

THE REDUCING MACHINE AND THE LAST COINAGE OF GEORGE III

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In the *Numismatic Chronicle* in 1971 Graham Pollard discussed the origins of how the reducing machine came to be adopted in Britain for the production of coinage dies. The machine, which operates by scanning a design and at the same time cutting the transferred details into what is usually a steel punch of the required diameter, came to transform the way in which engravers worked. Pollard explained how in 1790 the industrialist Matthew Boulton at his Soho Mint installed a three-dimensional pantograph imported from the Paris machine-maker Jean Baptiste Dupeyrat. By the second decade of the nineteenth century machines of this type were acquiring a wider appreciation in Britain: the sculptor Sir Francis Chantrey owned a similar kind of device and during the same period Boulton's business partner James Watt designed and built two machines for copying sculptures in the round. The Royal Mint in London, by contrast, lagged behind. But the accepted version of events that this remained the case until 1819, when the Italian artist Benedetto Pistrucci paid for one to be installed for his own use at Tower Hill, may be in need of revision. While the date of acquisition is not in doubt, there is evidence to suggest that the Mint had access to a machine three years earlier, evidence that helps to throw new light on a number of unusual items in the Mint collection.¹

Designing a new gold and silver coinage

In the years 1816 and 1817 the British coinage changed dramatically. During the eighteenth century the silver coinage had lapsed into an increasingly wretched condition, while in the two decades from 1797 the economy had been convulsed by currency instability, the impact of war with France and a measure of uncertainty over government management of the money supply. The advent of the Coinage Act of 1816 signalled the possibility of calmer monetary conditions. With this legislation Lord Liverpool's ministry made a commitment to adopt a gold standard, a change that was to be underpinned by the introduction of a new gold and silver coinage and the withdrawal of the old. Not only had an extremely large number of coins to be struck in just over a year, but there was also the thorny technical problem that arose of how to reproduce in steel designs for the new coins by an artist – Pistrucci – whose skill lay rather in engraving gemstones.

Pistrucci arrived in Britain during 1815 and thereafter 'rose without trace' through the patronage of influential figures such as the President of the Royal Society, Sir Joseph Banks, to obtain within a year the coveted commission of designing a new standard coinage effigy. He was employed by the Mint from the early summer of 1816 and the first work he undertook in this capacity was to prepare a portrait of George III for the new shillings and sixpences (Pl. 13, 1, 2). He submitted his portrait model in jasper (Pl. 13, 3) and this was in turn copied by hand and transformed into steel coinage tools by the Mint's Chief Engraver Thomas Wyon junior. When it came to the half-crown, however, a different effigy was planned, and although copied into steel from a jasper model (Pl. 13, 4) in exactly the same way as the shilling and sixpence obverse, Pistrucci's new portrait of the king met with immediate hostility from within the Mint.²

¹ J.G. Pollard, 'Matthew Boulton and the Reducing Machine in England', *NC*, 7th ser., XI (1971), 311–17. J.P. Muirhead, *The Origin and Progress of the Mechanical Inventions of James Watt* (London, 1854), I, pp. ccxlii–ccxlvi; II, pp. 373–74. PRO. Mint 1/21, p. 15. James Morrison (Deputy Master of the Mint) to the Treasury, 24 December 1819.

² Natural History Museum, London, transcript of Mitchell Library, New South Wales, Banks MS 743.3. Banks to Sir Charles Blagden, 19 August 1816. PRO. Mint 1/54, p. 281, William Wellesley Pole to the Treasury, 19 June 1816. A. Billing, *The Science of Gems, Jewels, Coins, and Medals, Ancient and Modern* (London, 1867), pp. 174, 190–2. J. Bagot (ed.), *George Canning and His Friends* (London, 1909), II, p. 32, Pole to Sir Charles Bagot, 5 July 1816.

The cameo for the half-crown had been completed by the end of September; Wyon copied it into steel during October and trial pieces were available by the second week of November. Having seen a trial striking, Sir Joseph Banks confirmed the misgivings about the portrait that had been expressed by William Wellesley Pole, Master of the Mint during the recoinage, and Pistrucci too was deeply dissatisfied with the manner in which his work had been reproduced. Corrections to the portrait were as a consequence requested but for coins to be available by February 1817 a commitment had to be made to put Wyon's unamended tools into production, a situation that confirmed Pole's distaste for the copied effigy. In an effort to lessen what was expected to be potentially harsh metropolitan criticism, the Master of the Mint gave an instruction that when the new coins were released, half-crowns struck from Wyon's dies were to be sent to the most distant parts of the country (Pl. 13, 5).³

Pistrucci developed his engraving skills making alterations to the portrait in the hope that an amended version would be put into work in place of that prepared by Wyon. A revised effigy was delivered in December but the punch upon which Pistrucci had operated seems almost immediately to have suffered some kind of damage. James Lawson, Superintendent of Machinery, subsequently observed that it had either been heated too severely or that the hardening material had not been well cleaned. Lawson's comments correspond with a reference in Forrer's *Biographical Dictionary of Medallists* to a pattern half-crown, the illustration for which is accompanied by an explanatory note. Attributed to Pistrucci, the note indicates that he had personally amended this particular design, which was indeed different from Wyon's copy, but that the punches were burnt several times at the Mint.⁴ Whether or not this revised effigy would have met with a kinder reception is unclear, but in any case two attempts had been made to generate satisfactory master tools for the obverse of the half-crown and both had failed. Such difficulties led to a different approach. The idea was to contact the Soho Mint to ask if the reducing machine acquired by Boulton twenty years earlier could be put at the disposal of the Royal Mint, in order to generate more faithful copies of Pistrucci's work.

Lawson had been employed for several years by Matthew Boulton before joining the rival government mint and although the reducing lathe was a closely guarded secret – even within the Soho manufactory – it was probably Lawson who originally floated the idea of its potential. Soho had played an important part in equipping the mint at Tower Hill when it was erected during the first decade of the nineteenth century, and now that there were the demands of a recoinage help was again being sought. In the eighteen months from June 1816 over two dozen separate orders were addressed to Soho – now under the control of Matthew Boulton's son, Matthew Robinson Boulton – amounting to a total cost of just over £2,000. Willing co-operation might have been somewhat complicated by tensions in the relationship between the two establishments, stemming in large part from the London mint's resumption of copper production in 1810, an area of work that Soho had hoped to monopolise. Looking to Birmingham for assistance with making its master tools was, nevertheless, for Tower Hill an extension of a well-established system of what had generally been ready co-operation, especially in relation to the less contentious issue of producing silver and gold, where Soho had not realistically expected to be involved.⁵

On 18 December Lawson wrote to Zacchaeus Walker, a senior manager at Soho, asking him to ensure that the 'engine lathe', as the reducing machine was called, be made ready in anticipation of copying some work for the Mint. As events transpired the Superintendent of Machinery had to travel to Birmingham himself, accompanied by Pistrucci, in order to supervise the work. Lawson had the purpose of the mission spelt out to him by Pole in forthright terms: the Mint's engravers had failed to generate a faithful reproduction from Pistrucci's amended die and, in characteristically melodramatic fashion, Pole went on to remark that there was no hope of striking half-crowns

³ PRO. Mint 4/26, Pole to Morrison, 29 September, 10 and 17 November 1816.

⁴ PRO. Mint 11/70, Lawson to Pole, 26 December 1816; Mint 11/71, Pole to Lawson, 23 December 1816. L. Forrer, *Biographical Dictionary of Medallists* (London, 1909), IV, pp. 604–5.

⁵ PRO. Mint 11/70, Lawson to Pole, 25 December 1816. Matthew Boulton Papers (MBP), Box 322, fol. 179, Lawson to Matthew Robinson Boulton, 6 January 1817. Boulton & Watt Collection (B & W), Letter Book 533, pp. 52–4. R. Doty, *The Soho Mint & the Industrialization of Money* (London, 1998), pp. 149, 156, 159–60.

fit to be seen 'or of coining gold coins worth a farthing in any reasonable time'. No hope, that was, unless the Soho reducing machine was successful in making a more acceptable half-crown punch from the cameo. It was intended that the resulting tool would be put into production on 1 January, and although Pole admitted that he was asking rather a lot, it was a typical instance of his forcing progress against the odds; Lawson and Pistrucci, after all, did not arrive at Soho until Christmas Eve.⁶ Indeed, that they should have embarked upon the mission at such a time of year is an indication of the pressure exerted by the February deadline for the issue of the new coins.

The two men spent several days in Birmingham. Amongst other items they took with them punches and matrices for the half-crown, a collar, a turned die and the wax and unfinished gem of Pistrucci's St George and the Dragon.⁷ But in addition to the pressing need for a revised half-crown, there was also a rapidly approaching deadline for sovereign tools. Underestimating the length of time needed to complete a piece of work on the lathe, Mint officials seem to have originally intended not only to address the deficiencies of the half-crown in Birmingham, but also to copy the shilling gem for use as the obverse for the sovereign. Instead of starting with the half-crown, the portrait copied was the one that would appear on shillings and sixpences and, because a punch for the half-crown would probably not have been completed in less than three weeks, the two men were ordered to return to London once work on the shilling gem was concluded.⁸

On their way back to London an axle on their chaise broke and, stranded for some hours, both men caught colds. Their suffering, however, was not in vain because they had with them, in the shape of a portrait punch, an indication of the reducing machine's potential. Although pattern half-sovereigns were struck bearing the design, the shilling effigy that was copied was never actually used on the official gold coinage. There was, nevertheless, general satisfaction with the tool and with the machine on which it had been produced, so much so, indeed, that in writing to Boulton in January Pole thought it 'highly desirable that His Majesty's Mint should possess so valuable a means of securing the advantage of the works of the first artist in Cameo engraving'. Boulton made discouraging noises in response, leading the London mint to look elsewhere for a machine, but this episode reveals that officials were alive to its potential and were willing to invest in one as early as January 1817.⁹

The real facility, however, of the Soho machine from the Royal Mint's point of view was more clearly appreciated in the months that followed the first trial. By early January, with the general issue date for the new silver coins only a few weeks away, Pole abandoned any thoughts of Wyon's copy of the half-crown obverse being kept from seeing the light of day. In view of the Master's unvarnished antipathy towards the original 'Bull Head' portrait, there remained, nevertheless, the difficulty of what to do about a new effigy for the half-crown, and it was the resolution of this issue, in the form of a revised obverse, that kept Boulton's reducing lathe active on behalf of the London mint. A new plan was devised whereby from Wyon's punch part of the neck and shoulder were to be cut away and Pistrucci would retouch the portrait from this new starting point.¹⁰ Although the effect of the alterations was to create a portrait that seems markedly changed, and the overall effect is certainly a good deal less brutish, a common origin can nevertheless be seen from the features of the face (Pl. 13, 6). Master tools for the obverse of the pared down half-crown were available from February and the favour in which they were held led the mint to think of exploiting the facility of Boulton's lathe by sending a punch of the revised portrait to Soho to be copied for other denominations such as the sovereign and the half-sovereign.¹¹

⁶ B & W, Letter Book 533, p. 34, Lawson to Walker, 18 December 1816. PRO, Mint 11/71, Pole to Boulton, 23 December 1816; Pole to Lawson, 23 December 1816.

⁷ PRO, Mint 11/71, Pole to Lawson, 23 December 1816.

⁸ PRO, Mint 11/70, Lawson to Pole, 25 and 26 December 1816; Mint 11/71, Pole to Lawson, 23 and 29 December 1816; Mint 4/27, Pole to Morrison, 3 January 1817.

⁹ PRO, Mint 11/71, Pole to Boulton, 14 January 1817. MBP, Box 322, fol. 179, Lawson to Boulton, 6 January 1817; Box 413, Boulton to Pole, 16 January 1817. B & W, Letter Book 533, p. 35, Lawson to Walker, 11 January 1817.

¹⁰ PRO, Mint 11/70, Lawson to Pole, 29 December 1816.

¹¹ B & W, Letter Book 533, p. 37, Lawson to Walker, 21 February 1817 and p. 40, 21 March 1817.

While the amended portrait was being finished the original was being prepared for issue and Pole lamented 'I am in despair when I think of the number of bad half-crowns we shall issue!'. The press and members of the opposition in Parliament playfully savaged both the effigy and the Mint administration that sought to pass off, as they judged, a wholly inaccurate image of George III. The expression given to the king was thought somewhat troubled, presenting a monstrous caricature rather than a regal portrait. *The Examiner* commented that 'surely the artist must have been a wag or a Jacobin! – perhaps both Jacobin and wag'.¹² Precisely when production of the maligned original half-crown obverse gave way to the new type is not clearly documented. But a possible answer lies in the coincidence of the break in production of all silver coins between 4 March and 21 April, and royal approval of the new design being received five days after the end of the cessation. The plausibility of production not having begun before the first week of March is supported by remarks made by the Master of the Mint in the House of Commons on 5 March when, responding to criticism of the original half-crown, he reported that a new one was in progress and would soon be issued.¹³

The chilly press reception given to the new coins and the chiding opposition within Parliament came and went. The more flattering profile of the king was in prospect and from 21 February the revised half-crown punch that had been sent to Birmingham was actively engaged in generating obverses for other denominations. The efforts of John Busch in operating the reducing machine in his workshop at Soho succeeded in producing copy punches for the sovereign, crown, half-sovereign and double-sovereign. Apart from a technical difference of opinion respecting the precise sizes at which copies were to be made, which resulted in a punch that was intended for the half-sovereign being reproduced at the size of a shilling, there were initially no major difficulties; the machine even seemed to be able to cope with enlarging the half-crown effigy to crown size.¹⁴

More significant difficulties, however, began to emerge from 5 June when the reverse punch for the sovereign, depicting St George and the Dragon, was despatched to Birmingham with the intention that it be enlarged to the diameter of a five-pound piece. From the outset Walker expressed doubts as to the chances of a successful outcome, principally because the errors engendered by augmentation, he warned, would become proportionately more conspicuous. Busch struggled with the challenge for a number of weeks, experiencing along the way the frustration of unsympathetic steel. Rather than the usual time of about a week that it would take to make a tool, over a month went by before a finished punch was despatched to London, and even then it was sent with the proviso of its being not entirely satisfactory. Although the next request was for a smaller scale enlargement from sovereign to double-sovereign, the challenge proved too much for Busch. After ten days the copy was abandoned on the grounds that the lathe could not readily cope with the demands of enlargements from so detailed a design as the St George.¹⁵

The sovereign and the half-sovereign obverses generated at Soho for the Royal Mint were adopted (PI. 13, 7, 8), but from the first trial tool of the shilling cameo it was apparent that not all the lathe's productions were destined to be developed into official British coins. The punches for the double-sovereign and crown piece obverses were abandoned in favour of alternative portraits of the king, and a revised version of the St George and Dragon for the five pounds was also pursued in preference to the enlargement derived from the sovereign. Pressure to issue the higher value gold coins and the crown piece was much less intense than for the smaller value denominations. Moreover, Pole had an ambition to make coins that he hoped would be regarded as masterpieces of numismatic art and the more leisurely pace attached to striking the remaining denominations presented him with the opportunity of realising his dream. None of the designs employed on the circulating gold and silver coins released in 1817 was, as a consequence, reproduced in exactly the same way on the higher value pieces. In this sense the last coinage of

¹² PRO. Mint 4/27, Pole to Morrison, 5 January 1817. *Parliamentary Debates*, 1st ser., XXXV, cols 895–6 (5 March 1817). *Morning Chronicle*, 19 February 1817. *The Examiner*, 16 February 1817.

¹³ PRO. Mint 4/71, pp. 18–19; Mint 9/33, Account of silver monies coined, 13 July 1816 to 31 May 1817. *Parliamentary Debates*, 1st ser., XXXV, col. 899 (5 March 1817).

¹⁴ B & W, Letter Book 533, pp. 37–45, letters to and from Lawson and Walker, 21 February to 2 May 1817.

¹⁵ B & W, Letter Book 533, pp. 45–50, letters to and from Lawson and Walker, 5 June to 29 July 1817.

George III has two distinct phases, the first being the issues in 1817 of shillings, sixpences, half-crowns, half-sovereigns and sovereigns, while the second comprised the subsequent striking of the crown, double-sovereign and five pounds. All the coins of the second phase were more properly intended for collectors or for presentation purposes than as circulating pieces and this was reflected in the much greater attention that was paid to their design and production.¹⁶

Cameos and punches

Beyond the documentary sources that point to use of the Boulton reducing machine to supply tools to the Royal Mint in 1817, punches and other items in the Mint collection may offer further confirmation of this association. Inevitably the collection is not complete; obverse tools for the crown and the double-sovereign bearing the revised half-crown portrait, and reverse tools for the five pounds with the original sovereign St George have not survived. But more positively there are portrait punches for the sovereign and half-sovereign that in some respects appear to have been generated on a lathe and there are also jasper cameos of George III by Pistrucci that are very much part of the story (Pl. 13, 3, 4, 9).

The tool brought back from Birmingham by Lawson and Pistrucci was copied from a shilling gem and was intended for use as an effigy for the sovereign. In his catalogue of the Mint collection W.J. Hocking identified an undated obverse tool, H544, as a portrait punch for a sovereign, and some of the physical characteristics of this item suggest that it may be the reduction punch that was executed in Birmingham at the beginning of 1817 (Pl. 13, 10). The features of the face have a rather soft-focus quality and the entire surface is covered with concentric lines which, being consistent with the operation of a lathe, hint at the involvement of a reducing machine. An examination of the shilling-size jasper cameo H1803 (Pl. 13, 3) and H544 reveals compelling points of similarity, features that are reproduced seemingly so exactly that it is hard to conceive of their having been copied by hand. If this is the case it would throw fresh light not only on the punch but also on the shilling gem, formerly thought to have only played the role of being a model from which Wyon copied the portrait into steel. It may now be justifiable to assign to this particular cameo a more extended function.¹⁷

What stands against the surviving shilling cameo having been used on a reducing machine, however, is the absence of any kind of damage. Given the pressures that would have been exerted on the surface of the model, the expectation would be that the tracer mounted on the lathe would have left evidence of its path as it scanned the details of the design. The tungsten carbide tracers employed on modern reducing machines leave a definite mark on the surface of nickel-faced electrotype models, but it is not entirely clear from what material tracers used on Boulton's machine would have been made. Some hope of an answer lies in the collection of tracing tools associated with the three-dimensional copying machines in the James Watt workshop in the Science Museum, London. Many of these tools are made of ivory and tend to be fairly blunt, and if tracers of a similar type were employed at Soho on the shilling gem it is unlikely that any significant damage would have resulted. Other tracers from the Watt collection, however, are metal and their use on a jasper model could have left their mark. With these doubts in mind there is the strong probability of an association between the shilling cameo, the sovereign punch H544 and the Soho reducing machine rather than absolute certainty.¹⁸

The portrait punch, referred to earlier as having been reproduced from the half-crown at the size of a shilling rather than a half-sovereign, may also have survived. The shilling-size tool H604 has concentric turning marks and the slightly unfocused appearance that distinguishes H544 (Pl. 13, 11). In addition, an examination of the detail of the design reveals that it bears a persuasive

¹⁶ PRO. Mint 4/27, Pole to Morrison, 17 and 27 September 1818.

¹⁷ Royal Mint Library Accessions Register, 1816–50, pp. 5–6. W.J. Hocking, *Catalogue of the Coins, Tokens, Medals, Dies, and Seals in the Museum of the Royal Mint* (London, 1910), I, p. 165, II, p. 33. The cameo for a surviving pattern sovereign is H1804 and for the half-crown obverse H1802.

¹⁸ I should like to thank M. Harding and M. Wright of the Science Museum for their advice and for the time they devoted to showing me Watt's workshop.

resemblance to the revised half-crown effigy. What also stands in favour of this particular tool being the one that was produced in error is that it has a hardness measure in the region of four times less than that of an average production tool of the period. Being so soft the punch could never have been used to generate other tools.¹⁹

Lawson's letter of 21 February to Walker enclosing a punch of the revised half-crown obverse and requesting that it be reduced to the size of a sovereign indicated the progress that Pistrucci was making in learning how to engrave directly into steel. He will, Lawson remarked, 'soon be able to *cut* any thing as well in this way as with the *lathe*'.²⁰ Of the tools relating to the revised half-crown obverse the portrait punch H584 is of particular interest (Pl. 13, 12). Given that an engraver has worked over the design fairly thoroughly it would be unwise to draw from it firm conclusions, but there are nevertheless areas of the surface that hint at remnants of the neck and shoulder in exactly the positions where one would expect details to have been carved away from the original half-crown. But going beyond this to claim that H584 was the punch actually despatched to Soho and from which copies were made is impossible to confirm.²¹

Over the course of 1816–17 engraving directly into steel gradually became a more important element of Pistrucci's working method, and with the aid of the reducing machine he found himself being supplied with fairly well-defined outlines upon which he could operate. Two tools, sovereign punch H530 (Pl. 14, 13) and the half-sovereign punch H552 (Pl. 14, 14), have been worked on by an engraver but because of the presence, albeit faint, of turning marks similar to those that cover the surface of H544 and H604, there are grounds for thinking that they emanated from Birmingham. The alterations made by the engraver mean that both differ in certain respects from the revised half-crown portrait and so making a definite association between them and the reducing machine is more problematic. But as with the other tools already discussed, there are compelling areas of similarity between the half-crown obverse and these punches that suggest a copying lathe was involved.²²

Conclusion

In his article in the *Numismatic Chronicle* Pollard argued that a reducing machine made its first appearance at Tower Hill after Pistrucci purchased one in November 1819 from Panisset of Paris. Pollard referred to Pistrucci being called to Paris by Pole in the autumn of 1817 and there first encountering the utility of the device. What now seems clear, however, is that the first association began at the end of 1816 through use of the Soho machine, and the first coins struck at Tower Hill from dies that originated on a reducing lathe were dated 1817 – very probably sovereigns. The difficulties experienced over the design of the half-crown were in this sense fortuitous because the Mint was made aware, sooner than would otherwise have been the case, of the benefits of employing a reducing machine. The pressure of work consequent upon the demands of the new coinage and the particular requirements of Pistrucci's methods led the Mint to seek out new forms of technical assistance. There is also some evidence to suggest that a handful of surviving tools from the time reflects and confirms the transition to an alternative way of generating master tools. As the nineteenth century advanced such items as electrotypes and plaster models became the common currency of numismatic art and in themselves they speak of the increasing facility that a new generation of engravers saw in the technology of the reducing machine.

¹⁹ Hocking, *Catalogue*, II, p. 36.

²⁰ The lathe in this instance probably refers to Pistrucci's own gem engraving lathe rather than to the reducing machine.

²¹ Hocking, *Catalogue*, II, p. 36. I am grateful to my colleagues in the Engraving Department for their helpful observations.

²² Hocking, *Catalogue*, II, pp. 33–34.



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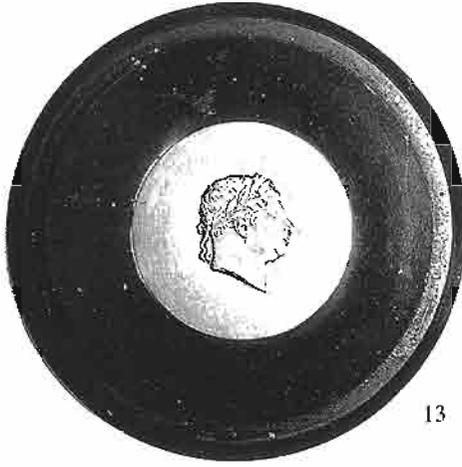
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ENLARGEMENTS



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