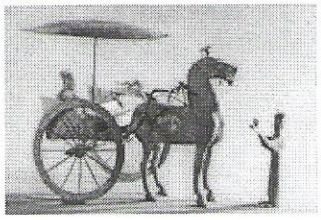
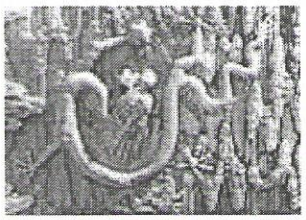
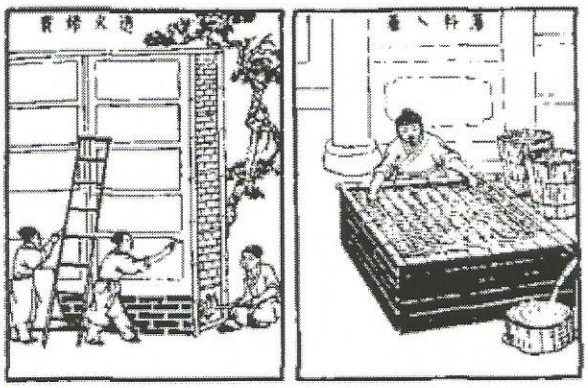


# Chinese Inventions



Dr. Keith Ray surveys the four great Chinese inventions that have changed the World. It is an article reprinted from SACU's China Eye magazine (2004).

Over thousands of years China has produced a great stream of inventions, ranging from the mundane chopstick and wheelbarrow, to sophisticated earthquake detectors and the advanced concept of bank notes. But in China there are four inventions traditionally referred to as the **Four Great Inventions**. These are paper, gunpowder, the compass and printing.



Making paper

## Paper

Interestingly the word 'paper' is derived from 'papyrus'. Around 2,200 BC the Egyptians in the lower Nile region discovered that a type of reed, papyrus, could be formed into a writing surface by overlapping thin strips which had been soaked for a long time in water, and then pounding and pressing it into a sheet. But it wasn't really paper as we know it, and it was difficult to write on, and expensive. But it was an improvement over the materials previously used for writing on, like bone, wood and stone. The invention of paper as we know it came in China around 105 AD. In fact the earliest paper is very similar to modern paper in concept and technology.

The inventor of paper is traditionally assumed to be Chai Lun (or Ts'ai Lun), who was the head of a royal workshop in 2nd century China. However recent archaeological evidence suggests paper was in use in China two hundred years earlier. In any event China was way ahead of the rest of the world. Chai Lum based his paper on a variety of fibrous materials, including rope pieces, old fishing nets, rags, bamboo fibres and tree bark. Modern paper is still made from rags and wood pulp. He made his paper by boiling up all the raw materials with wood ash or lime for up to 35 days. Another vital ingredient was birch leaves, from which the mucilage was drained out for strengthening the paper, and giving it evenness and smoothness. All the fibrous material, once softened, was beaten into a pulp which was said to be rather like porridge, and the birch leaf extract was added. This 'porridge' was then filtered through a flat mesh strainer made of cloth, leaving the fibres lying flat on the screen. This was then dried. Paper is still made this way. The great thing about Chai Lun's invention was that his paper could be mass-produced. It was also ideal to write on, inexpensive, light and so easy to store and to carry. So the world's first sheet of paper came into being.

Paper gradually spread from China, reaching Korea in the 3rd century AD. It was brought to Japan around 610 AD, and then moved to Vietnam and India at the beginning of the 6th century. It took a thousand years after its invention for proper paper to reach Europe. But it did not reach Britain until around 1490, when the first known paper mill in England was built in 1490. Paper reached the Americas in the 16th century, by which time it had become a truly global product. During the Tang Dynasty (618-907) and Song Dynasty (960-1279) many varieties of paper were developed, including bamboo paper, hemp paper, hide paper and xuan paper. Xuan paper is used in Chinese painting and calligraphy because of its smoothness and durability, and its whiteness. The only significant difference between the paper you print on from your computer and the Chinese paper is the 'filler' we now use to make the paper really smooth. But ironically that filler is called ... China clay!

## Printing