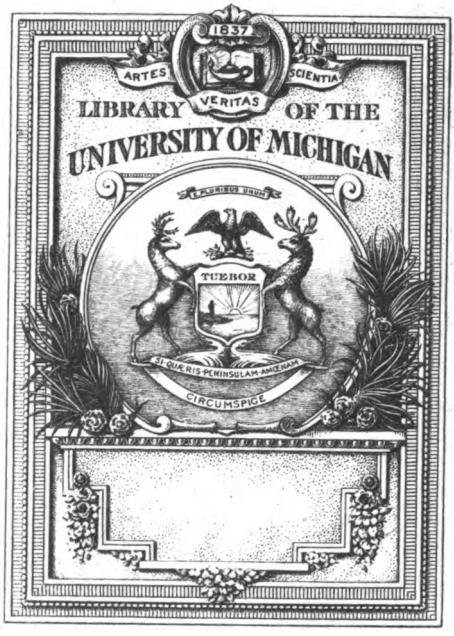
TYPE AND PRESSES IN AMERICA



TYPOGRAPHIC TECHNICAL SERIES FOR APPRENTICES—PART VIII, NO. 55

TYPE AND PRESSES IN AMERICA

A BRIEF HISTORICAL SKETCH OF THE DEVELOPMENT OF TYPE CASTING AND PRESS BUILDING IN THE UNITED STATES

BY

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INTRODUCTION

A STUDY of type founding and of the development of presses and other printers' machinery in America presents many interesting considerations. If the attempt were made to give in detail the story of American type founding and the accomplishments of the notable American type founders, and at the same time to chronicle the improvements and inventions which American genius has contributed to the machines and processes used in printing and the allied industries, a very large book might readily be produced. While such a book would not be without interest and would certainly have very great value, it would be valuable mainly as a work of reference and would lack the interest which ought to attach to a book of the sort contained in this series. It has seemed to the writer best, therefore, not to attempt to collect an encyclopedia of information, but to give a brief sketch of the development of types and presses in the United States, with a special view to the beginnings in both departments. It is greatly to be hoped that a more competent hand may later be set to the production of such an encyclopedic volume as has been indicated, but such a work does not belong in this series.

In these matters, as in so many others, we find a definite course of development going on. Originally American dependence upon Europe was complete. The political dependence of the colonies in those days was much more thorough-going than anything we know at present. The political and economic ideas of the eighteenth century were so different from those with which we are familiar that it is difficult for the

ordinary man who is not widely read in the literature and history of that period to understand them at all. Briefly it may be said that the prevailing idea, not only in England, but elsewhere, was that all colonies should be governed from the mother country; that they should send their raw materials to the mother country and receive all of their manufactured products from the mother country; and that they should not trade directly with any other part of the world, but that the mother country should act as a receiving and forwarding station for trade in both directions. This dependence extended much further than to politics and business. The American colonists, for example, got their literature, their art, their fashions, and many of their ideas from the mother country. The nearer the good people of Boston, New York, and Philadelphia could get to the ways of thinking, speaking, dressing, and acting which prevailed in London, the happier they considered themselves.

Accordingly we find that at first type and presses were all imported. Later we find that although type founding was being successfully carried on in this country, foreign models, especially in type, long continued to be followed. In machinery, American independence very soon asserted itself. Although some important machines and presses were not invented in this country, many were invented and nearly all were materially improved in American hands. This remark applies to the machines for producing type as well as to other mechanical operations. In the matter of type faces and typographical design America followed English models until comparatively recently. Indeed, it may be questioned whether there are more than a very few type faces now in use in this country which can be said to be American inventions. Many type faces have been designed, however, which were modifications and improvements of European designs. So true is this that probably the greater part of the type in use in this country would be considered as of American

design, although its indebtedness to Caslon, to Baskerville, to Bodoni, or to Jensen, as a remote original, might be recognized. As a matter of fact, the original designing of letter faces, regardless of any previously existing design, has been of very rare occurrence in this country. Within the last generation, however, we are pretty well emancipated from this following of foreign originals. We still study the products of the foreign type foundries and printing offices, but as sources of suggestion, not as models for imitation.

The great American printing houses of today are more and more the masters of their own craft, not the imitators of others. This condition is also true of the type founders and manufacturers of machines and materials used in the industry. The sentiment of independence is bound to become more marked, and the originality of American printing more pronounced, with the development of a generation of better printers.

CHAPTER I

The Pioneer Type Founders

DURING all the early years of American printing, as has already been said, all type used was imported. The first type cast in this country appears to have been made by Christopher Sauer, in Germantown, Pennsylvania, about 1735. Sauer (the family afterward anglicized the spelling of the name into Sower) was one of those Germans, colloquially known as Pennsylvania Dutch, who were an important element in the population of the colony of Pennsylvania and are still numerous in the State. Sauer printed books, and in 1739 we find him beginning a newspaper, all or nearly all in German. As an auxiliary to his printing business he seems to have cast his own German type or at least a part of it. His work had no particular commercial importance, but deserves record as the beginning of type founding in America.

In 1768 a Scotchman named Mitchelson came to Boston bringing the tools for type founding with him. We have no record that he ever cast any type. Probably he lacked capital to go into business and there was no one to employ him.

In 1769 Abel Buel submitted to the Legislature of Connecticut a document printed from the first English type known to have been made in the United States. This sheet, which is still in the archives of Connecticut, is printed in a very well-cut long primer (ten-point) roman of Buel's own casting. We have no evidence that Buel ever cast a great deal of type, but his personality is so interesting, and his character so typical of the proverbial "Connecticut Yankee" that it is worth while to recall the story of his life.

Buel appears to have been born in Connecticut, not far from 1750, and apparently early learned the printing trade. With more than his share of youthful irresponsibility, though he appears not to have been a really bad man at heart, he proceeded to counterfeit the State currency of Connecticut. This was not a difficult operation, as the early colonial currency was printed from ordinary type with stock ornaments upon ordinary paper by means of the ordinary printing press. The first definite record that we find of him is that he was pardoned in 1766 from a life sentence for counterfeiting these bills. The lesson that he got on this occasion seems to have cured him not only of counterfeiting, but of printing, as he apparently never again did either, although it was by no means the last time that he found himself at odds with the authorities.

He then invented a method of polishing crystals and precious stones. The amount of this valuable material in the hands of the good people of Connecticut was apparently not sufficient to afford him a livelihood, and we find him next engaged as an undertaker and a singing master. In this latter connection he was summoned before the authorities by certain good people who were greatly scandalized because while in charge of a church choir he had introduced the use of a bass viol into the services. This was deemed little short of blasphemy, but apparently no technical charge could be sustained against the culprit.

Buel early interested himself in the cause of the freedom of the colonies. Meantime he had evidently been experimenting in type founding, for the petition of 1769 sets forth that the petitioner has discovered the art of casting type, but that he lacks the capital and is, therefore, unable to go into business commercially. He accordingly petitions the Legislature to advance to him the necessary funds. The Legislature voted him a loan of £100 for seven years and promised him £100 more after he had been carrying on the

business successfully for one year. As we shall see in a moment, before the year was out Buel's interest transferred itself elsewhere and we hear no more of his type casting. When the seven years were up Mrs. Buel paid back the £100. Where and how she raised it is something of a mystery, as she asserted when she made the payment that she did not know where her husband was. He was not permanently lost, however.

Buel, as we have seen, had interested himself in the cause of American independence, and in 1770 he was arrested for participating in the tearing down of a lead statue of George III which had stood in New York. With true Yankee thrift Buel tried to combine his patriotism and his type founding, for a considerable portion of George III was found in Buel's house in the process of being cast into type. Things were not lively enough in Connecticut to suit our friend. He went to Boston, where we find him participating in the Boston Tea Party, serving a cannon in the Concord fight, and wounded at Bunker Hill. Later he fell into the hands of the British and was confined in one of the prison ships of unhallowed memory which were moored in Wallabout Bay, Brooklyn. Very likely he was in one of those floating wooden tombs when his wife declared that she did not know where he was. How long he remained as a prisoner of war and what his later military experiences were we do not know.

We hear of him next, after the war was over, being appointed to make a map of the coast from Maine to Florida and then appointed master of the mint for Connecticut, where he devised and erected the machinery for striking the copper cents then coined. One wonders if the master of the mint often thought of his youthful conviction for counterfeiting the money of the same community.

Later, when the world was becoming interested in cotton spinning under the stimulus of Arkwright's invention, Buel went to England to learn how to spin

cotton. He came back, bought some machinery, and set up in New Haven the second cotton mill in America, the first being Samuel Slater's mill in Pawtucket, Rhode Island. This seems to have been the last shift in Buel's varied life. He died in 1825 at the age of about seventy-five. He was an interesting product of his time and its conditions and as such his story deserves record, for it must be remembered that he was not a "sport," but a "type."

In 1774 Jacob Bay attempted type founding in Philadelphia, but he also was apparently only an experimenter.

In 1775 an experiment was made which, from the conditions and from the character of the maker, we should expect to find successful, but which failed nevertheless. At this time Benjamin Franklin brought out from France a full set of tools and punches and undertook, with his son-in-law, Bache, to establish a type foundry, there being then no type founding done in this country if we may except what was being done in Sauer's establishment. The Franklin-Bache foundry was well equipped with roman, italic, Greek, and Hebrew matrices. Bache had received some instruction from Fournier, the great French type founder, from whom Franklin had purchased the tools. They had for their workman a man named Frederick Geiger. Geiger was what is known as a "redemptioner," or a man who in return for his passage money to America, his board, and a small amount of money wages agreed to be the bond servant of his creditor for a certain period. These arrangements were very common at this time and reflected no discredit upon the young men who made them. Geiger was a mathematical instrument maker by profession, but became with study and practice a very expert matrix cutter and founder. Franklin had brought him out and he served his time with Franklin, but appears to have left him as soon as his time was out and to have gone to the Philadelphia mint. Like many another

skilled mechanic, however, he became interested in the search for a perpetual motion machine and finally died an insane pauper.

For some reason, the Franklin foundry was not successful. It has been conjectured that one reason may have been that Franklin was very much influenced by French models in his designs, and that the printers and the reading public were so accustomed to English type faces that they did not take kindly to the new forms. Curiously enough American printers have never taken kindly to French type faces although many of them, from Garmond down, are very beautiful. Some of the French types designed, not far from 1875, seem to have become Americanized and are among the most legible and beautiful in use, but the American printers have never been very willing to use them. Whatever the reason, the Franklin foundry was added to the list of unsuccessful attempts at type founding.

One more attempt was to be made before type founding was permanently established in America. This time the attempt was successful, but not permanent. In 1783 John Bain (or Baine) sent his grandson to Philadelphia with an outfit of type founder's tools. Bain had been associated with one of the famous type founders of the time, Alexander Wilson, of Glasgow. Wilson not only had a market in Scotland and England, but also in Ireland and in North America. Bain had been chosen by lot to start a foundry in Dublin, but after remaining there a time he went to Edinburgh, whence he turned his attention to the other side of the Atlantic. Encouraged by the reports from his grandson, Mr. Bain soon went, himself, to Philadelphia. He was further encouraged by the firm of Young & McCullough, then a leading house of Philadelphia printers. In 1785 he opened business under the quaint title of John Bain & Grandson in Company. Their work was good and the firm was immediately successful, theirs being the first

commercially successful attempt to cast type in America. Bain, however, died in 1790, and the business was soon given up by his family.

About the same time that Bain began business Adam Gerard Mappa made an unsuccessful attempt to start a foundry in New York. Mappa was born in Belgium in 1750. He spent his early life in the army, from which he retired after twelve years of service with the rank of lieutenant. He then purchased a part interest in the old firm of Voskens & Clerk. This firm was established some time before 1677, and had long been one of the principal sources of supply of type for England. As pointed out elsewhere in this series (No. 52, A Short History of Printing in England) many of the types used in England for a long period came from continental foundries, particularly Dutch. Shortly after the purchase the Government underwent important changes, in consequence of which Mappa left the country. He landed in New York somewhere about 1787, bringing with him his complete outfit of tools and matrices. He had a number of very handsome Dutch and German faces, some ordinary roman type, and seven varieties of Orientals. For these last Voskens & Clerk undoubtedly had found considerable use, but America was as yet far from needing any considerable supply of Oriental types. Mappa's capital had apparently been absorbed in his purchase and lost in emigration. In 1798 he was very ready to take himself and his equipment into the service of Binney & Ronaldson. Probably Mappa had no practical knowledge of type founding and very little interest in it, for he left the service of Binney & Ronaldson in 1800 to go into that of the great Holland Land Company. He seems there to have found his place and served in important positions until the end of his life.

CHAPTER II

The Establishment of Type Founding

SO FAR our story has been one of failure. There is, however, plenty of evidence that the time was ripe for success. The new country was growing rapidly. The Americans, then as now, were insatiable readers, especially of newspapers. The demand for type was constantly increasing. America was becoming more and more independent, more and more desirous of supplying her own wants, and more and more impatient of the inconvenience, expense, and delay involved in ordering such merchandise as type from England. If the persistency and courage of the elder Bain had been shared by his family unquestionably fortune would have been easily within their grasp, but they paid the penalty of their lack of good business qualities.

We come now to the story of the first permanently successful type foundry in America, a foundry which continued in vigorous existence until the erection of the Jersey City foundry of the American Type Founders Company, with which it was merged. There met one day in an ale house in Philadelphia two men whose lives were thenceforth to run together. I suspect that they were drawn together in the first place by the fact that they were both Scotchmen, and that in their first contact they showed each other the qualities which bound them together. They were Archibald Binney and James Ronaldson. Binney had learned and practiced the trade of type founding in Edinburgh, Scotland. Ronaldson was a biscuit-maker, out of business because of the burning of his establishment, but with some ready money in hand. It seemed to Binney that here was a heaven-

sent opportunity to combine his knowledge with Ronaldson's capital and enter under the most favorable circumstances the business of type founding. At this date there was no active foundry in America. The successful Bain concern had been closed out. The Sauer business, if active at all at this time, was only an adjunct to a printing office, while Mappa was finding it impossible to get started. They accordingly agreed to enter the business as equal partners, Binney putting in his tools, which were appraised at $888.88, while Ronaldson put in the same amount in cash.

With this they started business, the first entry in their account book being November 1, 1796. We learn that they rented a frame house on "Cedar Street atwixt ninth and tenth streets" at $17.33 a month. In .1800 the frame house was valued at $40.00 and cost $82.09½ "to shove it to its present location." It must be remembered that at this time a half-cent coin was in circulation and that accounts were kept down to a quarter of a cent. At the time of the moving of the house the firm bought the property and built a new house on the same lot. The new house cost $2,500 and they paid $72 a year ground rent, apparently for additional land not included in the purchase. Entries in their first account book show that one or both members of the firm lived in the house. They started with a small assortment of type, but of the most important faces. These faces appear to have included brevier (eight-point), bourgeois (nine-point), long primer (ten-point), small pica (eleven-point), pica (twelve-point), and some two-line letters. They probably employed as matrix cutter one Fürst, a die maker in the Philadelphia mint, who afterward cut a medal bearing Binney's face on the obverse and an appropriate design on the reverse.

At an early period, as we have seen, they took over Mappa and his outfit, and in 1799 they bought the tools of the Bain concern, paying $300 for them.

In 1806 the excellent Franklin outfit was in the hands of a man by the name of Duane. Duane became interested in Binney & Ronaldson and offered to lend them any of the Franklin tools and matrices which they desired to use. Ronaldson was so impressed with the superiority of a part at least of the Franklin equipment that, fearing that Duane might change his mind and not being willing to take any chances, he himself borrowed a wheelbarrow and moved the material over to Cedar Street in the middle of a very hot summer day.

Binney & Ronaldson were enterprising, thrifty, and obliging. They did good work, took good care of their customers, and were immediately and permanently successful. They prospered greatly from the beginning and both of them made fortunes, as fortunes went in those days, within twenty years.

A study of their account books is extremely interesting. Among other things they give the names of 114 customers who found their way onto their books in the first five years of the business. It would hardly be worth while here to give the names of these customers, but it is interesting to see where they were. They were located as follows:

Philadelphia	49
Pennsylvania (outside of Philadelphia)	6
New York City	22
Albany, New York	1
Delaware	4
Virginia	7
New Jersey	2
Maryland	4
District of Columbia (Washington and Georgetown)	2
Connecticut	1
Massachusetts (Concord)	1
Georgia	1
Augusta (state not given; probably Georgia)	1
Tennessee (Knoxville)	1
Location not given	12

In 1811 Binney invented an improved type mold which increased the output of the caster fifty per cent

and saved labor. He experimented with a machine for rubbing type, but in this was not successful.

In 1812 Binney & Ronaldson published a specimen book which is interesting as showing the development of their business. This book shows eleven faces larger than pica, fifteen kinds of body type, the smallest being pearl (5 point), two sizes of Anglo-Saxon, four sizes of Greek, four sizes of Hebrew, two sizes of German text, six sizes of black letter, three sizes of German, four sizes of Oriental letter, one size of script and 120 kinds of "flowers" or borders, the greatest number of these being on English (14-point) body. It is not unlikely that some if not all of the foreign letters may have come from the Franklin and Mappa stocks. We know that Franklin had Greek and Hebrew and that Mappa had German. Mappa's Orientals did not appear. Probably even if Binney & Ronaldson still had the matrices it would not have been worth while to include them in their specimen book. The preface says that they were obliged, contrary to their inclinations, to imitate European taste. Evidently America had not yet become independent except politically. They gave two examples of erroneously formed faces in long primer and small pica, which were really condensed faces as we should now call them. They appear to have invented the dollar mark $ in 1797 and the abbreviation ℔ for weight pounds in 1798.

In 1819 Mr. Binney retired with an ample competence. Mr. Ronaldson ran the business alone for a while, but in 1823 he was succeeded by his brother Richard, who conducted the business for ten years.

In 1833 the business was taken over by Lawrence Johnson and George E. Smith. Johnson was able, enterprising, and energetic, and introduced new vigor into the conduct of the concern. Contemporaneously with Jedediah Howe he introduced stereotyping into Philadelphia. Smith retired in 1845 and Johnson took in as partners Thomas MacKellar, John F. Smith, and Richard Smith, young men who had grown up

in the business and were thoroughly interested in it and devoted to it. The firm continued to prosper greatly. Johnson died in 1860, but his partners took in Peter A. Jordan, changing the firm name to MacKellar, Smiths & Jordan. By this time the house had acquired a great reputation and a leading position among American type founders. Mr. Johnson died in 1884 and the next year the firm was still further increased by the addition of William B. MacKellar, G. Frederick Jordan and Carl F. Huch. The firm name was again changed to The MacKellar, Smiths & Jordan Company. During all this time, however, the house was known among printers as the Johnson Type Foundry. For many years it had acquired great distinction for its diligence in electrotyping foreign designs as well as in originating new faces for ornamental types and borders. The fashion of the time for typographical decoration was largely developed by the publication of a house organ called the "Typographic Advertiser," a quarterly journal, edited by Thomas MacKellar, which contained a fund of matter of interest to printers and a vast quantity of fanciful borders and other material now out of fashion.

In 1892, when the American Type Founders Company was organized by the consolidation of some twenty foundries, the MacKellar, Smiths & Jordan Company entered the combination and became the Philadelphia branch.

Now that we have told the story of this great house in detail, we may go back to consider some more of the early firms. The success of Binney & Ronaldson was due to a combination of personal qualities and favorable conditions. The increase of printed matter was very great. Americans have always been a newspaper-loving people, and after the independence of the colonies the founding of new newspapers went on apace. It must not be forgotten that all printing in the early days of the last century was done with foundry type, hand set. The demand

for type, therefore, was not only large, but was increasing. Up to the outbreak of the war of 1812 the few type foundries in America were regularly from three to four months behind their orders, so greatly did demand outrun production.

Under such circumstances Binney & Ronaldson could not have the field to themselves. In 1805 we find Samuel Sower & Company at work at Baltimore. Sower belonged to the family of Christopher Sauer, and used the material of the old firm with additions. He made some fonts of roman and italic and appears to have made a specialty of small type faces such as diamond (4½-point), brilliant (4-point), and excelsior (3-point).

In 1809 the second permanently successful foundry was started by Elihu White and a man by the name of Wing in Hartford, Connecticut. Here again we have a sample of characteristic Yankee courage, resource, and ingenuity, qualities which have enabled Americans at all times to accomplish the apparently impossible. Neither White nor Wing knew the business of type founding. They had certain ideas of their own and for the rest they apparently worked backward from the finished type. Their attempt was to cast several letters at once, to be afterwards separated, instead of casting the letters singly as was the general practice. Probably partly for that reason and partly because of ignorance, perhaps also because of their confidence in their ability to improve on accepted methods, they did not use the approved moulds. The attempt to cast letters by wholesale, as it were, was not successful and their entire progress was slow and unsatisfactory. After many failures, they sent a man to Philadelphia in order that he might learn the trade secrets. In those days type founding, like many other trades, was to a great extent a secret trade and one of the chief duties of the workman was to keep his employer's secrets. Their attempt to steal the trade failed and they were thrown back upon their own resources again. Finally, however,

their efforts were crowned with success and they began to turn out commercially successful type. In 1810 White separated from Wing and went to New York, where he and his brother Julius established a business under the firm name of E. & J. White. From this time on they were steadily and brilliantly successful.

In 1820 they opened branches in Buffalo and in Cincinnati to meet the requirements of an expanding trade. The business remained in the family until 1854, when it was bought out by three employees who continued it under the later well-known firm name of Farmer, Little & Co.

Another famous name in the annals of American type founding appears at about the same time as that of White. This was the name of Bruce. David Bruce was born in 1750, in Wick, Caithness, Scotland. When a mere boy Bruce was impressed into the British navy after the bad old custom of that day and served for a while in the Channel Fleet under the command of Lord Howe, afterwards well known, together with his brother General Howe, for their part in the Revolutionary War. After he left the navy Bruce was apprenticed to a printer. He came to New York in 1793 and obtained work on a newspaper. Shortly afterward he sent for his brother George and apprenticed him to a printer.

In 1806, after George had become a journeyman printer, the brothers were offered by publishers the printing of Lavoisier's Chemistry. The fact that they had no plant, no equipment, and no money did not deter them from accepting the offer. Bruce managed somehow to secure a place and a press, and he borrowed a font of type. He introduced the standing press for dry pressing his sheets, and he turned out so good a piece of work that the publishers offered him all the printing that he could do. From this start he set up a successful business.

In 1811 Bruce, with his usual business acumen, recognized the importance of stereotyping and went

to England to study it. As we have seen, however, it was not easy to learn other people's trades in those days and Bruce met with great difficulty. He did, however, succeed in learning something from a Scotch workman, perhaps helped by a certain sense of kinship, which is common among the Scotch, and returned home to make experiments for himself. Times were not favorable for keeping business running, to say nothing of starting new business. The conditions preceding the war of 1812 were disastrous for business in the United States. American commerce was crushed between the upper and nether millstones of England and France, who had been at war for many years and were attempting to fight each other's commerce and industries as well as each other's soldiers. The condition was very similar to that which preceded the entrance of the United States into the great war of 1917, excepting that it continued much longer and, owing to the comparative weakness of the United States, was much more serious than the later difficulty. The war did not mend things industrially and its close in 1815 left the United States in a bad business condition for a good many years. Nevertheless, the courage and persistency of the Bruces enabled them to weather the storm, and they not only held their own but developed along new lines.

In 1814 and 1815 Bruce produced the first two sets of stereotype plates made in America. They were a common school testament in bourgeois type and a 12mo Bible in nonpareil. Bruce invented a machine for planing the backs of the plates to make them of uniform height. This was a great improvement and was so successful that it is said that of the entire two sets of plates only a single plate needed a slight overlay.

The development of the stereotyping process, however, brought to light difficulties with type. Foundry type was sold with the shoulder beveled off for ordinary printing and this was not favorable for stereotyping.

The type founders would not make the high spaces and quads which were needed. As the best way of meeting these difficulties, Bruce, in 1815, went into company with the Starr brothers for the manufacture of type. It soon appeared that type founding and stereotyping promised to be more profitable than printing and Bruce sold out his printing establishment to devote himself to the other branches. Bruce and the Starrs were unable to agree and the partnership was soon dissolved, Bruce deciding to carry on the business alone in spite of the difficulties of every sort which surrounded it. In addition to the business conditions of the time, neither of the Bruces had any practical knowledge of type founding and the matrices of their only complete font were stolen, presumably by someone who was interested to secure their failure. It needed more than that, however, to discourage this persistent Scotchman. George Bruce set himself at work to learn punch cutting and mould making. His first efforts were crude, but he had an artistic temperament, a critical spirit, and a practical knowledge of printers' needs. By these qualities and his own persistence he soon became very proficient.

By 1820 the Bruce foundry was the best in the country, doing better work than even Binney & Ronaldson at that time. In 1822 Bruce undertook to remedy the confusion in sizes which was then and for a good many years a source of difficulty, annoyance and expense to printers. He devised a scientifically correct system by which the size doubled with every seven sizes of the system. This was uniform throughout, so that wherever you touched the system, you found any given type twice as large as the seventh below and half as large as the seventh above. In spite of the fact of the simplicity and scientific correctness of the system it did not prove suited to commercial work and was not adopted.

In 1828 William M. Johnson had invented a type-casting machine in which a pump forced the liquid metal into the mould, giving the type a sharper face

than was possible with hand casting. The machine was a step in the right direction, but was crude and imperfect. White took it up and tried to improve it. but he did not succeed in removing its fundamental defects. The types were not cast solid. Being hollow they were light and too weak to withstand the pressure of the presses. The first successful type-casting machine was made by David Bruce, Jr., in 1838, in development of the Johnson idea. George Bruce bought David Bruce's patents and used the machine until 1845, when David Bruce made further improvements and produced the type of machine which is now in general use not only in this country but in Europe, where the method was soon adopted.

James Conner, a printer of New York, began business as a stereotyper in that city in the year 1827. His was the first stereotype edition of the New Testament. He also earned a good reputation as the publisher in the United States of the Bible in folio form. To the business of stereotyping he soon after added that of type founding, in which he was remarkably successful. With the aid of Edwin Starr, then in his employ, he made the electrotype matrices which enabled him largely to increase the stock of his foundry. After the death of James Conner, in 1861, the foundry was managed by his sons and grandsons, who finally merged the business in that of the American Type Founders Company.

Meantime the business of type founding spread from its original centers and new fields were occupied. By 1818 the Boston Type Foundry had been founded by Beddington & Ewer, and undertook to cast types, set types, and make stereotype plates. Samuel N. Dickinson was taught the trade of a printer in the State of New York, but afterward was employed as a compositor in the Boston Type and Stereotype Foundry. In 1829 he began business as a master printer and in 1839 he began type founding after having designed for an Edinburgh foundry a series of Scotch-cut letters. The success of this face deter-

mined him to cast type for himself. In 1845 he had a full assortment of types and issued a specimen book. Dickinson was not a strong man, however, and died of consumption in 1848, at the age of forty-seven. The business was continued by Sewall Phelps and Michael Dalton. Both the Boston Type Foundry and the Dickinson Type Foundry had unusually successful careers and were later absorbed in the American Type Founders Company.

Type foundries were started in Albany, Buffalo, Pittsburgh, Louisville, St. Louis, Cincinnati, Philadelphia, Baltimore, and in New York, where there were at least seven foundries. This led to overproduction, competition, and the failure of many weak concerns, a condition of things which was not entirely remedied until the organization of the American Type Founders Company in 1892.

In 1840 Augustus Ladew and George Charles opened at St. Louis the first foundry west of Cincinnati. This firm continued in successful operation until it was merged into the American Type Founders Company at its organization.

In 1806 Robert Lothian, of Scotland, tried and failed to establish a type foundry in New York. His son George B. Lothian, who had been taught the trade of stereotyping in the stereotype foundries of John Watts, of New York, and B. & J. Collins, of Philadelphia, had also received instruction from his father and from Elihu White in type founding, undertook to establish a type foundry in Pittsburgh, Pennsylvania. It was an unsuccessful enterprise and Lothian returned to New York. In 1822 he undertook to make type for the old firm of Harper & Brothers. The face of Greek, which he cut for the Anthon Classical Series, was very much admired. He died in 1851, but the foundry continued in business under other hands until 1875.

The next year Louis Pelouze, the founder of a distinguished family of type founders, started a business in Philadelphia. This was another of the successes

from both a commercial and artistic point of view, and was another of the constituents of the American Type Founders Company.

The Boston Type Foundry, which started as a stereotyping plant, passed through an experience as a co-operative concern under the direction of the employees who owned the stock. As is usually the case with such enterprises, it was unsuccessful until finally the majority of the stock got into the possession of Gorham Rogers, from which time it was operated as in the ordinary way and attained a high degree of success, doing very fine work. Mr. Conner, foreman in this foundry, who had started as a stereotyper in 1827, was sent to St.Louis to open a branch establishment which was very successful and later became famous as the Central Type Foundry. Conner invented an electrotype matrix to take the place of the matrices which had formerly been made by driving a steel punch into copper.

The Dickinson Type Foundry also did work of a very high grade. Perhaps the most fortunate thing that ever happened to it was the entrance into its service in 1868 of Mr. Joseph W. Phinney. Mr. Phinney was born in 1848, and after a varied experience as a printer in several places, went to Boston in 1868, later entering the employ of the old Dickinson Type Foundry, in the selling department. He soon distinguished himself in the service of the Dickinson Company and after a time became one of its partners. His skill, artistic taste, and ability soon made him one of the leaders in type design as well as one of the great figures in the type founding business. For many years Mr. Phinney has exercised an influence for good in type founding which it would be difficult to overestimate. On the establishment of the American Type Founders Company in 1892 the Dickinson concern became one of the constituent firms and Mr. Phinney's leadership was recognized by his election to the position of Vice-President of the new concern. Mr. Phinney has

remained in Boston as the head of the New England branch of the business and is one of the active and leading officers of the great type founding company.

Certain improvements in the manufacture of type which have brought it to its present perfection remain to be recorded. The most important of these were made by Barth, Marder, Benton, and Nicholas J. Werner. Henry Barth was born in Leipsic, Germany, in 1823, and learned the trade of mathematical instrument maker. Before 1840 the Bruce type caster was seen in Germany and (not being protected by German patents) was imitated by German type founders. Barth was engaged by Brockhaus, one of the more important German printers, who maintained his own bindery and type foundry and now added a machine shop primarily for the purpose of building Bruce machines. Barth spent several years in the employ of Brockhaus making type foundry tools and had two years' service in the German navy. He came to America in 1849 and at first practiced his trade as a maker of mathematical instruments, but before long connected himself with the Cincinnati Type Foundry. Here he invented a machine to cast type by direct steam pressure without the pump. The machine was successful, but for various reasons did not come into general use. He then built a 14 x 18 job press, long well known as the Wells jobber. During his service with the Cincinnati Type Foundry the hand-casting machines were entirely replaced by steam machines, and in 1853 he invented the kerning machine. About the same time the first shaved leads were made under Barth's direction. At first the shaving was done on a hand machine, but later he devised a steam shaving machine. During the course of a long service to the industry Barth was the author of many important inventions and improvements in the details of type founding. He died in 1907.

To John Marder we owe the development of the American point system of type bodies. The Marder

system was not immediately adopted, but as developed by later inventions its superiority was so great that in spite of the trouble and expense involved in the standardization of type it finally became universal.

L. B. Benton introduced the use of accurate unit width of type. Previously the width of the letters had varied with each character. This resulted in a multiplicity of widths of type. Benton's theory was that quicker typesetting and more uniform spacing could be obtained by having the types standardized on a minimum number of widths and securing the proper space between characters by modifying the shapes of certain letters to conform to these widths. Benton's type was popularly called "self-spacing" although the name was misapplied. Another disadvantage then existing was that similar style type faces from different foundries did not line, and even the height-to-paper of types varied. Type sizes which were supposedly the same, in reality varied considerably in different foundries. The confusion and difficulty for the printer arising out of this lack of standards may easily be imagined. Each foundry had its own width and size of type, and in many cases its size varied by a considerable fraction of a point from that of other foundries. Very probably this condition was deliberately maintained by some foundries for the purpose of holding the entire trade of their customers, the idea being that if the types coming from different foundries did not go together well the customer would naturally be led to buy all of his type in the same place. The improvement of these conditions was brought about by the introduction of the point system of bodies, Benton's unit width, and the perfection of the lining and unit set systems now in use.

Some important foundries held out against these improvements for years, but the demands of their customers, who perceived the great advantages of the standardized type, finally compelled adhesion to the new system. One important result of these changes was the invention of the punch-cutting or engraving

machine. The adoption of the improved system required the production of a vast number of new punches which had formerly been cut by hand. It was impossible to find enough skilled workmen to meet this demand and the engraving machine now used for making punches was accordingly devised by Benton.

The field for the artistic development of type is inexhaustible, but it is difficult to imagine how type, as a mechanical product, can be improved beyond its present condition. The completeness and perfection of the system, the excellence of the machinery, and the skill in processes which have been developed make the product apparently perfect.

CHAPTER III

Composing and Type-Casting Machines

WITH the great expansion of printing in the early part of the nineteenth century, and with the invention of greatly improved presses, there appeared a natural impatience with the slow process of hand composition. It seemed a strange comment on human inventiveness that while new machines had been found for doing so many kinds of man's work, while the simple screw press of Gutenberg had developed into the steam-driven platen and cylinder, and while so many improvements had been made in the manufacture of type, the setting of type was exactly where it was in 1450. More than 350 years had introduced practically no changes in the primary process of arranging type into words and sentences. What could be done to apply human ingenuity to this process?

This question was asked by inventors all over the world. Naturally the first line of approach to the answer was from the direction of a machine which should mechanically take up the types and place them in the stick, in other words, a mechanical composer or type-setting machine. Unsuccessful attempts in this line were made as early as 1820 or 1822. The experimenters were not deterred by failures and commercially successful type-setting machines were finally invented, among which may be named the Rogers, the Thorne, and the Simplex. The mechanical type-setter was successful for certain kinds of work and went a long way toward meeting the general need.

It would probably have been developed to the point of meeting it far more fully had it not been for

the epoch-making invention of the type caster. The first successful type composing and casting machine to be put on the market was invented by Ottmar Mergenthaler. Mr. Mergenthaler was born in Germany in 1854, and there learned the trade of an electrical instrument maker. In 1872, when he was eighteen years old, he came in sight of the period when the law would call him into military service. The war of 1870 with France was a very fresh memory. The political stability of Europe seemed then much less assured than it did at a later date. Young Mergenthaler had no desire to expose himself to the danger of being called upon to participate in another great war. Therefore, like many other young Europeans, he came to America to avoid military service.

Arrived in this country, he worked for some time at his trade. The turning point in his career came in 1876 when he was engaged as an expert mechanic to work on the development of a typewriter transfer machine in which a group of people were interested. His work on this machine, although long continued, was not successful, but his study and experimentation led him to conceive the idea of a type-casting machine which should be controlled from a keyboard similar to that of a typewriter, but larger on account of the greater number of characters necessary. The first model was produced in 1884. The machine was far from perfect, but was sufficiently developed to make it clear that he was on the track of a revolutionary invention. Two years later, in 1886, Mergenthaler produced his first successful machine. This was put into the composing room of the New York Tribune. Whitelaw Reid, the distinguished editor of the Tribune, afterward American ambassador to Great Britain, and other wealthy gentlemen became interested in Mergenthaler's work and formed a syndicate, making a contract with the inventor whereby he was hired to work for them with a share in the profits of the business. The machine was named by Mr. Reid

himself the linotype because it cast a "line o' type." The great success of the machine and the enormous growth of the business of manufacturing it are too familiar to need description, while the consequences of the invention in making possible an enormous increase in the output of printed matter can hardly be estimated.*

Mr. Mergenthaler severed his active connection with the syndicate in 1888, although he continued interested in it and made from time to time such minor improvements in the machine as suggested themselves to him. He died in 1899 at the early age of forty-five.

While Mergenthaler was at work Tolbert Lanston was experimenting along the lines of a different machine. His aim was not the production of a machine which should cast type, by lines, but of a machine which should cast type and spaces separately and at the same time arrange them in galleys ready for taking proof. Obviously, the line slug is of use only for the special purpose for which it was cast, while the separate types cast by the monotype can be distributed just as if they were foundry types and can also be used for hand composition. The type thus produced is not quite as perfect as foundry type, but is substantially as useful for many purposes.

Each machine has some advantages of its own and their use is dictated by the result which it is desired to produce. The Lanston machine appeared in 1892. These two machines are representative of the types of type-casting machines in the market. Other successful machines of the same general types have been invented and are in extensive use.

*See Text Book No. 23, "Type-Casting and Composing Machines."

CHAPTER IV

ELECTROTYPING

ELECTROTYPING is an American invention. As long ago as 1830 the laboratory discovery was made that when copper was deposited upon the side of a voltaic battery and then removed, it furnished a reproduction of the surface upon which it had been deposited. In the development of this discovery very interesting experiments in reproduction were performed by Thomas Spencer of Liverpool, J. C. Jordan of London, and Prof. Jacobi, a Russian. These experiments were purely scientific, with no commercial end in view. In 1839 Joseph A. Adams, a wood engraver connected with Harper & Brothers, the New York publishers, conceived the idea of applying this principle to the printing industry and made an electrotype from a wood cut which was used for a magazine illustration in 1841. He also made the illustrations for Harper's great family Bible, which was published in 1842-1844. Adams's method was to take an impression of his block in an alloy of soft metal, probably largely bismuth. The process, however, destroyed the block, and although experimentally successful it was not commercially practicable. The invention of Smee's battery and the use of wax for the moulds made the process commercially sound and practical.

In 1848 John W. Wilcox, of Boston, using these methods, began business as the first commercial electrotyper and was successful from the beginning. His first work contained all the essentials known for many years. Improvements soon followed. In 1855 John Gay, of New York, introduced the use of tin

foil for soldering the back of copper shells and the same year Adams invented a dry brush black-leading machine to take the place of the hand method which had hitherto been necessary. In 1856 Filmer, of Boston, invented the process of backing up the shells by holding the shell down with springs.

In 1868 Stephen D. Tucker invented the type of dry brush black-leading machine which is now in use and ten years later Edward A. Blake, of Chicago, invented the air blast black-leading machine.

As early as 1871 Silas P. Knight, of Harper & Brothers, invented the wet black-leading process. It was successful, but, as sometimes happens, attracted no particular attention. Its merits in comparison with other methods do not appear to have been appreciated and the discovery was forgotten for more than a quarter of a century. In 1908 Frank H. Learman, of Buffalo, invented a wet black-leading machine which was adopted by the industry and improved by later patents. The wet process is now considered the best. Perhaps the greatest single step forward in the development of the electrotype was the substitution of the dynamo for Smee's battery, a change accomplished by Leslie, of New York, in 1872.

R. Hoe & Company, of New York, were greatly interested in electrotyping machinery and were leaders in encouraging its development and in putting it on the market.

CHAPTER V

The Development of Printing Presses

THE development of printing machinery has already been described to a considerable extent in two of the preceding volumes of this series (No. 6, Platen Printing Presses, and No. 7, Cylinder Printing Machines). It may be worth while, however, to review briefly in this place the main points of progress in this direction. As we already know, American printers originally and for many years imported all their presses as well as their type. This condition, however, could not be permanent. As early as 1775 good presses were being made at Philadelphia and Hartford. These presses were of the Blaeu or "Dutch" type. They were wooden machines with stone beds and had undergone practically no change for a couple of centuries. The best known builder of these old presses in America was Adam Ramage, who came from Scotland to Philadelphia in 1790. Ramage was not only a good workman, but of an inventive turn of mind, and introduced several improvements, notably the substitution of an iron bed for the stone one. The iron press was invented by Lord Stanhope, in England, about the year 1800 and was the beginning of the improvements in printing machinery which were to go so far in the course of a century.

Mr. Henry L. Bullen is authority for the statement that no Stanhope press was ever brought to America. The reason lies probably in the fact that an American invented an iron press at about the same time. This was George Clymer, of Philadelphia, who after much experimenting produced the Columbian Press, an

iron machine which came into general use in England as well as in the United States about 1816. It was a complicated machine, but in spite of its complexity was very durable and beautiful as well as powerful. It was worked on the ordinary hand-lever principle, but the leverage system gave a fine chance for the pressman's skill. It had wonderful possibilities in the production of the most perfect work when in the hands of a skillful workman. It won and long kept well-deserved favor. It was introduced into England in 1807, and in 1817 Clymer himself followed it to England, where he spent the remainder of his life.

In spite of the capacity of the Columbian press for the production of artistically perfect work there was a great and increasing demand for presses of a different type. The demand was for a simpler press and also for one that would mechanically turn out larger quantities of work than were possible under the old leverage system. The first demand was met by the invention of Peter Smith, of New York, who built a press somewhat on the lines of the Columbian, which was very heavy, carried larger forms, and used shorter levers, and by Samuel Reid, who, in 1824, invented the simple but excellent Washington hand press, which is still in common use.

From this point on there are two lines of development which may be followed separately, one the development of the power printing press in which the bed and platen are brought together by a power-driven gear rather than by a hand-moved lever, the other the development of the cylinder press.

The first known attempt to apply power to a printing press was made by William Nicholson, of London, in 1790, in connection with his abortive attempt at the invention of a cylinder press, to which reference will be made later.

The first American attempt to use power was made by Nathan Hale, father of the famous Edward Everett Hale, who took possession of the Boston Advertiser in 1814.

Daniel Treadwell, of Boston, invented and built for Hale the first power press used in America. It was a very large platen with a wooden frame. The presses of Isaac Adams (1830) and Otis Tufts (1834) also had originally wooden frames, but later were built with iron frames. Very few Treadwell presses were ever used. At first they were driven by horse-power, later by steam. The early power presses were worked by horses, by men known as crankmen, and even in the case of small machines by dogs. These crude power appliances soon gave way to steam, and within a few years steam has been largely supplanted by the electric drive, with a tendency to a preponderance of individual motor-driven machines. The electric drive, by the way, is an American invention.

In 1830 Samuel Adams, of Boston, built a platen power press, which was long the only power press capable of fine work and exact register. Not long later S. P. Ruggles, of Boston, invented the Diamond, a small, rapid machine for the quick production of cards, envelopes, and other small work, and later, in 1839, the Ruggles rotary, a successful and popular power jobber. In 1856 George P. Gordon began the line of Gordon presses, still made in improved models by the Chandler & Price Company, of Cleveland, and very extensively used. The advantages of the Gordon were simplicity of design, a strong impression, high speed, and lightness of running.

In 1869 Merritt Gally invented the Universal press, using a different mechanical system and producing a perfectly parallel impression. Gally's invention was later improved by John Thomson, who produced a machine which has been extensively used and is well known as the John Thomson press. In 1875 Gally also invented a heavy press for embossing, cutting, and creasing heavy stock. In 1885 the Colt's Armory universal press, a very excellent machine especially adapted to heavy work, was placed on the market.

In 1885 Wellington P. Kidder invented a platen press of the Gordon type, with automatic feed and delivery.

In 1890 Albert Harris invented the Harris press, the first really successful high-speed automatic jobber. Two other familiar high-speed presses, the Auto Press and the Kelly, are small high-speed cylinders.

The first known attempt to make a cylinder press was that of William Nicholson, of London, who invented, in 1789, a machine that should apply the paper to the type by means of a cylinder. As we have seen, Nicholson went so far as to invent application of power to his machine, forseeing that power would be necessary for the use of any successful cylinder presses. Nicholson was not a printer, and his idea, although it had attracted attention, did not assume practical shape.

Ten years, or so, later Dr. Kinsley, a Connecticut man, developed Nicholson's idea and produced a cylinder press, which is described at considerable length by Isaiah Thomas in his History of Printing. Thomas seems to have been a good deal interested in the machine, although he appears to have regarded it as promising rather than successful. He says that it saved labor and did good work. He was sufficiently interested to print a picture of it although his book is not otherwise illustrated. In a general way it was not unlike a modern cylinder proof press. It printed on one side only and was not so arranged as to secure perfect register if an impression was desired on the other side.

Several other attempts were made at the invention of cylinder presses, which attracted considerable attention, but which were not commercially successful. The first real success was made by Fredrick König, a native of Saxony, who, in 1814, invented a cylinder press which was immediately put into use in the press room of the *London Times*. König's invention, like most first inventions in a new field, was susceptible of improvement, especially in the

direction of simplicity. These improvements, however, were soon made, and the cylinder press started on its career of wonderful development. The first cylinder press used in America was a Napier brought out from England in 1825, and set up in the office of the *National Intelligencer* in Washington.

The development of the cylinder press in America is largely connected with the name of Hoe. Robert Hoe, a Leicestershire farmer's son, was born in 1784, and in due time was apprenticed to a carpenter. In 1803 he came to New York, where he worked at his trade. After a time he became associated in business with his brother-in-law, Matthew Smith, Jr. Smith was a carpenter and a printer's joiner (that is to say, a maker of press frames and other wood work used by printers) and a brother of Peter Smith, the press inventor, who has already been mentioned. Through this association the firm got into the business of building presses, first of wood and later of iron.

Both the Smiths died in 1823 and Hoe inherited the business, which he carried on in the name of Robert Hoe & Company. Hoe was always enterprising and his attention was quickly drawn to the Napier press, which had been set up in Washington in 1825. As usual, this machine was not patented in this country and Hoe proceeded to imitate it, with such changes as occurred to him, and put on the market, in 1827 and 1828, the first flat bed and cylinder press made in the United States.

Robert Hoe retired on account of failing health in 1832, but he left the business in the capable hands of Richard M. Hoe and Matthew Smith, the son of Matthew, Jr., Robert Hoe's original partner. The concern went on building and improving presses and in 1842 they patented a new bed-driving motion of which the well-known Meihle press of today is a development.

In 1845 Hoe & Company brought out the Hoe type-revolving machine. This was the first press distinctively for large newspaper circulations, which

they afterward developed to so wonderful a degree, and which henceforth was their leading line of production. In this machine the type forms were imposed on turtles and fastened on a central cylinder, against which revolved as many impression cylinders, from two to ten, as were required. This machine put American printing machinery in the first rank. In 1858 the Hoe firm bought out the Isaac Adams patents and business.

About this time two other important inventions were made, both of which were later utilized by the Hoes. In 1853 Pratt built for the Brooklyn *Daily Advertiser* the first perfecting press, or press printing both sides of the paper without removing the sheet. In 1860 William Bullock began to experiment on a rotary self-feeding or web printing press, and finally succeeded in achieving success in 1865. The Bullock machine was self-feeding, but cut the sheets from a web before printing.

In 1847 Hoe & Company began work on a rotary printing press to print from the web without first cutting it into sheets. This involved all the essential parts which had been discovered and gathered them into one machine. The experiment was successful, resulting in the production of the wonderful multiple press, which may be seen today in the press room of any great newspaper.

The invention of the Hoe press, the development of the autoplate, a machine invented in 1900 by Henry A. Wise Wood, of New York, whereby the process of stereotyping is made in a practical way subsidiary to newspaper printing, and the invention of wood pulp paper have made possible the modern newspaper.

We have thus very hastily traced the process of development in types and presses in the United States. Much might be said, if space permitted and the purpose of this series required it, of the invention of other presses, appliances, and methods, and of the

improvements which are constantly being made in the tools and materials used in printing and the allied industries. These matters, however, are of only secondary historic interest. So much as the apprentice needs to know about them he will learn in the course of his work, as he comes in contact with them and learns their use. Perhaps the purpose of this book has been sufficiently accomplished in showing the milestones along the historical development of the two great tools of the printer, his type and his press.

The list which follows is a brief statement of the most important contributions of American inventors to the art of printing:

Web rotary presses.
Automatic stereotyping machines.
Printing machinery under electrical control.
Two-revolution cylinder presses.
Sheet feed rotary presses.
Multicolor presses.
Rotary direct and rotary offset presses for lithographic work.

This, of course, includes only the inventions which are fundamental and original. Improvements of some fundamental invention, made elsewhere or earlier, are not included, although in this connection it is worth while to mention one important thing which owes to America almost everything except its original invention. This is process printing,both in black and white and in colors. Process printing was not an American invention. It is safe to say that it would be only a scientific experiment if it had not been made practical by American inventions, such as coated paper, first made for half-tone work by the Cumberland Mills Company for Mr. De Vinne, ruling machines for half-tone work, which were first made by Max Levy, of Philadelphia, about 1880, and three-color process plates, which were first made by Frederick Ives, of Philadelphia, in 1881.

SUGGESTIONS TO STUDENTS AND INSTRUCTORS

The following questions, based on the contents of this pamphlet, are intended to serve (1) as a guide to the study of the text, (2) as an aid to the student in putting the information contained into definite statements without actually memorizing the text, (3) as a means of securing from the student a reproduction of the information in his own words.

A careful following of the questions by the reader will insure full acquaintance with every part of the text, avoiding the accidental omission of what might be of value. These primers are so condensed that nothing should be omitted.

In teaching from these books it is very important that these questions and such others as may occur to the teacher should be made the basis of frequent written work, and of final examinations.

The importance of written work cannot be overstated. It not only assures knowledge of material, but the power to express that knowledge correctly and in good form.

If this written work can be submitted to the teacher in printed form it will be doubly useful.

QUESTIONS

1. What general course of development do we find in the United States in relation to European influence?
2. How has this worked out in the case of type and presses?
3. Who cast the first type made in this country?
4. Who was Mitchelson, the type founder, and what did he do?
5. Tell the story of Adam Buell.
6. Tell about Benjamin Franklin's attempt at type founding.
7. Tell the story of the first successful type foundry in the United States.
8. Tell of the attempt of Mappa to start a type foundry in the United States.
9. What were the prospects for successful type founding in America about 1795?
10. Tell the story of the starting of the first permanently successful type foundry in America.
11. What were the first steps taken to enlarge its facilities?

12. What inventions did the senior partner work on?
13. Give a brief sketch of the firm from the retirement of the senior partner to the present time.
14. What other type founder was at work in 1805, and what was he doing?
15. Tell the story of the starting of the second successful type foundry in the United States.
16. Who were the Bruces, and how did they start in business?
17. What did the Bruces do in 1814 and 1815?
18. How did the Bruces become type founders?
19. What improvement did the Bruces attempt in 1822, and with what result?
20. What was W. M. Johnson's invention, and what became of it?
21. What development took place in the type founding business, and what was the result?
22. Who was Augustus Ladew, and what did he do?
23. Who was Louis Pelouze, and what did he do?
24. What can you tell about the Boston Type Foundry?
25. Tell about the work of J. W. Phinney.
26. Who was Henry Barth, and what did he do?
27. What do we owe to John Marder?
28. What do we owe to L. R. Benton?
29. What invention followed the work of Benton and Werner, and why?
30. What need became acute in composing room, and what was done to meet it?
31. What invention changed the course of development along this line?
32. Tell the story of Ottmar Mergenthaler.
33. What did Tolbert Lanston invent?
34. Tell the story of the discovery of the electrotyping process.
35. Who was the first to apply this process to printing, and what were the defects of his method?

36. Give a sketch of the development of the process of electrotyping, naming five principal inventions with dates.
37. What was the greatest single step in advance, and when, where, and by whom was it made?
38. Where did the first American presses come from?
39. How soon were presses made in America, and what were they like?
40. Who was the best known American press builder before 1800, and what improvement did he make?
41. Who invented the iron press, and when?
42. Who invented the Columbian hand press?
43. What demand soon arose, and how was it met?
44. Who invented the Washington hand press and when?
45. What was the first attempt to use power in press operation?
46. What was the first American attempt to use power in press operation?
47. What sort of power was originally used?
48. Tell about the inventions of Adams, Ruggles, and Gordon.
49. Tell about the invention of Merritt Gally.
50. What were the inventions of Kidder and Harris?
51. What types of high-speed small presses are made?
52. What was the first attempt to build a cylinder press?
53. What was the first American attempt to build a cylinder press?
54. Who invented the first successful cylinder press?
55. Tell the story of Hoe & Co. down to 1845.
56. What important invention did Hoe & Co. bring out in 1845?
57. What were the inventions of Pratt and Bullock?
58. What did Hoe & Co. produce in 1847?
59. What did Henry A. Wise Wood invent?
60. Give a list of the most important American inventions in printing machinery.
61. Why is the list not longer?

TYPOGRAPHIC TECHNICAL SERIES FOR APPRENTICES

THE following list of publications, comprising the TYPOGRAPHIC TECHNICAL SERIES FOR APPRENTICES, has been prepared under the supervision of the Committee on Education of the United Typothetae of America for use in trade classes, in course of printing instruction, and by individuals.

Each publication has been compiled by a competent author or group of authors, and carefully edited, the purpose being to provide the printers of the United States—employers, journeymen, and apprentices—with a comprehensive series of handy and inexpensive compendiums of reliable, up-to-date information upon the various branches and specialties of the printing craft, all arranged in orderly fashion for progressive study.

The publications of the series are of uniform size, 5 x 8 inches. Their general make-up, in typography, illustrations, etc., has been, as far as practicable, kept in harmony throughout. A brief synopsis of the particular contents and other chief features of each volume will be found under each title in the following list.

Each topic is treated in a concise manner, the aim being to embody in each publication as completely as possible all the rudimentary information and essential facts necessary to an understanding of the subject. Care has been taken to make all statements accurate and clear, with the purpose of bringing essential information within the understanding of beginners in the different fields of study. Wherever practicable, simple and well-defined drawings and illustrations have been used to assist in giving additional clearness to the text.

In order that the pamphlets may be of the greatest possible help for use in trade-school classes and for self-instruction, each title is accompanied by a list of Review Questions covering essential items of the subject matter. A short Glossary of technical terms belonging to the subject or department treated is also added to many of the books.

These are the Official Text-books of the United Typothetae of America.

Address all orders and inquiries to COMMITTEE ON EDUCATION, UNITED TYPOTHETAE OF AMERICA, CHICAGO, ILLINOIS, U. S. A.

PART I—*Types, Tools, Machines, and Materials*

1. **Type: a Primer of Information. . . .** By A. A. Stewart
   Relating to the mechanical features of printing types; their sizes, font schemes, etc., with a brief description of their manufacture. 44 pp.; illustrated; 74 review questions; glossary.

2. **Compositors' Tools and Materials . .** By A. A. Stewart
   A primer of information about composing sticks, galleys, leads, brass rules, cutting and mitering machines, etc. 47 pp.; illustrated; 50 review questions; glossary.

3. **Type Cases, Composing Room Furniture** By A. A. Stewart
   A primer of information about type cases, work stands, cabinets, case racks, galley racks, standing galleys, etc. 43 pp.; illustrated; 33 review questions; glossary.

4. **Imposing Tables and Lock-up Appliances** By A. A. Stewart
   Describing the tools and materials used in locking up forms for the press, including some modern utilities for special purposes. 59 pp.; illustrated; 70 review questions; glossary.

5. **Proof Presses . . . . . .** By A. A. Stewart
   A primer of information about the customary methods and machines for taking printers' proofs. 40 pp.; illustrated; 41 review questions; glossary.

6. **Platen Printing Presses . . . . .** By Daniel Baker
   A primer of information regarding the history and mechanical construction of platen printing presses, from the original hand press to the modern job press, to which is added a chapter on automatic presses of small size. 51 pp.; illustrated; 49 review questions; glossary.

7. **Cylinder Printing Presses . . .** By Herbert L. Baker
   Being a study of the mechanism and operation of the principal types of cylinder printing machines. 64 pp.; illustrated; 47 review questions; glossary.

8. **Mechanical Feeders and Folders** By William E. Spurrier
   The history and operation of modern feeding and folding machines; with hints on their care and adjustments. Illustrated; review questions; glossary.

9. **Power for Machinery in Printing Houses** By Carl F. Scott
   A treatise on the methods of applying power to printing presses and allied machinery with particular reference to electric drive. 53 pp.; illustrated; 69 review questions; glossary.

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