

From the *Transactions* of the
Bristol and Gloucestershire Archaeological Society

The House of Pinney and Garnetts Patent Rollers

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2010, Vol. 128, 189-205

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The House of Pinney and Garnett's Patent Rollers

By OWEN WARD

Among the exports from Bristol to the islands of the West Indies between 1773 and 1779 were dozens of millcases. These were substantial iron rollers, three of which stood vertically in a sugar-mill and rotated as a unit to crush the cane as it was fed through on one side of the central roller and back again on the other side. Records of the exports can be found in the Bristol Presentments

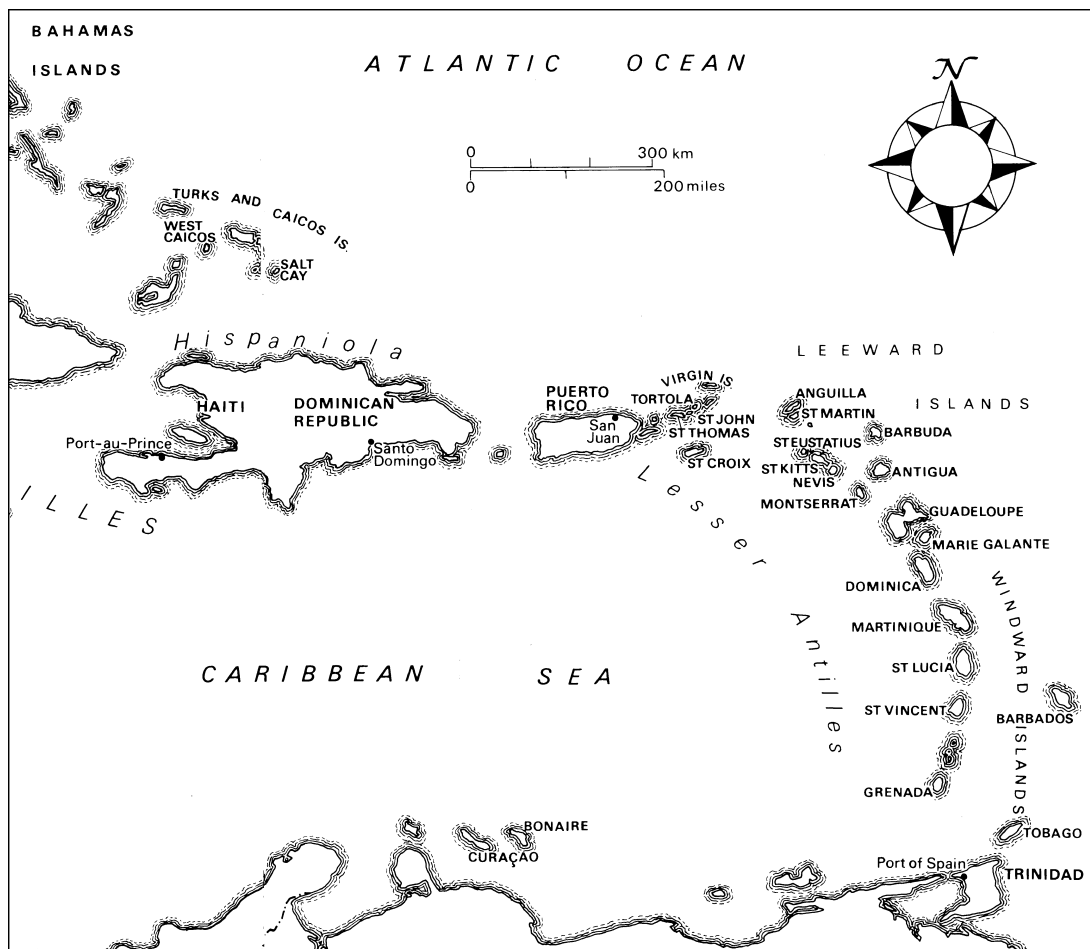


Fig. 1. The islands of the Caribbean: Nevis lies just to the south of St. Kitts in the Leeward Islands.

held in Bristol Central Library.¹ These are detailed lists of exports of goods of all sorts to ports in the Irish Sea and, more frequently, across the Atlantic. The present author began studying them to find traces of the distribution of the much-prized French millstones for cornmilling which can still be found in most of the former British colonies, and particularly North America.

A reading of Colin MacInnes', *Bristol: a Gateway of Empire* confirms that the millcases were destined for sugar mills.² Moreover, MacInnes had footnote references to some correspondence in a collection of copy letters and other papers which had belonged to the Pinney family, Bristol West India factors, and which are now largely concentrated at Bristol University Library in its Special Collections.

It is worth remembering that the present study has only been able to dip, however carefully, into thirty or so of the over 200 volumes of letters and accounts.

The Pinneys and the Island of Nevis, 1685–1851

The only account of any length devoted to the history of the Pinneys as plantation owners on the island of Nevis and sugar factors in the port of Bristol is Richard Pares', *A West India Fortune*, published in 1950 (Figs. 1, 2). At the time Pares was writing the family still lived on estates in Dorset, some ten miles inland from Bridport, which it had acquired during its business career; many of the records were still held by the family, but were gradually finding their way to Bristol University Library. Some of their estates are still occupied by members of the family. The firm also built the townhouse, now known as The Georgian House, in Great George Street, Bristol, in 1791. This is maintained by Bristol City Museums as a memorial to the Pinneys' enterprise.

According to Hester Pinney in her foreword to Geoffrey Nuttall's edition of *Letters of John Pinney*, the Pinney family can be traced back into the early 15th century but the first member of the family to leave a literary legacy was Reverend John Pinney (1645-1705).³ The volume of his letters, written between 1679 and 1699, was published in 1939 with a foreword by Hester Pinney who credits three of John 'the Preacher's' immediate descendants with success in life: Hester who sold lace, Azariah who 'made good' in the West Indies, and Nathaniel who carried on business on the family estates in Dorset and at Bristol. Then in the latter half of the 18th century a cousin, John Pretor, adopted the name of Pinney as a condition of inheriting the estates in the West Indies and in Dorset, and managed them well so as to make them profitable. He also became responsible for the Bristol family business of West India sugar factor, a role which consisted principally of the supply of plantation goods and loans against the remission of sugar, and he was so assiduous in its control that it flourished just so long as the industry itself did. Towards the end of the firm's existence in the mid-19th century, as a consequence of its customers' inability to pay for the goods which had been sent out to them or repay the loans which had been made to them, the Pinneys became substantial plantation owners.

Superficially the direction of the firm appears to have varied somewhat between the arrival of John Pretor in 1758 and the final closure of the business around 1850. Between 1784 and 1806 members of the Tobin family, friends and political allies of John Pretor Pinney, were partners in the business,

- 1 The books of Bristol Presentments contain printed lists of goods exported from the port between the last quarter of the 18th century and the early 20th. They were compiled by customs officers. Now held in the Bristol Reference Library they are made available on microfilm. Each ship is named under its date of departure, its destination is stated and this is followed by a fairly detailed list of commodities taken aboard.
- 2 Colin MacInnes, *Bristol, A Gateway of Empire* (1st edn., 1939, David and Charles, 1968). See especially ch. xv, 'John Pinney - planter and merchant'.
- 3 G.D. Nuttall (ed.), *Letters of John Pinney 1679-1699* (Oxford University Press, 1939), pp. v-vii.



Fig. 2. Nevis, by Thomas Jefferys, c.1749: the Narrows separate Nevis from St. Kitts.

whilst from time to time other relatives, and a chief clerk in the Bristol office, Robert Edward Case, became involved and their names included in the title of the House of Pinney. Although nominally retired, John Pretor Pinney continued to master-mind the affairs of the firm until his death in 1818, and thereafter it was his son Charles who continued to do business with the West Indies until he eventually cut his losses, succeeded in selling the plantations, wrote the last business letter in 1850, and sold the counting house in Great George Street in 1851. 'Thus', concludes Pares, in spite of its many changes in title, 'we may ... speak of it as the House of Pinney.'⁴

The island of Nevis is one of the smaller islands in what used to be called the British West Indies. One of the earliest to be occupied by the English, the first permanent settlement of all had been on its close neighbour, St Kitts, which had been occupied in 1624. Four years later, in 1628, a group of Englishmen - soldiers, planters and servants - was sent across the gap of barely two miles to establish themselves on Nevis at a time when it had no regular inhabitants. To begin with, as on the other islands, the newcomers would have been concerned to produce what they could for their own subsistence, but the colonists had to go on to earn a good living from the cultivation of anything which could be grown in their climate and traded with Great Britain. A number of potentially profitable crops was tried in the West Indies, but of these cotton was generally found to require too much land, and indigo had been a failure on St Kitts.

So it was that by the 1640s the islanders decided to cultivate sugar on a large scale. This determination coincided with both the demand for, and the supply of, an abundance of cheap labour which came from the trade in slaves from East Africa to the English colonies, a trade which closely followed the example of the Spanish and Portuguese. The figures which we have for the outlying island of Barbados tell us that in 1645 there were already 6,000 negroes on the island, but over the next 40 years an additional thousand slaves were shipped in each year, and at the same time by 1685 the white population had been reduced by half, from 40,000 to 20,000, as colonists left to go home to Europe or to newer prospects in other islands, such as Jamaica, or in North America.

By 1685 on the island of Nevis the plantations were owned by a number of self-made entrepreneurs who had gone to the West Indies, all determined to make enough money, as quickly as possible, so as to be able to retire and return home. While their every move was watched by ambitious and sometimes devious and envious neighbours, theirs was an interesting and volatile enclosed society, worthy of closer study than it has had - and fit for a dramatic piece of theatre. Into this confusion and constant internal bickering came Azariah Pinney, with just £15 in his pocket, to found a fortune. But how did he achieve this from next to nothing? At least we know already that he was an independently minded and determined young man. The first Pinney to reach Nevis travelled under a very heavy cloud. The youngest son of a practising nonconformist family, Azariah Pinney had unwisely so involved himself with the abortive rebellion of the duke of Monmouth in 1685 that he found himself in prison and under sentence of death. Pares was at a loss to discover how it nevertheless came about that he sailed to the West Indies as a free man, though under an obligation to stay there for at least ten years.

Colin MacInnes, whose *Bristol: A Gateway of Empire* was published in 1939, 10 years before Pares was writing, knew exactly what happened. He explains that 'Nathaniel Pinney, a member of the Royal African Company, exported lace and textiles to the [West Indies]. His brother, Azariah Pinney, ... was condemned by Judge Jeffreys to transportation ... Fortunately [as a member of the Royal African Company, which was involved in the slave trade], Nathaniel was able to buy him, and so, theoretically, Azariah went out as his brother's bondsman.'⁵ MacInnes then describes how

4 Richard Pares, *A West-India Fortune* (Longmans, Green and Co., 1950), p. 174.

5 MacInnes, *Bristol*, p. 308.

expensive this arrangement was. Even Pares was aware that something like £100 had changed hands. But he felt sure that 'as [Azariah] was young and obscure, and had not distinguished himself in the rebellion', and because the rapidly expanding plantation colonies were desperate for labour, he was not likely to be executed.⁶

How did it come about, then, that Pares was so much in the dark? There are two answers to this. The first reason is that when both writers were working on the Pinney papers, both were under some difficulty. The papers were not at that time all lodged in the same place, at Bristol University, but some were still held by various branches of the family. Crucially, MacInnes found the accounts and letter books of Nathaniel Pinney at the family home at Racedown. Pares does not seem to have benefited from these, so presumably did not know of their existence.

There is a second reason why Pares did not see the account of Azariah's deportation in MacInnes' book, nor the references to Nathaniel's papers in the bibliography. MacInnes was published in 1939, the year the Second World War broke out, and we learn from the reprinted edition of the book, not published until 1968, that in 1940 'when a small number of copies had been disposed of, the whole of the remaining stock was destroyed by enemy action'.⁷ So it is not so much of a surprise that Pares, who was based at Edinburgh University, had not seen a copy of MacInnes' book, nor knew that it had any reference to the Pinney family - although he had done his reading of the letter books in Bristol at the University where MacInnes was a professor.

So Azariah was bound, by the terms of his bond to his brother, to remain in the West Indies for a period of 10 years, but in fact he stayed there, for a variety of reasons, for over 30 years, until he came back to die at the family seat in Dorset. Azariah chose Nevis to settle on because it was the seat of British government of the islands at the time, so it was often one of the first ports of call for a Bristol ship, and was already home to the Coker and Keynell families from the west of England.

The Pinney family had no connection in the West Indies; their small, but satisfactory and hard-won business was in lace, making and selling it. So this is what they continued to do in Nevis. They sent Azariah consignments of family-produced lace to sell, and so he did. And to these shipments of lace were gradually added other things. For example, Pares tells us that 'in March 1689 his brother Nathaniel sent him a small parcel of axes and hoes to sell' which Azariah sold, either for money or more likely in exchange for shipments of sugar which he sent back to Bristol to repay Nathaniel.⁸ Azariah received a commission on sales, and his business as a factor grew, until he ended up selling everything for the plantations except slaves, which were the monopoly of the Royal African Company and their own agents, of whom he was not one. In addition to commission from sales, Azariah was also soon being paid to manage a small, but fertile, plot of land which he later acquired, in part as payment for a debt.

He gradually increased the extent of his holdings in the island, sometimes in partnership, perhaps with an experienced planter, sometimes as tenant, and sometimes as the sole landowner until he was able to establish himself at Mountravers, in Lowland parish, which became the island home of the Pinneys (Fig. 4). He progressed through the administrative ranks of the island earning the respect of his peers as an honest and prosperous merchant and plantation owner.

After Azariah's return to England in 1719 he was followed onto the island by a string of family members. But his plantation barely survived because his successors tended to aspire to the life of an absentee sugar planter in England and drained the estates of capital in their efforts to gain a quick return. In 1762, however, his cousin John Pretor inherited the properties in Dorset and on Nevis as well as the responsibilities which went with them. He went out to Nevis at the end

6 Pares, *A West-India Fortune*, p. 7.

7 MacInnes, *Bristol*, p. 9.

8 Pares, *A West-India Fortune*, p. 32.

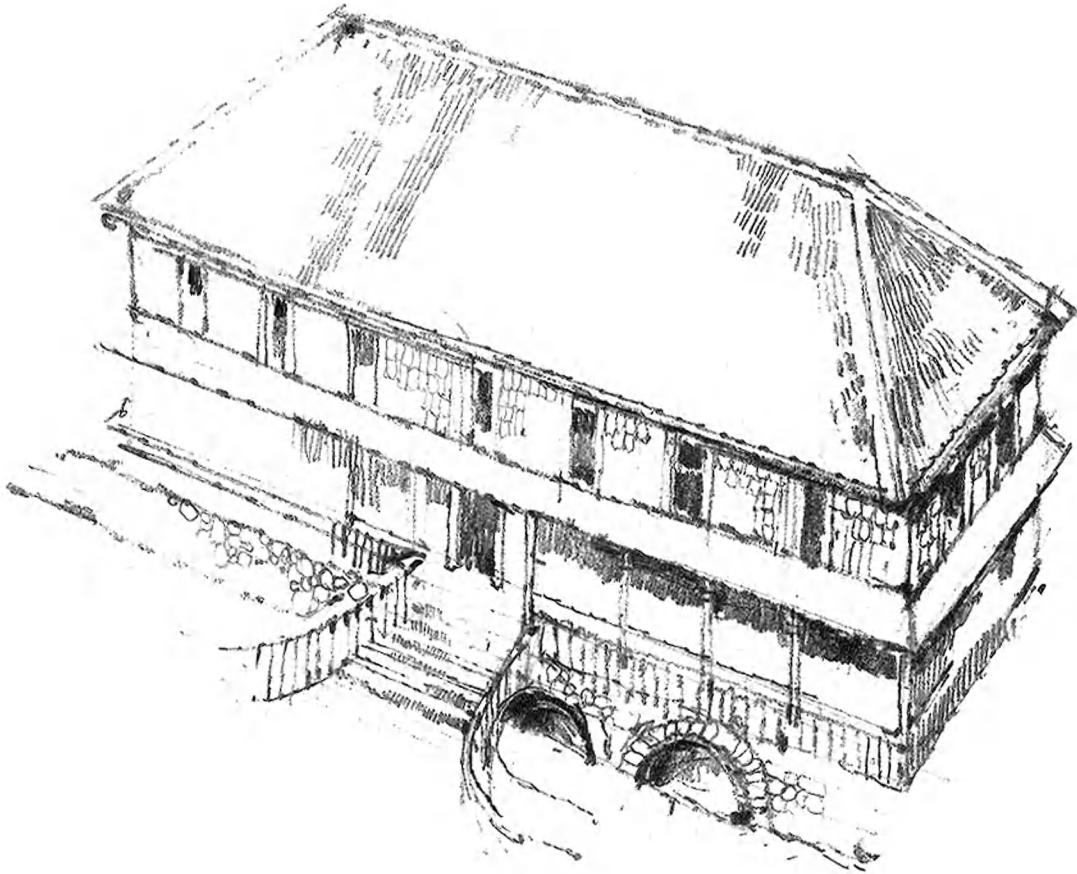


Fig. 4. The Pinney House at Mountravers, as realised by Vistor Ambrus in 1998 on the occasion of the visit of the Time Team to Nevis in 1998. Reproduced by permission of the artist.

of 1764, and his vigorous and rigorous management of the plantations began the revival of the family fortunes. John Pretor Pinney was himself ready to return to England, probably for the sake of his children's education, in July 1783, leaving a thriving estate in the hands of a succession of managers. Each one began his term of office with a sound, business-like attitude, but each in his turn became increasingly unreliable, mainly because of their easy access to rum, and had to be replaced. In his letters to them from England, Pinney fulminated meticulously but ineffectually for the next 20 years or so, but was nevertheless able to sell his estate as a going concern in 1808.

The sale of Pinney's Mountravers estate on Nevis should have meant an end to the family's personal involvement in running a plantation. But they continued to be encumbered, as they viewed it, with land which they received in lieu of repayment of mortgages or debts for plantation goods which they had supplied on credit. Although they looked on their real estate acquisitions as unplanned by-products of their business as merchants and financiers, the plantations were made to contribute substantially to the family fortune. And the family's experiences of ownership of

plantations undoubtedly added to their appreciation of their customers' needs and wishes - but perhaps led them to be over-indulgent in times of difficulty. In 1784, on his return to England, John Pinney had set himself up in business as a West India Merchant, and soon after 1788 he had built himself a town- and counting-house at 7 Great George Street.

What did a West India merchant supply? A simple way of finding out is to look over the cargoes listed in the Bristol Presentments for islands such as Nevis. So, for example, in Dec. 1778 the *Nevis Planter*, with Henry Webb as its master, carried an assortment of goods for 18 different manufacturers and agents. The goods despatched by the firm of Baillie and Bright included axles, mills, gudgeons, wheels, wrought iron in various containers, painters' colours, bread, potatoes, wearing apparel and hats, copper and pewter items, and four dozen ox bows. Walter Jacks sent out linseed oil, bacon, cheese, lime and vinegar amongst other things. The other merchants were sending such things as flour, canvas, soap, oats, port wine, candles, beer, cider, beans and materials including hoops to make hogsheads for the return of sugar to Bristol. Amongst all this paraphernalia, which sometimes included major items such as a coach, refined sugar was carried to Nevis which suggests that none of the crop was refined on the islands.

A more engaging and illuminating view of the business can be had from reading through the letters which the House of Pinney wrote to its correspondents on Nevis and elsewhere. Amongst other matters of considerable interest was the introduction of new technology to the planters, who would sometimes welcome it, even demand it, and at other times would be at best reluctant to adopt anything new especially if it were more costly than what they had been used to. Such an innovation was Garnett's system of patent friction rollers.

John Garnett's Patent

On 26 Feb. 1787, John Garnett, a merchant who was probably an American but was temporarily resident in Redland, Bristol, enrolled a Patent (no. 1580) for a 'method of reducing friction in axles etc.' He went on to describe an assembly of rollers in which an axle could rotate more freely than within a solid bearing. One of the earliest published references to Garnett's work is found in William Mathews' *New History ... of Bristol* (1794). He recorded that,

A patent has been granted to John Garnett esq. of Bristol, for his invention to lessen friction in all kinds of wheels, blocks for ships, grindstones and rollers; this contrivance is of much importance to all who are concerned in mill-work where great powers are required; for by its use, a far less force answers every purpose, and the movements being rendered more easy, the works of course last longer and seldom want repairs. The works are carried on near College Street, and are called Garnett & Co.'s Patent wheel and block manufacture.⁹

Mathews' own *New Directory of Bristol* of 1793/4 has 'Garnet [sic] & Co.' at his Patent Wheel manufactory, Bishop's Park.¹⁰

The system is shown clearly in the section on millwork in Rees' *Cyclopaedia* with illustrations dating from about 1805 (Fig. 5). It is first of all drawn in its original version designed for the axle of almost any kind of machine or gadget, so long as it lay horizontally. But when it came to the rollers of 18th-century sugar mills they were, and always had been, vertical. This may well have been because they were turned initially by animals, but the later introduction of more convenient, more sophisticated, alternative power sources, such as wind and water, did nothing to alter this. The islands were small, isolated outcrops where rivers were not inclined to be either large or regular in

9 William Mathews, *New History ... of Bristol* (1794), p. 41.

10 William Mathews, *New Directory of Bristol* (1793/4), p. 36.

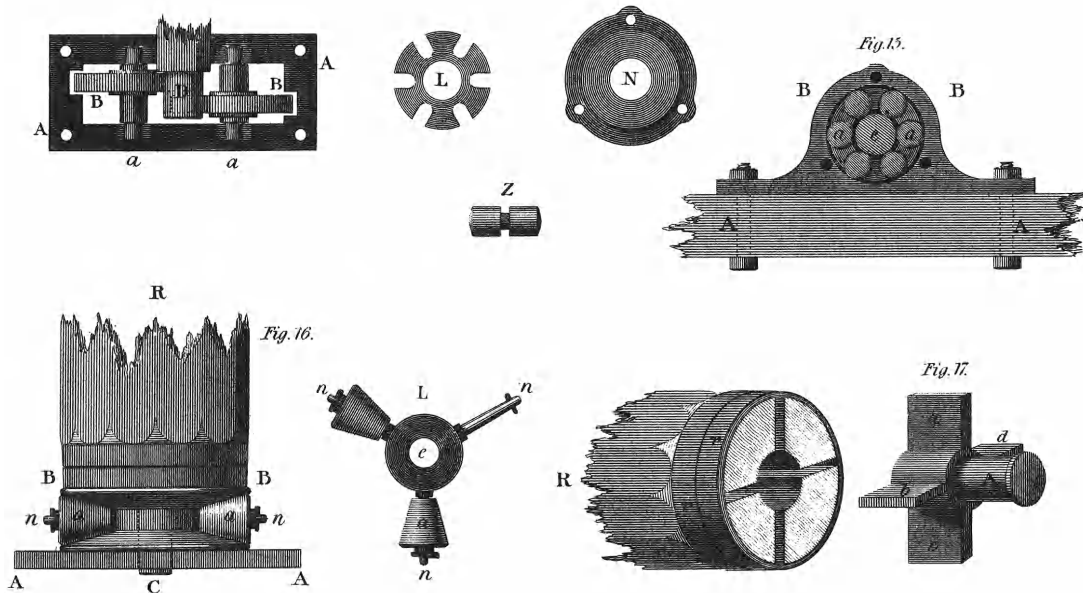


Fig. 5. Rees, *Cyclopaedia*; illustration from Millwork, Plate II: the top row shows the horizontal orientation of the Garnett system, the bottom row the modifications for the vertical system.

habit, and where wind could not be relied on to blow precisely at the time when it was needed to grind the crop. And one great snag was that in the late summer the winds would be devastating, and any less than extremely sturdy windmills had to be at least partially dismantled, and stored against next season's harvest. By the late 17th century stone-built tower mills were being put up, so that, if anything, only the sails needed to be taken down after the crushing season and reinstated after the hurricanes had passed.

In many parts of the world the rollers were made from suitable tree trunks, so they could be almost any size, so long as they could be made to work closely together. By the late 18th century, however, cast iron rollers were the norm, and initially appear to have been made to measure to fit existing mill frames. Although millcases had once been used to encase existing wooden rollers, it seems certain that all the cases which were met with so regularly in the Bristol Presentments were self-contained hollow ones reinforced with spiders top and bottom. But it is clear that Mr Garnett's friction rollers were not, as they had been designed, of any use in sugar mills with vertical cases; the system had to be turned through ninety degrees. It is Rees, again, who can show us how this might have been done.

At this point it is perhaps worth recalling how the vertically oriented sugar mill worked (Fig. 6). It was built with three rollers held in a straight line in a frame. The central roller alone was driven, usually by extending its central axle shaft upwards to be rotated by a couple of shafts yoked to circulating animals (oxen, mules or horses as a rule). It was made to mesh with the two rollers, one on either side, tightly enough to crush the sugar cane as it was fed, first between one gap in rollers, and then returned through the second gap which was more closely set. A vertical shaft or axle was fitted through the centre of each roller and was seated in a footstep bearing. A projecting pin, or gudgeon, retained the shaft in its proper place. Lubrication was an essential routine.



Fig. 6. Animal-powered sugar mills from Thailand; all parts are of wood including the rollers.

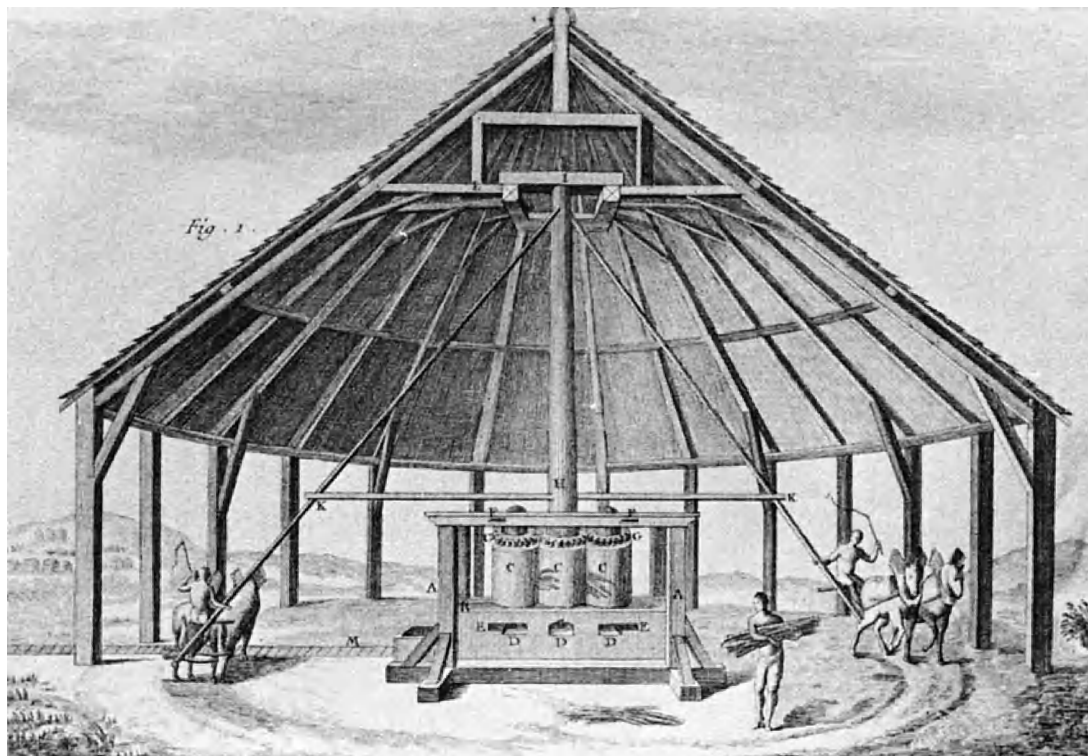


Fig. 7. Mule-mill for sugar (Bernard, *Sucrerie*, Paris 1784) in David Buisseret, *Historic Architecture of the Caribbean* (Heinernann Educational, 1980). Reproduced with the author's permission.

John Pinney and his 'friends' on their sugar plantations were, with few exceptions, concerned only with a vertical version of the Garnett system for use in their sugar mills, a rearrangement still in the experimental stage in 1790. Nevertheless, Pinney was convinced by the economies which it promised that he should at least give this, more expensive, machinery a fair trial. He would expect to save time, so that the crop could be got off more quickly by a strategic deployment of his slave force; and he should also save in the number of cattle required to operate the mill so they could be otherwise employed in the fields or in transporting cane or hogsheads of sugar. Or it might mean that a planter did not have to hire extra cattle when they needed to drive their mill. But although Garnett's was a local firm which Pinney could easily consult, it is clear that the House of Pinney did not pioneer the introduction of the patent, energy-saving roller, to the West Indies, preferring instead to wait until John Pinney could sound out the opinions of acquaintances who actually saw them at work.

Thus, on 20 July 1791 John Pinney wrote to Dr Thomas Pym Weekes, his brother-in-law and manager of his Lowland estate, that he was not now in a hurry to complete the windmill which he had started to build, and on which he had already spent nearly £700 because,

I hear that there is a Cattle mill at St Kitt's, with Garnett's patent rollers that does execution, with very modest strength, nearly equal to a windmill - it is so much approved of in that Island, that Mr Evan Baillie has orders for no less than six - I wish you would desire my worthy friend Taylor to see it when he goes to

St Kitt's, and send me his opinion of its utility, united with yours and Mr Atherton's, that I may determine on the propriety of sending one out next year.¹¹

Meanwhile Weekes was instructed to secure the masonry of the windmill so far completed against the weather. Evan Baillie Sons & Co. was a major sugar-factor and banking business in Bristol. Pinney would have been well aware of them. Peter Baillie, a partner in the family business, married Pinney's daughter Elizabeth. One month later, on 8 Aug. 1791 Pinney wrote again to Weekes that,

I have received such repeated good accounts of the above mills that Mr Tobin and myself have come to a resolution of sending one for each of our Estates. You will therefore reserve one of the mill-rounds', (which was already prepared to take a cattle mill) 'at my lower work, to erect it immediately.¹²

Meanwhile the firm wrote to another of their correspondents on Nevis, Walter Maynard, a competent planter and staunch friend of the Pinneys, that,

We are so entirely of your opinion as to the probable utility of Sugar Mills on the principle of Garnet & Co that Mr Pinney and our J[ames] T[obin] had each ordered one of them. On consulting however with Mr Milton, one of the patentees, and the acting one here, who is considered (although a clergyman) as a most excellent judge of Mechanics, we find, that it will be very inconvenient, if not actually impracticable, to apply their systems of Rollers to a Mill of 18 inches diam. We have therefore taken the liberty of ordering your cases as well as our own to be made 22 ins. diam. and we think that even much larger mills are likely to go very easy with these rollers ... We shall exert ourselves to get the Mill ordered ready to go out in the *Nevis* in October; but we cannot speak positively as this new invention has thrown much additional and unexpected business into the Foundry's, and other departments of the Iron Manufactory. Six or eight were bespoke immediately on Capt. Baxter's arrival from St. Kitt's, which of course will be expected to be finished before later orders.¹³

Another of Pinney's 'friends' on the island, John Hendrickson, also ordered a new mill, and beside being warned in Aug. 1791 that 'we shall duly attend to your order for a new Mill with the patent friction rollers, but can by no means say whether it will come within the price you limit, as the different parts must be made at three different manufactories',¹⁴ Pinney gave him the advice which he had given Walter Maynard.

A third correspondent to whom Pinney offered advice on mill improvements was George Webbe. He was always short of money, but was treated with unusual respect by Pinney, perhaps because he was so honest about it. So George Webbe was trying to economise, but Pinney was obliged to tell him in the same month of Aug. 1791 that,

your old iron mill we have very minutely examined, and we are afraid we cannot adhere strictly to the letter if your instructions with respect to the alterations you point out. ... Our J.T. will, however, with the advice and assistance of the manufacturers, and his friend Milton, make as good a job of it as possible. Mr Milton was indeed much struck with the size of this mill, and is persuaded that if it can be properly fitted, it will do immense execution, and with little or no additional strength.¹⁵

During the next couple of months Pinney wrote several letters to the islands about preparations for his new mill with the patent rollers, and his anxiety that it might not be ready to start work on the new crop in December. Pinney's business partner, James Tobin, was just as keen on making a

11 The figures are given in Account Book 39 of the Pinney papers (January 1791); Pinney Company Letter Books, Bristol University Special Collections Library (hereafter LB), 9, p. 215.

12 LB 9, p. 218.

13 LB 38, p. 303.

14 LB 38, p. 305.

15 LB 38, p. 308.

success of the new mill system. In Oct. 1791 Pinney wrote to their carpenter and millwright on the island, Edward Brazier, to say that, 'an oak mill frame made here like Mr Tobin's, who has described the whole to you in so full and masterly a manner ... will not be ready before the middle of December.'¹⁶ This was to accompany Pinney's roller mill. Meanwhile Pinney wrote to Weekes, 'I shall send out a complete oak frame with [my mill] like the one that Mr Tobin, if he can get it ready, will send by the *Nevis*.'¹⁷ He was also thinking about being able to economise on other parts of the mill as a result of using the new rollers, in particular the sails, by shortening them, and reducing maintenance on the shaft, whereby 'the spindle may be made of iron and the stocks and points shorter as the friction will be less: but this is a future consideration after proving the utility of the mills now making.'¹⁸

This last letter, written on 24 Oct. 1791, was one of several on a particularly busy day for John Pinney. Letters bearing the same date show Pinney writing to his friends J.R. Herbert and Andrew Hamilton on Nevis with a, 'P.S. We have not with all our exertions been able to get the two gudgeons for Mr B's estate in time for the *Nevis*; owing to the great quantity of work which is unexpectedly thrown into the iron manufactories by the orders for iron mills of the new patent construction.'¹⁹ However, there is a second; 'P.S. by the *Nevis* being detained we are enabled to send the gudgeons for Mr B's estate.' Pinney also wrote letters to John Hendrickson and Walter Maynard on Nevis that,

In our last we expressed our fears of not being able to get your Iron mill completed by this ship, and so it has proved. Of six of these mills which we have in hand, we have been able to get only a single one completed, and that is for our J.T. about which we were indeed the most anxious as he is at the additional expense of having a wooden frame made here, which will of course serve as a model (if it is approved of) for our other friends to prepare their frames by in readiness against the Iron work arrives, which shall be as soon as possible.²⁰

He also wrote in a letter to George Webbe, that, 'It is surprising what additional work these new mills have thrown into the different manufactories, and work of a new and more tedious kind.'²¹

In one of his account books' is a clutch of payments in 1791 on behalf of James Tobin which presumably represents a complete mill on the new pattern, including the specimen timber frame:²²

Wm. Jones & Son [timber work]	Millwrights	£51 12s. 6d
John Winwood	Iron founder	£35 7s. 4d.
John Garnett & Co. For patent rolling systems		£63 3s. 4d.
Winwood & Protheroe [gudgeons]	Iron manufacturer	£63 19s. 2d.

By 11 Nov. 1791 Pinney was able to respond to John Taylor's report on the cattle mill on St. Kitt's and advise him that,

By your kind favour of the 24th Sept which this moment came to hand, I find my windmill is so forward that you strongly recommend me to send out the ironwork immediately to complete it. Your reasons are so

16 LB 9, p. 225.

17 LB 9, p. 270.

18 LB 9, p. 270.

19 LB 38, p. 334.

20 LB 38, p. 345.

21 LB 38, p. 346.

22 Account Book 40, p. 317 (24 Oct. 1791).

cogent that I should [not?] hesitate about having it put into hand as soon as possible: but the manufactories are so full of work that I do not expect it will be in my power to get it ready to send before the sailing of the *Edward*, but if I can it shall be done.²³

But the letter concludes with a more ominous note: 'Mr Arthurton's account of the new iron-mills' (a document which remains to be identified in the records) 'differs very widely from all others we have received'.

At the end of Dec. 1791 a new potential customer, Jeffery M. Shaw, who wrote from his home at Ashford in Middlesex, was given an account of the advantages of the new mill:

The mill you mention is an iron one with the addition of a set of patent friction rollers, in which the gudgeons move instead of the old boxes. This is considered as much an improvement (after having been fairly tried) that 18 or 20 mills have been made, and are making here on this principle ... All the accounts of this mill seem to agree, that it does uncommon execution, with wonderful ease to the stock.²⁴

But a year later, at the end of Dec. 1792, Pinney gave one cautionary piece of advice to George Webbe, presumably based on experience of which there had not been a great deal up to that time. In discussion with the manufacturer, Pinney had found that 'if [his mill] is to move in the Patent Rollers, the gudgeons must all be case-hardened, which is a process of some time - But if she is to go in the common brasses there will be no need of that operation, as the common gudgeons are never case-hardened.'²⁵

By Feb. next year, 1793, John Pinney continued to hear of the problems arising in Garnett's novel system. His correspondent John Hendrickson evidently was suffering somewhat from the disappointing performance of his new mill, so that Pinney wrote a long and emphatic letter of precept and guidance, which frankly can have been of little help to Hendrickson, and, indeed, presents a number of puzzles.²⁶ The opening sentence employs a familiar stratagem. The fault was not in the machinery, but 'we fear her going heavy may be owing to her getting the rollers clogged', - which can hardly have been unexpected in a piece of equipment bathed in cane juice - 'or some accident from want of attention in the negroes'. However, Pinney goes on to redress this impression by recording what had happened to James Tobin's own early mill. She,

went very well all the first part of the crop, but hard and heavy towards the latter end; and it appeared on taking her down, after the Crop was over, that three of the Pivots (in one of the systems) on which the rollers turned were broken off: those three rollers, of course, not only stopped, but impeded the motion of the others.

The only way in which we can relate this accident to the vertical system is to take the 'pivots' to be the arms which project from the central ring, later on referred to rather neatly by Pinney as the annulus, and carry the conical rollers. We also have to assume that, although Rees' diagrams show three such rollers only, the mill supplied to Tobin must have had more than that - at least two more. There does appear to be space in the housing, and since the horizontal system included six rollers, it seems reasonable to suggest that the vertical system did also. Indeed, the vertical system surely needed to be stronger than the horizontal one in this respect, since the whole weight of one mill case rested on one bearing at the foot of the axle instead of being spread between two (one at either end of the axle) when the machinery is in the horizontal position.

23 LB 9, p. 286.

24 *ibid.*

25 LB 39, p. 10.

26 LB 39, p. 33.

Pinney then goes on to give Hendrickson details of a new mill which Tobin has had made. It had so many modifications as to amount to a confession that the original design had been found sadly wanting. The suggestion is then proffered to Hendrickson, to give up on the old mill and buy a new one:

Our J.T. has a small Iron Mill on board the Nevis, of only 15 inch cases, newly fitted up with brass rollers of a small dimension, which the patentees have completed for *him* by way of experiment; as they think brass Rollers will be stronger in proportion to their size than the iron ones, at the same time they will be less likely to wear the gudgeons.

In the new mill were 'likewise some other alterations, which are considered as improvements'. Pinney then suggested that Hendrickson not only goes to see for himself how well Tobin's new mill performs, but even asks him to report back:

We shall be obliged to you for your opinion of this mill, when she is put up - We are clearly convinced that the general principle on which these mills are constructed is a good one - and experience has proved itself here in a variety of motion work: but perhaps we may not yet have discovered the very best way of applying it to our sugar mills: its not answering our most sanguine expectations immediately should not however be a reason for our abandoning it without deliberate experience.

The mill seems to have cost Tobin at least £323 2s. 6d. paid to Garnett by Pinney on 12 March 1793 and a further £10 three days later for a spare patent system. He was allowed a total of £2 17s. 6d. discount for cash, a modest saving, but Pinney would not have let it escape him.

Whether or not Hendrickson was convinced by what he eventually saw of James Tobin's new mill it is difficult to judge from Pinney's letter of 30 Aug. 1793 in response to one from Hendrickson:

We had not ordered you an iron mill as we waited for your more particular directions respecting it. We shall attend properly to your order, but shall not venture to send it till the sailing of the first convoy.²⁷

Pinney felt it was too important, or not sufficiently urgent, for it to be sent earlier by a 'running ship', without armed escort, in the uncertain state of the times. British and French ships roaming the economically valuable West Indies were repeatedly seizing and plundering islands and ships, only to be deprived of their possessions so that a new round of retaliation was engendered.

Meanwhile it seems from the accounts that, amongst the customers for the new mills, the redoubtable Edward Huggins must have been tempted to try out Garnett's friction rollers for himself. We have a series of small payments including £3 17s. 10d. to John Garnett & Co., patent system manufacturer, at the end of Oct. 1793, and small sums to John Winwood, iron founder, and William Griffiths, smith, evidently for a repair or modification to a roller assembly.²⁸

Conclusion

The tale of the patent anti-friction rollers is next taken up in the House of Pinney Letter Book of 1814. At the end of the year Pinney wrote of 'Messrs. Dobbins & Co., the successors of Messrs. Garnett's & Co.'²⁹ In the following year, 1815, Pinney received an order from Henry Rawlings for,

a small cattle mill from the successors Garnett namely cases twenty inches diameter by thirty inches long cogs to fit close to the cases with brasses and crosses - needless my saying more as to the mill as they are in general finished in a superior manner.

27 LB 39, p. 99.

28 Account Book 40, p. 491 (31 Jan. 1793).

29 LB 51, p. 310.

This order was copied out verbatim by Dobbins before they proceeded to reply to Rawlings, and the whole was copied into Pinney's own letter book in June 1815.³⁰ Rawlings was a plantation owner on Nevis who had, by the terms of his order, perhaps unintentionally misled both Pinney and Dobbins regarding the system of bearings which he expected, as Dobbins rather breathlessly explained:

From the above order we considered that one of our patent mills complete (and not the parts of one as usually sent) was intended as such we of course made it, similar to those which of late years have given general satisfaction, and we were more particularly led to believe that such was meant having in the year 1807 fitted up two side cases which were sent home for the purpose with new Gudgeons and Patent Systems &c. &c. for the same mark; it was therefore natural to suppose that being expressly ordered from us a patent one was wanted.

This remark suggests that Dobbins had taken over from Garnett by 1807. Evidently Henry Rawlings was hoping either to re-use some old parts which he had by him, or sell them back to the English firm, who warned him that,

If the systems you say you have by you are of our composition metal rollers (not iron) we shall be happy to give the full value for them but rather suspect they are some of those made for Stedman Rawlins in the early days of the manufactory. If so they are of iron and are of no value it being found by experience that iron will not do but in particular cases.

Did these pieces of old mill belong to the mill on St Kitt's, where Stedman Rawlins had his estates, and which first aroused Pinney's interest in 1791?³¹

Dobbins were now anxious to promote their own modifications to the traditional system. In their letter of 13 June 1815 they included a wealth of detail about their own common mills, fitted with 'our improved ball-bearings and brasses' and a long list of iron and brass parts.³² Rawlings was not one to be put off. We find from our copies of outgoing correspondence that by September 1815, while Dobbins continued to defend his decision to send out a Patent mill, he enjoins Rawlings to 'have the mill erected when we have no hesitation in saying you will be highly pleased with the execution of her with so few Cattle, and glad you have it altho' it may not be exactly what you intended.'³³ They also mention that they have sent out 118 mills, 'not more than about half-a-dozen' of which 'have been fitted with common brasses and those for very large windmills'.

In Feb. 1816 they tried to strike a deal with the persistent Henry Rawlings, by letting him keep the ordinary elements of his 'patent' mill and substituting some of their own bearings for the Garnett rollers.³⁴ They would accept the return of those parts which related to Garnett's system (and which are listed in detail), and would send Rawlings their own replacement parts and allow him a least £350. Pinney wrote that he regretted that Rawlings had been put to so much trouble, and offered free passage back to Bristol for those parts which had to be returned.³⁵ From subsequent correspondence it appears that Rawlings was given, and may have taken, Pinney's advice on 6 March 1817 to accept Dobbins' offer 'to avoid the expense of attending a lawsuit'.³⁶ In any case, this particular problem, at least, then disappears from the record.

30 LB 51, p. 386.

31 LB 53, p. 19.

32 LB 51, p. 386.

33 LB 51, p. 452.

34 LB 53, p. 109.

35 LB 53, p. 110.

36 LB 53, p. 109.

Acknowledgments

I am pleased to acknowledge the help of the librarians and archivists at Bath and Bristol Universities, those who have provided illustrations, and the support of the Centre for the History of Technology at the University of Bath. The remaining infelicities and errors are, however, all mine.