Joseph Doughty, a York Spinning-Wheel Maker

VALERIE AND DAVID BRYANT

Early spinning-wheels can be divided into roughly two groups, those that were made for the cottage industry and those that were made for ladies of leisure. Cottage wheels were simple and unsophisticated, intended for the mass production of spun thread used in the cottage industry prior to the industrial revolution. Ladies' wheels by comparison were produced in the latter half of the eighteenth century by makers who specialised in making more decorative wheels. These are often termed *boudoir* wheels. Among others, two renowned York makers specialised in making boudoir wheels. One was John Jameson (fl. *c.* 1780) and the other was Joseph Doughty (fl. *c.* 1786–1801, Figures 1 and 2).

Wheels by both of these makers are found in a number of our country houses, museums and private collections. Their styles were entirely different. Jameson wheels are decorative and petite with finely turned spindle work whereas Doughty wheels were much plainer. Doughty on the other hand was an innovative spinning-wheel maker, and he fitted on his wheels a cam mechanism invented by John Antis, patented by the latter in 1793 and 1795 (Figure 3). Another maker, John Planta of Fulneck, Leeds, also used this mechanism on his boudoir wheels. A further maker, Robert Webster of Salop (fl. *c.* 1755–90) fitted a cam mechanism to a spinning-wheel, but it is more rudimentary and lacks the sophistication of the Doughty and Planta wheels.[1] Whether there was any connection between John Antis and Robert Webster is unclear. Let us begin first by considering Joseph Doughty the businessman and his family, and then look at some of the wheels he made, to see how he incorporated the Antis mechanism into his designs.

Joseph Doughty was born on 6 June 1755 and baptised at St Michael-le-Belfrey on 6 July 1755.[2] This is an early city church dating from around 1535 and lies in the shadow of York Minster. His parents John Doughty and Ann (née Kirby) were married on 25 November 1742 at St Michael-le-Belfrey, John being from the parish of St Olaves, Marygate, just outside the city wall, and Ann a spinster of the parish of St Michael-le-Belfrey.[3] At the time of Joseph's birth John and Ann Doughty's shop premises were in Minster Yard.[4]

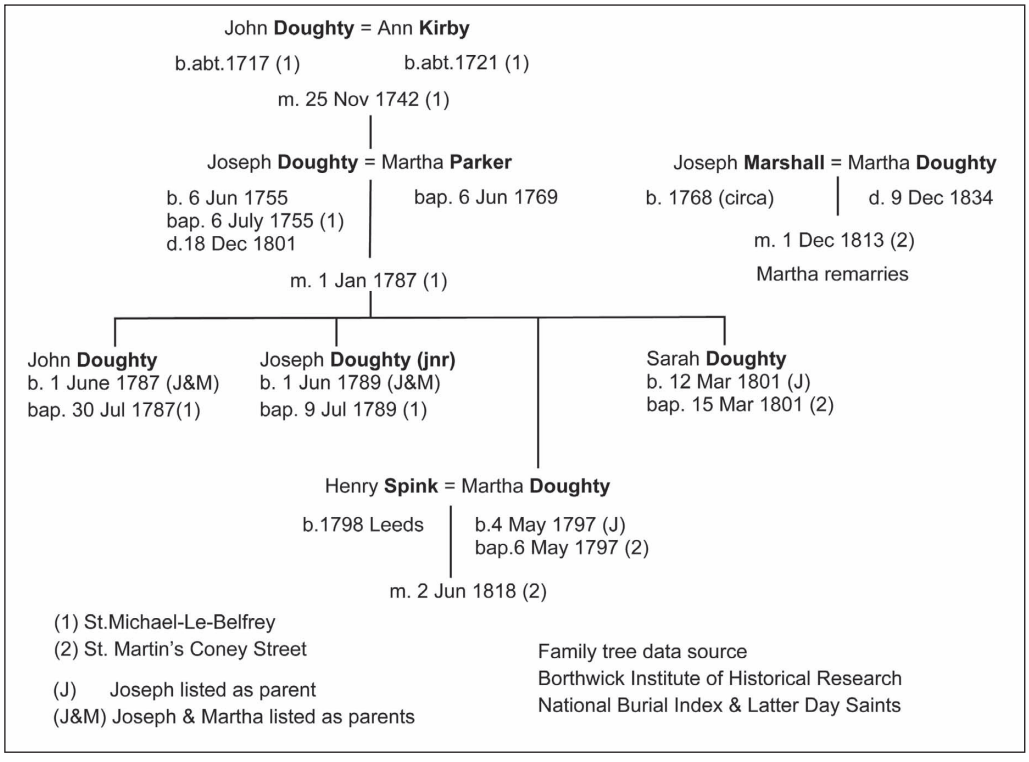
Joseph Doughty married Martha Parker at St Michael-le-Belfrey by licence on 1 January 1787.[5] Joseph was listed as a shopkeeper then aged thirty-two, somewhat older than Martha who was eighteen and at that time carrying their first child. One of the witnesses at the marriage was Martha's father Thomas Parker.[6] Martha was

[1] A spinning-wheel by Robert Webster is at Snowshill Manor, Gloucestershire.
[2] Borthwick Institute.
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Ibid.

1 (above) Spinning-wheel, by John Jameson, *c.* 1780.
The Castle Museum, York Museums Trust

2 (above right) Spinning-wheel, by Joseph Doughty, after 1795 (York 1)
The Castle Museum, York Museums Trust

3 (right) Detail of figure 2, showing the John Antis Mark 2 cam mechanism
The Castle Museum, York Museums Trust



4 The Doughty family tree.
The authors

baptised at Askham Richard in 1769, a village about four miles south west of York city centre.[7]

From this marriage there were at least four children, John, Joseph jnr, Martha and Sarah (Figure 4).[8] John and Joseph jnr were baptised at St Michael-le-Belfrey while Martha and Sarah were baptised at St Martin-le-Grand, a church a few yards down from No. 6 Coney Street, where Joseph and Martha eventually set up their shop and business premises. Like St Michael-le-Belfrey this was another important York church, but was bombed during the Second World War, and only part of it now survives. An article in *Furniture History*, Volume XIV, suggests that Joseph and Martha may also have had a further son Joseph, born on 22 November 1795.[9]

The partnership of Joseph and Martha is well documented in the York newspapers through their advertisements and notices, and also from trade directories. Doughty first worked in Minster Gates at his father's premises. An advert in the *York Courant* of 1 August 1786 says that Joseph had now succeeded his father John Doughty who

[7] www.familysearch.org.
[8] Borthwick Institute
[9] Brears (1978).

was then about 70 years of age. A later advert in the *York Herald* of 27 March 1790 states:

> Joseph DOUGHTY, at the FISH and FLY, within the Minster Gates, has now in stock a very extensive range of angling equipment, as well as ink-stands, canes, whips, walking sticks and umbrellas, combs, ivory, bone and wooden toys, hygrometers, barometers, fans, fan mounts and fan sticks.

The *Herald* of 26 July 1794 reported a Mr T. Doughty, a London dentist, was receiving patients at 'Mr J Doughty's Toyman, Minster Gates'. One year later Joseph Doughty became a Freeman of York, making it possible for him to trade in the City itself, and he moved to new premises at No. 6 Coney Street (Figure 5).[10] The street numbers appear not to have changed since 1800. Coney Street is now part of the pedestrianized shopping area of York, and No. 6 today is a Cornish Pasty Bakery, just a few yards from the Mansion House and close to St Martin-le-Grand slightly further down (Figure 6). St Michael-le-Belfrey where Joseph Doughty was married is also within close walking distance.

In 1795 Joseph Doughty advertised his new spinning-wheel fitted with the John Antis patent cam mechanism. Quite how the two men came to meet is not known. An advert in the *York Herald* of 14 February 1795 states:

> ... NB. The new-invented spinning wheel the most complete ever offered to the Public which winds the thread on the pearls in a cylindrical manner, and prevents the Ladies having the trouble of altering the thread on the Feather.

This advert also listed the firm at that time as 'Marshall and Doughty', i.e., Joseph Doughty had taken a partner in the business. This may have been Joseph Marshall, who later married Martha Doughty in 1813 after Joseph Doughty's premature death. Most of the spinning-wheels Doughty made probably date from this time as you will see later, but his newspaper adverts did not always mention them.

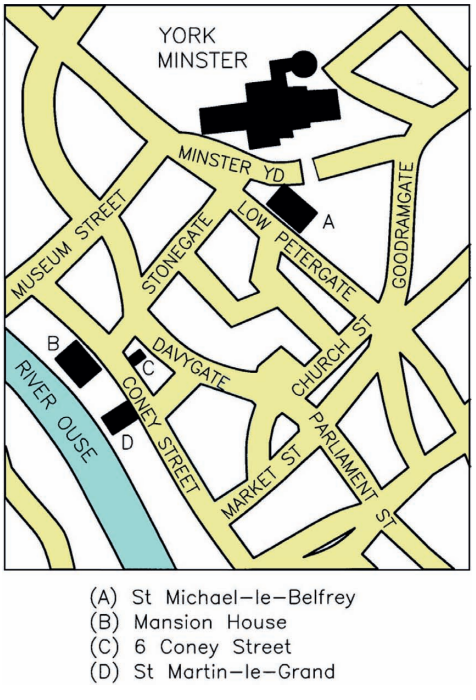
Joseph Doughty died on 18 December 1801, aged just forty-six. An obituary in the *York Courant* for 21 December 1801 begins; 'On Friday last died, Mr Joseph Doughty, Toy Manufacturer &c in this city ...'. He was buried at St Olaves, Marygate, on 22 December 1801.[11] At this time his widow Martha had a young family, and a baby only nine months old, and times must have been very hard for her. However, she decided to continue the business at Coney Street, and an entry in the *York Courant* for 8 March 1802 states:

> MARTHA DOUGHTY Widow of the late JOSEPH DOUGHTY TOYMAN and MANUFACTURERS OF FISHING TACKLE &c CONEY STREET, YORK, Returns her sincere thanks to her Friends and the Public for all their past favours to her late husband; and as she intends to carry on the Business in all its branches, she hopes to be favoured with a continuance of their patronage and support ...

Whether Marshall continued in partnership with Martha is unclear, for a later entry in the *York Courant* for 19 March 1804 shows her trading under her own name as 'Toy,

[10] York City Archives.
[11] www.ffhs.org .uk.

5 No. 6 Coney Street.
The authors



6 Map of York city centre.
The authors

Turnery and Cabinet Manufacturer', and in 1807 as 'Toy, Tunbridge and Cabinet Manufacturer'. The Coney Street business clearly progressed for in the *York Courant* of 2 March 1807 Martha advertised for a cabinet-maker:

> WANTED – A CABINET MAKER – a fteady fober Man will meet with good wages and conftant employment by applying to M Doughty at her Toy Shop, York.

Entries in Holden's *London Directories* of 1805, 1806 and 1807, and in Holden's *Triennial Directory*, 1809–11, also show her continuing to trade under her own name.[12] Perhaps, though, the partnership with Marshall did continue with Martha being the controlling shareholder, and with such a young family she would have needed all the help she could get.

On 1 December 1813 Martha married Joseph Marshall by licence at St Martin-le-Grand.[13] Joseph Marshall was entered as a merchant of the Parish of St Mary Bishophill Junior and Martha a widow of St Michael-le-Belfrey. Bishophill Junior is on the west side of the River Ouse, below Micklegate within the city walls. On 28 March 1814 Martha advertised in the *York Courant*, this time trading as 'M MARSHALL (late Doughty) Turner, Cabinet Manufacturer &c, CONEY STREET, YORK'.

[12] York City Archives.
[13] Borthwick Institute.

Interestingly, Joseph Marshall, now stepfather to Martha's children, was a witness to the marriage of her first daughter Martha five years later, when on 2 June 1818 Henry Spink married Martha Doughty by licence at St Martin-le-Grand.[14] The record cites Henry, aged twenty-nine, as a bookseller and bachelor of the Parish of Leeds and Martha Doughty a spinster then about twenty-one years old. Martha Marshall, as she was then known, continued in business until 1824 when she retired due to declining health. Martha died ten years later aged sixty-five, and was buried on 9 December 1834. She was buried at St Olaves where her first husband Joseph was laid to rest.[15] She sold the business in 1824 to John Hardy, and an entry in the *Yorkshire Gazette* for 8 May 1824 states:

TURNERY AND CABINET WAREHOUSE,
CONEY-STREET, YORK
M. MARSHALL

Most respectfully informs her Friends and the Public, that in consequence of declining health, she has retired from the Jewelery, Turnery and Cabinet business; and begs to inform them that she has DISPOSED of her STOCK-IN-TRADE to Mr JOHN HARDY, who will carry on business as usual, in all its Branches, in the SHOP, in Coneystreet.

M.MARSHALL takes this Opportunity of expressing her most grateful Thanks for the many Favours conferred upon her during a Period of 30 Years, and respectfully solicits a Continuance of the same to her Successor.

John Hardy advertised in the same issue of the *Gazette* below Martha's announcement as follows:

JOHN HARDY very respectfully informs the Nobility, Gentry, and the Public in general that he has purchased the STOCK-IN-TRADE lately belonging to Mrs Marshall consisting of every Article in TURNERY WARE, JEWELERY, TRINKETS, FANS, LADIES' AND GENTLEMAN'S DRESSING CASES, WRITING DESKS, WORK BOXES, RETICULES, &c., &c., together with FISHING TACKLE of all Kinds, and every Requisite for the complete Angler. J.H. earnestly solicits a Continuance of those Favors with which Mrs. M. has long been honoured, and which will be his constant Study to deserve; he at the same Time begs Permission to say, that the Business will be carried on in the usual Manner, and that Miss MORLEY (Mrs MARSHALL'S NIECE) who has been several Years with her, has been engaged to assist Mrs HARDY in attending the SHOP. York May 4 1824

JOHN HARDY'S BUSINESS

John Hardy traded at No. 6 Coney Street from 1824 to 1843. His shop, later known as *The Ark*, traded in a diverse range of products and especially jewellery. While like Joseph Doughty his adverts did not always mention it, he continued making spinning-wheels, examples of which are known with his stamp. An 1830 street directory listed John Hardy as 'Jeweller, English & Foreign Whs & Spinning Wheel Mfr'.[16] In the *Yorkshire Gazette* for 15 September 1832 John Hardy advertised '... a great variety of Articles manufactured from Wood rescued during the great Fire at the Minster in 1829

[14] Borthwick Institute.
[15] www.ffhs.org.uk.
[16] York City Archives.

which are now becoming exceedingly rare and valuable …'. He also offered 'IVORY in the Tusk or cut to suit Amateur Turners …'. He advertised again in the *York Gazette* for 5 October 1833 about articles manufactured from wood rescued from the great fire. While neither of these advertisements mentioned spinning-wheels this does not mean Hardy ceased to produce them. A few years later a Charles Hardy is listed in *White's Directory* for 1840 as still making spinning-wheels at this address.[17] Currently the relationship between John and Charles is not known, whether they might be father and son, brothers or otherwise. The business finally closed in 1843; an entry in the *York Gazette* for 30 September read:

THE ARK

> The Public are respectfully informed that the JEWELLERY and TOY SHOP (Hardy late MARSHALL) No 6 Coney Street, YORK, will FINALLY CLOSE at the END OF NEXT MONTH …

This advertisement gave a comprehensive list of the stock being offered for disposal and concluded with the statement, 'For particulars apply to Mr JOHN HARDY, Fulford, near York, or No. 6 Coney-street 28th Sept. 1843'. Fulford is on the outskirts of York to the south of the city and is presumed to be where his home was. So ended two generations of spinning-wheel makers.

DOUGHTY SPINNING-WHEELS

Stylistically, Doughty wheels are unmistakable and once seen are instantly recognisable (Figure 2). They comprise a vertical wheel with an unusual lobe form table supported on either three or four turned legs. Between the two front legs is a vase form treadle mounted on a stretcher with pin ends, which connects through a footman to the wheel crank at the back. Set into the table are two plain vertical wheel supports, on which is mounted a metal rimmed wheel and above this the bobbin/flyer mechanism. The wheels have metal rims mostly made of lead with six wood spokes set into a wooden hub. The drive belt connecting the wheel to the pulley whorl on the flyer axle is tensioned via a screw thread attached to the egg cup feature at the top of the back post. On each side a pair of double articulated arms is fitted to the framework, into which a birdcage distaff and a water pot are set. On many wheels the articulated arms get broken and the distaff and water pot have been lost. Doughty wheels were principally used to spin flax, which is dressed on the distaff, and the fibres moistened by dipping your fingers into the water pot. Examples of Doughty wheels are known with wire and cane bird-cage distaffs and also one with a lantern distaff.

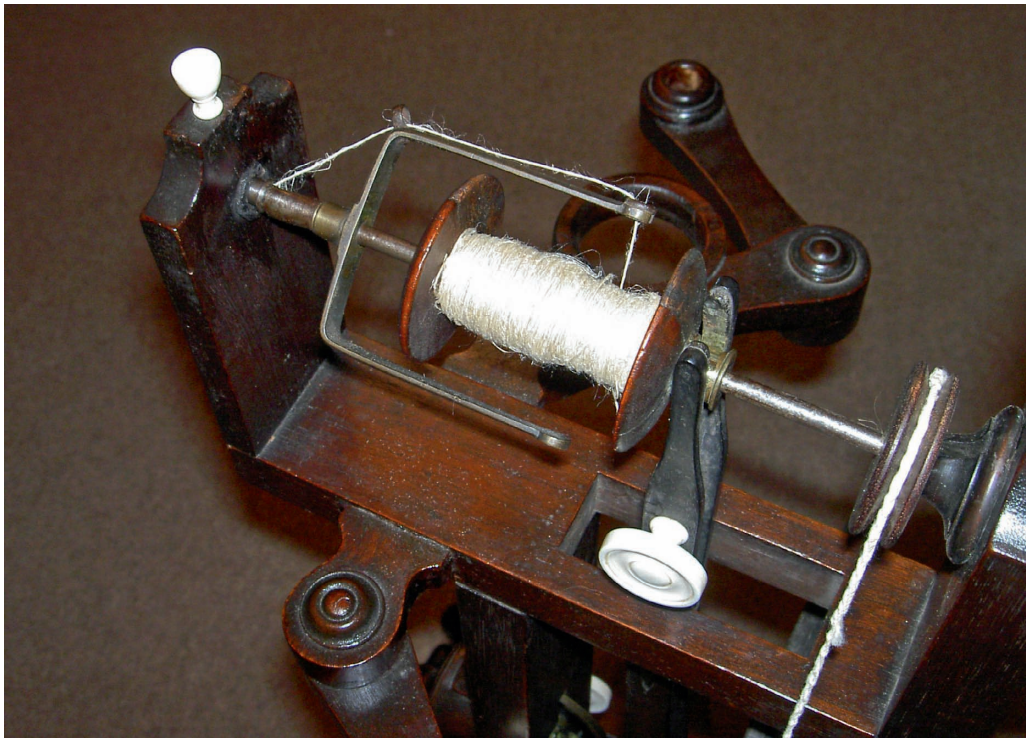
Built into the structure is the John Antis worm and wheel cam mechanism which Doughty incorporated, enabling the spinner to spin flax continuously where previously this was intermittent. In a traditional bobbin/flyer arrangement the flyer has a series

[17] *Directory of Trades and Professions for the year 1840*, at www.genuki.org.uk/big/eng/YKS/ARY/York/York40Dry.html

7 Traditional bobbin/flyer with 'Scotch' tension arrangement.
The authors

of hooks along each arm (Figure 7). As the spun thread collects on the bobbin the spinner stops and moves the thread along from hook to hook so filling the bobbin evenly. On Doughty's design fitted with the John Antis patent mechanism, the bobbin is slowly traversed back and forth under the flyer by the worm/wheel cam mechanism as the spinner works the treadle, so collecting spun thread onto the bobbin in a continuous spiral, and making it possible to spin continuously without stopping (Figure 8). There is a discussion in Appendix 1 about the development of the Antis patent, which evolved in three stages, which for convenience are termed Mark 1, Mark 2 and Mark 3.

The system Doughty employed is the 'Scotch' tension arrangement, so called because it was used on many early Scottish cottage wheels. In this the pulley whorl is screwed onto the flyer axle with a left-hand thread, and the bobbin rotates loosely on the spindle between this and the flyer. As thread is spun it passes into the orifice, then out onto the flyer arms and onto the bobbin. The thread connection between the flyer arm and the bobbin makes the latter rotate, but to enable spun thread to be collected onto it, this has to run faster or slower than the flyer. In the 'Scotch' tension arrangement the bobbin is slowed down by a friction cord tied across the bobbin pulley end (Figure 7). Doughty did it slightly differently by fitting a pair of adjustable leather faced fingers on the end of the cam follower bar, which face onto a brass sleeve attached to the



8 Detail of Figure 24, showing the Doughty 'Scotch' tension arrangement.
The authors

bobbin end. Closing the leather fingers increases the friction drag so causing the bobbin to slow down and the flyer then effectively wraps the spun thread onto the bobbin (Figure 8).

DOUGHTY WHEELS RECORDED

Ten wheels have been recorded and are presented in Figure 9. Three are unmarked and the others are stamped either round the orifice, or on a cover fitted to the front post over the end of the wheel axle. Those wheels that have been recorded are all of mahogany and some of the more sophisticated examples have ivory bobbins, whorls and finial decoration. On wheels mounted on three legs Doughty always set the treadle to the left side of the back leg. This is contrary to virtually all other three-legged vertical spinning-wheels where the treadle is set to the right side.

UNMARKED WHEELS

It is thought that the three unmarked Doughty wheels, which have four legs, were made before those which are stamped, for reasons which will become apparent. Two of the wheels, at Snowshill and Erddig, have table forms as in Figure 10, which are dimension-

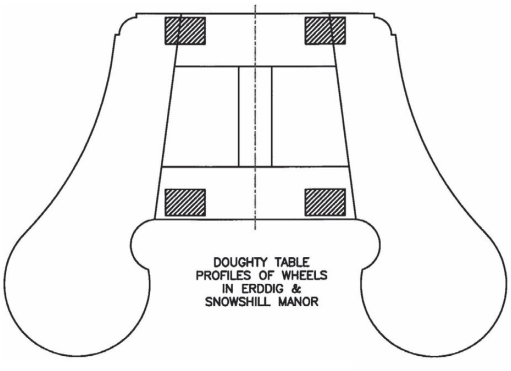
DOUGHTY SPINNING WHEELS

	Antis Mk 2						Antis Mk 3			
	SNOWSHILL	ERDDIG	YORK 3	YORK 1	YORK 2	USA (1)	USA (2)	USA (3)	UK (1)	MALLETT
Spokes	Turned taper	Ring turned	Square	Square	Square	Square	Square	Square	Square	Ring turned
Legs	Plain taper	Ring turned	Plain taper	Ring turned	Ring turned	Ring turned	Ring turned	Ring turned	Ring turned	Ring turned
Front maiden	Unclips	Unclips	Unclips	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
John Antis mechanism	Large wheel Flat faced cover	Large wheel Round faced cover	Large wheel Round faced cover	Large wheel Flat faced cover	Large wheel Flat faced cover	Large wheel Flat faced cover	2x worm & wheel	2x worm & wheel	2x worm & wheel (30mm dia)	2x worm & wheel
Gear ratio	160:1	150:1	120:1	180:1	180:1	180:1	40:1 x2 1600:1	40:1 x2 1600:1	40:1 x2 1600:1	
Cam vertical follower bar	Pivotted inside table (2 holes)	Pivotted inside table	Pivotted on strip over table	Pivotted inside table	Pivotted inside table	Pivotted inside table	Pivotted inside table	Pivotted inside table	Pivotted inside table	Pivotted inside table?
Swing arms each side	LHS - 1 (pot) RHS - 1	LHS - 1+WP RHS(missing)	LHS - 1+WP RHS - 1	LHS 1+WP RHS -1	LHS -2 RHS missing	LHS WP RHS distaff	LHS distaff RHS 1+WP	LHS - 1 RHS 1+WP	LHS - 1+WP LHS - 1	LHS - 1+WP LHS - 1
Table	Square frame	Carved square frame	Two layers	One piece	One piece	One piece	One piece	One piece	One piece	One piece
Table profile	Fig 10	Fig 10	Fig 16 Red	Fig 16 Black	Fig 16 Black	Fig 16 Black	Fig 16 Green	Fig 16 Green	Fig 16 Green	Fig 16 Green
Maker's label	None	None	None Possible early Doughty prototype	Doughty York On orifice ivory roundal	Doughty York On orifice ivory roundal	Doughty York On orifice ivory roundal	Doughty York brass plate on JAM cover	Doughty York ivory roundal on JAM cover	Doughty York ivory roundal on JAM cover	Hardy late Doughty ivory roundal on JAM cover
Wheel rim	Lead	Lead+wood	Lead	Lead	Brass	Lead	Lead	-	Lead	Lead
Posts	Splayed	Splayed	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight
Date	After 1795	After 1795	After 1795	After 1795	After 1795	After 1795	c.1800-1813	c.1800-1813	c.1800-1813	1824-43
Possible build order	1	1	2	3	3	3	4	4	4	5

USA (1) - American Textile History Museum
USA (2) and (3) - Private communications
UK (1) - Privately owned

LHS = Left hand side
RHS = Right hand side
WP = Water pot
JAM = John Antis Mechanism

9 Doughty spinning-wheels recorded
The authors



10 Early Doughty table forms used on the Erddig and Snowhill Manor wheels.
The authors

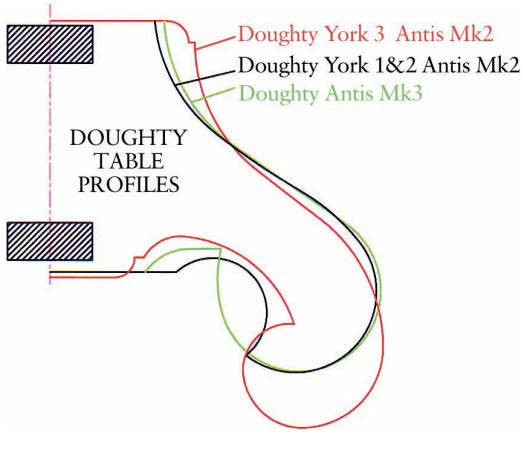
11 Spinning-wheel, by Joseph Doughty, after 1795.
Snowshill Manor, The National Trust

ally very similar, and are of four-piece jointed construction, and they also have similar splayed wheel posts where they fit to the table (Figures 11 and 12). The Erddig wheel, however, is exceptional in that it is one of two decoratively carved wheels from the ten recorded (Figure 13), the other being the Mallett example. It is also the only wheel where the rim is a composite with a lead centre faced with wood to create the impression it is a segmented wooden wheel.

The York (3) wheel, while it is similar to Snowshill in having simple tapered legs, has an entirely different table form with plain vertical wheel posts (Figure 14). Instead

12 (left) Spinning-wheel, by Joseph Doughty, after 1795.
Erddig, The National Trust

13 (above) Detail of Figure 12, showing the carved table.
Erddig, The National Trust



14 (left) Spinning-wheel, by Joseph Doughty, after 1795 (York 3).
The Castle Museum, York Museums Trust

15 (top) Detail of Figure 14, showing the laminated table top.
The Castle Museum, York Museums Trust

16 (above) Later Doughty table forms.
The authors

of the four-piece construction it has a laminated table comprising two layers of wood made of three pieces, and is considered possibly an experimental wheel, which Joseph Doughty was perhaps working on to produce an improved design (Figure 15). This would not have had the complexity of the jointed table form. All seven stamped wheels recorded have table profiles which could well have evolved from this (Figure 16). You can see for example that the York (3) table is especially weak across the grain adjacent to the two circular ends, making it prone to cracking here, and so the pattern was perhaps refined to improve its strength. Indeed, two examples out of the ten are known to have had tables which have split across the neck area at some time and needed

17 (left) Sloping bed spinning-wheel, stamped 'HARDY YORK', after 1824.
The Castle Museum, York Museums Trust

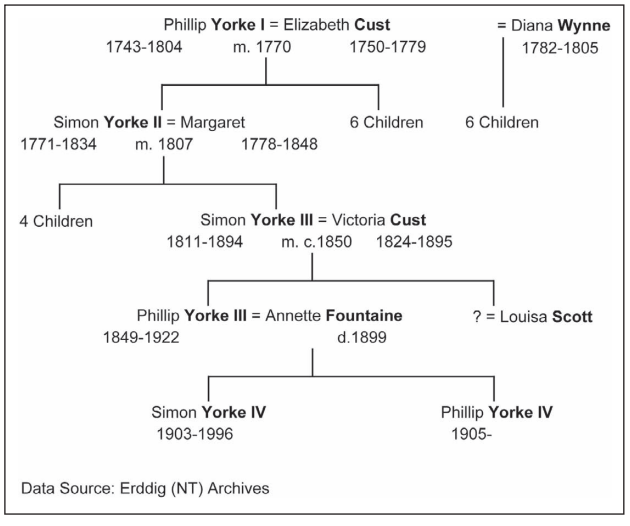
18 (above) Detail of Figure 17, showing the stamp 'HARDY YORK'.
The Castle Museum, York Museums Trust

restoration. All three unstamped wheels have the Antis Mark 2 single worm and wheel cam mechanism patented in 1795, and so probably date from this time or slightly after.

As Doughty improved his design, and as his reputation and clientele grew, he perhaps then had the confidence to mark his work with a stamp. The unstamped York (3) wheel, if it was an experimental piece, could have lain in the corner of Doughty's workshop, later taken over by John Hardy in 1824, and then acquired by York Castle Museum. An alternative possibility, that York (3) was made by Hardy and not Doughty is probably unlikely. The argument for this is that Hardy is known have made high-quality spinning-wheels, one of which is stamped 'HARDY late Doughty YORK'.[18] This example has stylistic turnings like Doughty's stamped wheels, the framework decoratively carved, and has an ivory bobbin, pulley whorl and finials. It is fitted with the Antis Mark 3 double worm and wheel cam mechanism. There is also a sloping bed wheel stamped 'HARDY, YORK' in York Castle Museum which has stylistic turnery features like later Doughty wheels (Figures 17 and 18). It seems doubtful that Hardy would have sold such a poorly made wheel, when he is known to be capable of producing very high quality ones. It is reasonable then to argue that the three unmarked wheels predate any wheels stamped 'Doughty York'.

One slightly puzzling feature about the York (3) wheel is the Antis worm and wheel gear ratio of 120:1. This ratio is lower than either the Erddig (150:1) or Snowshill

[18] Offered for sale by Mallett's, London, 2006.



19 The Yorke-Cust family tree.
The authors

20 Detail of Figure 12, showing the Yorke-Cust coat of arms.
Erddig, The National Trust

(160:1) wheels, yet York (3) is stylistically in many respects like later stamped Doughty wheels, suggesting it must have been made after the Erddig and Snowshill ones. As you will see in Appendix 1, the Antis cam mechanism gear ratio was gradually increasing. So how could Doughty go backwards as it were, and experiment with an Antis worm and wheel gear with a lower ratio of 120:1? One explanation might be that he borrowed this gearset from an earlier experimental design and refitted it into the York (3) mock up. The York (3) wheel probably dates to *c.* 1795 or perhaps just after when Antis patented his Mark 2 mechanism.

ERDDIG WHEEL

A further insight into unmarked Doughty wheels can be gained by studying the Erddig example together with the Yorke-Cust family tree (Figure 19).[19] This wheel originally had a pair of articulated arms either side of the bobbin/flyer mechanism. On the left side there is a wire birdcage distaff and to the right of this a carved water pot (Figure 20). The latter would originally have been fitted with an insert, possibly of glass, metal or porcelain, now missing. The articulated arm on the right was broken off at some time in the past. The carving on the water pot features the Yorke-Cust coat of arms, and the Erddig family tree shows two instances of a Yorke marrying a Cust.

Whether it was made for Elizabeth Cust, wife of Phillip Yorke I, or the later Victoria Cust, wife of Simon Yorke III is unclear. Elizabeth died in 1779, before the John Antis patented cam mechanism fitted to this wheel was invented. So was the wheel made for the later Victoria Cust? This is doubtful for she was only born in 1824 when John Hardy

[19] Erddig archives.

took over the business, and in 1843 when Hardy ceased trading she was aged nineteen and not yet married. If it had been made by Hardy it would in surely be impressed with Hardy's name stamp, and it would have the later Antis Mark 3 cam mechanism. So was it perhaps commissioned by Simon Yorke II (1771–1834) who married Margaret Holland? However she was not a Cust and did not marry Simon until 1807, after the death of Joseph Doughty, which still does not figure. It seems more likely that the Erddig wheel was perhaps purchased by Phillip Yorke I from Joseph Doughty *c.* 1795, the earliest known time the Antis Mark 2 cam mechanism was introduced and before Doughty stamped his spinning-wheels. But how then do we explain the Yorke-Cust coat of arms on the water pot? One thing that was evident when looking at the patination of the water pot, was that this appeared to be slightly different to other parts of the wheel. Could it be that this was a later addition by Simon Yorke III after he married Victoria Cust, or is there another explanation, to which we do not yet know the answer?

STAMPED WHEELS BEFORE 1801

While most Doughty wheels are stylistically similar to that in Figure 2 (York 1), Joseph is known to have produced at least one stamped boudoir spinning-wheel in the Jameson form, as in Figure 1, with long slim spindle turnery.[20] This wheel was undergoing restoration at the time it was discovered but frustratingly no photograph was taken, which would have been most valuable evidence. However detailed measurements of the wheel were recorded, and it is known to have a 254 mm (10 in.) wheel, but the turnery style is not known. It does not have the Antis cam mechanism fitted to it because the design is not suited to this form of construction. We can only assume for now that it was perhaps made before 1801 when Joseph died.

Doughty's stamped wheels fall into two categories, those that were fitted with the Antis Mark 2 single worm and wheel cam, and those that have a double worm and wheel cam Antis Mark 3. Stamped examples with Antis's Mark 2 single worm and wheel are impressed on an ivory roundel surrounding the orifice (Figures 21 and 22). Like all makers, as time progressed designs were improved and refined. These wheels and all later ones have three legs, reducing from four used on the earlier unstamped wheels, and so will stand firmly on an uneven floor. Making a wheel with three legs also reduces costs slightly and is easier to level. These wheels also have more decorative turnery on the legs than the Snowshill wheel or York (3).

Other changes were made to the bobbin/flyer mechanism, which has to be removable from its bearings so that the pulley whorl can be unscrewed and the bobbin removed. On the earliest Doughty wheels the front support or 'maiden' carrying the orifice can be unclipped (Figure 23). All three unstamped wheels work this way. Later stamped wheels have a fixed front maiden, and the bobbin/flyer mechanism is removed by lifting it out of a groove in the back bearing. Changes were also made in the way the Antis cam follower bar, with its U-shaped spring which makes it press onto the heart shaped cam, was attached to the tables of Doughty wheels.

[20] Private communication from the restorer.

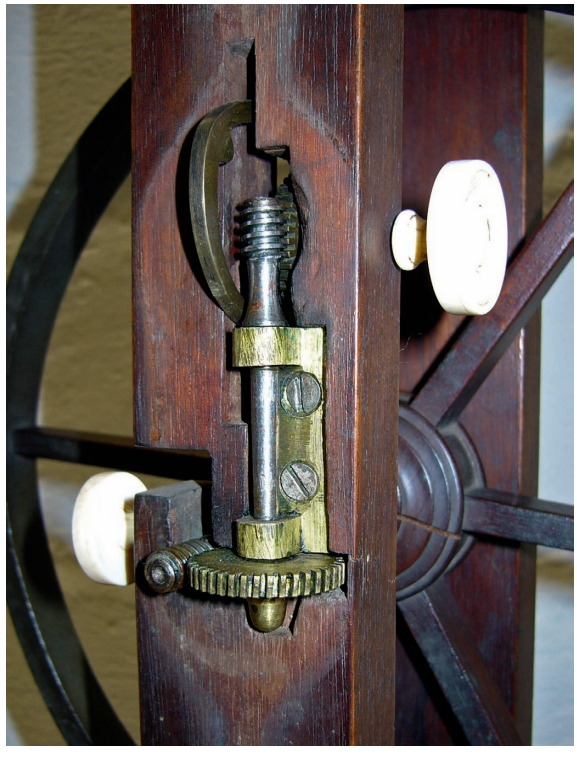
21 (above) Spinning-wheel, by Joseph Doughty, after 1795 (York 2)
The Castle Museum, York Museums Trust

22 (above right) Detail of Figure 21, showing the 'DOUGHTY YORK' stamp on the orifice roundel.
The Castle Museum, York Museums Trust

23 (right) Detail of Figure 14, showing the removable front maiden.
The Castle Museum, York Museums Trust

24 A Doughty spinning-wheel, probably *c.* 1800–13, possibly made by Marshall, Martha Doughty's partner, with the Antis Mark 3 mechanism. *The authors*

25 Detail of Figure 24, showing 'DOUGHTY YORK' stamp on ivory double roundel.
The authors



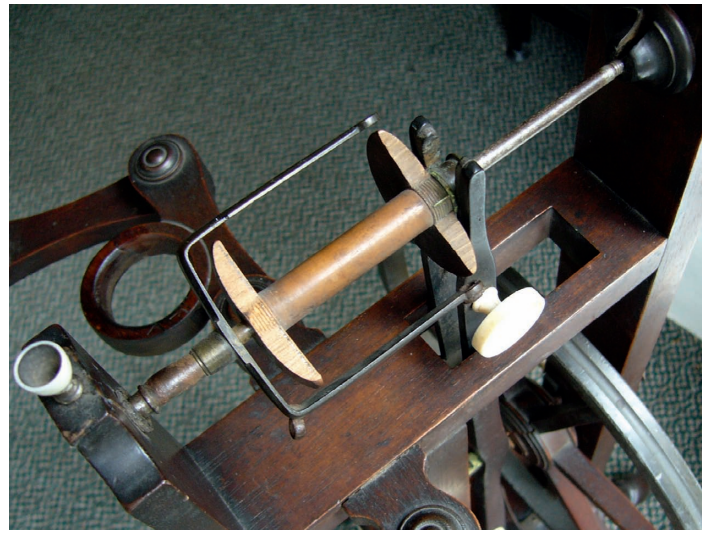
26 Detail of Figure 24, showing the Antis Mark 3 double worm and wheel (2 × 40:1).
The authors

Judging by the number of wheels fitted with the Antis Mark 2 single worm and wheel cam, these were probably made for a while after 1795 when the mechanism was first patented. Soon, though, wheels were being produced with the Antis Mark 3 double worm and wheel cam. Currently it is not known when this improvement was fitted, but perhaps it was after 1800 or even later. To add further confusion, a Doughty wheel (not listed in Figure 9), was exhibited at the Grosvenor House Antiques Fair in 1938.[21] This wheel was fitted with the Antis Mark 2 mechanism and said to date from 1807. However there seems no firm evidence that this wheel was made at that time, and Patricia Baines also argues this may be an estimated date.[22]

A good example of a wheel fitted with the Antis Mark 3 cam mechanism is shown in Figure 24. It retains the ivory roundel on the front maiden surrounding the orifice used on earlier Mark 2 wheels, but the Doughty stamp has now moved to the cover of the worm and wheel mechanism on the front post (Figure 25). This is now in the form of a double ivory roundel. The worm and wheel ratio is 40:1 making the overall ratio 1600:1 (Figure 26). An example of another Doughty wheel exists (Figure 9, USA (2))

[21] Advertisement in *Apollo Magazine*, September 1938.
[22] Baines (1977), p. 167.

27 Detail of a wheel in a private collection, showing brass plaque engraved 'Doughty York'. *Jeanne Asplundh/ Mike Taylor*



28 Detail of Figure 24, showing thread chased bobbin construction. *The authors*

with a rectangular brass cover over the double worm and wheel inscribed 'Doughty York'.[23] It is thought this could be an arrangement prior to the time that double ivory roundel covers were fitted (Figure 27). One other interesting design feature on the wheel is the way the bobbin is constructed (Figure 28). Most bobbins are made in three parts with the two ends glued onto the centre, but on this wheel the bobbin ends are thread-chased onto the middle section.

STAMPED WHEELS AFTER 1801

Up until the time of Joseph Doughty's death in 1801 we can reasonably assume that all stamped wheels would have been impressed 'Doughty York'. Whether they continued to be marked as such after this is unclear, but from York newspaper entries mentioned earlier we know that Martha was trading in her own name in 1802, 1804, and 1807. It seems reasonable then to presume that wheels continued to be marked 'Doughty York' up until 1813 when Martha married Joseph Marshall. A wheel with what must be the Antis Mark 3 cam mechanism is known to be engraved 'Marshall late Doughty' on the top disc and 'York' on the lower one, and so perhaps dates somewhere between 1814 and 1824 when Martha retired.[24]

[23] Private communication from the owner.
[24] Baines (1977), p. 167.

The Mallett wheel, stamped 'HARDY late Doughty YORK', has been presumed to date somewhere between 1824 and 1832, the latter date being assumed, because John Hardy's advert in the *Yorkshire Gazette* of 15 September 1832 did not mention that he still made spinning-wheels.[25] However it might date up to 1834, the year Martha Marshall died. A wheel in private ownership is also known to be marked 'Hardy late Marshall', suggesting a date after 1834.[26] This wheel could date up to 1840, because as mentioned earlier Charles Hardy was listed in *White's Directory* as still making wheels from No. 6 Coney Street at that time. It might even date as late as 1843 when the business finally closed. Which Hardy was it that made this example, John or Charles? No images of the stamps are yet available on any wheels marked with two names.

SUMMARY

This article has thrown more light and clarity on Joseph and Martha Doughty's spinning-wheel business in York *c.* 1786–1824, and the way they incorporated the John Antis patent worm and wheel cam mechanism. It also gives clarification on the business later taken over by John Hardy from 1824 to 1843. Research so far currently suggests rather more wheels exist marked 'Doughty York' compared to those stamped with a combination of two names, which seem to be less common. The study also suggests they may have continued to be marked this way up until late 1813 when Martha remarried. The Antis Mark 2 cam mechanism was not invented until 1795, and judging by the number of wheels fitted with this they may have been produced for a number of years afterwards, superceded eventually by the Mark 3 double worm and wheel design. Further study may reveal more examples of stamped Doughty style wheels suggesting when they might have been made and by whom.

ACKNOWLEDGEMENTS

We would like to thank Michelle Petyte of the York Castle Museum for her invaluable help and assistance in recording the Doughty and Hardy spinning-wheels in the museum collection. We also thank the National Trust for giving access to record spinning-wheels at Snowshill Manor and Erddig, and Mike Taylor and Jeanne Asplundh for sharing with us their knowledge of Doughty spinning-wheels. Thanks also are due to York City Archives, for help in providing information on Doughty's advertisements in York city newspapers, and the Borthwick Institute of Historical Research for data to help us create the Doughty family tree.

[25] York City Archives.
[26] Baines (1977), p. 168.

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APPENDIX 1 THE JOHN ANTIS PATENT CAM MECHANISM

John Antis, who worked at Fulneck, Leeds, was an inventor and a number of his innovations are recorded in the *Transactions of the Society for Arts, Commerce and Manufacturing*. In the *Transactions* for 1793 an entry states:

> TWENTY GUINEAS were this year voted to Mr JOHN ANTIS, of Fulneck, near Leeds, for his ingenious method of caufing the bobbin of the common spinning-wheel to move backward and forward; by which means, the time loft by ftopping the wheel, to fhift the thread from one ftaple, on the flyer, to another, as has hitherto conftantly been practifed, is avoided; the danger of breaking the thread and loofing the end, obviated; and the fpinner enabled to do much more work, in a given time, than by any common fpinning-wheel hitherto in ufe.[1]

Antis Mark 1 design

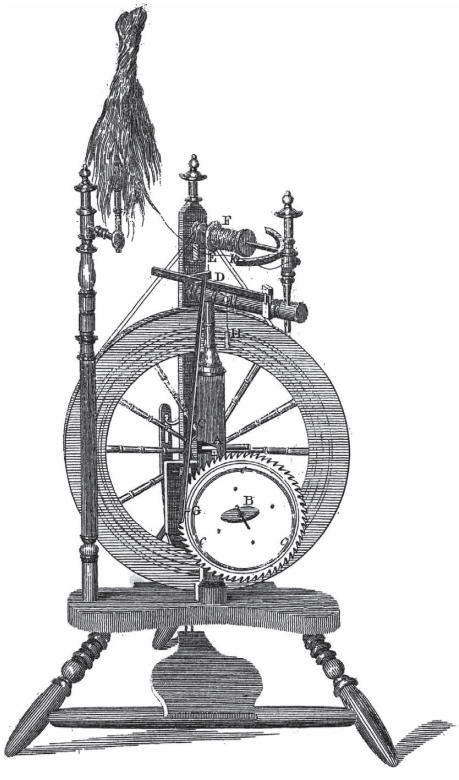
Included with the entry was an engraving showing the gear/wire cam and lever mechanism together with a description of how it worked (Figure 29). It is functionally quite complicated. The way it works is that the front end of the wheel axle is fitted with a small claw, which engages with a gear wheel with 192 teeth, so causing this to slowly rotate tooth by tooth as the spinner works the treadle. This 178 mm (7 in.) diameter gear has a wire form cam fitted to the side, and a follower pressing onto this moves a lever system so making the bobbin traverse back and forth.

Antis Mark 2 design

Antis acknowledged that his first patent worked in a somewhat erratic manner and produced an improved Mark 2 design in 1795, also recorded in the *Transactions*, for which he was awarded a further sum of 15 guineas. In the *Transactions* for 1795 an entry stated:

> A Bounty of FIFTEEN GUINEAS was this Seffion voted to Mr JOHN ANTIS, of Fulneck, near Leeds, for his further improvement of the COMMON SPINNING WHEEL (fee Volume XI page 152, where a Plate of this former Wheel is given): and for the ufe and information of the Public, a complete Wheel according to the laft improvement, is referved in the Society's Repofitory.[2]

[1] RSA, *Transactions of the Society for Arts, Commerce and Manufacturing*, Vol. XI (1793), pp. 152–57.
[2] RSA, *Transactions of the Society for Arts, Commerce and Manufacturing*, Vol. XIII (1795), pp. 233–38.



29 Engraving, showing the original design for the John Antis Mark 1 cam mechanism, 1793. *Royal Society of Arts London*

This was much simpler, based on a worm and wheel/cam which moved a vertical spring-loaded follower bar pivoted on/in the table, so causing the bobbin to oscillate back and forth (Figure 3). A letter in the RSA archives from Rich[ard] King of Salop to Samuel More, dated 4 April 1794, refers to 'a person in Shrewsbury who undertook to make improvements to Mr Antis's spinning wheel …' and goes on to say; 'and if the ingenious mechanic at Shrewsbury does not finally disappoint me I have great hopes that he will suggest and execute still further improvements upon it ….'[3] As mentioned at the beginning of this article, there is a wheel by Robert Webster fitted with a rather crude cam mechanism in the Snowshill Manor collection. The Websters were a family of Shrewsbury clockmakers and so clearly knew about things mechanical such as gearwheels and cams.[4] Could it be that Rich[ard] King was referring to a member of the Webster family?

Wheels or models of these were deposited at the Royal Society for both the Mark 1 and Mark 2 designs, but the Society unfortunately no longer has these in their archives. No Doughty wheels have yet been discovered with the Antis Mark 1 design, and it is thought probably never will be, for the mechanism is somewhat complex and unreliable.

John Antis's improved patent of 1795 featured a single worm/wheel cam mechanism. Doughty wheels with the Mark 2 cam mechanism therefore probably date from 1795 or later. From Figure 9 you can see that the gear ratios vary between 120:1 to 180:1. Those having smaller gear wheels are seen on the early unstamped Doughty wheels. York (3) has 120 teeth, Erddig

[3] RSA, PR.MC/101/10/593, Letter Rich[ard] King to Samuel Moore, 4 April 1794.
[4] Baines (1977), p. 163, refers to an article in the *Shrewsbury Chronicle* for December 1940 by L. C. Lloyd.

150 teeth and Snowshill 160 teeth. On later examples of Doughty wheels with a solid table and stamped on an ivory roundel surrounding the flyer orifice, the gearwheels have 180 teeth (Figures 2 and 15). It seems likely then that the Antis mechanism was in a state of evolution with the gearwheel becoming progressively larger as time passed. To understand why this might be you need to understand a little about spinning on a wheel.

If you think about it from the process of spinning flax to create a thread using a 120 tooth gear wheel, the bobbin moved by the cam follower bar would traverse the end of the metal flyer arm one end to the other in sixty revolutions of the wheel. Spun flax is a very fine thread, much more so than wool and other fibres, and Doughty and Antis perhaps recognised that to fill a bobbin full of spun thread more closely and evenly, the cam needed to rotate more slowly. This would necessitate a larger gear ratio and so this gradually increased. The Mark 2 design eventually settled on gear wheels with 180 teeth, the bobbin traversing each way in 90 revolutions of the spinning-wheel.

Antis Mark 3 design

Eventually the single worm and wheel mechanism was superceded with a double worm/wheel drive fitted into the front wheel post (Figures 24, 25 and 26), which would lay the spun thread more closely together on the bobbin. This was a much more compact design, but whether it was Antis or Doughty who was instrumental in conceiving the improved design is unclear. The two worm and wheel ratios were each 40:1 so the overall ratio was then 1600:1. Thus for the spun flax thread to traverse from one end of the bobbin to the other, the wheel turned 800 revolutions. This would collect the spun flax thread up much more closely, and possibly the gear ratio was perhaps now rather too high from the spinners point of view.