

*Meiji-zen Nippon Kikaigijutsushi*  
(History of Mechanical Technology in Japan before Meiji-  
Restoration) By Tomio Hora and Toshiyoshi Kikuchi:  
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This book is one of the volumes in the series of *Meiji-zen Nippon Kagakushi* (History of Sciences in Japan before Meiji-Restoration). Dr. Suketoshi Yajima has reviewed 26 volumes of this series, in the *Japanese Studies in the History of Science*, No. 7, 1968. Thereafter, *Meiji-zen Nippon Jinruigaku Senshigakushi* (History of Anthropology and Prehistory in Japan before Meiji-Restoration) was published in 1971. And now, this volume of mechanical technology has appeared.

Before Meiji-Restoration, there were not many worthwhile machines except water raising machines and wearing machines. Japan has traditionally been an agricultural country located in the monsoon area suitable for planting timbers.

In Japan, there have been few structures of bricks and stones like waterways, roads and buildings in Europe or castle walls like the Great Walls of China. Most of the structures in Japan have been wooden ones built by carpenters or by peasants. Thus, Japan might be called a country of wooden culture.

So-called machines were only used in the field of agriculture, but their power was lower than that of the Europeans'. For instance, the water raising machines in Japan developed for water raising and rice cleaning, while in Europe, water-mills developed for milling flour and they finally became gigantic machines which were well equipped with transmission systems. Moreover, during the age of the mine industry from medieval to pre-modern era, water mills in Europe made a remarkable development as one of sources of power, while those in China, to whom the Japanese people were much owing culturally, were far behind.

The Japanese people in those days used spinning wheels, pulleys, *etc.* They were mainly for manual labour, but, since they repeated simple movement as rotary motion and since they were useful for agricultural production, these simple tools may be called "machines" in a broad sense, according to the author. This book consists of eight chapters.

In chapter 1 "power devices", the author says that the only one that developed in Japan was the water wheel which was widely used for cleaning rice,

milling flour, oil manufacturing, pressing juice from sugar canes, *etc.* There were few valuable machines derived by animal powers such as an ox or a horse, or those driven by wind power. The reasons were that, geographically, there were many sloops and hills where people could easily get abundant water. As to wind power, in most places, the wind was either too soft or too strong, or even if the wind power was ideal, the direction of the wind varied irregularly. Because of these natural conditions, there had been few worthwhile machines. Heat engines and engineering were not yet introduced.

In chapter 2 "Spinning and wearing machines", the author recognizes that these machines were the most important ones in the technical history of machines, but, since they are described fully in another volume *History of Sericulture*, they are not much dealt with here. The author summarizes the mechanism of braiding warp and woof that were the central of the silk-reeling equipments and the cotton spinning machines.

In chapter 3 "Agricultural machines, sugar refining machines, and compressors", the author describes the rapid development of these machines in Edo era.

In chapter 4 "Water raising machines", the technical improvement and the variation of water raising machines, and the sprayed fire equipments are the main themes.

In chapter 5 "Air-blowers", mechanical development of foot-bellows used in mines and at metallurgical works, are investigated thoroughly.

Chapter 6 treats "Pulleys or the devices by rotary motions". From ancient time people used pulleys in order to transport or to raise heavy stones and building materials. The author explains that there have been few technical improvements until the end of Edo era. Pulleys were used in whaling and they were found in the fisher-boats.

Chapter 7 is on "Machine tools". Pulleys, potter's wheels for the production of earthenwares, windlass or a lathe for cutting and grinding wood, animals' bones, metals, *etc.*, were used in Japan. The perforating tools derived from the ancient ignition devices developed in connection with the import of guns. In consequence, the methods of using bow-drills and cord drills were worked out.

In the last chapter, the history from the end of Edo era to the middle of Meiji period is summarized. The introduction of the mechanical industry, that is, the import of the weapons and technics of shipbuilding of Holland began at the end of Edo era. It may be said that this was the dawn of modern technology in Japan. The Japanese traditional weapons and technics of shipbuilding are not dealt with here, since the former has already been separately treated and the latter is under preparation for publication in this same series.

In Appendix, histories of electricity, telegraph, telescope, other observation and surveying measurement, and of watch, are described briefly.

In this book, the author not only describes the history, but also extracts and transcribes important documents, records, *etc.*, or books written before Meiji era, and thus the book is, at the same time, a collection of historical materials. This book also contains about 300 illustrations which help readers understand the theme easily.

The author tries to describe how the Japanese people imported various technics from China and from other Asian countries, and how they digested them completely as if they had been the results of their own invention. Dr. Tomio Hora, Professor of Waseda University mainly collected the material and Toshiyoshi Kikuchi, lecturer of Waseda University, wrote the articles.

The basic problems of technics of machines in Japan before the modern time may be very well grasped by reading this book. The book, at the same time, may point out a starting point for further investigation.

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