

THE RISE AND PROGRESS OF PRINTING.

by

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"Printing is the process of taking impressions -- generally on paper in ink -- of printing types or designs, drawings or photographic prints, which have been previously cut, etched, drawn or engraved on some solid surface." Printing on paper in ink may be divided into four kinds: namely, typeography, xylography, lithography and copper or steel plate.

Xylography, or wood-engraving, is the process of printing by means of designs engraved on blocks of wood in high relief. The engraving may be of letters and pictures, but in every case the engraving is fixed on the block.

Wood-engravings of various forms were used by the ancient Babylonians, Assyrians, and Egyptians to stamp bricks and pottery; and by the Romans even to print letters. But wood-engraving in the modern sense postdates the introduction of paper into Europe, which took place some time during the twelfth century. Of the invention of Xylography we know nothing. There is no record nor even a tradition concerning its invention. All authorities admit that it was in use during the first quarter of the fifteenth century, and that books printed by this method were in use before typography was introduced. The first products of Xylography were the so-called image prints and playing cards. Next came the block books with and without text.

The image prints were of various sizes from about three by three inches to the size of a sheet of foolscap, and generally represented sacred personages. Most of these prints were colored by stencil or painting, with glaring, unblending colors, which were often applied in such a manner as to destroy the true outline of the picture. But very little attempt was made to bring out the perspective of the picture by heavy and light lines. A great many image

prints of the fifteenth century are on record. One of the most famous of these is that of St. Christopher, a very bold and rude print which represents the saint in the act of carrying the infant Saviour across a river.

It is a clearly established fact that playing cards were printed by Xylography in Italy and Germany in the first part of the fifteenth century. These cards bore the same kind of pictures as found in the image prints. They were also colored by painting or stenciling.

Block books were of two kinds, without and with text. The former contained sacred pictures, with description on the same page. The latter have the description printed on the opposite page. But one side of the page is printed on. These books were clumsy, hard to make, and so far as imparting knowledge was concerned were worthless. They were printed before and after typography.

Steel-plate or copper-plate printing is the process of printing from engravings or etchings below the surface of a plate of copper or steel. It is the reverse of relief printing. It is supposed to have been invented somewhere about the year 1446. It is a very slow process of printing and also very expensive. This kind of printing used to be extensively used for bank notes, portraits, and fine book illustrations. It is used but very little at the present time.

Lithography is a mode of printing not by means of figures engraved in high relief, but by means of the action of chemicals upon a certain kind of stone. This process is based upon the principle of chemical affinity of fatty or resinous matter for substances of the same nature and their repellent forces toward water. The stone

used is a variety of calcium carbonate with a porous texture. The best lithographic stones are obtained from Bavaria. When the stone is ground by pumice or sand to the desired smoothness, the lithographer draws upon the stone with lithographic ink or crayon. This ink or crayon is itself greasy but since the stone is porous it admits it. Then water is put on the stone, which sinks in where the crayon or ink has not been. After this a roller of greasy ink is rolled over the surface. The crayon attracts the ink, but the moist surface repels it. Thus there is ink adhering only where it is wanted. Now it is ready for printing on paper. There are other methods but this illustrates the principle.

Some time after the invention copper was tried as a substitution for stone. It was not very successful, but later on aluminum was found to be a good substitute and really better than stone itself.

The image is placed upon the stone or aluminum plate in several different ways. The picture may be drawn on by hand, it may be transferred from paper, it may be transferred from one stone to another, or it may be done by means of typography.

Lithography was invented in 1798, in Munich, Germany, which city soon after became the center of the art. In 1807 there were no less than seven separate establishments at that place. From Munich the art spread rapidly throughout Europe. It was established in London in 1822 and in New York as early as 1828. Lithography is now a world-wide industry, and it has reached its highest development in Paris.

Who invented typography? That is a question that has long been debated upon. It is a question that has raised bad feelings and jealousies among nations. And it is a question that has been

darkened on many sides by forgery. The most conclusive evidence points towards John Gutenberg, of Mentz, as the father of this important and very essential art.

Our knowledge of Gutenberg is incomplete, but what we have is true as far as it goes. Scarcely anything is known of his earlier life. What we do know of him has been gleaned principally from the records of lawsuits in the courts of his own country. He often appeared in these courts as plaintiff or defendant. From these records we learn that Gutenberg practiced three distinct arts, viz: making mirrors, polishing gems, and typography. Soon he devoted all of his time to printing. Gutenberg worked secretly upon his art for a while. He was always short of money, and for this reason was led to form partnerships with different men. About his last partnership was formed with Fust. He borrowed much money from Fust, and when it came time to pay it back, Gutenberg was unable to make it good. Fust went to law and won. The result was that Fust seized all of the printing possessions of Gutenberg. However, Gutenberg borrowed money elsewhere and started over again. He died in February, 1468. Among his earlier books are a Donatus, the Bible of forty-two lines, and the Bible of thirty-six lines. He printed many books and was greatly skilled as a printer. De Vinne says: "There is no other instance in modern history, excepting possibly that of Shakespeare, of a man who did so much and said so little about it." And further, he says that Gutenberg was the inventor of the greatest of modern arts.

Typography was invented between 1438 and 1450. At first it was kept a secret, but after the sack of Mentz the secret leaked out and printing began to spread. In 1469 it found its way to Nuremberg. It reached Augsburg in 1469, entered Italy in 1465, and was

established at Rome in 1469. The wave reached Paris in 1471 and the Netherlands in 1473. It was introduced into England in 1476. The first press in America was set up in Mexico in 1540, and the first one in the United States was erected at Cambridge, Mass., in 1638.

The earliest engraving of a printing press shows a stout framework of wooden posts braced against the ceiling to resist upward pressure. The power for making the impression was furnished by a large screw, worked in either direction by a long bar of wood and iron. Attached to the lower end of the screw and raised and lowered by the same was what is known as the platen, which was forced down by the screw and made an impression. The bed upon which the type rested was composed of stone, and by a certain contrivance could be slid out for inking of the type, which was done by hand, and slid back under the platen. The paper to be printed on was placed on the under surface of the platen, and when the platen was forced down by the screw against the type an impression was made upon the paper.

Such was the early printing press, a simple and crude machine, but yet by careful operation quite good work could be done upon it. Out of a simple machine like this, with many improvements and inventions, has developed the wonderful printing press of to-day.

To illustrate the great progress which has been made in the development of the press, a comparison might be drawn between the Franklin press -- one of the earlier type -- and Hoe & Co's double sextuple press of to-day. The Franklin press was constructed a great deal like the one previously described. The power was furnished by a large screw, worked by a rod. The type was likewise inked by hand. With this press an active man could work fifty sheets in an hour, and by ten hours steady industry he could get off five hundred copies for

carriers in the morning. Since Franklin's time improvements and inventions in the printing art have taken rapid strides. Our best newspaper press is Hoe & Co's double sextuple press. This machine is a marvel of mechanical art. It is 35 feet long, 17 feet high, 9 feet wide, weighs 225,000 pounds, and has approximately 50,000 parts. It is a cylinder press; it takes 125 horse power to start it; it requires a number of men to operate it, and they have to communicate with one another by means of bells. The machine turns out 150,000 8-page papers an hour, all counted and folded by machinery attachments. Indeed, the papers are counted and folded so fast that it is almost impossible for the men to remove them fast enough to keep them out of the way of the machine. The type is inked by machinery and the press is run by electricity.

I have copied a few statistics upon the number of publications in the United States in 1840 and also in 1905, which perhaps will be interesting to note.

Number of Publications.

Newspapers and Periodicals	1905	1840
Daily	2,452	138
Weekly	15,046	1,141
Semi-weekly	645	125
Periodicals	2,853	227
Total	20,996	1,631

This shows a wonderful increase.

The greatest development in the art of typography has taken place during the 19th century.

Type used to be cast by hand, one by one. In the year 1822 a type-casting machine was introduced by David Bruce. Now type are all

cast by machinery except exceedingly large ones. Besides being produced more rapidly than those made by hand, they are also more accurate.

Another boon to typographic printing was the invention of the linotype machine. This is a machine which casts type in lines, and it is vastly more rapid than setting type by hand. The average product of a good operator is 4000 ems per hour, the width of the type being based upon the width of the character "m". Many operators can cast 5000 to 6000 ems per hour, and a speed of 13000 per hour is on record. The machine is propelled by electricity.

The development of book and newspaper printing has been aided to an extraordinary degree by stereotyping and by electrotyping. Stereotyping was made practicable by Earl Stanhope in 1804. Stereotyping is a process by which composed type of a page are founded together in one piece. The objects of this is to preserve the composition so that it cannot be distributed, to cheapen cost, and to save the wear of type. Stereotyping is preferred for its speed by daily newspapers and electrotyping by book printers for its applicability to fine engraving in relief. In the first method a metal plate is cast from the form of composed type. In the second method the impression of the type is taken in wax and then the wax is covered with a layer of crystallized copper in an electric bath of copper sulphate.

Thus far but little has been said concerning illustrations. As has already been mentioned, the first printed pictures were the image prints. The early block-books were principally devoted to pictures. These pictures were made from wood cuts. Most of the books of the fifteenth century were illustrated by this means, and the art

was extensively practiced. The art flourished in Europe till the close of the 16th century and during the 17th it passed almost entirely out of use. The reason for this was that metal engraving had taken its place for the illustration of books. Later on wood cuts were revived, and after 1830 they had reached a high grade of development.

The origin of the art of metal engraving is a much disputed question. Copper or steel plates were used. This kind of engraving is called line engraving. It is the opposite of wood engraving. The first book illustrated by line engraving was published at Florence in 1477. Copper-plate engraving was practiced in Germany in the middle of the 16th century and this was superior to the Italian. The art reached high development in Germany in the time of Durer, who died in 1528. France contributed little to the early history of the art. Holland and Belgium took quite an active part in it; but it did not flourish much in England till a late date. Spain did not produce much copper-plate engraving till the middle of the 18th century.

During the 19th century line engraving has received a check. The check has come from a desire for cheaper and more rapid methods, a desire satisfied in various ways, but especially by etching and by different kinds of photography.

The early engravings were cut into the wood or metal by hand. In etching the engravings are eaten in by acids after the outline was drawn. Now instead of drawing the outline on the surface, it is put on by a certain process of photography.

The latest and best method for illustrating magazines and periodicals is by the half-tone process. The Scientific American of 1907 says: "The very general adoption of the half-tone process for the illustration of high-class periodicals and books practically

sounded the death-knell to wood engraving, which is fast becoming a lost art, having comparatively few exponents of note at the present writing, so that in a few years wood-engraving will be practiced perhaps only in art schools."