

Stationary Steam Engines on Sugar Plantations in the Caribbean: Nevis 1816-1846



New River Estate works, Nevis, in 2017
A Fawcett boiler can just be seen on display to the right

David Small
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Introduction

An interesting article in the spring 1991 issue of 'Industrial Archaeology Review' focused attention on the use of steam power in the mid-nineteenth century at Hamilton's estate, one of the remaining intact sugar plantation mills on the Caribbean island of Nevis¹. In 2000 David Rollinson, Director of the Nevis Field Studies Centre, and David Small 'rediscovered' an earlier steam engine on Stoney Grove estate on the outskirts of the island's capital, Charlestown. This, and a preliminary survey of the engine by a team from Bristol University in 2001, encouraged research into the introduction of steam technology on this small but important member of the Leeward Islands.

This research makes it possible to address some of the questions posed by Professor Jennifer Tann in her 1997 article in 'History of Technology' which reopened the discussion on the diffusion of steam technology to the Caribbean in the period 1770-1840. Having presented data about the numbers of stationary engines ordered from Boulton & Watt and Fawcett, Littledales & Co. and their distribution to various areas in the Caribbean, she went on to examine the causes of this 'large-scale diffusion' of steam technology. She cited a variety of causes which, among others, included Britain's position as the dominant colonial power in the Caribbean, the price of sugar in relation to plantation profits and the role of merchants and sugar houses. Her central thesis was that the widespread diffusion of stationary steam engines to the Caribbean during this period could be attributed to 'elements of the market combined with specific situational factors for certain territories which converged during the late eighteenth to mid-nineteenth centuries'. However, she noted that since the identity of many of the purchasers of the engines was not known, this made it difficult to be more specific and draw conclusions about the sort of plantations for which they were bought.²

The present article hopes to address this difficulty in relation to the six estates on Nevis on which steam engines were to be found before 1840.³ The first estate to equip itself with a steam engine did so in 1818. Three more estates then quickly followed suit before the engine in question for Stoney Grove arrived in 1826. After a gap of thirteen years, one more was purchased in 1839.

¹ Wright, N, and A Wright, 'Hamilton's Sugar Mill, Nevis, Leeward Islands, Eastern Caribbean', *Industrial Archaeology Review*, vol. 13/2 (1991), 114-141

² Tann, J, 'Steam and Sugar: The Diffusion of the Stationary Steam Engine to the Caribbean Sugar Industry 1770-1840', *History of Technology*, vol. 19 (1997), 63-84

³ Fryer, J, 'Post-Emancipation Life in Colonial Nevis 1840-80 as reported in the Blue Books – Part 1', *Nevis Historical and Conservation Society Newsletter*, (February 2002), 4-8

Nevis in 1815

The arrival of peace in 1815 was a mixed blessing. The owners of estates on Nevis had survived the uncertainty and increased costs of supplies, and war had brought a long, though not continuous, period of high prices for sugar. In March 1815 the average price of muscovado sugar, net of duty, reached the quite unparalleled price of 90 shillings per cwt.⁴

J R Ward has estimated the rates of profit on sugar estate capital for British West Indian planters in the period 1799-1819. He shows that, while the annual figure for the whole of the British West Indies was 9.6%, during that time, the figure for the Leeward Islands was a comparable 9.1%.⁵ Since he gives no breakdown of this figure per island we have to look elsewhere. J R V Johnston's article on the Stapleton plantations in the Leeward Islands suggests that at 5% the rate of profit for Stapleton estates on Nevis for the period 1796-1809 was lower than for the Leeward Islands generally.⁶ Ward suggests that, on the whole, 'adversity was more or less balanced out by favourable influences at least until the end of the Napoleonic wars'.⁷ Indeed, he notes that Nevis was the only one of the Leeward Islands to maximise its exports during the war.⁸

The high land values on Nevis during the war showed that planters had competed with each other to purchase large estates. The Pinney family sold Mountravers, their main estate on Nevis, in February 1808 for £35,650.⁹ In a slightly earlier valuation Pinney estimated prime cane land at £100 sterling per acre. Edward Huggins snr., by then an established Nevis planter seeking to expand his holdings, and John Henry Clarke, Pinney's neighbour, competed with each other to take possession of the estate. The methods of Huggins became famous in a court case in 1810 after he had publicly flogged 32 of the estate's enslaved people in the marketplace in Charlestown. His regime was harsh and exacting, and the combination of these methods and the high prices for sugar allowed Huggins to pay the final instalment of the purchase price earlier than he need have done.¹⁰

Richard Pares, however, makes the point in *A West India Fortune* that the island was faced with 'incipient economic decline'.¹¹ The island was plagued by the twin problems of planter absenteeism and mounting debt. There are no reliable figures for the population in 1815 but the general trend is evident in the following table:

⁴ Ward, J R, *British West Indian Slavery, 1750-1834 – The process of Amelioration* Clarendon Press, Oxford (1988), 43

⁵ Ward, *British West Indian Slavery*, 48

⁶ Johnston, J R V, 'The Stapleton Sugar Plantations in the Leeward Islands' in *Bulletin of the John Rylands Library*, vol. 48 (1996), 175-206

⁷ Ward, *British West Indian Slavery*, 47

⁸ Ward, *British West Indian Slavery*, 80

⁹ Bristol University Library Special Collections (BULSC), Pinney Papers, Misc. Vols. and Items, Case of Clarke and Huggins 1808, f7

¹⁰ Pares, R, *A West India Fortune*, Longmans, London (1950), 152-3

¹¹ Pares, *A West India Fortune*, 70

Table 1: Population Ratios, Nevis¹²

Date	White	Enslaved People	Total	Enslaved People-White Ratio
1676	3595	5132	8727	1.43
1772	1000	11000	12000	11.0
1834	700	7225	7925	10.32

While the radical decline in the white population had a variety of causes not relevant here, Pares estimates that, for the 63 sugar estates, ‘there were hardly more than two or three dozen’ resident plantation owners in about 1819.¹³ At best this meant that managers, attorneys and overseers were running at least half of the estates. While there was no guarantee that a resident owner would be a good planter, nevertheless both absentee owners and their enslaved populations became the victims of the frequent drunkenness, venality and inefficiency of the managers.

In a wonderful phrase Pares describes the owners as ‘waterlogged’¹⁴ by debt and lists the many reasons why. Some had inherited debt with the estate, as did John Pinney himself in 1762. Others had to incur debt to purchase new slaves or, like Edward Huggins, borrowed to buy the Pinney estate. Other debts ‘started quite casually and swelled up from a multitude of causes.’¹⁵ These included the personal expenses and extravagances of the planters, whether resident or not. In the case of the Rev. William Jones, the firm of Tobin, Pinney and Tobin wrote that they were ‘at a loss to conceive how he could contrive to consume so much property’.¹⁶ Large families, complicated inheritances overburdened with annuities and poor plantership all contributed.

Nevis 1815 to 1826

However, the three most fundamental problems which faced Nevis planters and the enslaved people on their estates in the decade after the end of the Napoleonic wars were the collapse in the price of sugar, the rise in plantation costs and drought. From a high of 90 shillings per cwt in early 1815 the average price of muscovado sugar net of duty on the London market inexorably slid to about 30 shillings in 1821 when it bottomed out.¹⁷ Ward lists some of the reasons for this. They included overproduction on new cane land, induced by wartime scarcities, new sources of production becoming important for the first time, such as Cuba, along with the territories acquired in wartime, such as Mauritius, Trinidad and Guiana. In addition there was the threat posed by the ending of the East India Company monopoly. These factors produced a glut in the market by 1820.¹⁸

¹² Derived from Watts, D, *The West Indies: Patterns of Development, Culture and Environmental Change Since 1492*, Cambridge University Press (1987), 313 Table 7.6

¹³ Pares, *A West India Fortune*, 24

¹⁴ Pares, *A West India Fortune*, 243

¹⁵ Pares, *A West India Fortune*, 244

¹⁶ Pares, *A West India Fortune*, 245

¹⁷ Ward, *British West Indian Slavery*, 50-55

¹⁸ Ward, *British West Indian Slavery*, 43-45

Planters meanwhile could not reduce their plantation costs for a variety of reasons. Between 1815 and 1822 they were unable to trade with North America from where, before the American Revolution, they had bought most of their food and lumber. Both Ward and Pares use the example of white oak staves for sugar barrels which rose from £3 per thousand in the 1750s to £20 per thousand in the 1820s. Over a similar period they show how operating expenses for a plantation very nearly doubled overall.¹⁹

The sale of Mountravers to the family of Edward Huggins in 1808 illustrates another point. Pinney was contemplating selling at the same time as the slave trade was being abolished. Planters were understandably nervous about the effect of this. However, Pinney recognised that abolition 'so far from its being injurious to the well settled Estates in the old Islands it will have a contrary effect, it will increase the value and be a check to new settlements - Not a negro has been purchased for my son's Estate a great many years and the number, I believe, is increased.'²⁰ Pinney had calculated the average value of his enslaved people at about £47 in 1783 when he left Nevis. By 1807 the average value had increased to £65 - £70 and four years later it had risen to £75.²¹ Thus planters faced a severe increase in the cost of replacing slaves who had died from various causes.

Abolitionists hoped that cutting off the supply of slaves to the islands would improve the conditions of the enslaved population. This was supposed, then, to reverse the decline in numbers. For all sorts of reasons this did not happen. Ward quotes figures from Higman's study of the rate of natural increase on Nevis based on the triennial returns required by legislation. Ward shows that, bar a slight increase between 1825 and 1828, the population continued to decline between 1817 and 1831 and only then did it begin to rise.²²

Using the same triennial returns²³ for ten selected estates on Nevis²⁴, it can be shown that their enslaved populations declined on 8 out of the 10 plantations between 1817 and 1834. The decline varied between 6% on Mountravers and 35% on the small and poorly managed Scarborough estate.²⁵ It is possible to identify some general causes such as drought in the 1820s and pressure on the enslaved populations to increase productivity. Other possible causes vary from estate to estate. Clarke's and Scarborough's were both badly managed by owners who were frequently absent. Golden Rock, Dasent's and Mountravers were all owned by the family of Edward Huggins who had a reputation for cruelty. To illustrate the difficulties posed by trying to explain the demographic trends on these estates it is worth noting that there are two estates which do not conform to the general pattern of decline and whose populations remained stable between 1817 and 1834. Of these Stoney Grove was very badly managed on behalf of an

¹⁹ Ward, *British West Indian Slavery*, 44-46; Pares, *A West India Fortune*, 91

²⁰ BULSC, Pinney Papers, Letter Book (LB) 20, Pinney to Cottle, 1 February 1807

²¹ Eickelmann, C, *The Mountravers Plantation Community 1734-1834* Part 2 Chapter 7
<https://seis.bristol.ac.uk/~emceee/mountraversplantationcommunity.html>

²² Ward, *British West Indian Slavery*, 225 quoting Higman, B W, *Slave Populations of the British Caribbean*, (1984), 308-310, 414-415, 606-607

²³ For Nevis 'Slave' Registers see UK National Archives (UK NA) T71/364-369, also available via
<https://www.ancestry.co.uk/search/collections/1129/>

²⁴ For a map showing the location of these and other estates see J A B Iles 'Map of the Island of Nevis' 1871

²⁵ Estates selected are Mountravers, Clarke's, Stoney Grove, New River, Golden Rock, Jessup's, Scarborough's, Dasent's Old Manor, Prospect and Mount Sion/Symond's. For a wider view of this issue, see C Eickelmann, *The Mountravers Plantation Community 1734-1834*, Part 2 Chapter 7.

absentee owner until 1825 and the other, New River, was owned and run by Walter Maynard who was said to have mistreated his slaves.²⁶

Drought has already been mentioned as one of the factors on Nevis which contributed to the decline in the slave population; to this must be added starvation and disease. Correspondents of the firm of Pinney, Ames & Co. complained in March 1822 about the driest weather for twenty years. On 23 April 1822 the merchants Mills & Galpine on Nevis wrote to the firm that the island was in a deplorable state, producing little sugar and without access to credit. 'How they are to feed their negroes the fall of this year God only knows - starvation and discontent will be the result. Parliamentary aid will be their only relief.'²⁷ Given that many planters were 'waterlogged' by debt and surrounded by creditors the island administration had to introduce legislation making food provisions the first call on any estate's expenditure. Other correspondents of the firm wrote of frequent robberies and cane breaking. Mills & Galpine reported further on 29 January 1823 that the island was not far short of famine. One third of the estates were not giving their people any food and for two weeks those on Hendrickson's estate had been given cash instead of provisions.²⁸ After four very bad years there was a temporary improvement when it rained from September 1825 to January 1826. The optimism thus produced was stifled in May when the dry weather returned for most of the rest of the decade. For planters and their enslaved populations already 'pressed', this series of disasters represented a critical blow.

While the Napoleonic wars had never been an easy time for planters and enslaved people, the high prices engendered by the wars had disguised the effects of debt, poor management and absenteeism. The period between 1815 and 1825, when steam engines were introduced in the sugar mills of Nevis, saw a collapse in those prices, an increase in the cost of labour and a consequent need to improve productivity. But the period was also characterised by drought, starvation and disease and a further decline in the labour force.

Caribbean Developments

Although there were other suppliers of steam engines to the Caribbean in the period 1815 to 1840, the two most important firms were Boulton & Watt and Fawcett, Littledales & Co., later Fawcett, Preston & Co. Fawcett was the principal supplier to Nevis, Boulton & Watt contributing no engines at all in this early period.²⁹ Most of what is known about the early period of steam on the island comes from the correspondence of Pinney, Ames & Co. who were organising quotations and, sometimes, shipment for their clients on Nevis from a number of different engine and mill manufacturers. Their first clear quotation was one forwarded on 17 October 1816 to Walter Maynard of New River estate from Fawcett for a 6 hp engine with

²⁶ Pares, *A West India Fortune*, 313

²⁷ BULSC, Pinney Papers, LB 56

²⁸ BULSC, Pinney Papers, LB 56

²⁹ Birmingham Reference Library (BRL), James Watt and Co. Soho MSS, vol. Arch/05 1, *List of Engines of the Independent Type Supplied to the Sugar Plantations*

horizontal mill (£1,050) and a similar 8 hp engine (£1,400), noting that they supplied both condensing and non-condensing engines.³⁰

Here it is worth considering where Nevis fits into the general development of the use steam-powered mills in the Caribbean. Tann gives figures concerning engines ordered for the Caribbean for the first quarter of the nineteenth century. She shows that there were 148 Fawcett & Littledale engines ordered between 1813 and 1825; of these 54 were ordered by the end of 1816 when Maynard placed his first order. 119 Boulton & Watt engines were ordered over the longer period of 1803 to 1825; of these 90 were ordered up to the end of 1816.³¹ So there were at least 144 steam engines in the Caribbean before Nevis placed its first order. Satchell notes that Jamaican planters had experimented with engines since John Stewart had been granted a patent on the island in 1768. Although these early experiments were unsuccessful, an engine was running on Moreland estate in Vere by 1800 and on Lord Penrhyn's Denbeigh estate by at least 1806.³² Cuba had first experimented unsuccessfully at the Seybabo mill in 1797 but the first successes happened when four of Fawcett's condensing engines were introduced in 1817.³³ While suggesting that the first introduction of engines to Demerara was in 1805, Deerr notes from the Fawcett order book that 79 cane mill engines were built between 1813 and 1817. Of these, 42 went to Demerara, nine to Jamaica, eight to St. Lucia, six to Cuba and six to Martinique.³⁴ This explains why the quotation letter from Fawcett to Maynard noted that their main demand was from Demerara and Jamaica, but that Maynard could consult their resident engineers, Samuel Brown on St. Lucia and John Handwick on Martinique.

Another point to notice is the chronological distribution of orders to the two firms which Tann demonstrates.

Table 2: Engines Ordered for the Caribbean³⁵

Year	Fawcett, Littledales & Co., 1813-1825	Boulton & Watt, 1803-1825
1812	-	8
1813	12	15
1814	15	14
1815	5	19
1816	22	13
1817	16	9
1818	26	7
1819	23	1
1820	5	5

³⁰ BULSC, Pinney Papers, LB 53

³¹ Tann, 'Steam and Sugar', 71-3 Tables 2 and 5

³² Satchell, V, *Early Use of Steam Power in the Jamaican Sugar Industry 1768-1810* in *Transactions of the Newcomen Society*, vol. 67 (1995), 222 and 227-28

³³ Friginals, M M, *The Sugar Mill: The Socioeconomic Complex of Sugar in Cuba 1760-186*, Monthly Review Press, New York (1976), 102

³⁴ Deerr, N., 'The Early Use of Steam Power in the Cane Sugar Industry' in *Transactions of the Newcomen Society 1940-41* (1943), 16

³⁵ Extracted from Tann, J, 'Steam and Sugar', 71-3 Tables 2 and 5

Before 1812 and after 1819 orders came in single figures. While Boulton & Watt had their most fruitful period between 1813 and 1816 Fawcett's period extended through the years of falling prices and consequent decline in optimism. Remembering that five of the six early engines on Nevis were ordered in the period 1817 to 1825 it is notable that these orders came after the flurry of enthusiasm for Fawcett engines in the Caribbean. 1819 was the last year when Demerara ordered more than two or three engines. St. Lucia's last order was in 1816 and Martinique's in 1815.

In December 1816 Fawcett received its first order for Nevis from Walter Maynard at New River plantation for a 4 hp non-condensing engine at a cost of £750.³⁶ Clearly Nevis was well behind Jamaica and Cuba in its first experiment with this technology. On the other hand, Cuba only succeeded with an engine slightly ahead of Maynard at New River. Nevis was also, in theory, able to benefit from the experience gained in Demerara, which was well ahead, and in St. Lucia and Martinique where there were already resident engineers.

It is worth considering both the size and type of engine being ordered in this context. The first Fawcett engine book is dominated by orders from Demerara which were overwhelmingly for 8 hp condensing engines. St. Lucia and Martinique ordered 14 engines between them in the years 1813 to 1817, eight 6 hp engines and six 4 hp, all of them non-condensing engines. The figures suggest that both the conditions prevailing in the Leeward and Windward Islands and the advice given led Walter Maynard to follow the example of St. Lucia. However, he changed his mind about the size of the engine and in December 1817 ordered instead an 8 hp non-condensing engine.³⁷

Maynard's New River Estate

So far as it can be done, it is worth looking at the details of this and other estates to see whether any conclusions can be drawn about what type of estate or owner chose to install a steam engine. New River is located on the windward side of the island, near the main road in the parish of St. James Windward, 6 ½ miles from the main port in Charlestown. The history of the plantation is unclear at present and tends to be conflated with that of the neighbouring Coconut Walk estate, owned by their rivals, the Huggins family, which the Maynards came to own by 1877. The size of the estate in 1817, when Walter Maynard registered 107 slaves, is also unclear.³⁸ However a plan of New River dated 1854 gave it as 315 acres in total, including land near the shipping port at Indian Castle.³⁹ At a simple level, without taking into account the acreage under cane and other factors, the number of acres per enslaved person at 2.94 suggests that the estate was seriously underhanded compared with others on Nevis.

³⁶ National Museums and Galleries on Merseyside (NMGGM), B/FP/5/1/1

³⁷ NMGGM, B/FP/5/1/1

³⁸ UK NA T71/364

³⁹ Suffolk R.O., Ipswich, Maynard Papers, HA 178/1/55

The will of Walter Maynard snr., drawn up in 1804, noted that the family was in possession of New River estate and had spent 'a very large sum of money' on the promise that he could purchase it, although he also noted that it was his eldest son, Walter, who was actually negotiating to buy it.⁴⁰ These New River and Coconut Walk estates of Walter Maynard and Edward Huggins have, since 1994, been the subject of several archaeological investigations by Earthwatch and members of a team associated with the Digital Archaeological Archive of Comparative Slavery (DAACS). This work may, in time, explain what Maynard snr. spent his money on. While the Fawcett engine was replaced at least once in the 1880s, it is worth noting that a Fawcett boiler, 3m 17.5 cm long with a diameter of 1m 47.4 cm, was found lying beside the buildings at New River.



Fawcett boiler on display at New River Estate, complete with the firm's nameplate and patent. The boiler shows that it had been dismantled and then reassembled, misaligned.

While their rivals and neighbours the Huggins family had built, or were building, a fine windmill on Coconut Walk, it seems likely that Maynard's New River relied on animal mills. The Fawcett engine book does list whether the mills on the plantation were vertical or horizontal but does

⁴⁰ Nevis Courthouse, Common Records Book 1829-1830 vol. 1, ff223-27

not distinguish between those cases where a mill was ordered with the engine and those where the engine alone was ordered. However, based on the cost, the New River engine is likely to have been fitted to an already existing horizontal, probably animal powered, mill. With the new engine attached to one of the mills and 'affixed to an old boiling house unaltered', a gang of 115 enslaved people made 12-13 hogsheads of sugar a week in 1825.⁴¹

The productivity of the estate raises another factor which deserves consideration. Those wanting to ameliorate working conditions within slavery may have hoped that steam would provide part of a 'technical fix'. This however was unlikely to have been a consideration for Walter Maynard since he seems to have had an unsavoury reputation even among estate owners connected with Nevis. Because of this Mrs Ames, one of the absentee owners of Stoney Grove estate, turned down an offer from him in 1831. She noted that he was 'generally considered cruel towards his treatment of his slaves and that his habit of feeding them amounted to nearly starvation'.⁴² On the other hand, the fact that the wider Maynard family came to own at least six other estates by 1871, had bought the neighbouring Coconut Walk estate by 1877 (albeit as absentees) and still owned the joint estate in the 1920s demonstrates that they were one of the few planter families wholeheartedly committed to remaining on the island.

Spring Valley and Round Hill Estates

New River may have been the first estate on Nevis actually to erect a steam engine but enquiries about engines had been made as early 1812 by Peter Jefferys who owned a 320-acre estate in St James Windward in the northeast of the island. This consisted of Spring Valley (240 acres) and Hope (80 acres), separated by the Hicks/Clay Hill estate of his brother-in-law Richard Hicks, on which he held a mortgage. The 1871 Iles map of Nevis shows all three in the same valley, with springs as a source of water and reasonable access to the main road.⁴³ At present it is unclear what motive power was used for these estates in the second decade of the nineteenth century, partly because the boundaries of the estates are themselves unclear.⁴⁴ A preliminary search in the valley by David Small and David Rollinson in 2002 relocated a windmill of uncertain date, perhaps at Hope, and a possible animal mill at Hicks.

Jefferys registered 150 enslaved people at Spring Valley in 1817⁴⁵ and thus, at 2.13 acres per slave, it was considerably better manned than Maynard's estate. However it seems he considered his own estates underhanded since, along with other planters, he was in discussion with the Pinney family either to rent or buy a small gang of 20 to 30 slaves in 1818.⁴⁶ This illustrates the labour problem facing Nevis planters.

⁴¹ BULSC, Pinney Papers, LB 58, J C Mills to Pinney, Ames & Co., 11 August 1825

⁴² BULSC, Pinney Papers, Domestic Box I ii/30; see also Pares, *A West India Fortune*, 313 and 316

⁴³ Iles, J A B, *Map of the Island of Nevis*, 1871

⁴⁴ For a 1906 outline plan of Hicks Estate see <https://eap.bl.uk/archive-file/EAP794-1-10-1> No. 133

⁴⁵ UK NA, T71/364

⁴⁶ BULSC, Pinney Papers, LB 25, John Frederick Pinney to Edward Huggins jnr., 19 June 1818

In addition to these estates Jefferys held a lease from the Dean of St. Asaph on Camp estate, just over the hill to the northwest. An interesting part of the negotiations on the lease was the attempt by Pinney, Ames & Co. to get permission for him to erect a windmill on Camp estate. What has not been recorded before, in the context of Nevis, is that it was on the understanding that he remove the windmill at the end of the lease.⁴⁷

The correspondence between Jefferys and the Pinney firm, which ran for at least eight years, provides an insight into the anxieties and difficulties of the planter, the specifications of the engines and mills available and the role of merchants in Britain. Initially the correspondence was about Trevithick's portable engine which, according to Trevithick, did the work of 12 mules at any one time, or 48 mules in 24 hours.⁴⁸ It consumed 42 pounds of coal and 10 gallons of water for one horse day's work. Further correspondence suggests that it was ordered but that Trevithick's bankruptcy saved Jefferys from an engine that was 'attended with much danger in the use and subject to be continually out of repair'.⁴⁹

Pinney, Ames & Co. began encouraging Jefferys to think of local Bristol firms. They suggested to him Mssrs Dobbins, iron founders of College Street, Bristol. Dobbins were successors to the firm of John Garnett & Co. which had patented a very successful form of roller bearing much admired by the Pinneys.⁵⁰ More than one hundred of their horizontal mills had been sent to the West Indies, costing around £700 each. In January 1815 Dobbins wrote to Jefferys, advising him to increase the size of his planned engine to 6 hp but particularly pressing him to convert to a horizontal mill at the same time. It could take two feeders, had no dumb returners, could be stopped and started at will and included a feed pump to supply the stillhouse with water. They also suggested he contact their engineer resident in Surinam.⁵¹ As in the previous case with Trevithick, Jefferys was unwilling, or unable, to contemplate the cost and wanted a mill for less than half their price. By the beginning of 1816 Pinney, Ames & Co. were advertising for plans of engines and mills for him. Their favoured option was a mill from the Bristol firm of Winwood and Co. with an 8 hp engine by another Bristol firm, Mssrs William Bond and Co., at a total cost of £925.⁵² However they also sent estimates from Fawcett, Littledales and Co. and Graham, Buxton and Co. The latter's estimate suggested that they made the mill 'so perfect the negroes can erect them easily; but a steam engine a skilful mechanic must put up'. The price for a 10 hp engine with 12 hp boiler, consuming 3,000 gallons of water and 87 lbs of best Newcastle coal per hour, was £1,375.⁵³

Although Jefferys was fully committed to improving his estates, he became an absentee owner from the end of 1816 when he left for England. Clearly seeking technological improvements, he bought ploughs in 1817. These had been tried before on Nevis in the 1780s and rejected but Jefferys was one of the first to try again. At the end of 1818 not only had he ordered an engine

⁴⁷ BULSC, Pinney Papers, LB 51, Pinneys & Ames to Peter Jefferys, 23 September 1814

⁴⁸ BULSC, Pinney Papers, LB 50, Copy of a letter from Richard Trevithick, 5 November 1812

⁴⁹ BULSC, Pinney Papers, LB 51, Pinneys & Ames to Peter Jefferys, 11 January 1814

⁵⁰ I am very grateful to Professor Hugh Torrens for this information.

⁵¹ BULSC, Pinney Papers, Misc. Volumes, vol. 19

⁵² BULSC, Pinney Papers, LB 53, Pinneys & Ames to Peter Jefferys, 15 March 1816

⁵³ BULSC, Pinney Papers, LB 53, Pinneys & Ames to Peter Jefferys, 17 February 1816

for his own estates but also one for the Round Hill estate of Thomas John Cottle in St James Windward.

Intermittently an absentee, Cottle was something of an innovator himself, being the first estate owner on Nevis to build an estate chapel in which master and slaves could worship together. However, he had a very mixed reputation as the son-in-law of Edward Huggins snr. Cottle had publicly defended Huggins the first time he was tried for cruelty in 1810. A subsequent case involved Huggins's treatment of slaves on Cottle's own estate. The size of this estate at 500 acres is misleading. Although much of it was on gently rising ground on the north coast with good access to the main island road, it is likely that perhaps 150 to 200 acres consisted of Round Hill itself. Cottle registered 151 enslaved people in 1817 and, if the working estate was around 350 acres, this would make the acreage per slave 2.33 and more like that on Jefferys' estate, rather than Maynard's. The enslaved population had, in common with other estates, declined to 133 by 1834.⁵⁴ In the absence of any ruins of a windmill the estate mills presumably relied on animal power.

Neither of the engines ordered by Jefferys appears in the records of Fawcett and its rival Boulton & Watt, and since the Pinney firm only handled the shipping, almost no details are known about them. The engines and coal were sent to Nevis in the *Sally*, specially chartered by Jefferys, and had been landed at Mr. Cottle's bay near Round Hill by May 1819. However, a letter from Captain Browne of the *Sally* doubted that Wright, the engineer, could have had them erected in time for the 1819/20 crop.⁵⁵ Mr Cottle's engine seems to have caused problems. A letter to him in November 1819 noted the following: 'Sorry were we to find the steam engine has caused you uneasiness. I was fearful it would not answer, I only wish that Peter Jefferys had had it instead of you he certainly was wrong in engaging a person that was not qualified for the undertaking of so expensive a scheme. He was to have all the benefit, and you all the trouble as well as loss.'⁵⁶ The engines clearly were erected since Jefferys was enquiring at the end of 1820 about chartering a vessel to take out another load of coal.

Although little more is heard from Jefferys, two other points are worth noting about Cottle's estate. In September 1820 Cottle ordered from Fawcett either an entire mill or a part of one. He changed the order in November 1821 to include the entire iron framing for the mill and a cane liquor pump.⁵⁷ The order book shows that his recently acquired engine was, like Maynard's, non-condensing, and this suggests that Jefferys' engine was the same. Cottle's difficulties with an independent manufacturer may explain why the next engine was ordered from Fawcett. Although the engine house at Round Hill contains a Mirlees and Tait engine dated to 1866 with a three-roller horizontal mill, the engine house itself may well have been built for the earlier engine since it shows signs of alteration. Lying a few metres away in the bush is a 4m 50cm return flue, perhaps from an earlier boiler on the estate.

⁵⁴ UK NA, T71/364 and 369

⁵⁵ BULSC, Pinney Papers, LB 54, Pinney, Ames & Co. to Peter Jefferys, 2 December 1819

⁵⁶ Nevis Historical and Conservation Society Archive (NHCS), MG1.16 (2) Grace Selfe, Ash Hall, to T J Cottle, Round Hill, Nevis, 3 November 1819

⁵⁷ NMGM, B/FP/5/1/1

Henry Nelson Coleridge undoubtedly saw Cottle's engine in 1825 when he visited the island as secretary to his uncle Bishop William Hart Coleridge. In a much quoted, but clearly inaccurate, observation he noted 'There were two steam engines employed in grinding canes, a thing which I had not seen anywhere else, except in Trinidad'. He noted that 'steam is not turned in Nevis to half the work it ought to do'.⁵⁸

Mountravers Estate – Peter Thomas Huggins

Undoubtedly the other engine Coleridge saw was the one at Mountravers, the estate once owned by the Pinneys and sold by them in 1808 to the Huggins family. An estate well known because of the detailed work of Professor Pares in *A West India Fortune* it continues to be the subject of investigation.⁵⁹

Three separate plantations in the early eighteenth century, this estate of 393 acres in the parish of St Thomas Lowland, running from the top of the mountain to the sea on the west coast within a mile of the main port at Charlestown, was consolidated into a moderately profitable enterprise by John Pinney. He calculated that his average net profit over the ten years 1769 to 1778 was £1,219 stlg.⁶⁰ At a rough calculation this amounted to 4.5% on the capital value of the two lower estates he held then.

Apart from a good location, which gave them some security of production in both wet and dry seasons, the Pinneys had a good sense of timing. Estates were still being sought and prices were high. They sold a property with a solid infrastructure of plantation roads and two principal sets of works located up the mountain at Woodland and near the main road at Sharloes/Pinney's Yard. The remains of the substantial works at Woodland, located by Nevisian Edward Herbert and surveyed by the Nevis Heritage Project, include an animal mill-round. The main works at Sharloes included two animal mills and 'a most excellent windmill', built in 1791/2.

Edward Huggins, unusually, managed to pay off the purchase money within the agreed period. But it was at a price paid by the enslaved population in the drive for profitability. The numbers of enslaved people under Pinney had grown from 141 in 1763 to a maximum of 221 in 1795, partly through purchases. At 1.77 acres per slave this, to some extent, bears out the contention that Pinney practiced what he preached to his managers which was not to 'press' his workers. In 1808, having reserved a number of favoured individuals, Pinney sold Huggins 192 people at a ratio of 2.04 acres per slave. It was alleged at the time that nine enslaved people had died within six months of Huggins taking over.⁶¹ By 1817 the population had dropped to 159 which

⁵⁸ Coleridge, H N, *Six Months in the West Indies in 1825*, John Murray, London (1826), 187-203

⁵⁹ Following *Time Team's* location of the 'slave village' and their investigation of the Mountravers great house site, a detailed longitudinal study of the enslaved population of the estate has been carried out by Christine Eickelmann. See <https://seis.bristol.ac.uk/~emceee/mountraversplantationcommunity.html>

Aspects of the Time Team investigation have been reported on by Dr. Elaine Morris et. al. in *Nevis Heritage Project - Interim Report 2001*, Department of Archaeology, University of Southampton and in subsequent interim reports.

⁶⁰ BULSC, Pinney Papers, Account Book (AB) 22

⁶¹ UK NA, CO 152/96, J W Tobin to Governor Elliot, 7 September 1810

increased the nominal acreage per slave to 2.46, in other words by nearly half an acre per slave.⁶²

At the end of 1816 Peter Thomas Huggins nominally bought the estate from his father and he began to improve the infrastructure. Fawcett's records show an order for the estate received from the merchant George Latham of London, dated 26 October 1820, for a 10 hp non-condensing engine. The entry and price (£1,750) show that the order included a horizontal mill but that it also included a corn mill, French stones and steam clarifiers.⁶³ In an interesting comment on Huggins's expansive, and expensive approach, the planter J C Mills noted: 'Mr P Huggins's engine house is very magnificent, he says it cost him £2,000 the house alone – Jefferys' and Mr Cottle's have been erected at very moderate expense'.⁶⁴ A preliminary survey of the works site at Sharloes/Pinney's Yard, together with a search of the documentary record, suggested at least four generations of works and extensive, perhaps twentieth century, alterations to the large engine house.

For a long while little trace of the engine itself was to be seen, with the exception of one Fawcett column. A possible explanation was suggested by a story that engines all around the island were collected for scrap. Whether this was to aid the British effort during the Second World War, or the engines were sold for scrap to the Japanese after the war was not made clear. It was suggested that a relic of this transaction may have been the multi-tubular boiler which for years lay several metres off shore on Pinney's beach, at the bottom of the plantation. However, in 2002 David Rollinson pointed out a number of early boilers collected in yards around the island including at New River.

In addition, investigation of the ghut to the south of Sharloes/Pinney's Yard, just below the works, revealed two sections of an early, probably Fawcett, boiler. One was buried in the ghut covered by stones brought down by storm water. The other was used as part of a small dam/ford built across the ghut. Turfing redundant steam engine parts into the neighbouring ghuts seems to have been a common practice and calls into question the collection for scrap at, during or at the end of the war.

The Fawcett engine encouraged Huggins's plans, which must already have existed, to expand his ownership of estates. The extended Huggins family, deeply committed in the island, already had substantial holdings in the parishes of St. George Gingerland and St. John Figtree on the windward side. Peter Thomas Huggins sought opportunities to buy Parris's, Scarborough's and Clarke's, the estates immediately surrounding Mountravers on the leeward coast, thus hoping to achieve economies of scale with his engine.

Two particular problems became apparent fairly quickly. One was the quality of the coal he was sent, about which he complained constantly to Pinney, Ames & Co. Deerr assumed that

⁶² Eickelmann, *The Mountravers Plantation Community 1734-1834* Part 2 Chapter 7

⁶³ NMGM, B/FP/5/1/1

⁶⁴ BULSC, Pinney Papers, LB 58, Mills to Pinney, Ames & Co., 11 August 1825

planters generally were firing their boilers using coal.⁶⁵ Satchell states that bagasse, or cane trash, and local wood 'became the chief sources of fuel for engines' in Jamaica.⁶⁶ Huggins's orders and subsequent complaints show that coal was used on Nevis – 'bad coal is bad economy for a steam engine'. Of a particularly poor delivery in 1826 he wrote that one hogshead of good coal would make three hogsheads of sugar whereas this coal had made half that.⁶⁷ In 1822 he thought the coal sent from Bristol half as good as that from Liverpool. The following year he praised both Newport and Lydney coal; in 1828 however he complained that the company had sent him 'sweepings' - this turned out to be Newport house coal. In several years he ordered 150 hogsheads although the shipments generally were around 50 to 80 hogsheads. It is possible that the use of coal rather than cane trash on Nevis may be explained by the importance to planters of manuring the ground. This might have been done in part by using cane trash as was the case on St. Kitts.⁶⁸

The second problem was the quality of the water available on the western side of the island. Much of the rain comes in short, intense, showers and runs away down 'ghuts', or ravines. Merrill assumed that lowland Nevis received no more than 50 inches of rain per annum.⁶⁹ This western side of the island lacked the springs which were to be found, for instance, on Jefferys' land on the northeast coast; storage was therefore an issue. John Pinney noted in 1807 that there were two large cisterns at his Sharloes/Mountravers works.⁷⁰ One cistern has been identified and another likely structure, close to the ghut, has a well in the corner of it.

Nevertheless, the large quantities of water required by a steam engine were always going to be a problem for plantations on this side of the island and so it proved. A letter written in 1825 by J C Mills noted not only Huggins's problems but those of Job Ede, the owner of Jessup's, an estate of 478 acres to the north of Mountravers: 'Mr. Ede has been under the necessity of giving up the idea of having a steam engine in consequence of the bad quality of his water and Mr P Huggins's engine has suffered from the corroding qualities of the water he makes use of'.⁷¹ Five dams are to be found in the ghut on the northern boundary of Mountravers estate, and the varying heights of these suggest an attempt to filter out the sediment flowing down the ghut.

⁶⁵ Deerr, N, *The Early Use of Steam Power in the Cane Sugar Industry*, 19

⁶⁶ Satchell, V, *Early Use of Steam Power in the Jamaican Sugar Industry*, 224

⁶⁷ BULSC, Pinney Papers, LB 60 Peter Thomas Huggins to Pinney, Ames & Co., 6 March 1826

⁶⁸ Ward, *British West India Slavery*, 75

⁶⁹ Merrill, G, *The Historical Geography of St. Kitts and Nevis, the West Indies*, Instituto Panamericano de Geografia e Historia, Mexico (1958) 27

⁷⁰ BULSC, Pinney Papers, LB 20 Pinney to James Tobin, 5 February 1807

⁷¹ BULSC, Pinney Papers, LB 58, Mills to Pinney, Ames & Co., 10 March 1825

The Rationale for Steam Engines

Two other estates considered the use of steam engines in this period, or, more accurately, would have liked to have been in a position to install them. They are worth considering because they make clear what some planters on Nevis considered to be the benefits of this technology.

The first of these was Cane Garden in the parish of St. John Figtree which, combined with Williams estate, amounted to 120 acres. Heavily mortgaged, with 120 enslaved people and a good iron animal mill, it was bought around 1822 from Richard Parris by the merchant and blacksmith brothers Frederick and John Huggins to secure debts owed to them. Wishing to get the firm to stand surety for a Fawcett engine, they explained their plans to Pinney, Ames & Co. They calculated on a profit of £545 a year, based on a notional production of 100 hogsheads of sugar. Fawcett's engineer, on the island at the time, suggested an engine would cost about £900 and that they could expect two years' credit. As to the benefits of the engine: 'The engine saves purchasing stock – takes off the crop to a certainty and greatly facilitates the work of the estate – the calculation is that 75 negroes with an engine will further the estate's work equal to 100 without it and improve the quality of the sugar equal to 4/- stlg per hundredweight'.⁷² At that rate the engine would have earned them £320 p.a. extra on 100 hhds and would have paid for itself in three years simply by the improved prices gained, let alone by savings on the purchase of stock and people. Although the calculations were certainly unrealistic, nevertheless, at even half that rate there was benefit to be gained.

The theme of 'certainty' was taken up by the Pinneys' attorney, J C Mills. He, like the Huggins brothers, was seeking to expand his holdings beyond his own estate, Prospect, in the same parish as Cane Garden. However, Prospect was burdened by numerous annuities and Mills lacked the money to make significant improvements. On 11 April 1823 he complained: 'The crop is very backward occasioned in great measure from the calm weather so that the windmills are useless and those who have cattlemills are hard off for stock to work them – I wish I had a steam engine – in this crop it would save twenty hhds of sugar'. A few weeks later he wrote again about the weather: 'We do not experience two good days in a week since the commencement of crop – the late showers have I think been of service to the canes but it will occasion it to be late before they are taken off. Steam engines are the only machines to be depended on – my friend W. Maynard at New River makes 12 – 14 hhds of sugar weekly, when my windmill for want of wind does not exceed three – my canes much better and everything but the means of grinding them much superior'.⁷³

Apart from the perceived dependability of steam engines in areas prone to variable wind, it is worth noting that at 40/- per cwt net of duty a saving of 20 hogsheads would have paid two thirds of the cost of the engine in one year; at even half that rate an engine might be paid for in three years. In addition, as the Huggins brothers pointed out, if planters could avoid paying for the replacement of even 10 enslaved people in a declining population, then at a notional price of £70 per head considerable savings on the cost of an engine could be made. Lastly, there is

⁷² BULSC, Pinney Papers, LB 56, F & J Huggins to Pinney, Ames & Co., 8 June 1822

⁷³ BULSC, Pinney Papers, LB 56, J C Mills to Pinney, Ames & Co., 11 April and 5 May 1823

the question of stock. From references in the Pinney Papers it seems that both cattle and mules were used to power the 'cattle' mills, although most of the clear references are about mules. None of these clarify how many were used in a 'spell' although Davy in the 1840s noted that he had seen an old working cattle mill consisting of 'three perpendicular rollers of small size, worked by six mules, three abreast, driven by two boys'.⁷⁴ Pinney bought 22 mules in five years in the 1780s and kept around 18 to 21 even after he had built a windmill. They were sourced both locally and from places as diverse as Ireland, the Barbary coast and 'Porto Rico'. A regular item of cargo, they cost somewhere between £20 and £40 per head, depending on supply and whether there was peace. Any decline in the rate at which they had to be replaced was a significant saving on the cost of an engine.

Neither Mills nor the Huggins brothers were in a position to order a steam engine. In Mills's case he was simply hankering after one and the subsequent history of Cane Garden and the Huggins brothers suggests that Pinney, Ames & Co. were wise in declining to stand surety for an engine. The estate was heavily in debt to a number of lenders, was considered by the firm to be too small anyway, and within a few years both of the brothers had died.

While it is unclear how far the Huggins brothers had been prepared to commit themselves to the island in the long term, the evidence is mixed about the other planter families. The families of Peter Thomas Huggins, Walter Maynard and John Colhoun Mills were fully committed to remaining on Nevis. Thomas Cottle and Job Ede were intermittent absentees and Peter Jefferys, while showing great persistence in buying an engine for his estate, became an absentee. The evidence is also unclear about how they financed their purchases. In Maynard's case it is probable that he had some surplus capital from the period of high wartime prices. Huggins's father had clearly put the enslaved population on Mountravers under considerable pressure and was able to pay off the mortgage leaving his son free to spend money on improving the estate in a period of declining profitability. What all the owners so far have in common, except perhaps Cottle, was a willingness in a period of debt, absenteeism and retrenchment to expand their holdings on the island in a search for that profitability.

Stoney Grove Estate - Background

It is now time to turn to the engine in question at Stoney Grove estate. This estate, which lay across the boundary between the parishes of St Paul and St John Figtree, ran one and a half miles in a narrow strip east up the mountain from Gallows Bay, just south of Charlestown. Although its early history is unclear it belonged to the family of the lawyer and anti-abolitionist pamphleteer James Tobin⁷⁵ when he first visited the island to assist in the running of the family plantations in 1758. He remained there until 1766 and then became an absentee owner for 11 years. Having returned in 1777, he was active in island affairs as a member of the Council,

⁷⁴ Davy, J, *The West Indies Before and Since Slave Emancipation* W & F G Cash, London (1854) 455 fn

⁷⁵ James Tobin and three of his sons, James Webbe, George and John Tobin are the subjects of articles in the new *Oxford Dictionary of National Biography* together with John Pinney, Edward Huggins and Thomas John Cottle.

negotiating with John Pinney the surrender of the island to the French in 1782 before leaving again in 1784.

Based on his experience as a planter, he became somewhat notorious for the pamphlets he wrote attacking the abolitionist James Ramsay between 1785 and 1788 for which he was roundly condemned by Thomas Clarkson and Olaudah Equiano, among others. Unabashed, he gave evidence as a planter in February 1790 to the House of Commons Committee investigating the abolition of the slave trade. As part of this he stated that he had 260 acres (cane land) of which he planted yearly about 90 and that he had 179 slaves of whom 77 were males and 102 females.⁷⁶ An estimate by the manager in 1829 suggested that, of the total 358 acres on the estate, around 200 acres were cane land and the rest marginal land and pasture.⁷⁷ In 1789 Tobin was lent £10,000 by his business partner, John Pinney, against a mortgage and by 1808 he owed nearly £19,000, a small portion of it to the merchant house which he had established in Bristol with John Pinney and the rest to Pinney himself.⁷⁸ In 1806 he returned to Nevis at the age of 69 because his affairs were in a parlous state. Before he left Nevis in 1810, he was succeeded by his eldest son James Webbe Tobin.

This was an interesting period in the estate's history. J W Tobin took control of an estate on which the number of slaves rose from 179 in 1789 to 220 in 1811, mostly through births. A friend of the Romantic poets and a campaigner for the rights of the enslaved and free coloured population, J W Tobin was nearly blind. This must have made the management of the estate more difficult and indeed his opponents on the island attacked him for only being able to produce 30 hogsheads of sugar with such a large workforce.

James Webbe Tobin died in 1814 and the enfeebled James Tobin in 1817, at which point ownership of the estate passed to Captain George Tobin R.N.⁷⁹ John Pinney's mortgage on Stoney Grove was left on his death in 1818 to Pinney's daughters Mrs Ames and Mrs Baillie. Negotiations between the sisters and Captain Tobin were handled by their brother Charles Pinney and his merchant house. Production of poor quality sugar on Stoney Grove varied between 53 and 69 hogsheads in 1819-21, current account debts mounted, and George Tobin began to make clear that he had no intention of spending his somewhat limited private 'fortune' propping up the estate.

Charles Pinney visited the estate while he was on Nevis in 1820-1. It had 'upwards of 300 acres, the most part of poor thin soil, and which I conceive will require much labor, attention and time to make it properly productive with a liberal allowance of manure'. 30 acres near town called White lands were of 'superior quality', capable of a large return per acre, and a considerable proportion of the sugar was made there. Although it had 220 slaves, 'From the length of the property it is laborious, three works are used, and the only still house at the extreme end, to

⁷⁶ Lambert, S ed., *House of Commons Sessional Papers of the Eighteenth Century*, vol. 71 (1975), 270-1

⁷⁷ BULSC, Pinney Papers, West Indies Box 1829-1836

⁷⁸ BULSC, Pinney Papers, LB 22, John Pinney to Capt. George Tobin R.N., 3 August 1808

⁷⁹ George Tobin sailed as a lieutenant to Tahiti on Bligh's second voyage there in 1791 from which they returned to the Caribbean with breadfruit. For more on his career see David Small, 'Tobin, George (1768-1838)' *Oxford Dictionary of National Biography*, 2004

which everything is carted from the upper and middle works to make rum, which necessarily increases the labour of the stock'. 'And where all the canes are ground by cattle or mules, the number is too small, fewer than a much smaller estate I am acquainted with where everything is ground by wind.' So much time was consumed in taking off the crop and in the manufacture of sugar that there was less time to prepare the ground and put in a new crop.⁸⁰ Previously he had written to the firm that the management of the estate was 'very bad...the negroes are discontented having applied in a body to Mr. Mills and also I believe to the magistrates. The wisest thing Capt. Tobin could do would be to come out immediately'.⁸¹ This the absentee owner resolutely declined to do.

Instead, with a market in which West India property had halved in value, he hovered between selling and improving the estate. The first suggestion of erecting a steam engine at Stoney Grove seems to have come from George Tobin. Charles Pinney replied on 15 June 1822: 'When I was in Nevis a steam engine was erected there, the cost landed there I believe about £2,000 sterling, but a smaller one to answer every purpose may be sent for less – a good deal of preparation is necessary for putting it up, and an engineer must be sent out for the purpose – I cannot form an idea what the cost of erecting a windmill would be, lately complete iron mills have been sent from Liverpool.'⁸² This is the first mention of iron windmills in relation to Nevis. Almost eight months later Pinney noted that iron windmills had been sent to the West Indies from Glasgow, at less expense than a windmill could be erected on the island.⁸³

The expenses of running the estate mounted, and in March 1823 Tobin stated his 'determination to advance no more of my own private fortune, which has already been sorely injured by attempting to prop the estate up'.⁸⁴ Two weeks later, in negotiations about J C Mills renting the estate, he had changed his mind about erecting a steam engine. He noted that with 40 slaves less it had, at one time, made more than 150 hogsheads, indeed he had occasional accounts of 188, 195, 163 and 193 hogsheads.⁸⁵ In the end Mills, as the Pinneys' attorney, took possession of the estate on 1 January 1824, with the permission of George Tobin and probably to the relief of the enslaved population. They had been caught in a spiral of decline in which the negligent local attorney, William McPhail, supervising poor local managers, had tried to reduce the supplies to a level which an absentee owner could tolerate.⁸⁶

Mills's first report clarified the situation for the Pinneys: 'To describe the condition of this estate exceeds everything. I have (never?) before witnessed of neglect nearly to ruin - Mr McPhail's conduct is most glaringly culpable...the buildings are in ruins.' There had been no ongoing repairs, the roofs of the principal buildings needed renewing for want of shingling in time; the curing house of the upper works was so bad the sugar was in danger of being washed

⁸⁰ BULSC, Pinney Papers, LB 27, Charles Pinney to Capt. George Tobin, 1 February 1821

⁸¹ BULSC, Pinney Papers, LB 27, Charles Pinney to R E Case, 4 September 1820

⁸² BULSC, Pinney Papers, LB 28, Charles Pinney to Tobin, 15 June 1822

⁸³ BULSC, Pinney Papers, LB 28, Charles Pinney to Tobin, 4 February 1823

⁸⁴ BULSC, Pinney Papers, LB 56, Tobin to Pinney, Ames & Co., 31 March 1823

⁸⁵ BULSC, Pinney Papers, LB 56, Tobin to Pinney, Ames & Co., 12 April 1823

⁸⁶ The managers had included one Adam Ritchie, the mulatto overseer William B Archbald who had been on the estate since 1809 and was not highly thought of by Mills, and a relative of McPhail's, William Murray who was.

out of the hogsheads; the middle works called Thomas's was too bad to repair, the roof gone; coppers at the upper works and still house had been newly hung but local 'country' lime, not Bristol lime, had been used so they would not last. The 'lands, stock and even the negroes are considerably injured by parsimony and neglect'. Carpenters and coopers had no tools, mules and horses bought from Porto Rico the previous year were nearly all dead. 60 hogsheads only could be expected from the estate. 'The mismanagement of this estate has been noticed by the whole island'.⁸⁷ In a further letter Mills wanted permission to remove the 'mulatto' overseer and to replace him with someone from off the island. This theme of poor local management, whether white or 'mulatto', is one which is repeated on other estates on Nevis at this time.

A New Manager

Mills was an enthusiast for steam and thought that the estate's cattle mills were too slow and prevented the crop being taken off in reasonable time. He and the estate's other attorney recommended either a small steam engine, or a windmill. Pinney, Ames & Co. responded to the request for a new manager first. They appointed Henry Ransford whose family came from Bristol. His journal records that, aged 16, he was sent on a voyage to the West Indies to recover his failing health. He had no difficulty at all getting work in Jamaica. In the three years between landing in April 1821 and departing in April 1824 he worked on at least six estates. One of these was Lodge estate managed by Mr. Hannaford whose reputation as a manager was known by planters on Nevis.⁸⁸ Although Ransford does not mention this fact, Lodge estate was one of four estates in the parish of St. Dorothy which had installed Boulton & Watt steam engines between 1811 and 1817, and the engine had been in place for five or six years by the time Ransford arrived.⁸⁹ Having been offered a job by Pinney, & and Co., Ransford stayed for several months with Hannaford, visiting the works regularly, and must have gained a little experience with the engine before he left for England.

One issue which Mills had complained about was the depredations of the gang at Stoney Grove. Evidence of this activity can be seen in reports in the 1824 accounts of sheep and goats stolen by those on the estate. The firm tried to allay these concerns by noting that Ransford had been 'some years in Jamaica under an experienced planter who by adopting a new system of management has been highly beneficial in renovating a property and improving the moral habits of the negroes...he has been accustomed to an estate with a steam engine upon it, and from the report we have heard of his talents from indifferent people we trust he will be able to instruct the negroes in its management'.⁹⁰ In the meantime Charles Pinney gave Mills permission to get banished from the island any enslaved person Mills thought incorrigible, a punishment which meant, of course, the break-up of families.

⁸⁷ BULSC, Pinney Papers, LB 58, Mills to Pinney, Ames & Co., 15 January 1824

⁸⁸ Ransford, H, 'Dates and Events Connected with my Family (1667-1881)', in *Western Ontario History Nuggets*, No. 28, 1959

⁸⁹ Satchell, V., 'The diffusion of the Watt Steam Engine in the Jamaican slave/sugar economy 1810-1830', Paper given at the 29th Annual Conference of the Association of Caribbean Historians, April 1997, 16

⁹⁰ BULSC, Pinney Papers, LB 59, Pinney, Ames & Co. to Mills, 18 November 1824

The firm clearly believed that they would have to spend a 'considerable' sum on the estate on behalf of the Pinney sisters if they were to get any return from it. Charles Pinney had seen the installation of the engine at Mountravers and would have known about the performance of the engines on the other three estates, and in August 1824 his firm got quotations for engines from Henry Maudsley of Lambeth. Another was from Fawcett from whom they ordered in 1825.

Given the crisis on the island from drought, disease and hunger and the drain on the Pinney finances from the estate there was a surprising lack of speed in the progress of events. Ransford left Jamaica in April 1824, had a leisurely trip to England via America, got bored in Bristol for some months and only arrived in Nevis in March 1825. The engine did not *leave* Fawcett until September of that year.

Ransford described the estate in his journal. 'Stony it was with a vengeance, one of the canefields called Grape Tree about 30 acres and another Gardenpiece 12 acres, were literally a bed of stones with small bare patches of earth. The cane was planted wherever one could be stuck in or planted, nevertheless there were good crops of fines canes produced but the labour for the negroes and mules to carry away the canes when cut was great and troublesome. The bog lands on the lower part of the estate consisted of 25 acres of rich wet soil without a stone on it, the trouble here was that on parts the canes had to be carried to firm ground where the mules and carts could travel, as in many parts the weight would have swamped them. The place had been much neglected and badly managed and the small cattlemills were not sufficient to grind a good crop. So, it was arranged that I should build a good central set of Works and a steam engine be sent out from England.'⁹¹ In his first letter to the firm he stated that they needed new clarifiers and shell coppers to replace the old iron furnaces, but he also noted the lack of pasture for cattle and therefore the lack of manure. The lack of pasture proved to be a serious problem in 1826 when nearly 20 % of the cattle died from 'poverty and starvation'.⁹²

It having been agreed that the old middle works, called Thomas's, was the best site for the engine and main works the workforce started to pull down and replace the old buildings. Ransford (who later built the Battersea Starch Works) gives his own account of this:

'The walls of the old Works I had to remove were exceptionally hard and tough, a large cistern that stood in the way I could only remove by blasting – the mortar was harder than the stone. A cistern underneath the engine house was another difficulty, every inch had to be blasted and by the time the space was cleared it appeared a huge rock or bolder had occupied exactly the place we wanted. I believe all round was only a stiff clay. A stone chimney 65 feet high had to be built...The works consisted of boiling house, curing room, engine house and distillery, a plan for the engine room was sent out from Liverpool by Fawcett who made the engine, but all the rest was planned by myself and built by negroes and coloured men entirely under my direction. I then made first rate roads leading from the upper and lower ends of the estate on which to transport the

⁹¹ Ransford, H, 'Dates and Events'

⁹² BULSC, Pinney Papers, West Indies Box 1826-1828, Stoney Grove Account 1826

canes to these central works. This was a work of time as hundreds of rocks and large stones had to be blown up so very rough was the ground.’⁹³

According to Charles Pinney’s recollections in 1829 the engine house had taken four good masons, and 12-14 labourers three months to build it using 25 hogsheads of lime and 10,000 shingles.⁹⁴ One of the masons was a free coloured man, James Dore, described in 1822 as ‘a very good man’, who by 1831 had prospered and owed a N£800 mortgage and in 1834 was compensated for 11 enslaved people.⁹⁵

As for the engine, in April 1825 Fawcett quoted Pinney, Ames & Co. £1,500 for a non-condensing 8 hp engine with cane mill and steam cane liquor clarifier. The firm noted that, due to the pressure of work, an order would take four months to fulfil.⁹⁶ The fact that the order was entered in the Engine Book on 27 September 1825 illustrates a problem with the dates in this Engine Book. They are identified as the dates orders were received but since, from other records, it is known that the engine was shipped on the *Mary* from Liverpool to Bristol two days later, it seems that not too much reliance can be placed on the order dates given.



The Fawcett boiler and flywheel *in situ* at the works Ransford built on Stoney Grove (2004)

⁹³ Ransford, ‘Dates and Events’

⁹⁴ BULSC, Pinney Papers, West Indies Box 0-3/3, Charles Pinney to R W Pickwood, 22 April 1829

⁹⁵ Eickelmann, *The Mountravers Plantation Community 1734-1834* Part 3 Chapter 2

⁹⁶ BULSC, Pinney Papers, LB 58, Fawcett to Pinney, Ames & Co., 19 April 1825

Unfortunately for the Pinneys the *Mary* was ‘wrecked’ off Holyhead on the night of 19 October in a gale, and the engine had to be rescued from the wreck. Subsequent delays were caused by the need to repair the *Mary* and clean and repack the engine which only arrived on Nevis in August 1826, nearly a year after it had set off from Liverpool. Even the landing on the island was a trial and they had to build a timber raft to stop the pieces being buried in the sand on the beach. Fortunately, it was only a short distance to the works.

Engineers

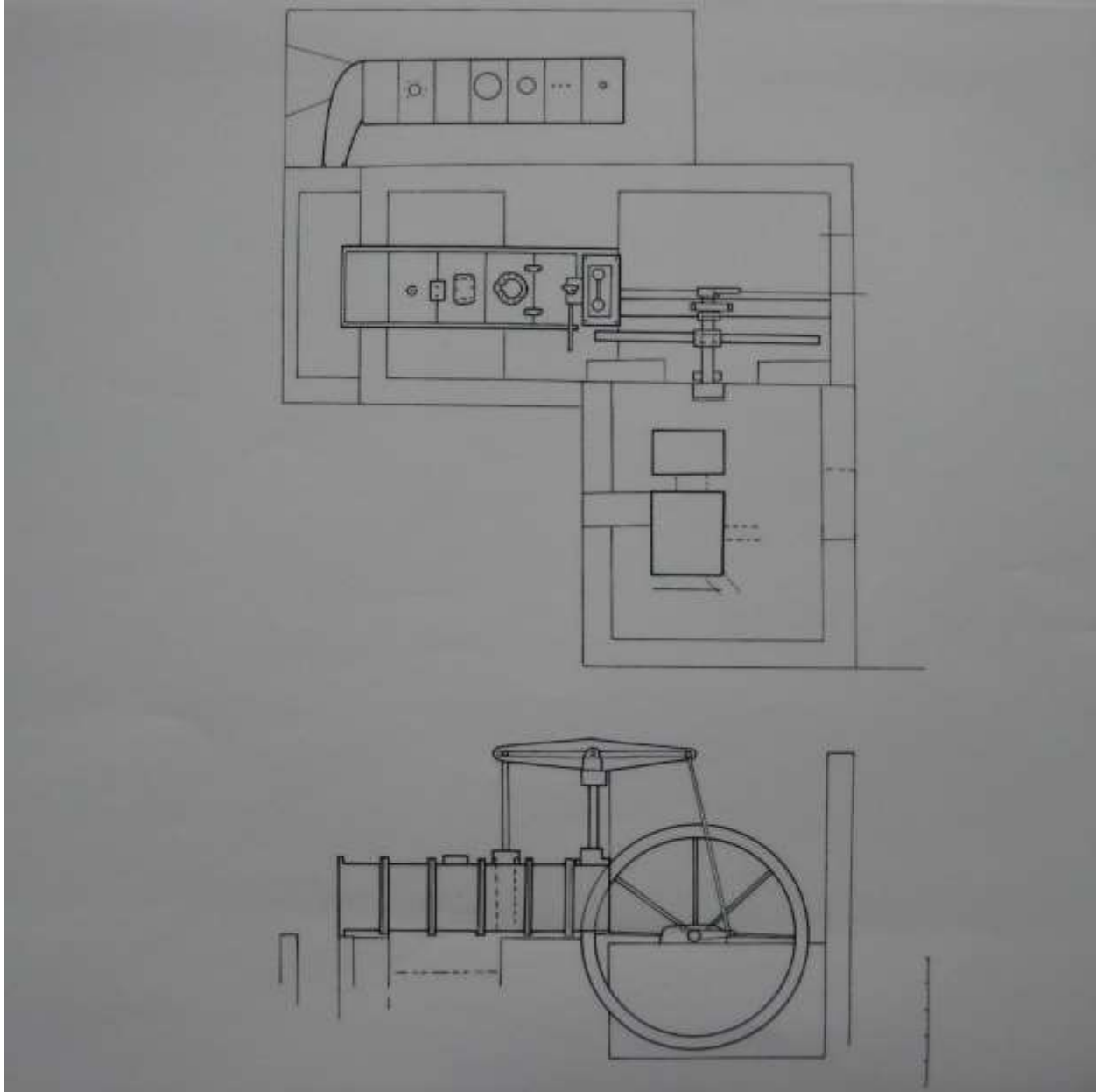
Ransford planned and organised the building of the works but erecting the engine was supervised by Fawcett’s own engineer resident on Antigua, Joseph Gardner. In fact Mills had noted in September 1825 that there was a resident engineer on Nevis who was perfectly competent and deserving of encouragement but Fawcett insisted that their own man do the work, otherwise they would not be responsible for the engine.⁹⁷ Gardner had already experienced conditions on Nevis since he had erected the engines for Maynard at New River and Peter Thomas Huggins at Mountravers. There was a series of letters in April and June 1826 over whether Gardner’s charge of £150 was exorbitant. Pinney, Ames & Co. contended that he had previously only been paid £100 each by Maynard and Huggins, with board, and that they had understood that to be the sum agreed in a meeting with him. Fawcett replied that the charge had recently been £300 in Demerara. It was left to the attorneys on the island to get the best terms they could; unsurprisingly Gardner got his £150. Apart from the difficulties of arranging for highly skilled labour in the West Indies, it is interesting that there clearly were a number of engineers resident in the Leeward Islands at a time when the attractive markets were to be found in Guiana, Cuba and Jamaica. A question worthy of further investigation is the extent to which these resident engineers were passing on their knowledge and skills to the local, free and enslaved, skilled labour force of masons, blacksmiths and carpenters.

Gardner died during the latter stages of the work and his nephew, Andrew Gardner, completed the job. Before he died it seems that Joseph Gardner ordered, possibly on his own account, a 12 hp condensing and non-condensing marine engine for Nevis at a cost of £700. Pencil marks in the entry in the Fawcett Engine Book, dated 7 January 1826, suggest that it was for a vessel called the *Phoenix*. It raises the intriguing possibility that somewhere on Nevis may lie the remains of one of the early steam vessels in the Caribbean, used, perhaps for inter-island traffic. In any event, his principal responsibility, the engine at Stoney Grove, was tested for the first time on 21 December 1826 ‘and gave perfect satisfaction’.⁹⁸ In March, in the middle of its first season, Mills expressed himself ‘so much pleased with the steam engine and satisfied with the benefit to be derived’ that he would have liked to have one at his ‘Trust’ estate where in the previous three weeks he had been unable to make any sugar at all with his windmill.⁹⁹

⁹⁷ BULSC, Pinney Papers, LB 59, Pinney, Ames & Co. to Mills, 21 July 1825

⁹⁸ BULSC, Pinney Papers, LB 60, Mills to Pinney, Ames & Co., 22 December 1826

⁹⁹ BULSC, Pinney Papers, LB 60, Mills to Pinney, Ames & Co., 15 March 1827



Stoney Grove engine and mill site, as surveyed to scale by Professor Mark Horton and Dan Hicks ca. 2002. Scale unknown. As shown in the photo the beam was not *in situ*, may have been smaller than necessary and have come from another site. An additional, Lancashire, boiler was added to the works at some later date. Courtesy of Professor Horton and Dan Hicks.

The Economics of a Steam Engine

When comparing Stoney Grove with the other estates it is possible to identify some shared characteristics but also some important differences. Near the island's capital, with excellent access to the road and the main port, its 360 acres and the potential to produce, say, 150 hogsheads of sugar in a good year put it in the same category as the larger Nevis plantations

like Mountravers or Clarke's. It had particular difficulties, being long and narrow, with difficult ground that was both stony and boggy. Although it had the potential for wind power, it depended on three small cattle mills. The quality of the water may or may not have been an issue but access to it at the works was. The firm suggested sending a 300-gallon water cart with a pump if the engine was going to be built in the middle of the estate.¹⁰⁰ The problem was only addressed later by building a large ground cistern about 40m east of the engine house.

With 213 enslaved people in 1817 it was considerably better manned than the other estates at 1.69 acres per slave. The total number rose and fell over the next eleven years, generally showing that births outstripped deaths except in the 1825 register. 205 people were registered in that year and the register reveals the effect of drought and disease since twice as many deaths as births were registered for the previous three years.

What is different about the estate is the attitude of its owners. Unlike Peter Thomas Huggins, or Walter Maynard, the Pinney family had been trying to extract themselves from the ownership of estates in Nevis since 1808 when they sold Mountravers. The fact that they owned a considerable number of properties on this and other islands in the 1820s stemmed from their need to take possession of bankrupt estates to secure loans made to them. Stoney Grove fell into this category, yet it was the only one on which they spent a considerable amount of money in technical improvements, and it is worth considering why.

Most of the plantations were in a dreadful state and Charles Pinney, in particular, often had a good sense of what improvements were necessary to get rid of an estate to some other planter. Where this could be done inexpensively by supplanting a rotten, absentee planter by a half-decent manager or attorney, as in the case of Parris's, it was done. In the case of Clarke's estate the buildings had to be repaired, a manager installed and title to a portion of the land had to be secured. He also judged correctly that Peter Thomas Huggins, neighbour to both of these estates, could be persuaded to buy them.

Stoney Grove, with its animal mills, lack of pasture and other problems was not susceptible to such a quick fix. Moreover, both the attorneys were enthusiastic about a steam engine and Pinney's firm had already assisted a number of planters with their engines. One additional factor may have been at play. Unlike many of the other estates, taking possession of Stoney Grove was relatively straightforward without expensive recourse to the courts to secure title or buy off other creditors. So, Charles Pinney may have been more willing to invest some of the money, which would otherwise have gone to the lawyers, in improvements. Although they were keen to sell if they could, it seems that the family understood that improvements would take some years to make this possible. It is likely, however, that they would have found some other solution if they had had some idea of the cost to them over the next few years.

¹⁰⁰ BULSC, Pinney Papers, LB 59, Pinney, Ames & Co. to Mills, 8 October 1825

Table 3: Stoney Grove Accounts 1823- 1832¹⁰¹

Year	Total Expenses in £ stlg	Total Receipts in £ stlg	Current Acct. surplus/deficit in £ stlg	Qty. of Sugar Produced in Hogsheads	Total Value Sugar Produced in £ stlg
1823-4	1044	443	601	24	326
1824-5	1996	879	1117	62	879
1825-6	3576	1292	2284	119	
1826-7	2164	2079	85	61	1157
1827-8	1872	1157	715	61	1151
1828-9	3284	2505	779	135	2478
1829-30	2827	1430	1397	131	
1830-1	1673	1971	298	153	1920
1831-2	1535	957	578	85	

The accounts show an immediate improvement in the production of sugar from 62 to 119 hogsheads in the first partial season for which Ransford was responsible. Unfortunately for everyone, the sale of these sugars coincided with a drop in the sugar market due to bank stoppages at the end of 1825.¹⁰² Mills may have been happy with the engine but he was ambivalent about Ransford. While praising his energy and hard work he was less impressed by Ransford's methods when the latter sacrificed some of the 1826 crop to concentrate on the following one. This seems to be reflected in the fall in production again to 61 hogsheads and may have been sensible anyway, given reports from Mills about incessant rains and the prevalence of fever among the enslaved workforce. 'I never knew so many sick since I have lived in Nevis and many deaths have taken place'.¹⁰³ Nevertheless Ransford almost managed to balance the books from the 1826 crop. The weather intervened and the 1827 crop was generally awful on Nevis. One planter noted that it had been the worst in 27 years as a resident planter.¹⁰⁴

There then followed two good years in 1828 and 1829 which should have produced a profit. There is no explanation in the accounts as to why the expenses of the estate increased by 75% during the year 1828-9 and fell from that only partly the following year although it is clear that there was a fall in the price of sugar from the 1829 crop. Aside from the steam engine, and despite the increases in production, not one of the years Ransford was in charge produced a current account surplus except the last one. The 'enormous and alarming expenses' of various estates, including Stoney Grove, were noted by the firm in August 1827.¹⁰⁵ Meanwhile

¹⁰¹ Derived from BULSC, Pinney Papers, AB 71 and Pares, *A West India Fortune*, 302 Table 9. Note that the accounts ran from 1 May to 30 April in any year. Sugar produced in one year was accounted for in the next set of accounts; the value of sugar produced in some years was not noted. The 1823-4 account was only for part of the year.

¹⁰² Pares, *A West India Fortune*, 199

¹⁰³ BULSC, Pinney Papers, LB 60, Mills to Pinney, Ames & Co., 10 February 1826

¹⁰⁴ BULSC, Pinney Papers, LB 60, Walter Bucke to Pinney, Ames & Co., 29 June 1827

¹⁰⁵ BULSC, Pinney Papers, LB 62, Pinney, Ames & Co. to Mills, 1 August 1827

Ransford, whose ideas had always been regarded as expensive by Mills, continued to improve the estate probably with an eye to the offer he made subsequently to buy it. In 1829 he fitted up an old boiling house as a chapel run by Methodists, presumably near the estate house, and may have started an infant school there. In April 1830 new patent coppers, or 'teachs', with winches, were installed in the boiling house, and in May he noted that they needed to complete the works by building a trash house and a ground cistern which would not be finished until the following year. On 31 July he reported a crop of 156 hogsheads, the largest for 25 years 'and I am happy to add without the loss of a single field negroe, horse, mule or working cattle'.¹⁰⁶ By January 1831 he had finished a new still house with six vats.

Charles Pinney was able to see some of the improvements on the estate when he arrived on the island in March 1828 for a two-year visit. He thought Ransford had done a good job but he was more ambivalent about the engine. In a letter to R W Pickwood, owner of Godwin's estate on St. Kitts, he noted that an 8 hp engine was considered best and that 6 hp was too small. In dry weather the engine was invaluable, presumably because it ground the canes much more quickly, but the cost of coal and cartage over difficult terrain from the port were problems, and in Pickwood's situation on St. Kitts he would prefer 'a tolerably good windmill', together with cattle mills and four or five spells of mules.¹⁰⁷ St. Kitts planters seem to have heeded advice like this for a while longer since, according to Deerr, it was not until 1838 that the first steam engine arrived on St. Kitts.¹⁰⁸

The cost of coal was an on-going issue. In 1827 Charles Pinney had written to Ransford: 'I had no idea the fire place of the steam engine was so much larger than that of Mr. Peter Huggins's – could you not lessen the aperture so that the consumption of coal may be decreased.'¹⁰⁹ Another problem was identified in the letter to Pickwood. The quantity of coal depended strictly on the boiling house. If the engine was working 10 hours a day, it would grind canes for three hogsheads, would consume 1,000 galls of water and one and a half hogsheads of coal. But if the mill was continually stopping to wait on the boiling house, the engine would consume twice as much coal. This was close to the calculation made by Ransford who noted that, by running the engine continuously, they had reduced the consumption of coal per hogshead of sugar from 1.2 to 0.7 hogsheads. This meant a considerable saving over 156 hogsheads of sugar.

Emancipation

1831 brought considerable changes in the running of the estate. Henry Ransford departed in a hurry in March without taking off the crop. According to his journal years later 'Things now began to get very uncomfortable, Exeter Hall ravings had set the negroes all eager about emancipation throughout the West Indies and nothing was talked of but freedom or at all

¹⁰⁶ BULSC, Pinney Papers, LB 60, Ransford to Pinney, Ames & Co., 31 July 1830

¹⁰⁷ BULSC, Pinney Papers, West Indies Box 0-3/3, Pinney to R W Pickwood, 22 April 1829

¹⁰⁸ Deerr, *The Early Use of Steam Power in the Cane Sugar Industry*, 17

¹⁰⁹ BULSC, Pinney Papers, LB 28, Pinney to Ransford, 2 August 1827

events the apprenticeship system. I did not altogether like the system of slavery and thought I should prefer renting an estate and hiring people to work'.¹¹⁰ Given the speed of his departure, something must have happened on the estate which put him in fear of his life, for he wrote to the firm that he was giving up the 'dangerous' job of manager. 'I say dangerous as on Stoney Grove there are five notorious thieves and runaways who unless worked in chains are creating constant trouble and expense, and should anything happen to them suddenly the life of the manager would in these times be possibly forfeited.'¹¹¹ This, of course, may also have been a sign of other developments. Tann notes Wilberforce's idea in 1789 that the use of steam power might possibly play a part in the abolition of slavery.¹¹² In fact, far from even ameliorating the conditions of enslaved people, steam, by speeding up the production process, put workers under more pressure as evidenced by the contrast between Mills's three hogsheads per week and Maynard's 12 to 14.

Ransford's period of management had seen the successful installation of the steam engine, the building of a complete set of works and further changes to the infrastructure of the estate. For the enslaved population, bar the arrival of a manager likely to ill-treat his workforce, any active and half competent manager, backed by owners who were prepared to pay for sufficient supplies, was an improvement on their previous situation. Ransford, however, was not able to deal with the expectations raised by the prospect of emancipation. For the owners his last year was the only profitable one. The judgement of his contemporaries was that he was a good planter but one with expensive ideas. Charles Pinney's assessment of the steam engine clearly led him with hindsight to the conclusion that, faced with a similar choice, he might not have gone for this new technology.

After Ransford's departure a new manager, Charles Clifton Caines, was installed quickly but the Pinneys decided to sell the estate. Although production fell immediately the estate began to show a small profit on current account, largely because expenditure was screwed down.

The Pinneys received a number of offers to buy the estate, one from Caines himself, and their principal concerns were the rate of interest and that they retained the slave compensation money which accompanied Emancipation. Walter Maynard Mills bought the estate in September 1835 for £5,000 exclusive of the compensation, a year after Emancipation. This, of course, demonstrates how the value of estates on Nevis had declined. John Huggins had been prepared to offer £25,000 for it in 1812 and sometime later Walter Maynard had offered £12,000.

One of the immediate effects of Emancipation was to raise the problem of labour. Mills found that people who were formerly enslaved were unimpressed either by the new system of apprenticeship, the powers of the magistrates to enforce it, or the wages on offer. In the prevailing circumstances of the following 20 years Mills was no more able to make the estate

¹¹⁰ Ransford, H, 'Dates and Events'

¹¹¹ BULSC, Pinney Papers, LB 65, Ransford to Pinney, Ames & Co., 24 March 1831

¹¹² Tann, 'Steam and Sugar', 69

pay than the Pinneys had been, or George Tobin before them, and the Mills family sold the estate for £2,400 cash in June 1857.¹¹³

Postscript

It was to be thirteen years after the steam engine was installed at Stoney Grove before another engine was put on an estate in Nevis. Men like Maynard and Peter Thomas Huggins had come from a small pool of owners whose estates were large enough to contemplate such a development. Many of the others were in debt to the Pinneys, were otherwise struggling, or had sold their estates to the Huggins family. A few may have been satisfied with the returns from their existing wind and cattle mills and may never have thought of investing in a steam engine. While the Pinneys were keen to divest themselves of the estates which they had been forced to take possession of, Peter Thomas Huggins was keen to acquire the land around his Mountravers estate. This culminated in him buying in 1830 the neighbouring estates of Clarke's and Parris's in St Thomas Lowland.

However, the general climate was not favourable to such an investment. After some stability in the sugar market in the 1820s the price of sugar fell sharply beginning in 1829. Crops on Nevis were poor generally throughout the 1830s, there was a severe hurricane in 1835 and droughts and cane fires from 1836 to 1838. In addition, the excitement and uncertainty generated by Emancipation and its aftermath were not likely to have persuaded planters to continue the experiment with steam in the short term. Huggins immediately regretted his 'imprudence in purchasing Clarke's and Parris's, it will be the Ruin of my Family...the moment Emancipation takes place there will be an end to these Colonies you need not send another ship for Sugar.' In a further letter he warned of 'ruin and misery and Blood-shed'.¹¹⁴ Ransford, too, had clearly been in the same state of panic. In the short term little changed after Emancipation because it brought a period of enforced apprenticeship. Compensation money which might have fuelled a new round of investment in steam mostly went to the merchant houses to pay off mortgages or debts.

There were, however, two other limiting factors which are specifically related to the introduction of technology thousands of miles across the Atlantic. The first is the time it took, in the age of sail, to get repairs done and replacements ordered in Britain. In September 1836, for instance, Mills on Stoney Grove shipped home for repairs a flue and one end of the boiler. Fawcett had still not returned the flue to Bristol by January the following year. In 1838 Mills had to return a pump he had ordered which, he complained, was big enough to power the whole island. In 1835 Huggins was without his boiler head. In September 1839 Fawcett was repairing a cylinder for the Maynard engine at New River and in 1841 a new boiler tube took at least a year to arrive on Nevis. Estates could, of course, revert to their previous source of mill power but such delays emphasised the problems of reliability and delay and hardly encouraged planters to change to steam.

¹¹³ BULSC, Pinney Papers, Domestic Box I/2, Thomas Huggins to Charles Pinney, 12 June 1857

¹¹⁴ BULSC, Pinney Papers, LB 65, Peter Thomas Huggins to Pinney, Ames & Co., 6 and 19 July 1831

A further problem was finding engineers to work on Nevis at a reasonable salary who would live to tell the tale. Gardner had died while installing the engine at Stoney Grove and another engineer had died of consumption in 1830. From January 1827 to December 1833 the engine was supervised by John Hill who was probably a local man. He was replaced on Stoney Grove and the island as a whole by an engineer and blacksmith from England, Daniel Dangerfield. He lasted until 1836 when he was found to be 'inattentive'. The engineer's terms were the subject of disagreement in a series of letters in 1833. Fawcett had proposed the following:

'The Engineer to be bound for 3 years – a free passage to superintend your Engine only and perform any smith's work on your estate at a salary of £2 sterling p. week, board and lodging to be found him, the other engines to be superintended by him at his own profit, independent of the salary of £2 p. week from you, if sick, you to find him medicine and attendance, salary to commence from the date of this agreement, should he give satisfaction to you a free passage home at the end of his term if he requires it, his wages to be paid up to his arrival in England, his wife and family to remain at home and to be supplied with £1-5-0 p. week out of the proposed salary of £2 p. week for his support.'

Pinney, Ames & Co. pointed out that the previous engineer had been paid £100 a year to supervise all five engines.¹¹⁵ By the time Dangerfield arrived the Stoney Grove accounts show that there were only four engines to supervise, not the five he had been led to suppose, and thus each of the remaining estates had to increase its share of his annual salary. This, of course, indicates that one of the engines was already out of commission, however temporarily.

A similar problem of labour attended the ending of apprenticeship in 1838. Planters now found that the erstwhile 'apprentices' were no longer willing to work on the estates, particularly at the miserable wages which the planters offered. These free people preferred working as small farmers for themselves, or they emigrated to islands offering better wages and conditions.

In the light of this labour situation, and despite the difficulties, one further estate on Nevis was equipped with a steam engine in 1839. This was Clarke's estate which Peter Thomas Huggins had regretted buying from the Pinneys in 1830. At 396 acres with a windmill, several cattle mills and good access to the main road and port it was very similar to his own neighbouring estate of Mountravers, sharing the same ghut. With 234 enslaved people in 1817 it had exactly the same acreage per person as Stoney Grove and was therefore better manned than many other estates. However, the Clarke family were unable to pay the mortgage on part of the estate and workforce and they had to be returned to their owner. Drought and disease and appalling mismanagement reduced the workforce further, and by 1834 the number of people had been reduced to 148.¹¹⁶

¹¹⁵ BULSC, Pinney Papers, LB 63, Pinney Ames and Co. to Peter Thomas Huggins, 12 December 1833, to Fawcett, 1 January 1834 and LB 66, to Peter Thomas Huggins, 1 January 1836

¹¹⁶ UK NA, T71/364 and 369

In August 1839 Pinney and Case paid a bill of £758-7-0 for an engine, sugar mill and well pump ordered from Thomas Vernon and Co. through Stephen Moore of Liverpool. It is possible that Vernon was the Fawcett engineer who had supervised the rescue of the Stoney Grove engine from the wreck off Holyhead in 1825 and had gone into manufacturing engines on his own account. The engine seems not to have been satisfactory since another engine was ordered on 21 December 1846 at a cost of £650, this time from Fawcett. It was a 10 hp non-condensing beam engine without a mill. The remarks describe it as a 'Beam engine on Diagonal cast iron framing' and note that it was 'the first of this kind'.¹¹⁷ Its base can be found in the ruins of Clarke's engine house at the Four Seasons Resort on Nevis.

These engines represent a postscript to the initial flurry of interest in steam on Nevis which lasted from 1812 to 1826. They demonstrate that Huggins had not lost his enthusiasm for the technology but the second engine also illustrates the difficulties even a competent planter on Nevis got into in the 1840s. In reply to a dunning letter from Charles Pinney, Huggins wrote in January 1849 that the failure of the West India Bank, panic in the money markets, a fall in the price of sugar and a hurricane had left him going from one merchant house to another trying to borrow money to pay off the engine. As a result he no money left with which to plant a new crop.¹¹⁸

A further description of the problems with steam engines on Nevis in this period comes from John Davy who was in the West Indies from July 1845 to November 1848. He had heard of a report from Nevis that the introduction of steam 'was hardly successful, for of the four (sic) steam engines erected, I was assured, only one remained in use, the other three being out of repair, as no artificer in the island possessed of the requisite skill to make them efficient'.¹¹⁹

Conclusion

The available evidence makes it possible to draw some conclusions about how and why steam technology was introduced to six estates on a small, but important, island in the Caribbean between 1818 and 1840. This diffusion of technology took place against the background of a collapse in sugar prices, increasing competition from other islands and an increase in the costs of running a sugar plantation based on slavery. It was a period characterised by debt and absenteeism but a crucial role in the general failure of the sugar industry on Nevis in the 1820s and 1830s was played by drought, disease and famine.

Although enquiries were being made about steam engines in 1812, the first Nevisian order for an engine came in 1817 by which time there were already considerable numbers of steam engines in the Caribbean. It came at the tail end of the flurry of enthusiasm for steam in Demerara, Jamaica, St. Lucia and Martinique but at about the same time as Cuba began to succeed with steam-driven mills.

¹¹⁷ NMGM B/FP/5/1/2. The NMGM holds several sets of drawings for parts of this engine at B/FP/5/3/2/112-113

¹¹⁸ BULSC, Pinney Papers, Domestic Box I/2, Peter Thomas Huggins to Charles Pinney, 20 January 1849

¹¹⁹ Davy, J, *The West Indies Before and Since Slave Emancipation*, (1854), 487

In common with St. Lucia and Martinique, but totally against the trend of orders from Demerara, the Nevis orders were for non-condensing engines. Perhaps, having learnt from the experience of the two Windward Islands with smaller engines, Nevis planters tended to take the advice of the manufacturers and ordered the larger 8 and 10 horsepower engines. These were attached either to existing, or to newly ordered, horizontal mills, and steam power replaced both wind and animal power. Unlike the engines of Jamaica, those on Nevis were clearly fired by coal from the coalfields of South Wales and the Forest of Dean.

The engines were located all around the island and, because of the topography, they were placed on estates which had good access to ports and main roads though there was a continuing problem with access to water of suitable quality. Those estates which actually did install engines were near, or substantially above, 300 acres in size, capable of producing a good deal more than 100 hogsheads of sugar in a productive year. This placed them among the larger estates for Nevis. However, it put them well below the 250 hogsheads which Ward states was considered to be an economic minimum for an estate with a steam engine and which were to be found on Jamaica.¹²⁰ Either the estates were undermanned or were facing declining populations.

The planters who installed these engines came from a small, mixed pool of absentees and those who were fully committed to the island in the long term; most were prepared to expand the number of estates they owned. In the context of Nevis they were, by definition, innovators and they showed this in some other areas of plantation life like plantation chapels and schools. In general they were building on experience gained in other islands. The case of Stoney Grove does not fit into a pattern of long-term commitment, however, since the Pinney family were hoping to extract themselves from their entanglements on the island.

The evidence as to why planters were attracted by steam-driven mills is very clear. In a period of declining profitability, they believed that steam engines could provide certainty of production, as compared to windmills, speed up the production process, increase the quantity of sugar produced and enable savings in the labour costs of enslaved people and animal stock

While steam-driven mills had the potential to improve the balance sheets of the estates, in the medium term the hopes of planters proved to be unrealistic. The engines were less reliable than the planters had expected and their dependence on parts, repairs and scarce engineers from England threw them back on their previous sources of power. In the case of Stoney Grove, and probably at Mountravers too, the extent of the ambitious building programmes did nothing to improve the profitability of the estates. But there were external factors too. Recurring droughts and disease, the collapse of land values, absence of credit, panic in the money markets and the decision, post-Emancipation, of free black labour not to work on the estates all played their part in dashing the hopes of the planters. Generally this first phase of the experiment with steam on Nevis proved to be a failure. It was the late 1850s before the arrival

¹²⁰ Ward, *British West Indian Slavery*, 98 fn 103

of Thomas Graham Briggs from Barbados initiated the new round of investment in steam technology described by Neil and Ann Wright in their 1991 article in 'Industrial Archaeology Review'.

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