Collaborative Artisanship: Medals at Louis XIV's Royal Mint

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ABSTRACT: During Louis XIV's reign, royal medals were fabricated in a workshop called the Monnaie des Médailles, situated at the heart of artisanal production at the Louvre. Medals were produced by a series of men appointed by the king, but the Monnaie des Médailles achieved administrative perfection under master goldsmith Nicholas Delaunay, who transformed the workshop into a space of performative display, where the king's most important visitors could marvel at the quality of medal-making equipment and witness the process of medal striking. Although scholars of medals tend to attribute specific medals to individual artists, struck medals do not correspond to contemporary ideas about the work of art's authorship. Here, we reconstruct six stages of making – design, modelling, production of punches, dies and flans, followed by striking – to elucidate the artisanal process and place these objects back into the hands of their producers.

Introduction

Although they seldom receive much scholarly attention today, portrait medals were once the most prestigious metal objects in princely collections. Coin-like in form, but not currency, medals were cast and struck from copper, bronze, silver and gold to commemorate illustrious men and women of church and state. They were made in emulation of ancient Greek and Roman coins, whose labelled portraits and allegorical reverse inspired a wealth of antiquarian study of the past (Wellington 2015). During the reign of Louis XIV (b 1638, r 1643–1715) the manufacture of medals took place in a workshop called the *Monnaie des Médailles* [Medals Mint] at the Louvre. It was there that the medallic history of Louis XIV was struck, the most comprehensive chronology of a reign in medals ever produced, with well over 300 individual medals struck in a uniform series to commemorate the glories of the Sun King's tenure. Like many workshops at the Louvre during the *ancien régime*, the *Monnaie des Médailles* was as much a space of representation as it was a workshop.

Following a brief history of the *Monnaie des Médailles*, this article provides a description of the practice of medal-making in the age of Louis XIV. This fascinating history of metal work reveals that the Sun King's medals, often attributed to a master medal-maker alone, were in fact the products of a complex, multi-stage and collaborative process.

The *Monnaie des Médailles* at the Louvre

Throughout the reign of Louis XIV, royal medals were fabricated in a large workshop at the Louvre called the *Monnaie des Médailles*, established in 1639 during the reign of Louis XIII (Fig 1) (Mazerolle 1897, 333). The *Monnaie des Médailles* was situated on the ground floor and in the basement of the *Grand Galerie* of Henry IV (1553–1610), which linked the Louvre and the Tuileries. It occupied four arcades to the right of the *Guichet-a-Lanterne* [the portal of three bays with a raised dome roof] beside the Seine. There is an inscription which marks the exact place in a plan from 1739 (Fig 2). It

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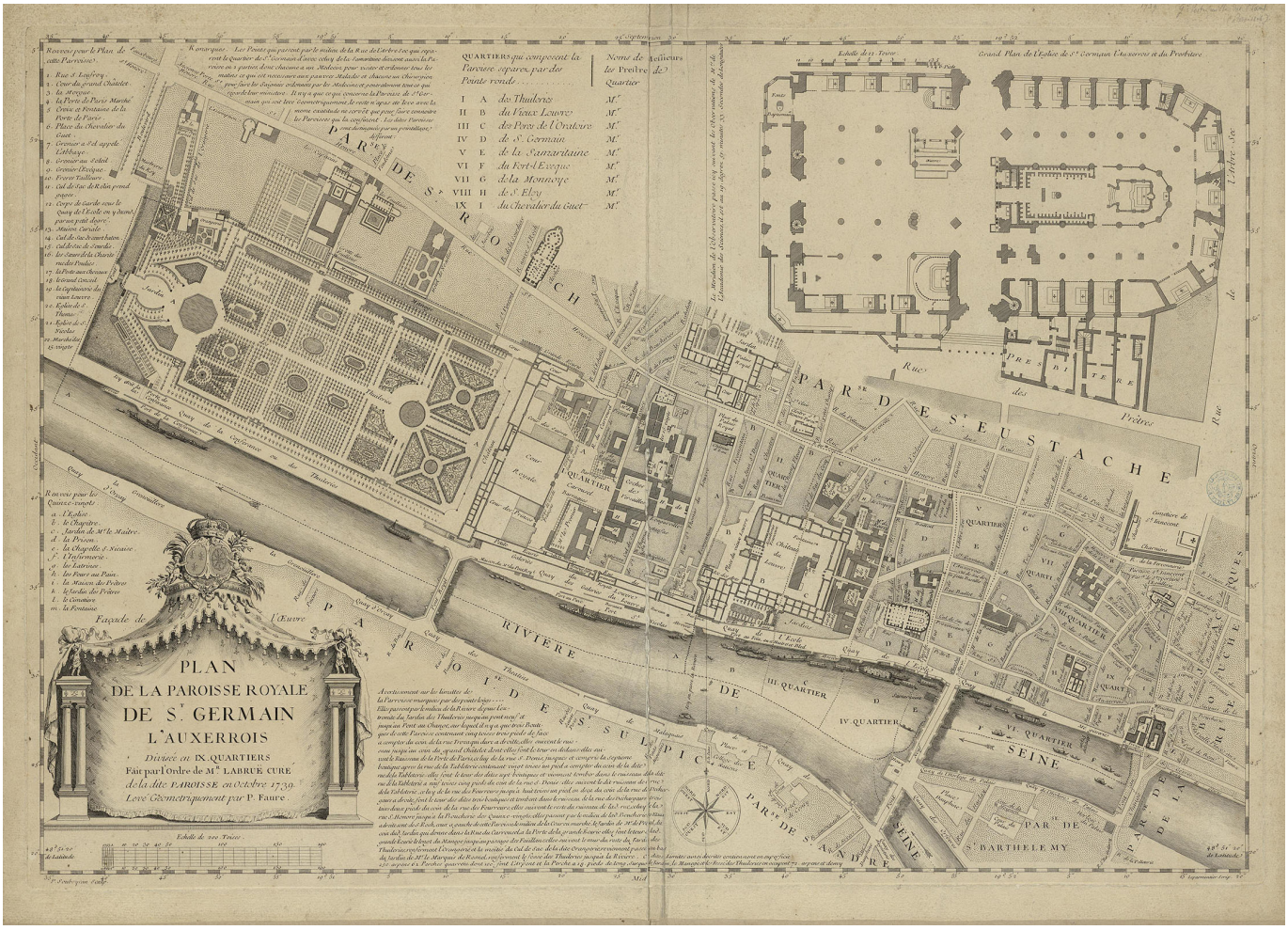

Figure 1: The Louvre and associated buildings are at the centre of Pierre Soubeyran's engraving Plan de la paroisse royale de Saint-Germain l'Auxerrois, divisée en IX quartiers / Fait par l'ordre de Mr. Labrue, curé de la dite paroisse, en octobre 1739, 800 x 545mm. © Collection Bibliothèque nationale de France.

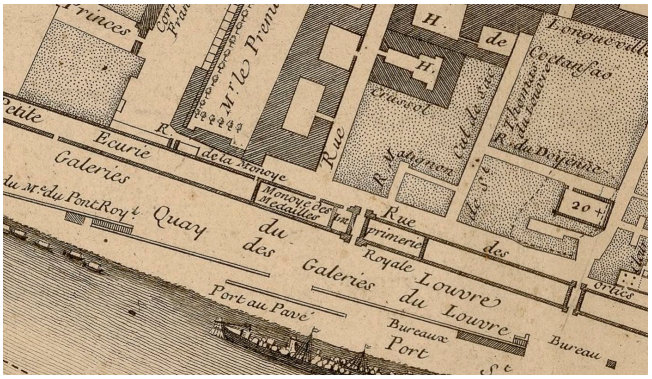

Figure 2: Detail of Figure 1*, showing the location of the Monnaie des Médailles and the Imprimerie Royale under the Grand Galerie. © Collection Bibliothèque nationale de France.*

was next to the *Imprimerie Royale* [royal print works]; so, the medals of Louis XIV and the book *Médailles sur les principaux événements du regne de Louis le Grand* (1702) published to describe them, were made together simultaneously within the same walls. The *Imprimerie* and the *Monnaie des Médailles* occupied a central position on the ground floor of the *Grand Galerie*, the artists' quarters, in full view of all the artists and artisans who inhabited the lodgings provided by the Crown. The print and medal workshops were part of the daily lives of many of the more famous artists of the *ancien régime*.

The royal mint was moved to the new purpose-built Hôtel de Monnaie on the left bank of the Seine in 1775. This was the ultimate destination of the *Monnaie des Médailles*, remnants of which remain today in the Musée de la Monnaie de Paris on the Quai Conti. The part of the Louvre that once housed the *Monnaie des Médailles* was completely transformed in the 1860s, when the western part of the *Grand Galerie* was razed completely for structural reasons (Hautecour 1929, 102–3). The architect Hector Lefuel took advantage of this demolition to construct the *Grands Guichets* on the former site of the old *Monnaie des Médailles*. Today, the *Grands Guichets* are the point of passage for cars and buses travelling from the left bank to the right bank of the Seine over the Pont du Carrousel, through the Guichets, and into the buzzing tourist hub of the Place du Carrousel (Fig 3).

Figure 3: the black rectangle shows where the Monnaie des Médailles used to be, under the Grand Galerie of the Louvre. Base photo by Jebulon, CC0 via Wikimedia Commons.

This article is more concerned with the period of the *Monnaie des Médailles*' flourishing in the 17th and 18th centuries. In 1640 when, following a declaration of the king on 30 March, an inscription in golden letters on a black marble background was erected above the entrance of the royal workshop: '*Monnoye du Roy pour la fabrique des médailles, jettons et pièces de plaisir d'or, d'argent, de bronze et de cuivre* [King's Mint for the fabrication of medals, gambling tokens [*jetons*], and coins of gold, silver, bronze and copper]' (Piganiol de la Force 1742, 165).

The workshop was placed under the control of '*Directeur général des Monnoyes de France*', and the most accomplished medal-maker of his century, Jean Warin (1604-1672). Warin perfected the system of striking coins and medals with modern screw presses (Jones 1987, 19). From 1639, he successively carried the titles '*Conducteur générale des monnaies au Moulin de France*', '*Contrôleur général des effigies*' and, eventually, '*Tailleur général des monnaies de France*' (Jones 1987, 13). Warin was perhaps the first man, but certainly the last, who could carry out all the parts of the process – from conception to striking – for fabricating the official medals of Louis XIV. His 'reign' at the *Monnaie des Médailles* ended with his death in 1672; he was the first of seven men responsible for the fabrication of medals during the reign of Louis XIV.

François Warin (*c*1637–1699), the son of Jean Warin, inherited the titles of his father but the history of his administration of the *Monnaie des Médailles* is fairly complex (Mazerolle 1932, 56–8). It appears that he had numerous demands for payments of his, and his father's work. It suffices to say that from 1676, the control of the *Monnaie des Médailles* passed on to another more capable man.

That year, the title of '*Maitre ouvrier, graveur, garde et conducteur de la monnoie de Moulin*' was conferred on the master goldsmith Claude Ballin (1615–1678), famous for his work on Louis XIV's silver furniture (Bimbenet-Privat 2003). It is possible that the workshop of the *Monnaie des Médailles* could function as a goldsmith's workshop too, thanks to the tools and materials shared between the two trades. Ballin may have used the Monnaie's workshop to fabricate the silver furniture, in addition to the workshop in his lodging only a few doors down from the *Monniae des Médailles* that he had occupied since 1667 as goldsmith to the king. This is an especially fascinating notion for students of the history of metalwork, because it connects two types of royal representation produced by metalsmiths. In fact, there have survived accounts to pay Ballin, and later his widow, for medals, jetons and other works in bronze and silver in the years 1676 to 1678 (Guiffrey 1881, 934, 941–2).

When Ballin died on 22 January 1678, less than two years after his nomination, the post of intendant of the *Monnaie des Médailles* passed to Pierre Bizot (1630-1696), who was more an antiquarian than an artisan. Bizot quit the office in 1684 following bankruptcy and a second incident forced him to leave Paris later that year. He concentrated his efforts after that date on writing his *Histoire métallique de la République de Hollande*, published in 1688 (Bizot 1688). His successor as intendant of the *Monnaie des Médailles*, Nicolas Petit (active in the 1680s), is more mysterious. He was secretary to the king and evidently an antiquarian like Bizot. In fact, the name of Petit was mentioned by Bizot in his list of '*quelques personnes choisies qui aiment et connoissent la [médaille] moderne* [some select people who love and know the modern medal]' (Bizot 1688). There are many records of payments to Petit for medals and presentation jetons during his administration, but the archives are silent regarding the man himself. It is quite the opposite for his successor, Nicholas Delaunay (1647–1727), who gained the new title of '*conseiller directeur du Balancier de Louvre*' and *'contrôleur et garde de la fabrication des médailles et des jetons*' in 1696 (Mazerolle 1897, 339). A master goldsmith like Claude Ballin, his father-in-law, Delaunay achieved administrative perfection in the production of medals and jetons for the king. At the same time, he continued to take the most important orders of goldsmithing for the crown and the royal family (Bimbenet-Privat 2003).

The arrival of Delaunay at the *Monnaie des Médailles* generated an abundance of archives for us to understand how the medals of Louis XIV were made. When he took his new office, a new ordinance was written for the *Monnaie des Médailles* and its director. While the director would be paid for the responsibilities of his post, it was ordered that '*Les poinçons, matrices et carrés servant à la fabrication des médailles et jettons d'or et d'argent seront payez séparément aux graveurs, suivant la qualité de leur travail…* [the engravers of punches, dies and *carrés* [square dies] used to fabricate medals and jetons in gold and silver will be paid separately according to the quality of their work…]' (Mazerolle 1897, 335). We will show later that the fabrication of medals was a complicated process with several stages. The engraving of punches and dies was, evidently, a very refined art and well appreciated by the crown.

The director would be given '*un logement convenable dans le lieu du travail…* [suitable lodging within the place of the work]' (Mazerolle 1897, 339). He would be responsible for the care and '*toutes réparations* [all repairs]' of '*outils et machines servant à la fabrication desdittes médailles et jettons* [tools and machines used to fabricate said medals and jetons]'. In addition, '*les poinçons, matrices et carrez servans à la fabrication desdites médailles et jettons seront mis dans une armoire fermant à deux clefs, dont l'une restera ès mains du directeur et l'autre en celle du controlleur et garde qui en tiendra pareillement registre* [the punches, dies and *carrés* used to fabricate said medals and jettons will be placed in a cabinet locked with two keys, one of which will remain in the hands of the director and the other in those of the controller and guard, who will equally maintain an inventory of them]' (Mazerolle 1897, 336). Delaunay would take advantage of this article of the ordinance to make a gallery in his lodgings for exhibiting precious punches and matrices (our thanks to Ludovic Jouvet whose research on Delaunay's gallery of dies is forthcoming). When Delaunay was installed at the *Monnaie des Médailles* on 24 June 1696, the original inscription above the door that had been inscribed in 1640 was in a poor state, so it was replaced by another simpler one: '*Monnoyes des Médailles*' (Piganiol de la Force 1742, 165).

Upon Delaunay's appointment, the king ordered an inventory of punches and dies which Nicolas Petit would provide for Delaunay (Mazerolle 1903–07). By a council decree of 25 June 1697, he appointed two commissioners: the abbé Jean-Paul Bignon (1662–1743) of the *Petite Académie* and his brother, Armand-Roland Bignon de Blanzy (1666–1742). The production of the inventory of the numerous punches and dies necessitated several visits by this team between September 1697 and March 1698. It is fascinating to learn that this inventory of tools for striking the royal medals and jetons was made by the same person who had been responsible for directing the team to compile the king's medallic history since 1694. During the two years, Bignon and his brother recorded more than 2,750 punches and dies. It is quite possible that the punches and dies which he saw at the *Monnaie des Médailles* were another source for determining the medals that remained to be made to complete the medallic history. In addition, in one of their last meeting minutes, they mentioned that Nicolas Petit had received a good number of punches, dies and wax models from the director of the *Imprimerie Royale*, Jean Anisson (1642–1721), who had received them from the heirs of François Michel le Tellier, the Marquis of Louvois (1641–1691), one of Louis XIV's most esteemed ministers who, during this period, was Superintendant of the King's Buildings (Mazerolle 1903-07). This is a fascinating insight into the social and professional networks of ministers, academicians, artists and workers responsible for the medals of Louis XIV and the medallic history.

While Delaunay was director of the *Monnaies des Médailles*, his lodgings became a gallery for displaying the punches and dies like works of art. Piganiol de la Force (1673-1753) has left us this description in his 1742 volume *Description de Paris … etc.*:

> The cabinet in the form of a gallery, which is improperly called the Cabinet of Medals, is the most curious of its kind in the world, because even without speaking of its cabinetry, mirrors, bronzes and portraits of the royal family since Henry IV with which it is adorned, one can see here the punches and the dies which are so perfectly executed and in such great numbers that they cost more than two million [*livres*]. It is so easy for the polishes to tarnish that previously we did not see them, but now they are displayed in cabinets with glass panels, where the curious can see them all at their ease. We then descend to the screw press, where we admire the beauty and the size of two great bronze screw presses which weigh 26,000 [*livres*, almost 13 tonnes]. In the cabinet one can observe how the punch or die makes the medals. One also sees at the director's house the goldsmithing work, which he continues to make for the king. There have been two complete suites of medals struck in this mint. The first is the medallic history of Louis le Grand....the other is that of the kings of France from Pharamond to Louis XIV.
> *Le Cabinet en forme de Galerie, qu'on appelle im-*

> *proprement le Cabinet des Médailles, est dans son genre tout ce qu'il y a de plus curieux au monde, car sans parler de la menuiserie, des glaces, des bronzes, et des Portraits de la Famille Royale, depuis Henry IV, dont il est orné, on y voit les Poinçons, & les Quarrés qui sont si parfaitement travaillés, & en si grande nombre, qu'ils en coûté plus de deux millions. Il est si facile d'en ternir le poli, qu'autrefois on ne les voyoit point, mais présentement ils sont exposés dans des armoires à panneaux de glace, où les Curieux les voyent tout à leur aise. L'on descend ensuite au Balancier, où l'on admire la beauté, & la masse des deux grands Balanciers de bronze qui pèsent vingt-six milliers [ça c'est près de 13 tonnes]. Dans le Cabinet on peut remarquer comment le Poinçon ou Coin forme le Quarré ou creux, & au Balancier, comment avec le Quarré on fait les Médailles. On voit aussi chez le Directeur les ouvrages d'Orfèvrerie, ausquels on travaille continuellement pour le Roi. L'on a frappé deux suites complètes de Médailles dans cette Monoye. Le premier est l'Histoire Métallique de Louis le Grand […] L'autre est celle des Rois de France, depuis Pharamond, jusqu'à Louis XIV* (Piganiol de la Force 1742, 166–7).

Here, Piganiol de la Force has confirmed that, as director, Delaunay used the workshops at the *Monnaie des Médailles* to produce not only medals and jetons, but also his goldsmithing work.

In one very long note for his description of the galleries of the Louvre in the fourth volume of his 1756 *Architecture Françoise*, François Blondel (1705–1774) gave another interesting description of the *Monnaie des Médailles* as an exhibition space. It begins,

> Under this new director [Delaunay] … the *Monnaie des Médailles* took on another face; it was put into admirable order and reached the greatest perfection, which has continued into the present under the current direction of M. Jules-Robert de Côte.'
>
> *Sous ce nouveau Directeur … la Monnoie des Médailles prit toute une autre face; elle fut mise dans un ordre admirable, & parvint à la plus grande perfection; ce qui a toujours subsité jusqu'à present sous la direction actuelle de M. Jules-Robert de Côte* (Blondel 1756, 22).

He continues with very interesting details on the medallic history of Louis XIV and how the dies for the uniform series were exhibited:

> We see again in this gallery a complete suite of dies which are used for striking the medallic history of Louis XIV, numbering 328 medals, of which the last 32 were engraved on the order of Louis XV since his accession to the crown.
>
> *On voit encore dans cette galerie une suite complette de quarrés qui servent à frapper l'histoire métallique de Louis XIV, au nombre de 328 médailles, dont les 32 dernières ont été gravées par l'ordre de Louis XV depuis son avénement à la Couronne.*

He continues,

> M. Delaunay ... bearing in mind that the acquisition of these medals becomes too expensive for collectors and that, moreover, they fit poorly into a medal cabinet, proposed to Louis XIV to reduce them all to a diameter of 18 *lignes* [*c*40.6mm]. His Majesty agreed, and a uniform suite was developed, like the one that we see in this gallery at present.
>
> *M. de Launay … Faisant attention que l'acquisition de ces médailles devenait trop dispendieuse pour les amateurs; que d'ailleurs elles s'arrangeaient mal dans un médaillier, proposa à Louis XIV de les réduire toutes dans un même diamètre de 18 lignes; Sa Majesté y confirmait, & on forma une suite égale, telle qu'on la voit à présent dans cette galerie* (Blondel 1756, 22).

The process of revising the king's medallic history was undertaken by the *Académie Royale des Inscriptions* (the company known as the *Petite Académie*, who were responsible for overseeing royal commissions) from at least 1694 (Wellington 2015, 39–78). But if Blondel's account is to be believed, we can shed light on the reasons why a uniform series of medals of Louis XIV's history was engraved and struck at the end of the seventeenth century. Medals of the same size with a matching set of portraits of the king at various ages provided a consistent visual narrative. But equally this decision for the new size of medals may have been driven by market forces.

From all the descriptions of the *Monnaie des Médailles*, it was not only the incredible display of punches and dies which impressed visitors, but also the heavy bronze screw presses ordered by Delaunay at the end of the seventeenth century for striking the uniform series and the royal jetons. In his long entry 'Monnoie des Médailles' in his *Traité des Monnoies … en forme de dictionnaire* of 1764, the François-André Abot de Bazinghen (1711-1791) attributes the two screw presses, which remain to this day at the Monnaie de Paris (Fig 4), to Delaunay himself:

> It is to Sieur Delaunay that [the Monnaie] owes its final perfection, not only by the exquisite taste that this skilful man had for his art, but also by the fine order that he gave to the cabinet of punches and dies

of the king's medals, and by the beauty of the bronze screw presses which he has cast, whose bas-reliefs and ornamentation, which are of his design, surpass anything we have seen of this type.
C'est au sieur Delaunay à qui elle [La Monnaie du Louvre] doit sa dernière perfection, non seulement par le goût exquis que cet habile homme a eu pour son art, mais aussi par le bel ordre qu'il a donné au Cabinet des poinçons et carrés des médailles du Roi, et par la beauté des balanciers de bronze qu'il a fait fondre, dont les bas-reliefs et les ornemens qui sont de son dessein, surpassent ce qu'on avoit vu jusqu'ici en ce genre (Bazinghen 1764b, 247).

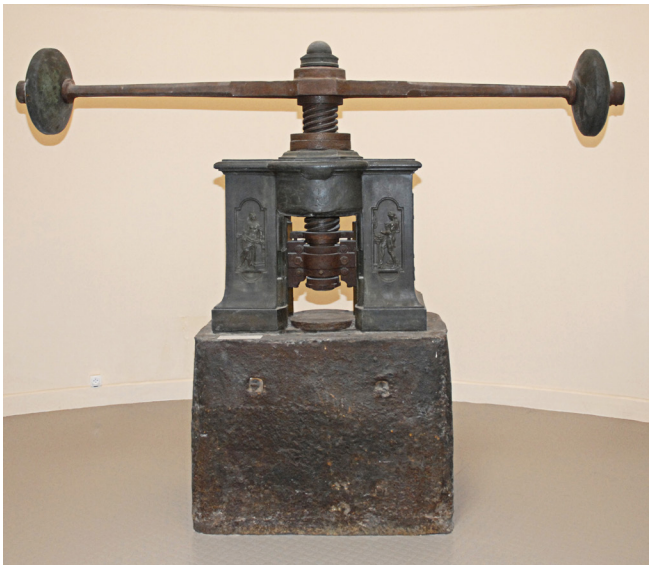

Figure 4: Screw press, known as le balancier Delaunay; bronze, steel, lead, 1697. © Musée de la Monnaie, Paris.

Bazinghen had reason to attribute the designs and ornamentation of the screw presses to Delaunay, no doubt. However, like royal medals, the allegorical designs for these screw presses were conceived by the *Petite Académie*. The minutes for the *Académie* from March to April 1698 commence:

> Various designs for the figures and for the inscriptions to be placed on the two screw presses were proposed and we agreed on this unanimously. Since there are two, and each of the two has space for four figures, on the larger one, which is particularly designed for the medals of the History of the King, we will place the four principal virtues which reign in all the actions of his majesty, either in peace or in war. Valour, Justice, Religion, Liberality. At the two ends of the screw press, for inscriptions, we would put on one side, *Rerum gestarum fidei et aternitati.* On the other, in the manner of the ancient Romans, *Aere, argento, auro, flando, feriundo.*
> *On a proposé divers Desseins pour les figures, et pour les inscriptions qu'on doit mettre aux deux Balanciers et on est convenu unanimement de cecy. Comme il y en a deux, et qu'à chacun des deux il y a place pour quatre figures, on mettra pour le plus grand qui est plus particulièrement dessiné pour les medailles de l'Histoire du Roy, les quatre principales vertus qui regnent dans toutes les actions de sa majesté, soit en Paix, soit en Guerre. La Valeur, la Justice, la Religion, La Libéralité Au deux bouts de Balancier, pour Inscriptions, on mettroit d'un costé, Rerum gestarum fidei et aternitati. De l'autre, à la manière des anciens Romains, Aere, argento, auro, flando, feriundo* (Registre Journal, 22 April 1698).

It is remarkable that the first inscription is very close to that which the *Académie* selected for the medal celebrating the formation of their company (Fig 5). But it is the design for the reliefs for the smaller screw press for jetons which is the most interesting. The gentlemen of the *Académie* explained the four stages of the fabrication of medals:

> For the little press [Fig 4], we will place four figures [Fig 6] which concern particularly the art of inventing and fabricating jetons and medals. Genius or Invention represented by Apollo holding his lyre. Design, represented by a young man drawing, and who has close to him a bust of the King. The art of the engraver also by a young man who holds a chisel, or graver, in one hand, and in the other an engraved bust of the king. The art of the medallist, represented by a standing woman who holds a scale in one hand and has nearby a pile of medals.

Figure 5: Silver medal, RERUM GESTARUM FIDES (reverse), c1701. © Département des Monnaies, médailles et antiques, Bibliothèque nationale de France.

Figure 6: Detail of the relief panels on Delaunay's screw press (Fig 4). Left to right: Genie, Dessein, Graver and l'Art de frapper les médailles. © Musée de la Monnaie, Paris.

> *Pour le petit Balancier, on mettra quatre figures qui concernent plus particulièrement, l'art d'inventer, et de fabriquer les Jettons, et les médailles. Le Génie, ou l'invention représenté par Apollon tenant sa Lyre. Le Dessein, représenté par un Jeune homme qui dessine, et qui a près de luy un Buste du Roy. L'art de graver, par un jeune homme aussy qui tient un cizeau, ou cizelet, d'une main, et de l'autre une teste du Roy gravée. L'art de fraper les medailles, representé par une femme debout qui tient une balance à la main, et qui a près d'elle une pile de medailles* (Registre Journal, 22 April 1698).

Evidently, Delaunay did not follow these descriptions exactly. For example, the figure of Genius is not Apollo but a woman, perhaps the muse Clio with the trumpet of renown and her hand on Apollo's lyre. The art of the engraver does not hold a bust of the king in his hand but looks at a medallion portrait hanging on the wall in front of him. Nevertheless, Delaunay's screw presses remind us that the designs proposed by the *Petite Académie* were not necessarily followed to the letter by the artists who interpreted them. Indeed, we often see similar minor changes between the design and the production of medals under Louis XIV because of the numerous different artists and artisans involved in the complicated process of engraving dies and striking medals, the subject to which we will now turn our attention.

The profession of the medallist

We know that there were cast medals. The famous medal of the foundation stone of the Louvre by Warin (Fig 7) was cast because it would have been too expensive and have taken too long to have it made by striking. However, the medals of Louis XIV were struck for the most part. Although scholars of medals tend to attribute specific medals to individual artists, struck medals do not correspond to contemporary ideas about authorship for works of art – it is often impossible to name an author among the numerous people involved in the six stages of the fabrication of medals.

The many hands at work on the production of medals is akin the productions of prints. Scholars have long recognised the difference between prints made by a single artist, and those produced by a team. A medallist like Jean Warin designed and made medals himself from start to finish. In printmaking terms, this is akin to the *peintre-graveur* (Durer or Rembrandt for example), responsible

Figure 7: Gold medal by Jean Warin, LUDOVICO XIV REGNANT ET AEDIFICICANTE (obverse), 1665, diameter 105mm. © Département des Monnaies, médailles et antiques, Bibliothèque nationale de France.

for both the design of the print and the etching and/or engraving of the plate from which it was made. After Warin, the task of making medals for Louis XIV was undertaking by a team of designers and engravers. When a print was designed and realised by different hands the role of each maker is acknowledged by Latin words that appear beneath the image. 'Invenit' (often abbreviated to 'inv.') attributes the artist after whose design the plate was etched and/or engraved, and the terms 'fecit' (fec.), 'delineavit' ('del.'), or 'sculpsit' ('sculp.') signals the person who made the plate. Unfortunately, the names that appear on medals are only those who engraved the dies. There is no distinction made between the designer and engraver for a medal. With every new die that was made after the old one broke, the name of the die engraver appears on the new edition of the medal. By the 1690s, there were so many people involved with the design and production of medals it would have been impossible to fit all of their names on these diminutive sculptures.

Parts of the medal-making process are described in Denis Diderot and Jean le Rond d'Alembert's *Encyclopédie* and Bazinghen's *Traité de monnoies*, scattered across dozens of short articles throughout these volumes. The incomplete and fragmentary nature of these descriptions leave many gaps. Consequently, we present here a reconstruction of the *chaîne opératoire* of medal making at the *Monnaie des Médailles* pieced together from these fragmentary descriptions and from examination of extant equipment, all in light of the practical metalworking experience of one of the authors of the present article (Clarke). The *Encyclopédie* and Bazinghen's treatise provide more information on coin production than medal production, but the inventory of the *Monnaie des Médailles* taken in 1696 when Delaunay became director (Mazerolle 1897) lists the same equipment that each publication describes for coin-making. Apart from the milling of coin edges and differences in the scale of production, the processes for coin and medal production were much the same.

The first stage in the process of medal making was design by committee. The members of the *Petite Académie* were charged with the task of identifying appropriate subjects for medals, for devising allegorical images for their reverses, and for writing the inscriptions to accompany them. The *Petite Académie* worked closely with artists from the *Académie Royale des Peintures et des Sculptures*, including Sébastien LeClerc, who would realise designs, such as those illustrated here (Fig 8).

After the sketch on paper, the medallist makes a three-

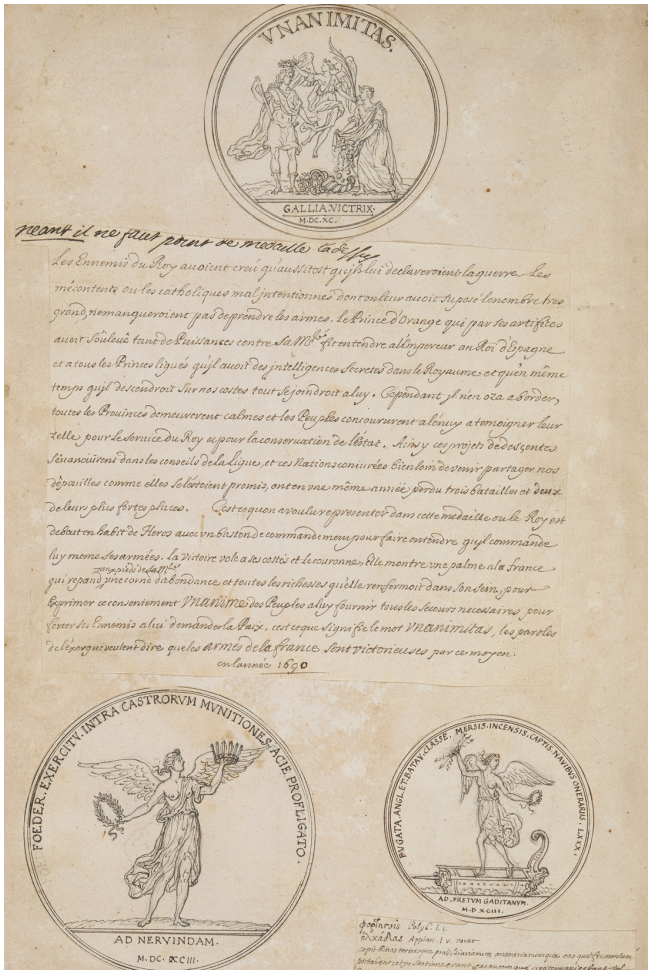

Figure 8: A page (with an annotation in the hand of Louis XIV) from Projets pour le Médaillier de Louis XIV avec les desseins de Seb. le Clerc des Nottes du roy des Ministres et de l'Académie Royales des Inscriptions. © British Library, ADD MS 31908.

dimensional model to determine how the design could be translated into relief for the medal (Fig 9) (Bazinghen 1764a, 558). Each medal requires two steel dies – one for each side – in which the design is created in *intaglio* (Diderot and d'Alembert 2017, *Matrices*; Bazinghen 1764b, 22-23). The design on a die is created with a series of steel punches of the required motifs which are carved in relief (Diderot and d'Alembert 2017, *Poinçon*; Bazinghen 1764b, 514). The die and punch for the reverse of *LUDI EQUESTRES*, created by medallist Jacques Nilis in *c*1693, are illustrated here alongside one of the resulting medals to demonstrate this stage of the process (Figs 10–12) (Guiffrey 1889, 443). By making the model, the medallists can determine the different depths of relief required and what range of punches will be necessary to create the different zones of the composition on the die. On *LUDI EQUESTRES* (Fig 11), for example, there are several distinct zones of the composition with different degrees of relief: the king and horse in the foreground are in high relief, the architectural elements in the background are in mid-

Figure 9: Wax on slate by Massimiliano Soldani; model for a medal by Francesco Redi, 1677, 66 x 67mm. © Metropolitan Museum of Art, Robert Lehman Collection, 1975.1.1320 a.

relief, and the onlooking audience are in quite low relief. Outside the vignette, there is also the inscription above and that below. Several different punches were necessary to create these different zones and depths to ensure that each layer transferred perfectly from the punch to the die and, subsequently, from the die to the medal. If we examine the die (Fig 10), we can see the different degrees of depth in inverse. The motif of the king and his horse are fairly deep, which has necessitated a punch in high-relief (Fig 12), but the letters of the inscription are shallower and the architectural elements and audience in the background are so shallow that some elements were probably engraved directly into the surface of the die. A wax model could be used to determine the range of punches and processes required to create a design.

The punches were fabricated from steel rods. The authors are not aware of any published analyses of the extant punches and dies. Bazinghen's *Traité des monnoies* describes the process for carburising steel by the cementation process by heating strips of iron with animal matter and charcoal and quenching the red hot metal in cold water (Bazinghen 1764a, 2–3). The fact that Bazinghen, a commissioner of the *Cour des Monnoies*, mentions the process suggests that it may have been performed within the workshops of the *Monnaie des Médailles* itself. He does not describe the necessary subsequent stages of welding together and forging the strips to consolidate the material and produce bars of a useful size. In all likelihood, since precise quality control would have been difficult, the composition of the steels used would

Figure 10: Die by Jacques Nilis for the reverse of the medal LUDI EQUESTRES (left) with detail (right), c1693, steel. © Musée de la Monnaie, Paris, PAR_0343.

Figure 11: Bronze medal by Jacques Nilis, LUDI EQUESTRES (reverse), c1693, diameter 62mm. © British Museum, M.2312.

Figure 12: Punch by Jacques Nilis for the reverse for the medal LUDI EQUESTRES, c. 1693, steel. © Musée de la Monnaie, Paris, PAR_0342.

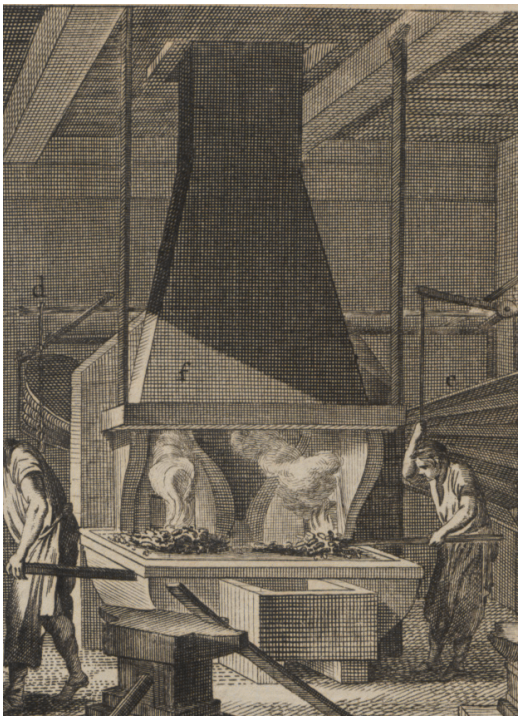

Figure 13: A blacksmith's forge (Diderot and d'Alembert 2017, 'Serrurier' plate I, detail). by courtesy of the ARTFL Encyclopédie Project, University of Chicago.

have varied enormously. Consequently, we follow here with a general description of the treatment of useful heat-treatable steels (*c*0.35–1.5% C) for striking tools.

From steel rods, the punches were produced through three stages: annealing to soften the steel, carving of the motif and heat treatment to harden the punch for use (Bazinghen 1764a, 557–560). The rods would have been annealed in a simple forge with forced draft (Fig 13), heating them to a carrot orange colour (up to 780°C), and cooling them slowly to maintain the fine-grained annealed structure. A simple method would be to leave the rods to cool gradually in the embers of the forge, but there are several other techniques that metal-smiths use, such as burying the metal in powdered lime or ash. A general description of annealing steel in the *Encyclopédie* recommends covering it with a mixture of powdered charcoal and cow's blood; this would cause localised carburisation of the surface (Diderot and d'Alembert 2017, *Trempe de l'acier*). Subsequently, one end of the rod would be filed flat and perhaps the outline of the design transferred from the wax model via a wax paper rubbing. The engraver could then carve this outline into relief using gravers, chisels and files.

The punch was heat-treated after the motif was complete to harden the steel and prevent it from being destroyed with use. Heat-treatment consists of two stages: hardening and tempering. Descriptions in the *Encyclopédie* and Bazinghen's treatise only mention hardening (Diderot and d'Alembert 2017, *Trempe de l'acier*; Bazinghen 1764a, 2-3). The punch is heated in the forge until its colour is carrot orange again, then it is immediately quenched to form the hard, needle-like martensite microstructure. Ideally, the quenching solution contains salts which prevent the formation of bubbles on the metal, allowing it to cool rapidly. The *Encyclopédie* mentions solutions of urine or potash as quenching solutions but also provides two other recipes, one incorporating garlic and brandy, another with carbonised animal material, soot, 'decrepit' sea salt and cow's blood (Diderot and d'Alembert 2017, *Trempe de l'acier*).

In this hardened state, the steel is very brittle, and a punch would crack or shatter if used. Although the *Encyclopédie* and Bazinghen do not seem to mention the process, hardened steel has to be tempered, which partially decomposes the martensite microstructure, reducing internal stresses and improving mechanical strength (Brepohl 2001, 72). Tempering is achieved with slow, controlled heating. The microstructure changes as it reaches different temperatures, altering the working properties of the metal. If it is overheated, the steel will return to its softened, annealed state, so it is critical for the artisan to observe the process carefully. The punch is placed in the forge with the shaft in the embers and the patterned end away from the heat. It is heated slowly and carefully. The back end heats up first and the heat slowly moves up the shaft towards the patterned end. As the heat moves through the rod, a rainbow of coloured oxides develop on the surface, ranging from pale yellow to shades of purple, blue and grey. The colour on the surface of a given part of the metal indicates the temperature which that part has reached: yellow indicates 220°C, dark purple 288°C, dark blue 299°C (Brepohl 2001, 70). The ideal tempering temperature for the face of a punch is approximately 275°C, a light purple colour. As the heat moves towards the patterned end of the punch, the worker watches the bands of colour move up the shaft. As soon as the correct shade of purple reaches the end, the worker immediately quenches the punch again to fix the microstructure. If the tempering has been performed correctly, the punch is now at a suitable state of hardness and ready for use.

Each die was made from a short, thick bar of steel approximately 100–140mm long (Figs 10 and 14 E). In order to create the design, the worker placed the annealed steel for the die into a special vice or jig to hold it perfectly straight (Fig 14 B, C). The die needed to be perfectly level so that when it was fixed into the screw press, it would come down perfectly aligned horizontally

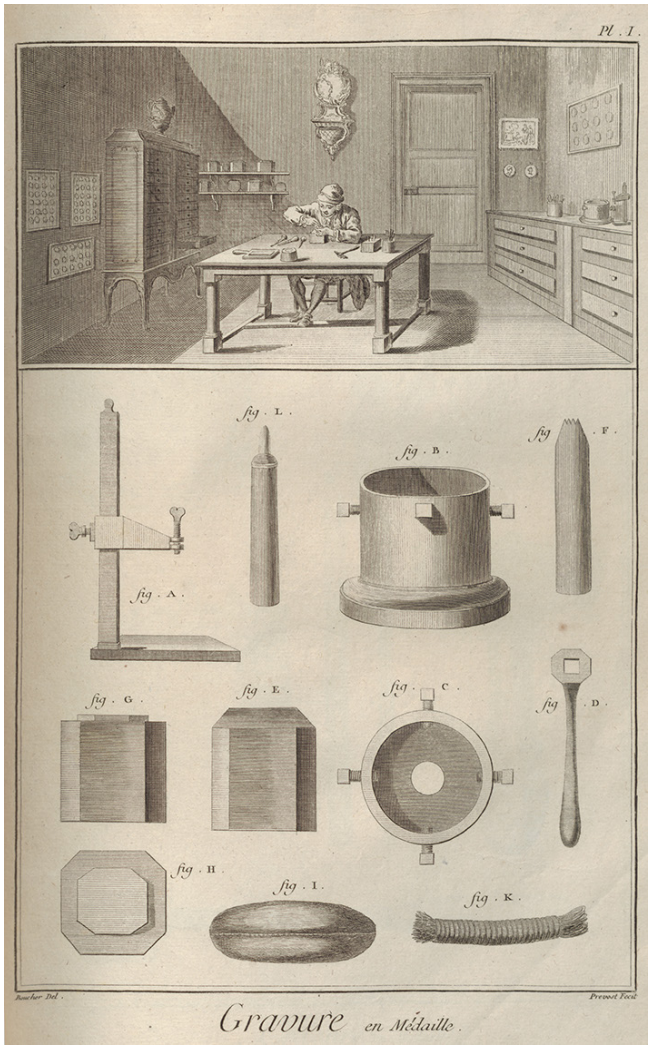

Figure 14: The workshop and equipment of a medallist (Diderot and d'Alembert 2017, 'Gravure en médailles' plate I). By courtesy of the ARTFL Encyclopédie Project, University of Chicago.

and make its impression evenly on the flan (the medal blank). Using the jig, the worker was able to file each end of the steel bar level, and the excess material around where the design would be was filed back at an angle (Fig 14 E). The jig was then placed on a leather cushion filled with sand (Fig 14 I) and the medallist worked the design into the surface with the punches, as we see in the vignette on Delaunay's screw press (Fig 6, third from left). In working the surface, it was critical that the punches be struck firmly and did not bounce, since this risked creating a double impression. The cushion below helped to absorb some of the force from hammering which might otherwise cause the punches to bounce.

After the work with punches was complete, finer details would have been engraved into the surface, which we see illustrated in a plate on medal making from the *Encyclopédie* (Fig 14, vignette). On the die in Figure 10, we can see details which do not appear on the punch used to make it (Fig 12), such as the lance and the ornaments on the flank of the horse. These would have been engraved directly onto the die after the rest had been created with punches. Finally, the die was heat-treated in the same manner as for the punches, by hardening and tempering, to make it usable.

The flans from which medals were fabricated were of gold, silver or copper alloys (Diderot and d'Alembert 2017, *Flanc*). The first stage for fabricating these was to cast strips of metal in sand moulds made from a wet sand-clay mixture pressed into wooden box frames (Diderot and d'Alembert 2017, *Sable, Fondure en* and *Monnoyage* pl 2). The cast strips were annealed to soften them and then fed into a steel rolling mill to reduce their thickness to the required gauge (Fig 15; Diderot and d'Alembert 2017, *Laminoir*). In the 1696 inventory of the *Monnaie des Médailles*, a hand-powered rolling mill is recorded, but Nicolas Petit also noted that a horse-powered rolling mill had been decommissioned in 1686 and placed in storage (Mazerolle 1897, 341). The strips were annealed again and the blanks were cut with a disc-cutting tool, which we see illustrated in the *Encyclopédie* (Fig 16) (Diderot and d'Alembert 2017, *Couper* and *Coupoir*). The 1696 inventory mentions *'trois corps de coupoirs garnys de toutes leurs pièces* [three [flan] cutter frames furnished with all their parts]'

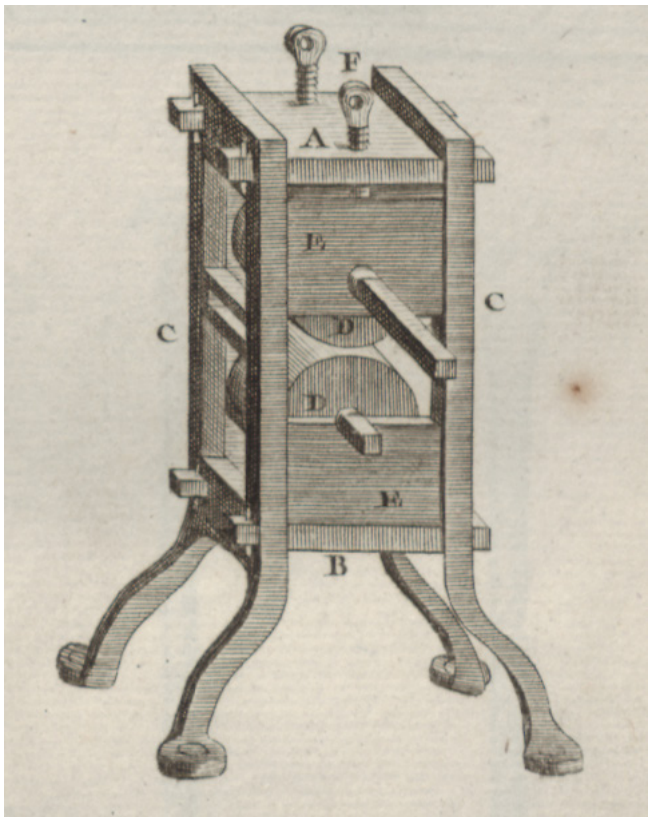

Figure 15: A rolling mill (Diderot and d'Alembert 2017, 'Monnoyage' plate IX, detail). By courtesy of the ARTFL Encyclopédie Project, University of Chicago.

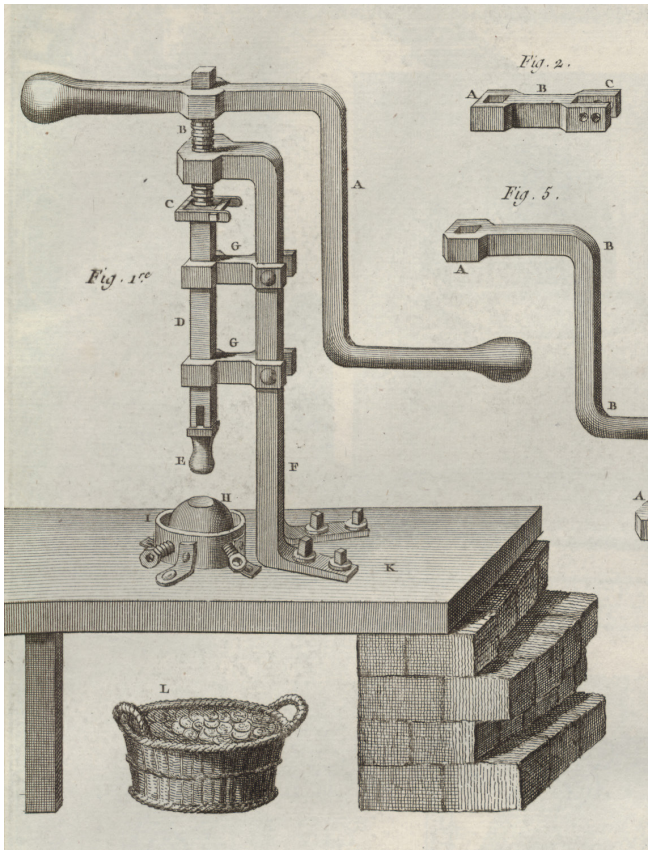

Figure 16: A disc cutter (Diderot and d'Alembert 2017, 'Monnoyage' plate XII, detail). By courtesy of the ARTFL Encyclopédie Project, University of Chicago.

located near the rolling mills (Mazerolle 1897, 341). The lower part of the cutter, which in the illustration is attached to the table, was a round, mound-shaped block of hardened steel with a sharp-edged hole cut through its centre. The strip was placed over this hole and, when the handle was turned, the upper anvil of the tool came down and pressed the strip against the sharpened edges of the hole, cutting out the disk which would then fall through the hole and a hole in the table, landing in a container below.

The flans were then prepared to receive the imprints of the matrices. They were annealed one last time and cleaned in an acidic solution to remove oxides remaining from annealing from their surfaces (Diderot and d'Alembert 2017, *Blanchiment* and *Monnoyage*). If oxides were not removed at this stage, they could be pressed into the surface of the metal during the striking, after which they could not be removed. Finally, the flans were oiled to assist the imprinting process and prevent the medal from adhering to the dies after imprinting (Diderot and d'Alembert 2017, *Balancier*).

The dies for the effigy (obverse) and the type (reverse) of the medal were fitted into the screw press and held

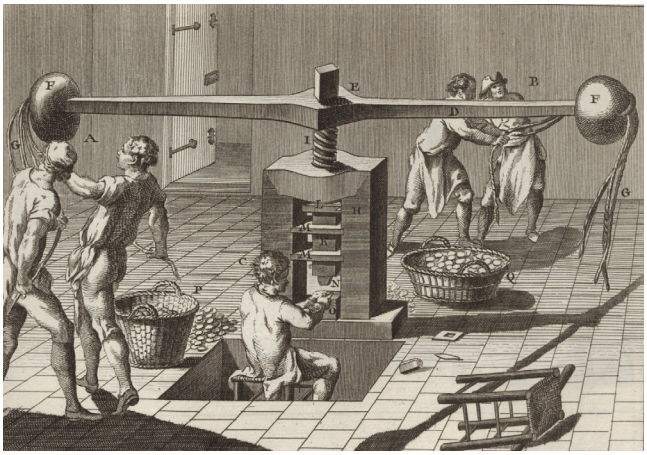

Figure 17: A screw press (Diderot and d'Alembert 2017, 'Monnoyage' plate XV, detail). By courtesy of the ARTFL Encyclopédie Project, University of Chicago.

in position with nuts and bolts (Fig 17) (Diderot and d'Alembert 2017, *Balancier* and *Monnoyage*). On the die in Figure 10 we see a hole in the side which would have been used for this purpose. To strike the medal, one worker positioned the flan carefully on the lower die and others pulled on ropes attached to lead weights on each end of the screw press handle, turning the screw to bring the upper die down to press the flan between the two dies, imprinting both sides instantaneously. The screw press workers pulled the ropes again to return the screw mechanism to its original position, lifting the upper die. The worker below removed the medal and placed a new flan on the lower die, ready for the next impression.

In conclusion, an account of the visit of the Czar Peter the Great to the *Monnaie des Médailles* at the Louvre in 1717 provides an overview of the striking of medals at the Louvre as a site of the representation of the glory of the king:

> The Czar went on 12 June to see the minting of medals. As it is under the administration of the superintendence of [royal] buildings, M. le duc de Antin was there with several gentlemen to receive this prince. As soon as he had arrived, M. de Launay, director of this place, had a gold medal struck in his presence [Fig 18]. M. le duc d'Antin presented it to the Czar, who did not expect to see his portrait on one side with a legend *Petrus Alexiewitz Tzar, Mag. Russ. Imp.* and on the other side Renown traversing the air and holding two trumpets (on the banner of the one she is playing, we see a nude man on horse-back with a lance with which he pierces a dragon); around these are the words *Vires aquirit eundo* and in the inscription *Lutet Parisi. M.DCC.XVII*. It was observed that this present was very pleasing to him, and even more the manner in which it was made.

Figure 18: Silver medal by Jean Duvivier, VIRES ACQUIRIT EUNDO obverse (left) and reverse (right), 1717, diameter 59mm. CC0 Musée Carnavalet, Paris, ND5006.

He greatly admired the beauty and the size of the two great bronze screw presses weighing 26,000 [*livres*], which have been made since M. de Launay commenced his directorship, and he examined, with an attention which marked his intelligence, all which serves the fabrication of medals. The cabinet, in the form of a gallery of punches and dies, improperly called the *cabinet des médailles*, which is of beautiful joinery adorned with mirrors and bronzes, with portraits of the royal family since Henri IV, pleased him tremendously. He examined punches and dies for a long time and praised the work greatly. One thing which greatly surprised him was to find in a medal cabinet forty silver medals and the same of bronze similar to the gold medal which M. le duc d'Antin had just offered to him on behalf of the king, and to see them at the same time distributed to his retinue and to all the people who were present.

The paintings and the curiosities which decorate the apartment of M. de Launay also seemed to please the Czar. Finally, he left this place so pleased that he returned there on the eve of his departure, but without any retinue. He wished to see again the same things that had been showed to him the first time, and his admiration was not less. M. de Launay presented to him a medal of the king. This prince received it with a tender satisfaction, which he marked by placing this medal on his breast, and using expressions which signified that he would wear it his whole life out of love for His Majesty.

Le Czar alla le 12 de juin voir la monnoie des médailles. Comme elle est de la dépendance de la surintendance des bâtiments, M. le duc d'Antin s'y trouva avec plusieurs seigneurs pour recevoir ce prince. Aussitôt qu'il fut arrivé, M. de Launay, directeur de ce lieu, fit frapper en sa présence une médaille d'or. M. le duc d'Antin la présentera au Czar, qui ne s'attendoit pas d'y voir d'une côté son portrait, ayant pour légende Petrus Alexiewitz Tzar, Mag. Russ. Imp., & de l'autre un Renommée traversant les airs & tenant deux trompettes (sur la banderole de celle qu'elle embouche, on voit un homme nu à cheval avec une lance dont il perce un dragon); autour sont ces mots: Vires aquirit eundo, & dans l'exergue: Lutet Parisi. M.DCC.XVII. On remarqua que ce présent lui fut fort agréable, & encore plus la manière dont il fut fait. Il admira beaucoup la beauté & la masse des deux grands balanciers de bronze pesant vingt-six milliers, lesquels ont été faits depuis que M. de Launay à cette direction, & il examina, avec une attention qui marque son intelligence, tout ce qui sert à la fabrication des médailles. Le cabinet, en forme de galerie, des poinçons & des carrés, appelé improprement le cabinet des médailles, qui est d'une belle menuiserie, orné de glaces & de bronzes, avec les portraits de la famille royale depuis Henri IV, lui plut extrêmement. Il considéra longtemps les poinçons & les carrés, & en loua beaucoup le travail. Une chose qui le surprit fort, ce fut de trouver dans un médaillier quarante médailles d'argent & autant

> *de bronze, semblable à la médaille d'or que M. le duc d'Antin venoit de lui offrir de la part du Roi, & de les voir en même tems distribuer à sa suite, & à toutes les personnes qui étoient présentes.*
> *Les tableaux & les curiosités qui décorent l'appartement de M. de Launay parurent aussi faire plaisir au Czar. Enfin il sortit de ce lieu si content qu'il y revint la veille de son départ, mais sans aucune suite. Il voulut revoir les mêmes choses qu'on lui avoit montrées la première fois, & son admiration ne fut pas moindre. M. de Launay lui présenta une médaille du Roi. Ce prince la reçut avec une tendre satisfaction, qu'il marqua en metant cette médaille sur sa poitrine, & en se servant d'expressions qui signifioient qu'il la porteroit toute sa vie par amour pour sa Majesté* (Dubois de Saint-Gelais 1885, 152-155).

This story is a reminder that, like the Czar, one should appreciate not only the iconography of medals, but equally their fabrication. We propose that the production of medals was a complex, multi-staged collaborative and ideological process. In showing the location of their fabrication and some specifics about the artisanal process, we place these multiple objects back into the hands of their producers.

Acknowledgements

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