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Sir William Congreve
James Lonsdale (1772–1828)
The National Portrait Gallery, London

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The chronic problem of counterfeit bank notes in England in the early 19th century led the Bank of England to sponsor a public competition for a printing process that would deter forgers. Among those answering the appeal was Sir William Congreve, a colorful and controversial figure, who was a governor of the Bank and an engineer by profession. During his temporary excursion into the printing trade he developed a process which he felt could not be imitated. This became known as "compound-plate printing." The process was never accepted by the Bank, but it was used with success for many years by one of London's private printing firms and by Somerset House, a government office.

The illustrations used in this paper are reproduced from photographs in the collection of the University of Reading, and were kindly made available by Dr. Michael Twyman of the Department of Fine Arts.

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Sir William Congreve (1772–1828) was a soldier, engineer and inventor. Most of his inventions had to do with ships and fighting machines, and he is chiefly remembered now for a military rocket which he invented in 1808 and used successfully in several battles of the Napoleonic Wars. He was interested in mechanical problems of all kinds, and his fertile imagination occasionally went beyond the laws of mechanics. Among his contemporaries Congreve was notorious as a tireless inventor of perpetual-motion machines. Journals were apt to treat his public activities with amused forbearance and his inventions with caution, for some seemed no more than rearrangements of the work of other inventors. Congreve filed eighteen British patents between 1808 and 1827.

Congreve's connection with the printing trade was

a temporary excursion from his main fields of interest. An appeal for inventions to defeat forgery—a chronic problem in England at the time—kindled his imagination. In 1818 a public competition was opened, with the winning entry to be put into operation by the Bank of England. Although Congreve was appointed one of the judges, this did not deter him from submitting his own entries. One of these was the process he called "compound plate printing."

The following five years were eventful for Congreve. He developed the idea of compound-plate printing and took out a series of three patents connected with it. He saw the process established with a private firm of printers, Branston and Whiting, and Somerset House, a government office. He wrote pamphlets and letters in defense of the method, published specimens, and was involved in several quarrels with other inventors. Then in about 1824, when the new trade was flourishing, Congreve turned over the patent rights to Branston and Whiting and returned to his other interests. He had nothing more to do with the process. Compound printing survived until late in the century at Whiting's firm and until 1920 or later at Somerset House. But its history after 1824 formed a second chapter of steady application, quite different in character from the first colorful years of its invention and establishment under Congreve's management.

Compound-plate printing was a method of making relief prints in several colors, the colors all being printed at once with a single pull of the press. By the ordinary method of color-relief printing, different blocks were used for the different colors and they were printed in succession. It was always difficult to print the colors so that they coincided exactly. Congreve's compound plates, on the other hand, were composed of several interlocking parts like the pieces of a jigsaw puzzle. To print a plate the parts were separated, inked in their different colors, fitted together again and printed as a single plate. In the resulting print the colors registered with a precision that could not be achieved by any other method. At the same time it was impossible, from the nature of the plates, to print one color over another to product a third color. This precise registration between adjacent simple colors gave the print a peculiar character and made it quite easy to tell a true compound print from a copy, however carefully made, by some other method. This, and the fact that the equipment needed to set up a compound-printing shop was cumbersome and expensive, made the process a potentially useful protection against forgery.

The endemic problem of forgery was intensified with the coming of the Industrial Revolution. The volume of bank notes increased to meet the demands of an expanding commercial activity for which the specie circulation was inadequate. Moreover, the growing labor force needed notes in smaller denominations. The notes were issued by many independent banks of which the Bank of England was the most important. The Bank soon became the chief target of forgers, whose efforts would easily pass among a new group in society unused to the currency and incapable of recognizing forgeries.

In 1797 the Bank of England invited suggestions from the public for improvements that would safeguard its notes. In 1802 a "Committee to examine plans for the improvement of bank notes" was set up by the Bank to consider these suggestions, but it found none worth recommending. Over the next fifteen years more suggestions were made, but many were worthless and others repeated ideas that the Bank had already rejected. Meanwhile the recognized forged notes increased from about 3,000 in the year 1803 to 31,000 in 1817.[1] During the Napoleonic Wars the problem had been shelved. With Europe at peace again it was no longer to be ignored.

At this time forgery or the passing of forged notes was a crime which brought the death penalty or life transportation, but the forgers themselves were rarely caught. Most of the executed criminals were the passers, often ignorant and illiterate men and women who did not understand their crime. Public sympathy was more with the convicted criminals than with the law. Juries were unwilling to convict and private banks would not prosecute if they could avoid it. Public feeling was strong. Pamphleteers and journalists demanded some action to improve the situation. As a result three separate committees were established in 1817 and 1818 to investigate the matter: the Bank's "Committee to examine plans for the improvement of bank notes" was revived; a Royal Commission was set up by the government; and the Society of Arts held its own inquiry. Sir William Congreve, who was a governor of the Bank, was one of the seven Royal Commissioners.

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[1] A. D. Mackenzie, *The Bank of England note* (Cambridge: Cambridge University Press, 1953), pp. 55, 58.

The three committees were told of ideas concerning all aspects of the Bank's activity and the production of its notes. but they were principally looking for a new technique by which currency could be produced in very large quantities, with each piece virtually identical and inimitable. In particular they considered printing, papermaking and ink-making techniques.

From these inquiries several facts emerged to explain why Bank of England notes were forged more often than those of private bankers. Private banks promised to redeem forgeries of their own notes which were accordingly handed in promptly and were thus easier to trace to their source. The Bank of England, on the other hand, refused to redeem forged notes, so people who suspected that they held forgeries would try to pass them on rather than hand them in to the Bank. The Bank of England was handicapped, too, by the size of its circulation for there were technical difficulties in the production of such a large number of notes, and consequently there was some variation even between genuine notes.

The Bank's notes were printed from copper plates. Engraved copper will provide only a limited number of prints before it becomes worn and the quality of the prints deteriorates. The number may range from a few hundred to several thousand, depending on the kind of engraving, the kind of copper, and the way the plate is handled in printing. There was no known way of duplicating plates mechanically. A team of engravers was employed continuously at the Bank to engrave new plates which were put into service as soon as they were ready, but the plates deviated more and more from the prototypes. The Bank had various devices, but none satisfactory, for increasing the number of impressions from each plate. It was customary for engravers to touch up worn plates by deepening and sharpening the lines, though this was not considered among engravers to be a reputable practice as prints from retouched plates were never as fine as the originals. Bank of England plates were retouched several times over, to increase the life-span of a plate two- or three-fold. Another trick was that of taking two prints from a plate with only a single inking. The inked plate was printed the first time with light pressure so only half the ink was taken from the lines. This print was removed, a second paper put in its place and the plate printed again, this time with extra pressure to take the remaining ink from the lines. Thus two imperfect prints were taken for the price of a single good one, and the plate was saved from the wear of the extra inking operation.[2]

The quality of Bank of England notes was so low that there was said to be more variety among its genuine notes than among forgeries. The genuineness of any note, however bad, could be discerned from secret marks on the print, such as apparently accidental scratches or faults in the engraving. These marks, however, known only to Bank officials, gave no protection to the public. The effect was that the Bank of England offered both the greatest temptation and the harshest penalty to the forger.

Sir William Congreve submitted three suggestions to the Bank committee. They were a metal coin, a paper, and the compound-printing process. All three had in common the idea of compound construction. He patented only the coin and the printing process. The coin [3] was to be composed of two elaborate separable metal parts. The inner piece or "token" was made of a hard metal like steel, and the outer piece or "gauge" was made of a more fusible metal which was cast around the first. This "gauge" was of no value except in testing the genuineness of any "token" by the exactness of the fit. Congreve maintained that the token was inimitable without the original die with which it was stamped, since no forged copy could be made to fit perfectly into the gauge. He suggested, too, that a compound gold ingot could be made in the same way from interlocking pieces of gold and another metal. The words "Bank of England" and "Ingot" were to be stamped on the sides, crossing the different metals. The ingot would be tested by the precision of the fit and the coincidence of the stamped letters on the different parts.

The compound coin and ingot were rejected by the Bank Committee and Congreve made his second suggestion, a method of making bank-note paper. The paper, which he called "triple-paper," was to be made of three thin layers couched together so that they fused. The outer two were white and plain and the center layer colored and strongly watermarked so the watermark showed very clear and bright. This, too, was turned down by the Committee.

Congreve next adapted the idea of the compound

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[2] *Report of the Society of Arts relating to forgery* (London 1818). This report contains a full and interesting account of the state of engraving in England at the time, particularly at the Bank of England.

[3] British patent 4404 (November 1819).

coin to make a printing plate. This was his final "compound plate printing," later sometimes known as "Congreve's" or "Whiting's process." The process was patented in 1820.[4] By this time, however, the Bank Committee had already chosen Applegath and Cowper's plan.

Congreve's compound plate was made by first cutting or stamping a design through a plate of fairly strong metal, such as brass or copper, to make a stencil. The stencil was then put on a flat surface and another more fusible metal was melted and poured over it. This formed a second detachable plate covering the back and filling the holes of the first. Next the face of the entire plate was engraved with lettering and mechanical patterns in a continuous design over both metals. Commonly the stamped holes were in wormlike shapes as in Branston's specimen bank note (figures 1 and 2) or roughly circular (figures 3 and 4). The linear engraving on the surface was not governed by the pattern of the stencil: in both of these examples the engraving formed a more or less independent design laid over the two colors. For printing, the two interlocked plates were separated, inked in different colors, fitted together again and printed at one pull. A special machine was built to ink and print the plates.[5] In his patent specification Congreve claimed that other materials such as wood or ivory could be used as well as metal, and that three, four or more colors could be combined and printed by the same machine with a slight adjustment.

In 1819 Congreve introduced his compound coin to the public in a pamphlet, *Principles upon which it appears that a more perfect system of currency may be formed.* The pamphlet had three pages of illustrations. Two of these consisted of ordinary hand-colored engravings showing coins. The third illustrated the gold ingot, with two compound prints in blue and yellow. These two prints are particularly interesting as they predate Congreve's patent for compound printing. They must have been his first published compound prints though they were not mentioned as such in the text of the pamphlet. Congreve himself still hardly recognized the promise that the process held: he argued in the pamphlet that no printed money could be quite as satisfactory or as inimitable as hard coin. He had claimed in the 1819 patent for the coin, however, that his method of casting one metal within another might be useful for ornamenting furniture, and for printing. In the case of printing it would "tend to throw great difficulty in the way of forgery of bank-notes and other documents which it is desirable to protect."[6]

In these two first compound prints the colors, blue and yellow, were divided very simply into rectangular forms, unlike Congreve's later more complex plates. The words "Bank of England" and "Ingot" were engraved with the letters crossing both parts. It is obvious, by applying the same procedure recommended by Congreve for testing his patent ingots, that these prints were made from compound plates and the colors printed simultaneously: the broken edges of the letters coincide exactly and the colors meet but do not overlap.

Other renowned people besides Congreve made suggestions to the various committees. Among them was Rudolf Ackermann, an influential London publisher who, with Charles Hullmandel, was largely responsible for the successful introduction of lithography into England. Ackermann recommended the new lithography for bank-note printing, but the Bank Committee regarded it as a "discovery as applied to the subject of forgery infinitely more to be dreaded than encouraged."[7] Other suggestions were made by John Landseer, the first of a famous family of painters; Alexander Tilloch, a Scottish printer and pioneer of stereotyping; and Anthony Bessemer, father of the engineer Sir Henry Bessemer. Thomas Hansard proposed a note printed entirely from type in minute sizes. Hansard was the founder of the publication *Hansard's Parliamentary Debates* which continues to this day. Thomas Bewick, the famous wood engraver, submitted some of his engravings. Jacob Perkins, an outstanding American engineer, came over to London with his "siderography," a process for mechanically duplicating engraved steel plates. The London firm of printing engineers, Applegath and Cowper, was responsible for several important innovations in presses and color printing. They proposed a method of printing in several colors

[4] British patent 4521 (December 1820).

[5] According to Timperley the credit for this machine went to an engineer, Wilks, of the firm of Donkin and Company. C. H. Timperley, *Dictionary of printers and printing* (London, 1839) p. 885.

[6] British patent 4404 (November 1819).

[7] Quoted in A. D. Mackenzie's *The Bank of England note* (Cambridge University Press, 1953), p. 61.

Figure 1.—Specimen bank note engraved by Robert Branston on Congreve's compound plates, about 1820. Reduced from $4^{1}/_{4}$ x $8^{1}/_{4}$ inches. (Original in St. Bride Library, London.)

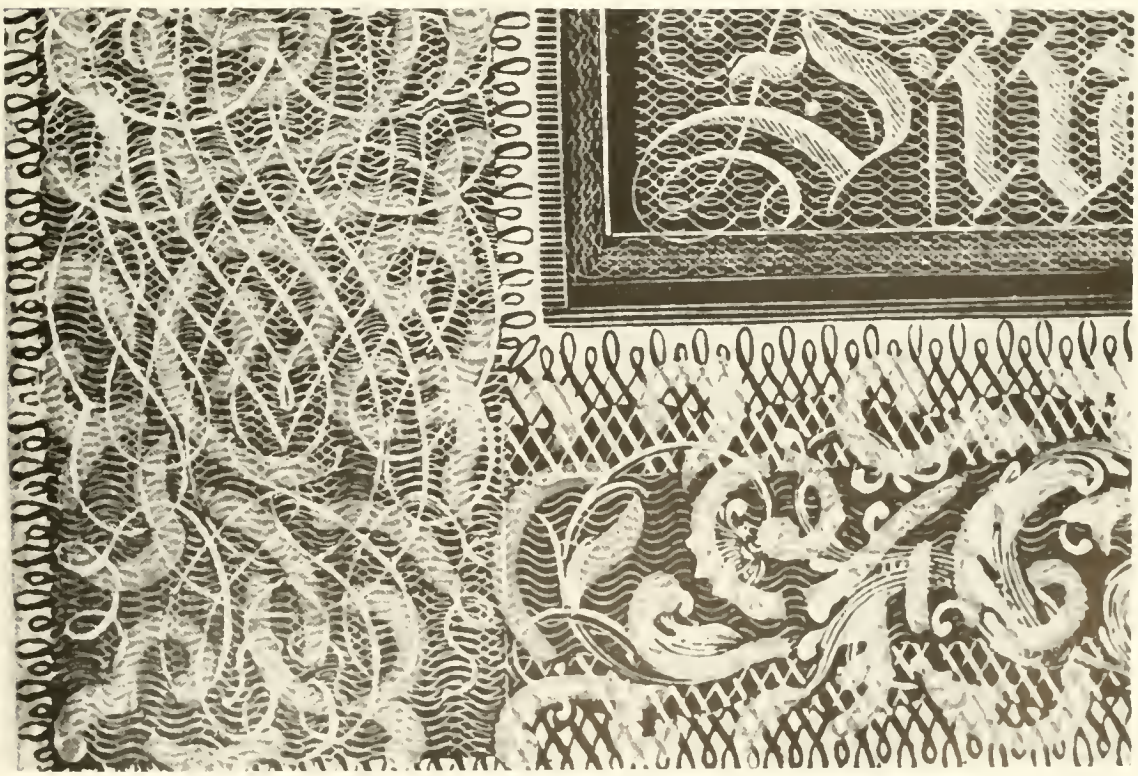

Figure 2.—Detail from figure 1. Enlarged from $1^{1}/_{2}$ x $2^{1}/_{2}$ inches.

with a reverse impression on the back of each note in exact register with the one on the front, and this was the plan that was finally chosen by the Bank Committee. Printed specimens were sent on to the Royal Commission and approved. Applegath and Cowper were installed in the Bank where they carried out their work in strict secrecy.

The new bank note was relief printed from stereotyped plates. The method of making the plates was a guarded secret. It apparently involved some casting system similar to Congreve's, though the colors were printed at separate impressions. The note was described in the "Bill for protection against forgery" of the 10th of July 1820:

> The ground work will be black or coloured, or black or coloured line work, and the words, Bank of England, will be placed at the top of each bank-note, in white letters, upon a black, sable or dark ground, such ground containing white lines intersecting each other.[8]

For two years the Bank's chief engraver, William Bawtree, tested the security of the new note by making copies, using the ordinary means a forger would have at hand. The design of the note was made more and more complicated to defeat Bawtree's efforts, until in 1821 Bawtree finally succeeded in imitating a five-color version. After failing on the basis of Bawtree's test, the Applegath and Cowper note was abandoned by the Bank. The old method of copper engraving was readopted.

In 1819 a pamphlet had been issued by another competitor, John Holt Ibbetson. This was *A practical view of an invention for better protecting bank-notes.* Ibbetson described his own process, "dissected plate printing," through its stages of evolution and he pointed out that it had much in common with Congreve's compound-plate printing. He hinted that Congreve's process might be derived from his, for Congreve, as commissioner, had "had the opportunity of perusing the various plans which were submitted to his board."[9] Ibbetson's submissions had been made between November 1818 and January 1819, ten months before Congreve's first patent was taken out. His ideas, as they were described in the *Practical view*, were broad and vague. Originally Ibbetson simply took relief prints from wood blocks engraved by his improved model of the rose-engine engraving machine. Later he thought of cutting up the engraved blocks and separating the parts with type. Finally he inked the several parts in different colors, clamped them together and printed them as one block. Specimens of the process in this final form were shown to the Bank Commission in January 1819. It was these specimens that Ibbetson suggested were the basis of Congreve's compound process.

Some illustrations in the *Practical view* demonstrated Ibbetson's two-color printing (figures 5 and 6). The designs were bold and attractive, with the blocks divided into relatively simple geometrical shapes for the two colors. But this very simplicity worked against the process as an acceptable means of preventing forgery. Ibbetson's method of cutting the blocks, which he kept secret, was evidently not capable of producing the complicated filigree of Congreve's plates.

Congreve was probably referring to Ibbetson's prints in a note in his next pamphlet, *Analysis of the true principles of security against forgery* published in 1820:

> We have seen such printing [as the compound prints] produced from blocks; but the form in which the colour was introduced was extremely simple, not at all like the work here described.[10]

But Congreve made no public reply to Ibbetson's pamphlet. The Bank competition had led to a number of similar charges, chiefly suggesting that the Commission had shown unfair favor to Applegath and Cowper, whose method was said to be the same as other suggestions made and rejected over the previous fifteen years.

While Ibbetson was making his barely concealed accusations, Congreve himself was involved in a quarrel with the American contestant, Jacob Perkins. Perkins had been as persistent as Congreve in submitting his "siderographic" notes to the Bank (figure 17). Siderography was a mechanical method of making faithful copies of engraved steel plates in almost unlimited numbers. A single steel engraving could provide as many duplicate plates as were needed. The plates were printed by the intaglio rather than the relief process, that is, the ink-holding lines were grooves sunk below the surface of the steel. The original engraving, usually measuring only one or two inches square, was made on a plate of mild steel, and the surface of the steel was then hardened

[8] Quoted in J. H. Ibbetson's *A practical view of an invention for better protecting bank-notes* (London, 1820), p. 67.

[9] Ibid., p. 62.

[10] Sir W. Congreve, *Analysis of the true principles of security against forgery* (London, 1820), p. 10.

Figure 3.—Ticket to the Coronation of George IV printed from Congreve's compound plates, 1821. The border was embossed by Dobbs. Reduced from $5\frac{1}{4}$ x 8 inches. (Original in Constance Meade Collection, Oxford University Press.)

Figure 4.—Detail From Figure 3. Enlarged from 1 x $1\frac{1}{2}$ inches.

Figure 5.—Compound print from Ibbetson's dissected plates, 1820. Enlarged from 2⅝ inches diameter. (Ibbetson, *A Practical View*, 1820. St. Bride Library, London, copy.)

Figure 6.—Compound print from Ibbetson's dissected plates, 1820. Enlarged from 2½ inches diameter. (Ibbetson, *A Practical View*, 1820.)

Figure 7.—Ticket to the Coronation of George IV, at left, produced by Whiting and Branston by conventional means with two impressions. Reduced from 8½ x 6¾ inches, 1820. See the corresponding compound-plate printed ticket, figure 3. (Original in Constance Meade Collection, Oxford University Press.)

Figure 8.—Detail, Below, From Figure 7. Actual size. The border was embossed by Dobbs.

Figure 9.—Embossed Print made by Whiting using Congreve's print-embossing process. Reduced from 7 x 6 inches. (Original in Constance Meade Collection, Oxford University Press.)

Figure 10.—Needle Cases printed by a process similar to Congreve's printing-embossing process. The contrasting color on three of the labels was printed separately. Unsigned, undated. Actual size. (Originals in Constance Meade Collection, Oxford University Press.)

Figure 11.—Label Printed from Congreve's compound plates and signed "Whiting Patentee." Undated. Reduced from 4 x 5 inches. (Original in Constance Meade Collection, Oxford University Press.)

Figure 12.—Government Duty Seal for medicine, printed from Congreve's compound plates. Late 19th century. Enlarged from 2½ x 4 inches. (Original in Constance Meade Collection, Oxford University Press.)

Figure 13.—Compound-Printed blacking label.

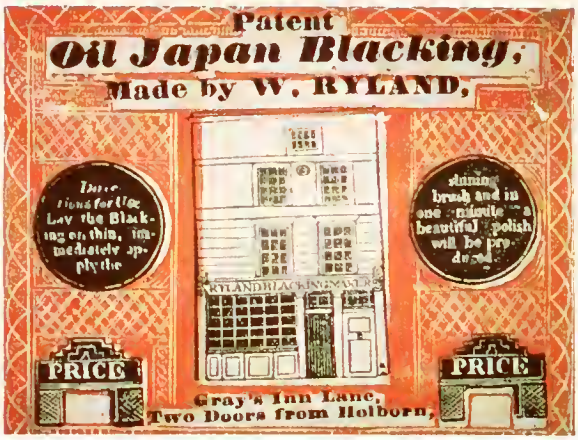

Figure 14.—Blacking Label in the style of a compound print, but made with two impressions.

Figure 15.—Poster for Stephens' Inks, printed from Congreve's compound plates. Three separate labels are pasted down onto a brown printed ground. Reduced from 11 x 7 inches. (Original in Constance Meade Collection, Oxford University Press.)

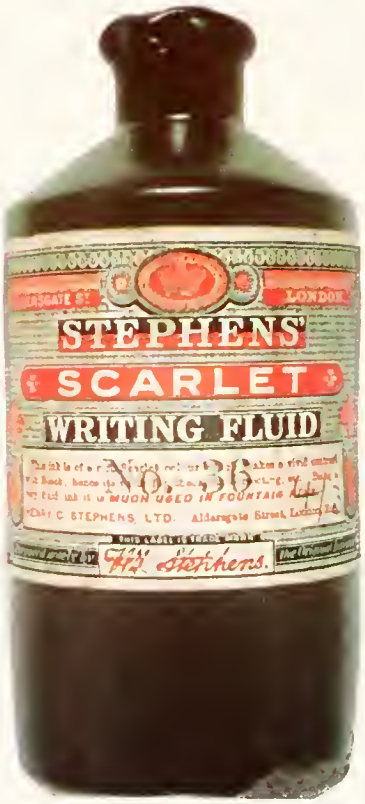

Figure 16.—Modern Bottle of Stephens' Ink with a label printed in imitation of the old compound prints. Height 7¼ inches.

Figure 17.—Siderography specimen plate. 1819. Reduced from 8 x 6 inches. (Original in Constance Meade Collection, Oxford University Press.)

by the old case-hardening method. Next a small cylinder of mild steel was rolled and pressed repeatedly over the engraving, by means of a special machine, forcing the softer metal into the engraving until the image was transferred in raised lines to the cylinder surface. The cylinder was then hardened and used in its turn to impress the image into any number of mild steel plates, this time once again in sunken lines. These plates were then hardened for printing. Thus a single engraving, however complex, could be copied exactly on to any number of plates, or the engraving could be repeated several times on the same plate. The blacks and whites of an image could be reversed by a change in the order of transferring: if an extra cylinder was introduced, or if the initial engraving was made on a cylinder rather than on the flat plate then the final printing plate would hold the image in raised rather than sunken lines, and the printed result would be a white line design on a black ground.

The siderography process had enormous advantages for bank-note printing. Since the plates were copied

mechanically, not by hand, there was no variation between them. The questionable devices for stretching the output of each worn plate were avoided, for there was an endless supply of fresh plates. It was feasible once more to employ only the most skilled of engravers to make the original engraving. By repeating high-class engraving several times on the plate, combining this with complex machine-engraved patterns, and reversing the blacks and whites in parts of the design, a composite plate could be built up which was well beyond the copying skill of the ordinary engraver.

Perkins' siderography was already well tried before he submitted it to the Bank Committee in 1818. He had worked it out in America over the previous twenty years, from a much simpler idea. By 1804 the developing process already involved the transfer by pressure to mild steel and subsequent hardening of the steel. It was adopted at its different stages by a considerable number of American banks. In 1810 the process was patented in England[11] and demonstrated, unsuccessfully, to the Bank of England on Perkins' behalf by his agent, J. C. Dyer.[12] The process in its perfected form of 1818 was undoubtedly the most important suggestion that was made to the Bank, and it was short-listed with the Applegath and Cowper process for the final choice. William Congreve, however, was determined to oppose the American plan and to further his own at the same time. Perkins and his friends believed that Congreve's hostility had caused their failure. In December 1819 Perkins wrote to a friend:

> We were told yesterday from the best authority that one of Sir Willm. Congreave's workman had said, that Sir Willm. had been as cross as a bear, ever since our specimens were exhibited to the commissioners, that he had said that he expected the American plan would be adopted, altho it was not any better than *his own*.[13]

According to an Irish banker, Thomas Joplin, Congreve behaved as though:

> the competition lay between Messrs. Perkins and Heath and himself; and he wrote a pamphlet to prove that his plan was a good plan, and theirs good for nothing.[14]

The full title of this pamphlet of Congreve's explains his thesis:

> An analysis of the true principles of security against forgery; exemplified by an enquiry into the sufficiency of the American plan for a new bank note; with imitations of the most difficult specimens of those bank notes made by ordinary means, by which it is proved that there is no adequate security to be achieved in one colour, in the present state of the arts, and that the true basis of security is in the due application of relief engraving, and printing in two or more colours.

A copy of this rare pamphlet is in the Patent Office Library in London. Ten of its twelve pages of illustrations are imitations of Perkins' siderographic notes or parts of them. One shows a clumsily engraved and printed compound plate and one is a very beautiful specimen of Congreve's "triple paper." The siderography imitations were the work of Congreve's friend Robert Branston, and Branston's son. Robert Branston was one of the greatest English wood engravers of the time and a leader of the London school of engravers, the rival to Thomas Bewick's pioneer school in Newcastle.

The Perkins claim for siderography rested on the fact that it was virtually impossible to make by hand a number of identical engravings like the repeated designs on his notes. A forgery would give itself away immediately by the slightest variation between the designs. Branston got around this difficulty in a very simple way. He engraved only one copy of each design and printed this onto the paper as many times as necessary. Thus a note which, in the original, was composed of five designs appearing nineteen times altogether was copied by making five engravings and putting the paper through the press as many as nineteen times. Branston engraved on wood and on metal, and used both intaglio and relief methods of printing. A trained eye could spot that his copies were printed part relief and part intaglio, but the man in the street would notice only that the repeated designs were the same, line for line. Branston's method was ingenious and his results were remarkable, but there were serious weaknesses to his case. No ordinary paper could take the punishment of so many impressions. Branston pointed out that the relief blocks could be duplicated and united into one block by stereotyping, to reduce the number of impressions. But the task of making and printing the blocks was so great that it would have been easier and more profitable for the forger to earn a living as an honest engraver. Perkins and his company re-

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[11] J. C. Dyer, British patent 3385 (1810).

[12] A. D. Mackenzie, op. cit. (footnote 1), p. 56.

[13] From a letter quoted in G. & D. Bathe's *Jacob Perkins* (Philadelphia: Historical Society of Pennsylvania, 1943), p. 81.

[14] T. Joplin, *An essay on the general principles and present practice of banking in England and Scotland*, 6th ed. (London, 1827), p. 118.

garded Branston's copies as the best possible advertisement for their siderography and they offered

> to furnish every purchaser of Sir William Congreve's work with the original note, free of charge, and are desirous of giving the greatest possible publicity to Sir William's published imitations.[15]

Congreve was known as a troublemaker and in his dispute with Perkins public sympathy was on the side of the American. But the skirmish had no practical effect as the Bank competition had already been judged and closed by 1820, and both Perkins and Congreve soon found other applications for their processes.

The single compound print in Congreve's *Analysis* consisted of a short chain of interlocking rings in a red and black pattern with delicate white line engraving through the two colors. The engraving was so fine that it became almost scratchy, and the relatively large gap between the two metals disturbed the course of the engraving tool. The result was less satisfactory than later coarser engravings. In the final "Notice" at the end of the book Congreve apologized for this bad example of his process and promised better ones to follow:

> A variety of Specimens of the work of the Compound Plate illustrative of the foregoing principles, and formed on the test of inimitability except by original means, are in preparation, and will be published, with due explanations, as a sequel to this volume, containing both partial and complete Designs for Bank Notes, and all other public documents, the security of which against Forgery is important. The Specimens hitherto produced are to be considered merely as progressive Experiments.

So far as I know, the promised sample prints never appeared.

Congreve had a compound-printing press already established in the government offices at Somerset House, London, by the time he took out his patent of 1820. The patent specification refers to the use of this press for printing government stamps on the backs of private bankers' notes as an extra precaution against counterfeit.[16] In 1822 Congreve issued a notice to draw the attention of private bankers to these government stamps, and to the fact that his "triple paper" was obtainable from his office, "The New Bank Paper Office for the Prevention of Forgery" at Somerset House.[17] The bank-note stamps continued in use for some years, often on the backs of notes printed from Perkins' siderographic plates. They must have been the earliest important application of Congreve's process. But bank notes were not often dated, and it is difficult to know which of those that survive were the earliest. The first dated compound prints that I have seen (apart from those in the *Principles* of 1819 and the *Analysis* of 1820) were tickets to the coronation of George IV in 1821. From about this time compound prints became quite common on tickets, labels, bank bills, and posters. Most of the blocks were engraved by Robert Branston, the wood engraver, and they were printed either by the Somerset House press or by James Whiting. Whiting had been associated with Congreve as early as 1804 when they were involved in a libel action together[18] and had printed most of Congreve's numerous pamphlets since then.

The coronation tickets of 1821 were the joint production of Branston and Whiting along with Charles Dobbs, one of the great 19th-century masters of embossing. In the ticket illustrated in figure 3 there is a red and black compound pattern of roses and circles surrounding a blue centerpiece which was apparently printed at the same time. The blue ticket numbers in the top corners were printed separately. The print is surrounded by a border richly embossed by Dobbs. The enlarged detail from this ticket in figure 4 shows how the red printing plate fitted into the black, and how the combined surface was cut away in some places and engraved in others. Branston and Whiting made at least two other designs of tickets for the same event. Their "Procession Pass Ticket" (figure 7) was produced by conventional means with two engraved plates printed separately to give a moiré effect in the overprinting. The general design echoes the style of the compound

[15] *London Journal* (London, 1820), p. 209.

[16] In his *Memoir*, Thomas Bewick, the wood engraver, claimed that the idea of printing stamps on the backs of country bank notes was his, and that the credit had been unjustly taken by Congreve. Bewick wrote a letter to the *Monthly Magazine* to this effect and made the same accusations as Ibbetson against Congreve as Bank Commissioner. Congreve gave no public reply, though he sent a "very impudently written" reply by hand. *Memoir of Thomas Bewick* (London, 1862), p. 171.

[17] A. D. Mackenzie, op. cit. (footnote 1), p. 73.

[18] The action was brought by the Hon. G. C. Berkeley against William Congreve, John Parsons, and James Whiting who were the proprietor, publisher, and printer of the newspaper, *Royal Standard*, in which Admiral Berkeley was accused of cowardice in battle. Congreve asked that the fine of £1000 be imposed entirely on him, as the others were young men who would be ruined by it. *Trial of Whiting, Parsons and Congreve* (Buckingham, 1804).

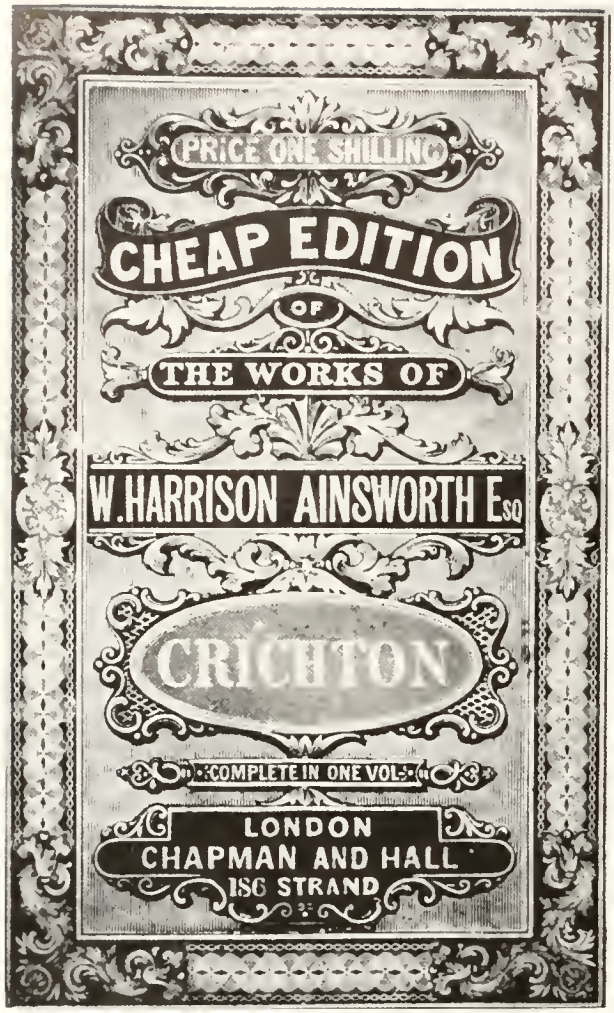

Figure 18.—Compound-printed book cover. About 1850. (From the Constance Meade Collection, Oxford University Press.)

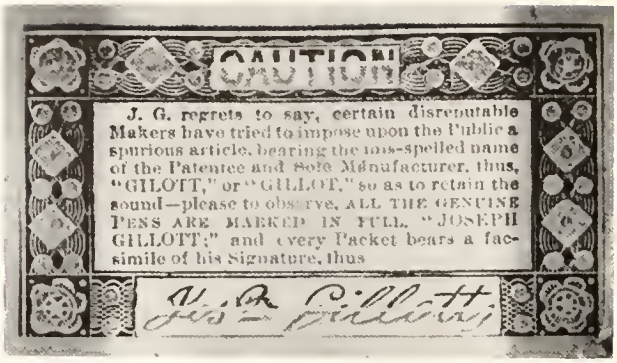

Figure 19.—Compound print from a pen nib box. Mid-19th century. (From the Constance Meade Collection, Oxford University Press.)

printed tickets, and the borders were again embossed by Dobbs.

Other compound prints dating from the 1820s are to be found on the ream labels that sealed bales of paper on leaving the makers. These were probably the work of the Somerset House press. Branston and Whiting printed compound-plate lottery tickets and bills for various betting houses until private lotteries were made illegal in 1827. From about 1830 the process was used on labels of manufactured goods, paper wrappers for series of books, government duty seals for patent medicines (figure 12) and the decorative borders of official documents. The process probably survived longest at Somerset House where it was still being used for government medicine seals in 1920.[19]

In about 1824 Whiting and Branston acquired the patent rights for compound printing from Congreve.[20] Congreve returned to his other interests and from this time he played no active part in connection with the process, though he continued to have Whiting print his pamphlets. The association between Whiting and Branston continued until Branston's death in 1827.[21] Branston's son broke with Whiting to go into partnership with Henry Vizetelly, another wood engraver. For a time the new firm, Branston and Vizetelly, used the separate elements of compound plates for page ornaments, but they never made true compound prints. Congreve died in 1828 and his widow married James Whiting [22] who moved to Beaufort House, in the Strand in London. There James, and later

[19] Sir E. D. Bacon, *The line engraved postage stamps printed by Perkins, Bacon and Company* (London: C. Nissen, 1920), p. 5.

[20] R. M. Burch, *Colour printing and colour printers* (London: Sir Isaac Pitman & Sons, Ltd., 1910), p. 122. The dates Burch gives for these transactions are inaccurate.

[21] A unique album, probably the firm's record, was preserved until recently in London. It consisted of hand-painted designs, progressive proofs showing engravings at different stages, prints from blocks separated and united, and test pieces of machine engraving and lettering, all pasted into a guard book. The original is lost, but a photostatic copy survives in the Constance Meade Collection in Oxford.

[22] Sir E. D. Bacon, loc. cit. (footnote 19).

Figure 20.—Manufacturer's label of the late 19th century, printed lithographically. (From the Constance Meade Collection, Oxford University Press.)

Figure 21.—Paper-ream label of about 1825, printed from compound plates. (From the Constance Meade Collection, Oxford University Press.)

his son Charles Whiting, continued in business with the process until well into the second half of the century.

In addition to compound-plate printing, Whiting practiced another process patented by Sir William Congreve in 1824.[23] His idea was a simple method for making a printed and embossed impression. A single embossing die, in which the image was sunk, served as a printing plate: the flat surface surrounding the intaglio image was inked with a roller and then printed with great pressure to produce a white embossed (or raised) design against a colored ground (figures 9 and 10). The process was sometimes known by the French name *gaufrage*. It was not as original as compound printing, nor was the equipment as unusual, and consequently it was practiced by other London printers, notably Charles Dobbs and Thomas De La Rue, as well as Whiting. Nevertheless, Whiting lettered his *gaufrage* prints, like his compound prints, "Whiting Patentee" until long after the patent rights had expired.

In 1839 a competitive prize of £200 was offered by the British Treasury for suggestions for new postage stamps. Whiting entered both his processes. His suggested adhesive stamps were printed from compound plates, and the embossing process was to be used for stamping paper sent in by the public.[24] None of the competitors' entries was judged good enough to be adopted, but nevertheless the prize was increased to £400 and divided equally between four outstanding competitors. Charles Whiting was one of these four, and the specimens of another, Henry Cole, were also said to have been made by Whiting.[25] The contract for producing the first penny postage stamps was eventually given to Perkins' company—Perkins, Bacon and Petch—which had not taken part in the competition. The stamps were printed from Perkins' siderographic plates.

A famous example of color work from the incunabula of printing which provides a unique parallel to Congreve's work is the Psalter printed by Fust and Schoeffer at Mainz in 1457. The initial letters in this Psalter are remarkable for the precision of the

[23] British patent 4898 (February 1824).

[24] Some of Whiting's blocks for this competition were printed in the *Art Union* (London, 1848), p. 194.

[25] Sir E. D. Bacon, op. cit. (footnote 19), p. 4.

Figure 22.—Trade card printed by a process similar to Congreve's printing-embossing process. Unsigned, about 1825. Reduced from 4 x 7½ inches. (Original in Constance Meade Collection, Oxford University Press.)

registration between their two colors, red and blue. Engraved ornament, printed in one color, completely surrounds the initial itself in the contrasting color. There may be a millimeter or less separating the two, but the colors never overlap. For some 19th-century printers the Psalter was a symbol of superb achievement and a challenge to their own ingenuity. Senefelder, in his *Complete course of lithography* (London, 1819) and William Savage, in *Practical hints for decorative printing* (London, 1818–23), chose to demonstrate their own prowess in color printing with reproductions of the initial "B" from the first page of the Psalter. T. C. Hansard followed suit in his *Typographia* (London, 1825). Savage made a careful study of the original initials and decided that they were produced by exceptionally good registration of two impressions. It is now thought that a compound system similar to Congreve's was used, and the two colors printed at a single pull.[26] Surprisingly, Congreve himself never attempted to make a facsimile, and there is no thoroughly reliable evidence to show that he even knew of the initials or their bearing on his own process. There is only the weight of probability. It is not likely that he was unaware of the work of his contemporaries. Branston, at that time Congreve's chief assistant, was concerned with the production of Savage's *Practical hints*. A disparaging note in Congreve's *Analysis* seems to refer to Savage's color work:

> A very elaborate work has lately been published on this subject [color printing], which proves the impossibility of uniting two colours with any degree of accuracy, by the ordinary processes, where the forms of its adaptation are at all complicated.[27]

Some years later a French scholar-printer, J. H. H. Hammann, stated plainly that Congreve was well aware of the Mainz Psalter initials and their significance. Hammann, however, was writing thirty years after Congreve's death, and he did not declare the source he was quoting:

> Le célèbre imprimeur, M. Bensley, montrait un jour à M. Congrève comme un phénomène typographique la grande lettre B, qui est la première du Psautier, et dont

[26] See the IPEX catalogue for the British Museum Exhibition, *Printing and the mind of man* (London: F. W. Bridges & Sons Ltd., and The Association of British Manufacturers of Printers' Machinery [Proprietary] Ltd., 1963), Part 1, p. 32.

[27] Sir W. Congreve, loc. cit. (footnote 10).

les ornements en bleu et en rouge rentrent si parfaitement les uns dans les autres; l'examen attentif qu'en fit M. Congrève lui fit découvrir qu'une pareille régularité ne pouvait être obtenue par des impressions successives, et que le tout avait dû être imprimé d'un seul coup de presse au moyen de deux parties gravées séparément et s'adaptant l'une dans l'autre après avoir été couvertes séparément, l'une de l'encre bleu, l'autre de l'encre rouge. C'est aussi de cette manière qu'on procède maintenant dans l'impression à la manière Congrève.[28]

Compound printing was a cheap process to work provided that a long run of prints was wanted, for the blocks were tough and hard wearing and could be kept in endless supply by casting from the originals. Apart from cheapness, there were two particular advantages for the ticket- and label-printing trades. Any part of the design which might have to be changed, such as the title, the date, the number of lottery prizes, or the grade of ticket, could be engraved on a separate piece of metal and taken out and changed as necessary without altering the rest of the block. This principle was already familiar in a simpler form in the "pierced block" which had been part of the job-printer's stock-in-trade since the 18th century. For this, an engraved wood block had holes cut through where names or numbers were to appear, and these names were engraved on separate fitting blocks and inserted into the holes.

As a second advantage to Congreve's process, it was extremely difficult to make a good forgery of a compound print without the equipment for casting, which ordinary forgers were unlikely to have. Some of the ream labels were very roughly printed, but it was still immediately obvious that they were genuine from the exact registration of the engraving through the different colors. Besides these two practical advantages, the prints looked attractive whether they were gay for the lottery bills, formal for the official seals, or rich and splendid for the coronation tickets.

In the 19th century Congreve's prints were commonplace. They were found in everyday use on posters, tickets, book wrappers, labels, and bank notes. The process came to be so well accepted in its role of protector against forgery that sometimes the typical compound design, rather than the peculiar details of printing, was taken as a sign of authenticity. Then, when the process was superseded by a more modern one, the old design was carried over to the new process although, of course, it no longer represented any actual security. Figures 20 and 21 show a late 19th-century paper-manufacturer's label, printed lithographically, and the official paper seal of the 1820s that served as model. In the same way the recent "Stephens' Ink" label (figure 16) is a close copy of the 19th-century one (figure 15). Compound prints themselves had no more collectors' value in their own time than bus tickets or match folders have today. As a result, they are now extremely hard to find. But it is not unusual to see modern designs, like those illustrated, which are derived from compound-printed prototypes.

[28] Translated, this reads: "The famous printer, Mr. Bensley, once showed to Mr. Congreve as a rare phenomenon of printing the Psalter's first large B, with the blue and red ornaments fitting so perfectly into one another. Mr. Congreve examined it carefully and was convinced that such precision could not have been produced by successive impressions. It must all have been printed at a single pull of the press, using two parts which were fitted into each other after being engraved and inked separately, one in blue and one in red ink. This is the same as the method used today in the Congreve process." J. H. H. Hammann, *Des arts graphiques* (Paris and Geneva, 1857), p. 112.

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