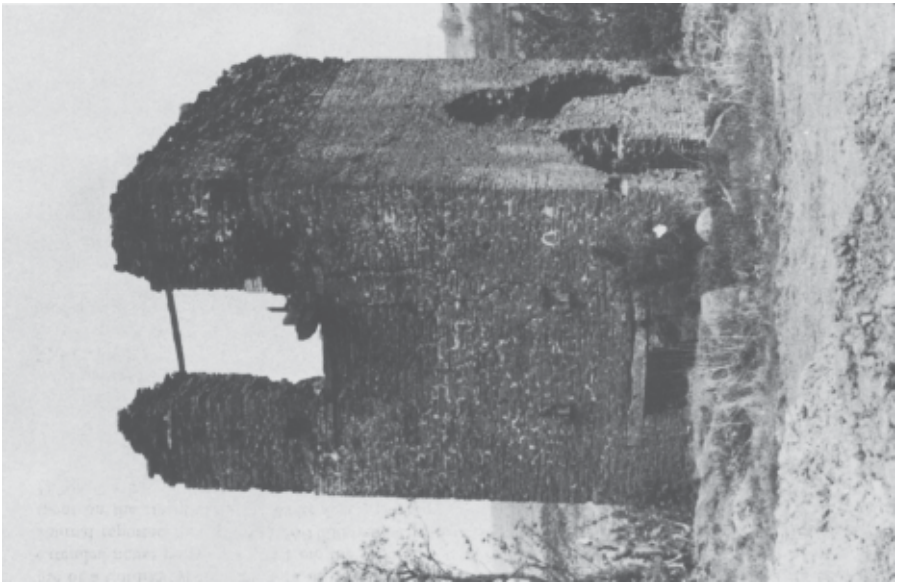
Some time would be spent in clearing the old workings and making the alterations to the engine house for the larger beam of this engine. The continued use of the ground floor opening on to the shaft top points to the possible use of a Cornish type engine with its outside condenser. Probably by 1840 this new engine would be working in the extended house pumping water from the Rider and Squilver veins which intersect near the engine house. The Mining Journal reported that by 1841 £50,000 had been spent exploiting the mine, with some of this figure probably being spent on the steam engine at White Grit. The mines were worked under various companies until final closure about 1870. The date of the removal of the engine is unknown.

REFERENCES

Letters and drawings held by the Archives Department, Reference Library, Birmingham Public Libraries and used to produce this article by their kind permission.

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WHITE GRIT ENGINE HOUSE