



Fig. 1. The replica Haas press at the Basler Papiermühle. Photograph courtesy of Karel van der Waarde.



*An early iron hand-press at the
University of Coimbra, possibly
built by Wilhelm Haas
the younger of Basel*

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INTRODUCTION

In 2016, Robert Oldham learned about and examined – in the company of António Eugenio Maia do Amaral, Deputy Director of the Biblioteca Geral at the University of Coimbra, Portugal – a mysterious and apparently unique iron hand-press, on a wooden base, held at that time by the Biblioteca Joanina at the University. He was immediately struck by its resemblance to what is generally held to be the first iron hand-press, invented in Basel, Switzerland, in 1772 by the noted typefounder Wilhelm Haas the elder (1741–1800).

THE IRON HAND-PRESSES OF WILHELM HAAS, FATHER AND SON

Haas senior wanted to print his beautiful types so as to show them to the best advantage, and designed and built a new printing press.¹ All parts subject to stress during the printing process were made of cast iron, except for the wooden plank-and-coffin, the press-stone and the rails or ribs on which it moved (which were metal tracks mounted on wood, as in earlier wooden presses). The iron upper parts of the press were mounted on a block of stone estimated to weigh about 450 kilogrammes. The Basler Papiermühle museum² built a full-size replica of this press in 1958, based on the plates published in Haas's *Beschreibung und Abrisse einer neuen Buchdruckerpresse* of 1790,³ and exhibits it in their 'Haas Gallery' (see Fig. 1).

Manufacturing key parts – the staple and platen – out of iron greatly improved the strength, precision and efficiency of the press. In addition, due to Haas's design, the press was capable of printing

1. After he built and used a prototype, the first working press was constructed for Haas by a locksmith named Heinel in Lörrach, a town a few kilometers north-east of Basel; Heinel later claimed to be the

inventor (Bruckner (1943, see the Bibliography below), p. 90).

2. The Basel Papermill, also known in English as the Swiss Museum for Paper, Writing and Printing in Basel.

3. Haas (1790). The title of this pamphlet translates as 'Description and sketches of a new book-printing press, invented in Basel in 1772 and published for the benefit of the printer's art by Wilhelm Haas the father. Printed by Wilhelm Haas the son'. It consists of a title-page and ten pages of text including descriptions of the three hand-coloured aquatint plates depicting the press and its components (these plates are also reproduced in monochrome in Moran (1978), pl. VI–VIII). The pages are in quarto format, and of a size that they could have been printed four-up on one of Haas's iron presses. Wegelin (1836), says that Haas published a book in quarto format about the press in 1772, copies of which are not known; however, he may have seen the 1790 pamphlet and inferred the existence of an edition of 1772. If there was a 1772 edition, it is possible that the plates in the 1790 pamphlet were printed from the same copper-plates. Bruckner (1943, p. 90) describes the development of the press by Haas in 1772, and the resulting decision by the authorities in Basel prohibiting him from using it himself, and mentions that in 1772 Haas printed, on a press he himself had built, a twelve-page description of his development of a supposedly more-efficient method of typesetting.



Fig. 2. Plate I, a hand-coloured aquatint, from Haas (1790), showing a perspective view of Haas's press. Cropped and reduced from 220 × 175 mm (full-page size).

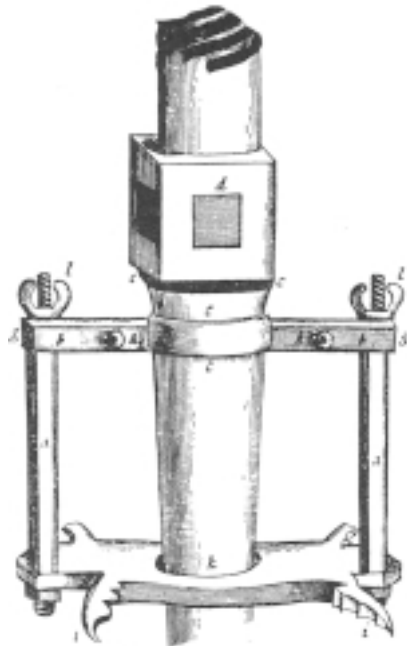


Fig. 3. Detail of plate 8 from Joseph Moxon, *Mechanick exercises ... applied to the art of printing* (1683–[1684]) showing the Blaeu hose (with its collar) and spindle. Actual size,

the full forme with a single pull of the bar (see Fig. 2). This was achieved by re-engineering the bar and screw mechanism. The bar had weights added to the handle and to a doubly-curved rearward extension, so that the mass on either end of the bar was equal (resembling the mechanism of a fly-ball or ‘balancier’ coining-press, which was its inspiration).⁴ This added force to pull the pressman was able to achieve. The iron screw of the Haas press was about 2½ inches (65 mm) in diameter with two ‘worms’ or threads, set at a steeper pitch than was usual with wooden screws and giving a fall of about 2⅜ inches (38 mm) per revolution, just over 1 inch (25 mm) fall with the roughly 160-degree arc of the ‘balancier’ bar. This was limited by the catch of the bar on the far side and the supports for the ball-stock cradle on the near side of the staple (see Fig. 2). By comparison, the arc of rotation of the bar of contemporary common presses was limited by the cheeks to around 120–140 degrees, depending on the shape of the bar.

Existing wooden presses used a hose, originally a square wooden tube (a ‘box-hose’) with a metal cap, through which the screw-spindle passed to press down on the platen; Willem Blaeu (1571–1638) of Amsterdam is credited with the invention of an open iron hose. The wooden platen of the press was hung from hooks on the four bottom corners of the hose by cords lashed to similar hooks on the top of the platen. In the Blaeu hose, a ‘garter’ or collar⁵ encircles the spindle (see Fig. 3) and lifts the hose (and platen)

4. For an eighteenth-century description of the balancier-press and its use in coining see Ephraim Chambers, *Cyclopædia: or an universal dictionary of arts and sciences* (2 volumes, London: Printed for James and John Knapton etc., 1728; ESTC T114002), vol. I, under ‘Coining’. The same description was repeated in later editions, well into the nineteenth-century.

5. Joseph Moxon (in *Mechanick exercises: or, the doctrine of handy-works. Applied to the art of printing. The second volume* [sic] ... (London: Printed for Joseph Moxon ..., 1683–[1684]; ESTC R17720), plate 8) shows the collar of the Blaeu hose in two pieces, held together by screws and clamped in a shallow groove around the screw-spindle. See Fig. 3.

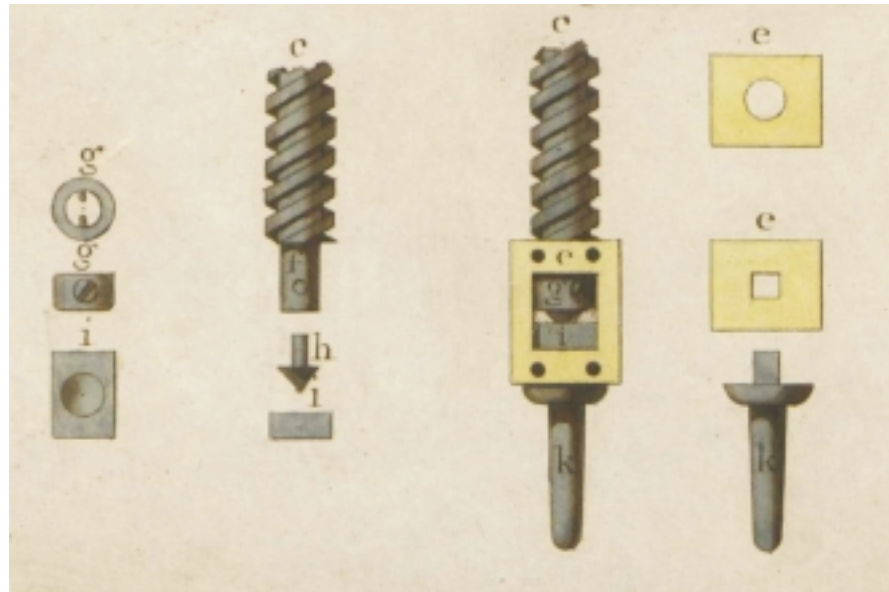


Fig. 4. Detail of plate III, a hand-coloured aquatint, from Haas (1790), showing the screw, spindle and hose of Haas's press. The garter is marked 'g' and the brass hose 'e'. Actual size.

when the bar is pushed back, as the screw turns (which action causes wear to the garter and spindle, requiring regular repair or replacement), but without rotating the hose which is constrained by the till.⁶ The Haas press depicted in the 1790 *Beschreibung* incorporated an original design of box-hose made of cast brass and enclosing the lower end of the screw which turned against the upper end of the fixed spindle (see Fig. 4). The collar was an iron ring which encircled the screw-spindle and was held in place by means of two grub-screws; the collar thus turned with the screw, inside the hose, which was allowed to move only in the vertical plane by the structure of the iron staple of the press, thus functioning in much the same way as the wooden box-hose of a common press.

Haas's original design had, however, two major faults: the cast iron staple of the press, although stronger than a wooden frame, was too slight and the metal was brittle under bending stress; and the balancier-bar could apply considerable power, so that a too-vigorous application of available force when printing large formes could, and occasionally did, break the staple, which was subjected to both vertical and twisting forces. Furthermore, wear would be inevitable where the garter turned against the top-plate of the hose, and the stone base (estimated to weigh nearly half a tonne)

6. On the parts of the common press, see Alan May, 'A new census of wooden presses in Great Britain', *Journal of the Printing Historical Society*, new series 24 (2016), pp. 63–89, especially the diagram at page 65



was too heavy to be moved or installed easily. These problems would perhaps have doomed this innovative design, had Haas's son not made significant improvements to the engineering of the press.

Due to resistance from the Guild of Printers of Basel, Haas was forbidden by a court order to use his press. The ostensible reason was that he was not a trained printer according to the definition of the Guild (which presumably meant that he had not served an apprenticeship as a printer). However, he was able to supply his presses to the Basel printer and publisher Johann Jakob Thurneysen (1754–1803), with whom he entered into a partnership in 1779 or 1780. In 1782, at the age of sixteen, his son, Wilhelm Haas the younger (1766–1838), who had as a youth shown a great talent for engineering design as well as for printing, began working with Thurneysen. He was not indentured as an apprentice, but joined the printing-office (which was equipped with Haas presses) in order to learn the trade of printing and publishing. He later stated in his *Tagebuch*:

Schon ano 1772 hatte mein Vater eine neue Buchdruckerpresse erfunden und einige Preßbogen nach Art der Münzbalanciers in Eisen gießen lassen; jedoch, da die ersten etwas zu schwach und zu elegant waren, zerbrachen einige, und der wahre Nutzen der Erfindung wurde dadurch bedroht zu scheitern. Durch diese Erfahrung belehrt, ließ ich ein solideres Modell machen und da der Guß davon einige Schwierigkeit zeigen wollte, da damals diese Kunst noch nicht so vervollkommnet war wie seitdem, so reisete ich 1784 selbst auf die Eisenschmelze nach Zinsweiler im Elsaß um die Form nach meinem Sinn machen zu lassen, die auch wohl ausgefallen und nun die Preßbogen solide und dauerhaft gegossen wurden, auch bereits über 50 jährige Probe gehalten haben.⁷

(As early as 1772 my father invented a new book-printing press and had some press-frames,⁸ resembling those of balancier-presses, cast in iron; however, since the first ones were a little too weak and delicate, some broke, and this truly useful invention was threatened with failure. Having learned from this experience, I had a more solid model made and, since the casting of it proved rather difficult, as at that time this art had not been brought to such perfection as it has been since, I myself traveled in 1784 to the iron-works in Zinsweiler in Alsace, in order to see the thing made according to my design, which has turned out well, and now the frames have been solidly and permanently cast,⁹ and have already borne more than fifty years of trial.)

In *Die Buchdruckereien der Schweiz*, Peter Wegelin describes the Haas press as 'verbesserte und perfektionierte Druckmaschine in

7. Haas (1997), p. 23. From the language of the *Tagebuch*, it appears that much or all of it was written near the end of his life, based on earlier notes. The section quoted, referring to 'über 50 jährige Probe', can have been written no earlier than around 1823.

8. 'Pressbogen' evidently means 'press-frames' or staples here.

9. 'Gegossen' means 'cast', but an examination of the Coimbra press suggests that Haas may have been using the term loosely to mean 'made', and that the frames for his presses were later constructed from wrought rather than cast iron by the Baron von Dietrich foundry in Zinsweiler. They had two water-powered hammers and made large quantities of wrought iron at this period. See note 27.



allen Teilen, in einfacher und leichter Eisenkonstruktion, aber gleichzeitig solide' ('a printing-press improved and perfected in all its parts, of a simple and light iron construction, but at the same time solid').¹⁰

In 1787, having attained the age of twenty-one, Wilhelm Haas the younger left Thurneysen's workshop and joined his father's Basel typefoundry, the Haas'sche Schriftgiesserei, and at the same time established his own book-printing company, equipped by his father with 'mehrere mit neuen Verbesserungen ausgerüstete Pressen' ('several presses fitted out with new improvements').¹¹ Haas junior continued to make improvements to the design, and sold presses to a number of other printers in Switzerland and Germany, as well as sending improved parts to the printers who had purchased earlier versions of the press. He also made some improvements in the map type, which had earlier been developed and produced by his father (see Fig. 5).

In November 1790, the Königlich-Preussische Akademie der Künste und mechanischen Wissenschaften¹² created a new category of awards to artists, a class for 'Mechanische Künstler' and awarded the first diplomas given in this new class to Wilhelm Haas, father and son, for their iron printing press.¹³ In 1793 the important publisher Georg Joachim Göschen (1752–1828) of Leipzig purchased three improved Haas presses for his newly-established printing/publishing house.¹⁴ Göschen later wrote that Haas's press was the only one with which he could obtain the greatest precision and beauty in printing.¹⁵

Wilhelm Haas junior had delivered an improved iron press to the printing-office of the Monastery at St Blasien in 1790,¹⁶ and in addition to the three presses purchased by Göschen in 1793, the Haas printing-office in Basel was equipped, from 1787, with several of the improved presses. Albert Bruckner, in his history of Swiss typefounding, records that a number of Swiss book-printers also bought improved presses.¹⁷ Thus there may have been at one time (around 1800) at least ten Haas presses in use in Switzerland and

10. Wegelin (1836), p. 167.

11. Haas (1790), p. 6.

12. The Royal Prussian Academy of Arts and Mechanical Sciences (active 1696–1945), known after 1790 under eight different successive names.

13. See Haas (1997), pp. 40–41, in which Wilhelm Haas junior noted receipt of his diploma on 13 November 1790. The awards are recorded in the manuscript 'Mitglieder-Matrikel' (4, 1695–1804, pp. [103], [105]) of the Akademie for 6 November 1790 (see archiv.adk.de/objekt/2305753).

14. Göschen knew Haas junior personally, having travelled to Basel in August 1792 to meet him, to place his order for three presses and a paper-smoothing machine, and to commission him to print the first portion of his forty-volume edition of the complete works of Christoph Martin Wieland; at this time Göschen was awaiting permission to print his

own books from the Elector of Saxony (Göschen (1909), vol. II, p. 46). Göschen attained a reputation for the quality of the books he printed and published, and was said to have been the first in Germany both to publish good-quality cheap books for the general reader, alongside deluxe editions of German literature and the classics. See Göschen (1909) and Eberhard

Zänker, *Georg Joachim Göschen: Buchhändler, Drucker, Verleger, Schriftsteller: ein Leben in Leipzig und Grimma-Hohnstädt* (Beucha: Sax-Verlag, 1996).

15. Letter from Göschen to Friedrich Koenig (of Koenig & Bauer, press-manufacturers of Würzburg), December 1804 (see Dangon (1955), p. 6).

16. Haas (1997), p. 40.

17. Bruckner (1943), p. 93.



Fig. 5. Specimen of Haas's map types. Detail from *Carte typométrique du Canton de Basle* ([Basel: Haas, 1799]), published as a specimen of and advertisement for the types. The caption beneath the specimen notes that the 'Premier essai' at the map was printed 'après quatorze jours de travail'. Actual size (full image-size 200 × 195 mm).

Germany, and Haas the younger referred in his *Tagebuch* (no earlier than the mid-1820s) to some of his firm's presses having been in use for more than fifty years.

As has been mentioned, the staples of the earliest models of Haas press, manufactured between around 1772 and 1784, sometimes broke in use. Haas the younger made efforts to solve this problem, although we can only guess at what these were, as it is not clear whether the 1790 *Beschreibung* depicts one of the early flawed, or the later improved, presses. The first known Stanhope press, which had a cast iron staple and mechanism on a wooden frame and base, used by William Bulmer of London after 1800, is no longer extant,

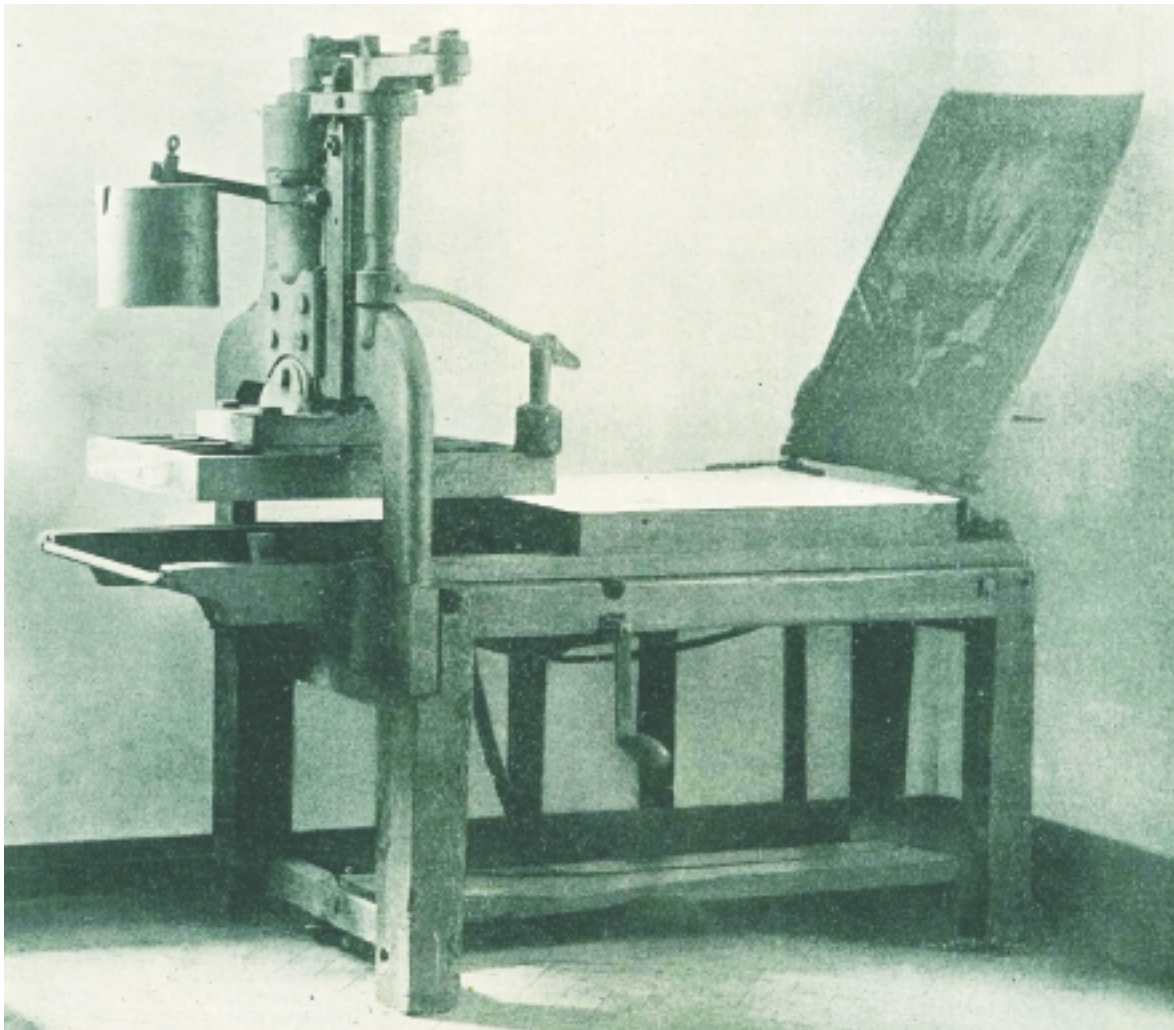


Fig. 6. Stanhope's press of ca 1800. Photograph from *The British and colonial printer and stationer* (13 December 1906).

although a photograph has survived (see Fig. 6).¹⁸ In his description of the Stanhope press, Walter Wilkes wrote:

Thirty years after the Stanhope press was invented, there was still debate as to whether Stanhope might have owed his idea to Wilhelm Haas. Representatives of this thesis saw as decisive evidence the fact that Stanhope had lived in Geneva from 1763 to 1774. But the lever system of his press alone shows Stanhope's independent contribution to the construction of printing presses.¹⁹

However, while the lever-mechanism of Stanhope's press is evidently not copied from Haas's early presses, other aspects of its design may be, and the lever-system may perhaps owe something to Haas's improved press-design (which may have had a lever-system in place of the balancier-bar; see below). The earliest known

18. See Moran (1978), p. [49]
 19. Translated from Wilkes (1998), p. 76. See also Moran (1978), pp. [59]–60.

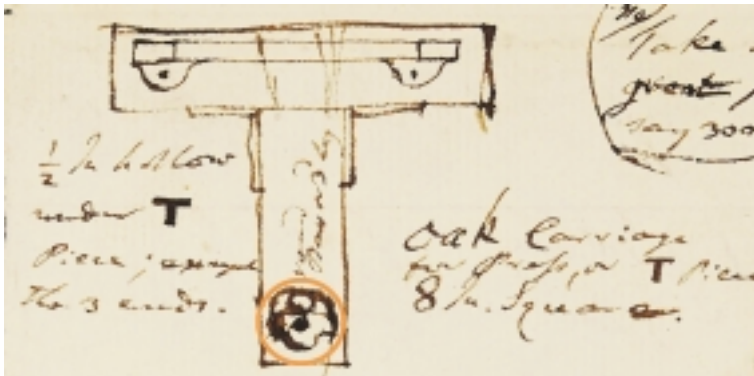


Fig. 7. Lord Stanhope's drawing of the wooden T-base for his press, with the 'toe' of the base sketched in (marked with a circle). Reproduced with kind permission of Kent County Archive.



Fig. 8. Detail of the 'toe' of the T-base of the Coimbra press. Photograph by Robert Oldham.

sketch by Lord Stanhope for his press shows the upper part of the iron staple, with careful indications of the dimensions of the various parts, but no indication of feet, and no depiction of the compound lever impression-mechanism. The sketch was evidently intended for Keeton, the carpenter who was to make the wooden patterns for the casting of the main parts – the staple, platen and bed – with an instruction to allow for about fifteen percent shrinkage between the patterns and the finished castings. The sketch also has a drawing of the T-base that was to become a feature of the Stanhope press's design, with a doodle on the 'toe' of the T-base that closely resembles the same area of the Coimbra press described below (see Fig. 7, 8). Beside the drawing is a note that the two timbers of the T-base should measure 8 × 8 inches. The oldest known surviving



Fig. 9. View of the Coimbra press. NB the background has been lightened to clarify detail. Photograph by Robert Oldham.

Stanhope press (number 5 of 1804) has rather heavier timbers, measuring $11\frac{1}{2} \times 11\frac{1}{2}$ inches (29×29 cm), while the 'stem' of the T-base of the Coimbra press, measuring $7\frac{7}{8}$ inches (200 mm), is closer in size to Stanhope's original specification.

THE COIMBRA PRESS

The unusual press now located in the Biblioteca Geral of the University of Coimbra, Portugal (see Fig. 9) bears some similarities to Haas's design. This press has by tradition been attributed to the skilled blacksmith and locksmith of Coimbra, Manuel Bernardes

Galinha (1810–1864), who is said to have made it in 1845; this tradition can be traced back to a statement made by the Coimbra historian Joaquim Martins de Carvalho in 1866,²⁰ repeated in 1888.²¹ These two sources are the only reference we have to the press having been ordered from Manuel Galinha in 1845, as well as to its later (1847) acquisition by the office of the Coimbra newspaper *O observador*, which was founded by Carvalho. The press is known to have been used to print *O observador*, but we are doubtful that it was made by Galinha in 1845, and suspect that this may rather have been the date at which he repaired and refurbished the press. The press bears a cast brass plaque reading ‘M. GALINHA | EM COIMBRA’²² and Galinha’s crudely-stamped monogram is visible on the outer side of the rounce-crank. The position and appearance of this monogram suggest that Galinha re-made the rounce-crank, but it is an odd position for a maker’s-mark, had he built the entire press. During restoration we found no other identifying markings on the press.

Carvalho recalls that the press ‘tinha sido feito em 1845’ (‘had been made in 1845’) by Galinha for Augusto Valério Ferreira Pinto Basto (1807–ca 1902),²³ who had wished to start a newspaper in Coimbra, but that this plan was aborted.²⁴ After the failure of Pinto Basto’s printing initiative, the press was bought in 1847 to print *O observador*, and sold on in 1866 to a local printer, Francisco dos Santos e Silva, who used it for several years, including for the production of the literary bi-monthly *Povo* (published 1 July–31 October 1866). Some time before 1874, the press was sold to the University of Coimbra Library with the intention that it be used to print catalogues of new acquisitions,²⁵ and was later acquired by the university’s Botanical Institute to print, among other works, an *Index seminum*. During restoration we found a sheet of this publication (from 1894) stuffed into a hole in the base of the press. The only other historical record of the press we found was a note that it had been restored and sent to Lisbon in 1941 for an exhibition on typography.²⁶

We believe that the Coimbra press may actually be one of the later Haas presses, as manufactured by the younger Wilhelm after the late 1780s, showing various improvements over the model depicted and described in the *Beschreibung* of 1790 (compare Fig.

20. Carvalho (1866), p. 391.

21. J. M. de Carvalho, editorial in *O Conimbricense* 4303 (24 November 1888), pp. 1–2.

22. Galinha had built an elaborate iron gate in 1844 for the University

of Coimbra’s Botanical Garden, and placed beside it a plaque reading ‘M. Bdes. Galinha o fez em Coimbra’. The plaque on the press does not state ‘o fez’ (‘made it’). It was common European practice in that

period for printers’ engineers to place a plaque identifying them on presses they had repaired and/or set-up.

23. Pinto Basto had been the first manager of the Vista Alegre glass and ceramics factory in Ílhavo, Portugal, which was founded by his father, and had traveled extensively in other European countries visiting other ceramics companies and recruiting porcelain artists and workers.

24. Carvalho (1866), p. 391.

25. Bernardo de Serpa Pimentel, manuscript report dated 10 August 1874. Coimbra, University of Coimbra General Library, Ms. 3,470, nr. 18.

26. See ‘Exposicao evocativa da imprensa dos séculos XVII, XVIII, e XIX’, *O século* 61:21,443 (29 November 1941).



2 and 9). The differences could be construed as intended to overcome the main faults of the original design. The staple of the press, essentially the same size and shape as the earlier one, is made of wrought iron, a very much stronger and more flexible metal that resists bending-stress effectively.²⁷ The one-pull platen and bed are a few centimeters larger than those of the press described in 1790. The bar operates the same size and pitch screw as depicted in the *Beschreibung*, but through a lever on the separate bar-spindle connected to another lever attached to the screw-spindle.

The heavy T-shaped base and staple-support of the Coimbra press are made of oak,²⁸ and at an original estimated weight of 90 kilogrammes is much lighter than the massive stone block of the earlier press. The connection of the screw to the platen is somewhat different from that depicted in 1790 in using a counterweight²⁹ behind the staple to raise the iron hose and platen, rather than the garter inside the brass hose of the earlier press, which difference avoids the problem of wear to the garter and hose. The construction of the one-pull platen is different from that of the early Haas presses too. The platen is a sandwich of a wooden plank between two plates of wrought iron, held together with sixty-three flat-head screws, and the top plate is reinforced with four diagonal ribs. It is suspended from the hose by iron straps bolted to the hose and platen, instead of the cord lashings of the earlier presses.³⁰

The two presses have similar traditional plank-and-coffin beds and press-stones, though on differing arrangements of ribs and cramps, and their platens, beds and coffins are similar in size.³¹ The forged wrought iron staple of the Coimbra press is many times

27. The press-staple is clearly of wrought iron, and other iron parts of the press have been subjected to laboratory analysis (micro-photographs were analysed by Prof. Teresa Vieira of the University of Coimbra Department of Mechanical Engineering) to show that wrought iron was used in their manufacture too. This was an unusual method of manufacture, but has been observed in examples of Adam Ramage's 'Philadelphia' press, first manufactured around 1830 (see Stephen O. Saxe, *American iron hand presses* (Council Bluffs: Yellow Barn Press, 1991; reprinted: New Castle: Oak Knoll, 1995), pp. 69–72). Wrought iron was also used for some copying presses, such as Ramage's 'Writing, Copying, and Seal' press, which was also used for book-printing (see Elizabeth M. Harris, *Personal impressions: the small printing press in nineteenth-century America* (Boston: Godine; London: Merrion Press, 2004), pp. 160, 161). However, making a press of wrought iron is essentially a one-off process – each individual press must be made the same way, by

forging red- or white-hot iron and forming it by eye. Uniform mass-production was not possible.

28. The 'stem' of the T-base measures 20.1 cm (8 inches) wide × 14.5 cm (5¾ inches) high × 70.5 cm (27¾ inches) long. The crossbar of the T measures 26.5 cm (10½ inches) × 14.5 (5¾ inches) high × 90 cm (35½ inches) long. The two wooden 'cheeks' that support the iron frame are 20 cm (7¾ inches) wide × 10 cm (3¾ inches) thick × about 75 cm (29½ inches) tall. The wood has been identified by laboratory analysis as 'Quercus spp'. It has been extensively invaded by termites during a past period of storage, and it was necessary to replace portions of the most badly-damaged parts during restoration.

29. The original counterweight has been lost, and a modern replacement was made during restoration with a weight of about 14 kilogrammes.

30. In addition, the Coimbra press has the toe of the rotating spindle in direct contact with the bearing-surface at the top of the platen, as in earlier wooden presses, whereas in the 1790 Haas press the spindle was divided into two sections, the rotating screw and the toe, and the latter was fixed in the bottom of the hose and did not rotate with the screw (see Fig. 4).

31. The press described in 1790 has a platen measuring 41 × 43 cm (16½ × 17 inches); the Coimbra press has a platen measuring 44 × 48 cm (17¼ × 18¾ inches).



stronger than even a thicker cast iron staple would be – witness the fault of early Stanhope presses, many of which suffered broken staples, despite these staples being several times thicker than the wrought iron staple of the Coimbra press (the thickness was increased several times during the early development of the Stanhope press).³² The compound lever-system of the Coimbra press further relieves the stress on the staple, by progressively increasing the transmitted force at the end of the pull.³³ Such a lever-mechanism, although different in detail, was also a feature of Lord Stanhope's press.

CONCLUSION

The presses designed and manufactured by Wilhelm Haas, father and son, from 1772 were the first to be built principally from iron components, and the first successful, commercially-manufactured models to be able to print a full-size forme in a single pull.³⁴ The structural details of the first Haas presses are known only from the *Beschreibung* of 1790, while the details of the improvements wrought by the younger Wilhelm Haas to the design during the later 1780s, 1790s and early 1800s remain unknown. Both Wilhelms were careful, exacting printers, who strove to produce fine work themselves, and to improve the type and machinery they used, and sold to others, as can be seen in their typefounding business and evolving iron hand-presses, and in the paper-smoothing machine they built, based on one seen in the printing-office of Giambattista Bodoni in Parma, Italy. Georg Joachim Göschen evidently appreciated the quality of their work, both employing the Haas firm to print for him, and purchasing presses and one of their paper-smoothing machines for his own use.

The Haas press was evidently a successful machine, but was out-evolved in the early nineteenth century by the cast-iron Stanhope, Columbian and Albion presses, so that relatively few were in use between around 1772 and 1825, and none survives. Unless, as we think possible, the press now at Coimbra is an example of one of the later improved models of Haas press. It is both similar to and different from the press depicted in the *Beschreibung* of 1790, but the differences can be interpreted as rational improvements, made to solve the mechanical problems of the original design. If so, examples of these improved presses may have influenced Lord Stanhope in the design of his first cast-iron presses rather more directly than is usually thought. That the metal components of the press are made largely of wrought iron argues against it having been manufactured by Manuel Galinha in Coimbra in the 1840s. While Galinha was a

32. On the development of the Stanhope press see Moran (1978), pp. [49]–57.

33. For more information about this press and its known history see Amaral and Oldham (2021).

34. Wooden 'common' presses were almost invariably two-pull presses, with a platen no larger than half the size of the bed (the earliest European presses were one-pull, but had platens of roughly the same size as those of later two-pull presses).

skilled blacksmith, it is doubtful that he could have worked wrought iron on this scale, the necessary machinery and forge probably not being available in Coimbra in that period, while they certainly were at the Baron von Dietrich foundry in Zinsweiler, where Haas junior had his improved press-components made.

The depredations of time are hard on outmoded printing machinery. Of the approximately 1900 Columbian presses produced and sold by George Clymer and his successors between 1817 and 1863, only 121 surviving examples are known. If the press in Coimbra was made by Wilhelm Haas the younger, it is not at all surprising that it is the only survivor.

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