

AN EARLY PAPER FACTORY

THE AGE OF PAPER

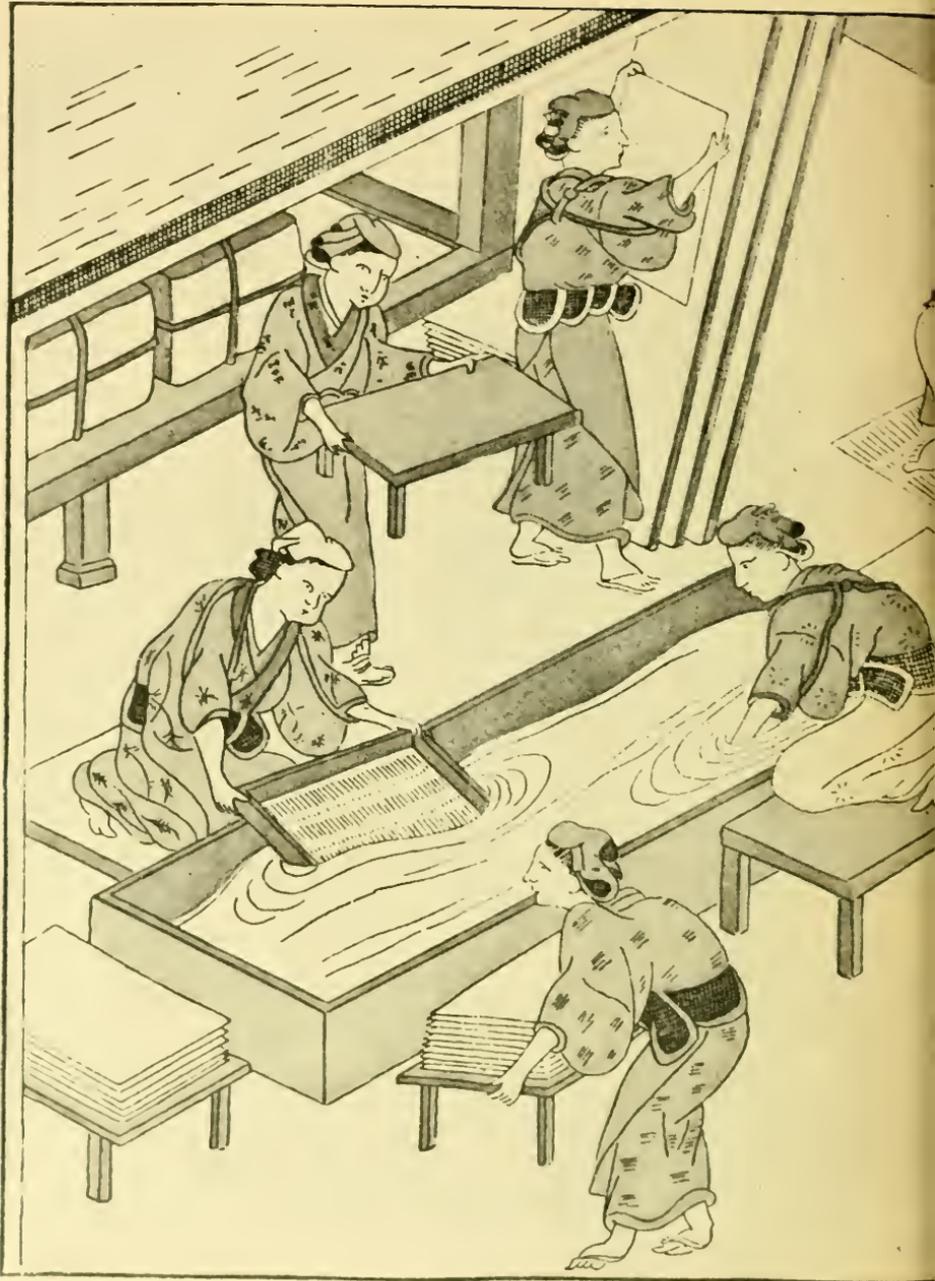
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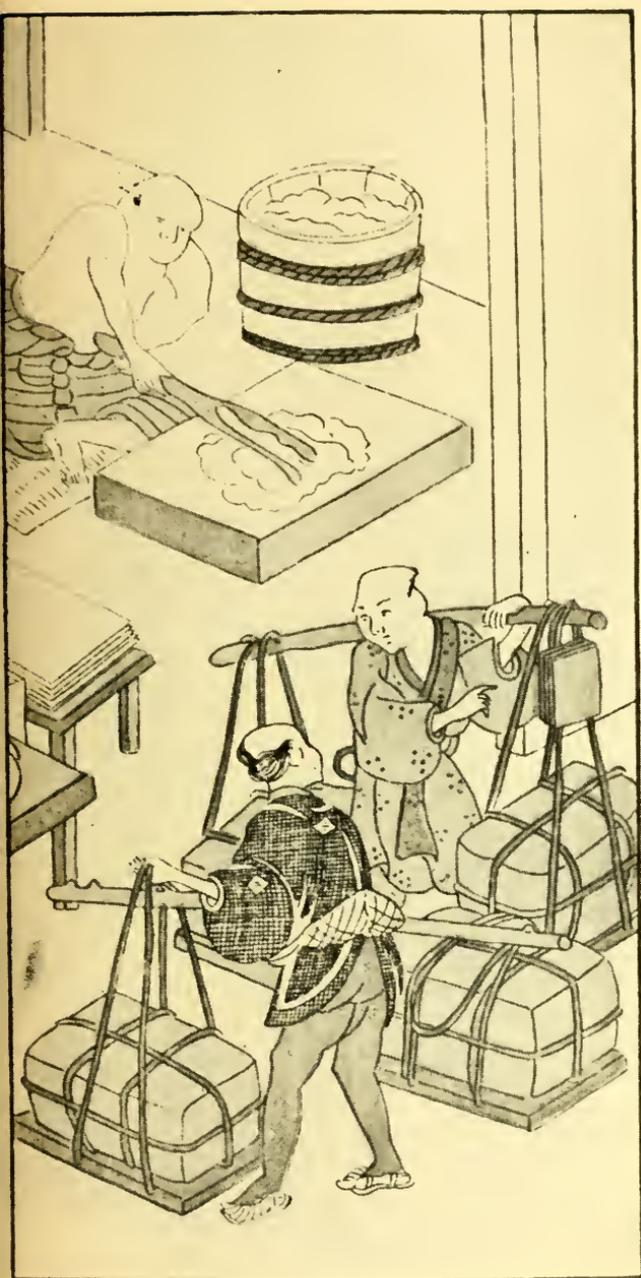
THE Age of Steel! So we call the present time. The reason for this name and its justification are too obvious to need comment, and the name itself is so well established that we accept it as a matter of course. When one thinks of the part that steel plays in human life, from the most colossal work of engineering to so small a thing as a needle, one is not inclined to question the aptness of this name.

Although it is not here intended to question the importance of steel or to deny its name to our age, let us consider the possibility that the name, the "Age of Paper," would not be entirely unjustified. Consider how much and in how many forms and for how many purposes we come in contact with paper every day and every hour of our lives. It is said that the wasp was the first paper-maker, but let us dwell a few minutes on the making and introduction of paper among men.

Paper was first made in China, and its invention was announced to the Emperor in A.D. 105 by one of his officers, Ts'ai Lun. A near-paper made of silk fibers seems to have been known and used about fifty years before. Its purpose was to replace both bamboo and silk as writing material, the former being too heavy for convenience, and the latter too expensive for general use. The invention was perfected long before the first piece of paper was brought to Europe. Many kinds of paper were in common use in China, writing papers, hemp paper, wrapping paper, tissue paper, and pure rag paper.

The process of making paper from its beginning to the present time has remained fundamentally the same, although both the process and the product have been greatly improved, until now many kinds of high quality paper are made with very little hand labor. In early times silk, mulberry bark, and rags were used. The resinous material contained in them had to be separated out by fermenting and washing in boiling water, before the fiber was beaten to a pulp. Water was then added to form an emulsion, which had to be continuously agitated. This material was poured upon cloths stretched horizontally on a frame with a rim. Later these frames were made in such a way that they could be dipped into the emulsion; and the





A Japanese Paper century. One can see the process—the maceration of the pulp, the dipping of the moulds into the vat, and the drying of the sheets. Paper, in Japan, is used for every conceivable purpose.

rim or deckle was made removable. While the water drained out through the cloth, the operator agitated it in such a way as to properly orient the fibers. Next the material was placed between felt and pressed until dry enough to hold together by itself. The sheets thus formed were pressed again without the felt, after which they were hung up to dry. Finally, to prevent ink from soaking into the paper, they were dipped into sizing and rubbed, or later rolled, until smooth.

When one compares the advanced state of civilization of China with the backwardness of Europe at the time of the introduction of paper and considers the advances made in the Occident when its use became general, the assumption seems plausible that the two things are related. Without a writing material which is neither "too heavy nor too expensive" (as an old Chinese document describes the remarkable product), could literacy have become general?

When Marco Polo returned to his home where noblemen could barely sign their names and scorned writing as an effeminate occupation of the clergy, the greatest marvel that he could tell of the wonderful land of Cathay was that every man could read and write.

In China seals impressed in clay had come into general use about 200 B.C., but long before, it had been customary to carve the standard texts of the classics in stone. In the second century of our era, with the use of this new material, paper, inked rubbings taken from such inscriptions were an early precursor of the printed page.

In the fifth century the first step toward true printing was taken; inked seals were stamped on paper. In the following hundred years a number of methods were tried, such as stencils and stamps. The use of paper gradually led to the invention of printing. The need for quantities of Buddhist sacred texts gave the incentive for the development of printing and so it came about that the work of perfecting it was for the most part done in Buddhist monasteries. The first important printed books in Europe, too, seven hundred years later, were the *Bibla Pauperum* and the Bible.

In the ninth century in China actual books were printed; in the eleventh, the art attained a quality which has never been surpassed. Movable type was invented and used to some extent, but it was not perfected, perhaps because the Chinese orthography did not lend itself conveniently to its use.

It is fairly certain that movable type was reinvented in Europe about 1540. The idea of block printing may have been carried to Europe by some unknown traveler, but there is no positive evidence either for or against this possibility. It is known positively, however, that the secret of making paper came from China over Central Asia, through North Africa to Spain, and then to France, Italy, and Germany.

The great religions served as bonds of union between nations of various groups. Christianity formed one family of states with a common religion and a universal literary language; Islam formed another; and further east there were the Buddhist, Hindu and the Chinese group. While religions brought the nations of each family closer together, they also placed almost insurmountable barriers between the different groups, separating the world into great cultural domains.

On its way to Europe, paper had to pass from the Chinese, into the Islamic, and on into the Christian world. It was a long and difficult journey, over Asia and North Africa, across inter-religious, interracial, and international boundaries. A thousand years after its first invention, paper was made in Christendom in 1189 at Hérault in France. The first paper made in Europe was in Moslem Spain at Nativa in 1150.

For a long time, the greater part of the paper used in Europe was imported, the progress of its use being slower than it had been in the Far and Near East. There were two reasons for this, first the prevalence of illiteracy and second, the fact that parchment or vellum, which paper displaced in Europe, had never been as difficult to use as the papyrus of the Moslems or the bamboo stationery of the Chinese. The first large paper-mill in Italy was established at Montefano in 1198 and, by the following century, Italy supplied more paper to Christian Europe than did Spain and Damascus, which up to then were the chief sources of supply.

Like craftsmen in other fields, the Italian paper-makers were proud of their work, and devised a method of putting the emblem of the master craftsman on their product by means of the watermark. A wire, bent in the form of the mark desired, was laid on or attached to the screen in the mould which left its imprint in the paper as it was made and put the craftsman's signature on his work without disfiguring it. Indeed, so modest was the mark that it could only be seen clearly by holding the paper to the light, and

yet it was permanent and unmistakable—an ideal form for a craftsman's mark.

The first known watermarks are found in paper made in 1282 or, some think, in 1272. They are simple in form, crosses, loops, and knots. A few years later a paper-maker used fleur-de-lis, and soon others used their initials. For about twenty years after 1307 the use of the maker's full name is often found, but this custom seems to have been confined to the environs of Fabriano. Characteristic emblems or pictures were more widely understood and more easily remembered, since few people were able to read in those days. There were a great number of marks depicting anything from pairs of shears, bunches of grapes, to winged lions, conventionalized and adapted for use as watermarks. Some marks indicate the maker, some his city, some the mill; some indicate the size or quality of the paper, and some the year in which it was made, like hall-marks still in use on silver.

There is some doubt as to the date of the introduction of paper-making into Germany. A mill was opened in Nuremberg in 1391, and it is possible that there had been one in Cologne in 1320. Some maintain that the art was introduced from Spain as early as 1260. The industry seems to have remained rather small until the middle of the fifteenth century, when the invention of printing stimulated the demand. Illiteracy, then so general throughout Europe was the greatest obstacle to be overcome.

It was in 1494 that paper was first made in England, over two hundred years after it was made in France and Italy. Two centuries later the first paper-mill was opened in Philadelphia.

The fourteenth century saw both, the revival of learning and the general use of paper in Italy. It may have been merely a coincidence, scholarship might have been reawakened without paper, but this new cheap and convenient writing material must have been a great boon to the writers and scholars of that age.

Without paper there would have been little incentive toward the development of printing. Even if printing had been invented, it would have remained a restricted, esoteric art, serving the few, leaving the great mass of mankind outside its sphere of influence. Both paper and printing were necessary to lift Europe out of its ignorance and make possible the great intellectual movements which have made modern times.