

機巧図彙 首卷

Karakuri Zui Extended Preface

About the Translation of *Karakuri Zui*

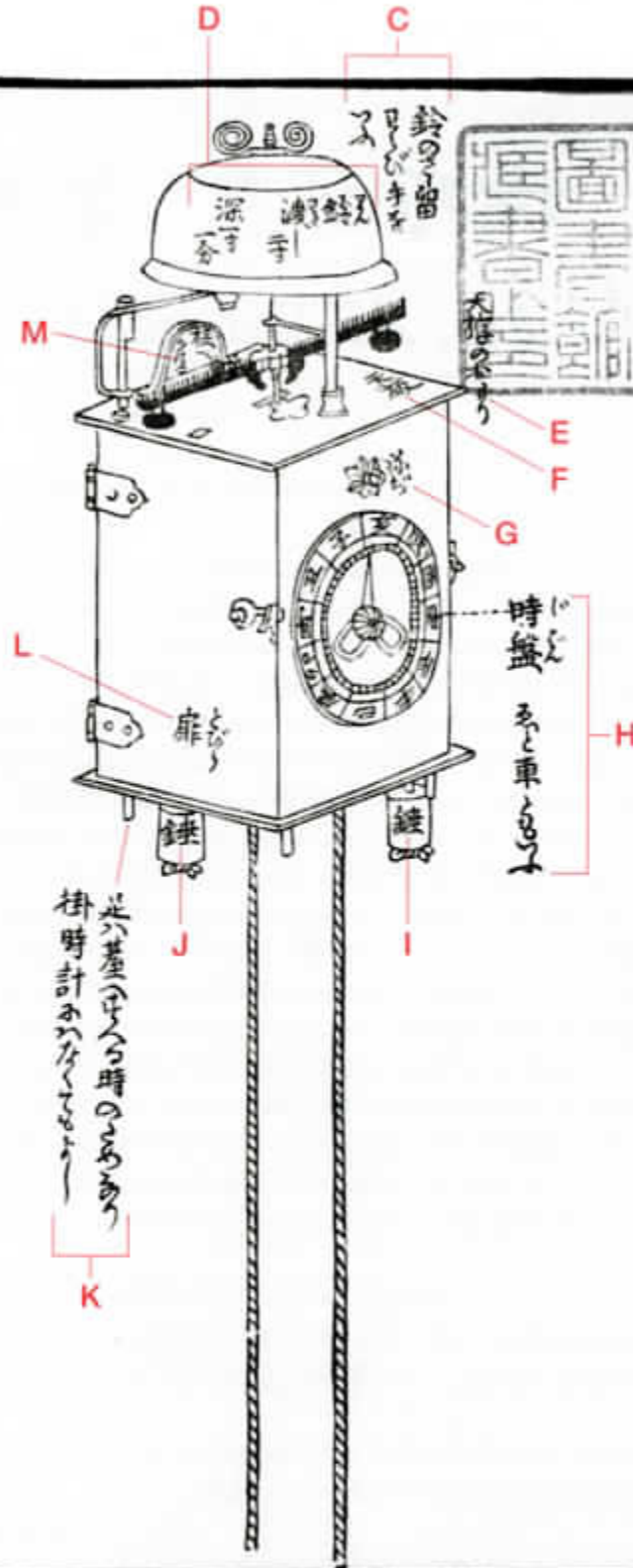
The original text of *Karakuri Zui* contains a number of inconsistencies. For example, the year of publication is given on the final page of the book as "Kansei *hinoe-tatsu*" (1796). However, the season and date of the completion of the introduction given in that part is "spring, Kansei *hinoto-mi*" (1797), that is, the spring of the following year. The reason for this peculiarity in the book's composition process is unclear. As we know that Hosokawa passed away in 1796, it is possible that he had originally planned to publish the book in the spring of 1797, and had made sure to ask Morishima Chūryo to write an introduction using that season and date. Perhaps an unexpected situation had arisen that had distracted him from his work and he had been unable to finish the book before he died. Other examples of a lack of cohesion in the work support this supposition: the incoherence, for instance, between the contents list and the content meant to correspond to it. For example, a clock part referred to in the list has no related section in the book. Also, some parts of the text appear unpolished and are difficult for the reader to comprehend. Despite such problems, I have avoided resorting to a free translation because the incoherency itself reveals the original character of the text that should, I think, be conveyed to and appreciated by the reader. A glossary of the main technical terms used in *Karakuri Zui* is provided at the back of the book.

Japanese script is traditionally written and read from top to bottom and right to left. The reader should note that the original pages of *Karakuri Zui* are presented here accordingly, and are to be followed from right to left.

- The original text of *Karakuri Zui* used in this book is copied from the collection of the Osaka Prefectural Nakanoshima Library.

柱時計 掛時計也云

柱時計は、掛時計の一種を以てし、より若くは天然の石を以てし、その鐘を打つるに四つ時、八つ時、九つ時、十つ時、十一つ時、十二つ時、あり、前よりあり、らんては時刻を知らず

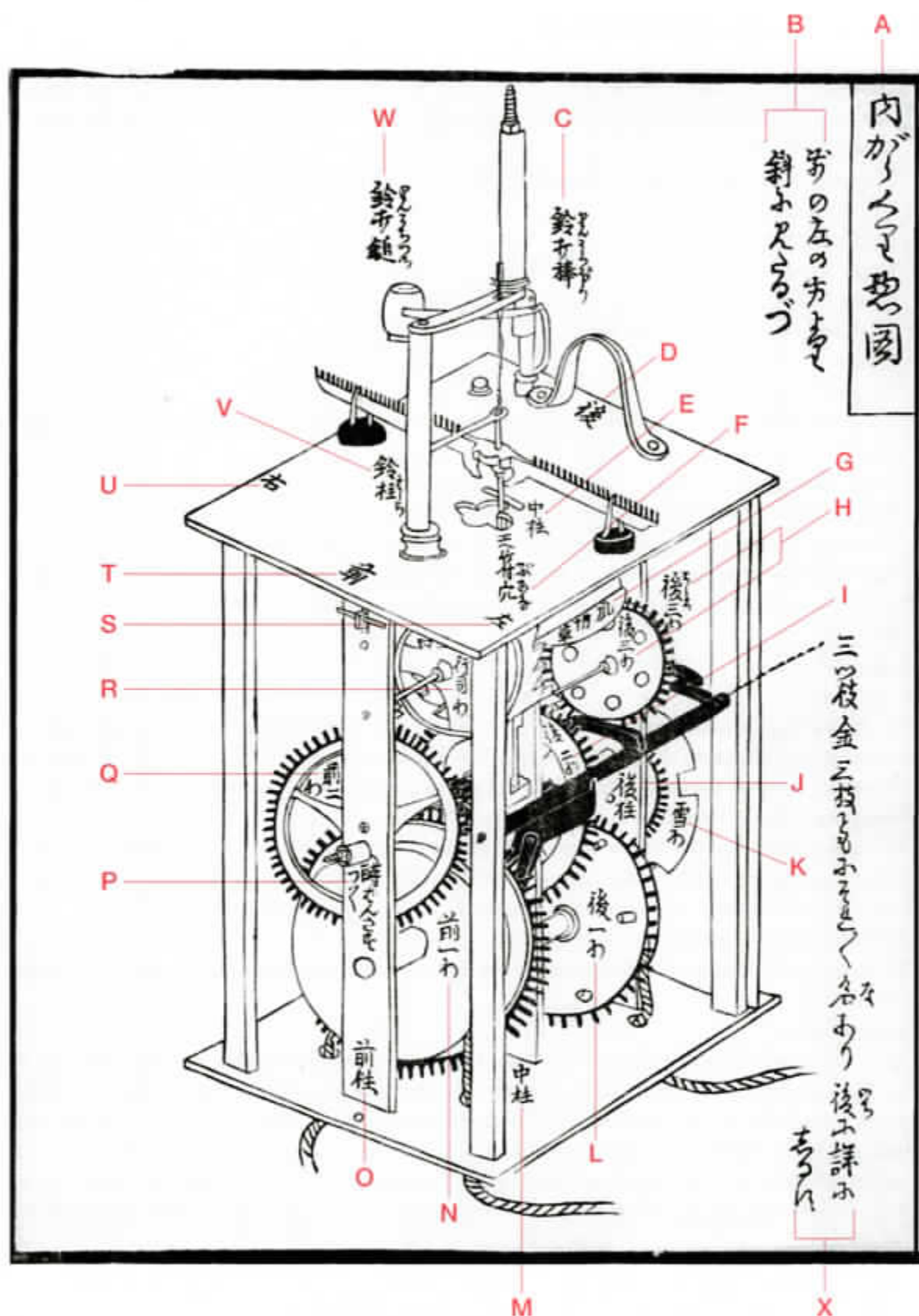


天柱の鐘面にて日と昼夜の長短を以てし、日長き時ハ外へおし、日短き時ハ内へおし、てくらりあり外へおし、てくらりあり、天柱を以てし、内へおし、てくらりあり

- A) Pillar clock¹ Also called “hanging clock”
- B) It is hung on the wall and when the front and the back weights are pulled, the bell will be automatically struck on time. Indeed, it strikes four times on *yottsū* (fourth),² nine times on *kokonotsū* (ninth) and once on the half-way point between them. The hour is indicated by the sword³ on the front.⁴
- C) The *sashi-tome* (‘pierce-fix’)⁵ of the bell is called a *warabi-te* (‘bracken-hand’).
- D) Bell diameter 2 *sun*⁶ Depth 1 *sun* 1 *bu*
- E) Weight of the balance
- F) Upper panel
- G) Screw
- H) Clock face, also called “zodiac wheel”
- I) Weight
- J) Weight
- K) These are used for fixing [the clock] onto the stand; they are not needed if the clock is to be hung.⁷
- L) Door
- M) Hang on the pillar.
- N) The length of the daytime and the nighttime can be regulated by the weights on the balance. When the daytime is long, the weight is hung far from the center and when the daytime is short, the weight is hung near to the center. When the weight is put on the outside, the balance will oscillate slowly and when the weight is put on the inside, it will oscillate quickly.

1. This type of Japanese clock is not called the pillar clock in Western horology; this name is given to another type of Japanese clock (see page 86). The Japanese hanging clock and the pillar clock were designed to hang on the supporting column of a Japanese house as the walls of the Japanese style houses were usually too soft to support a clock.
2. This does not indicate the fourth interval of time in the present system, but the fourth unit in the system used during the Japanese Edo period. The “ninth” in this sentence therefore refers to a time unit of the same system. See the note 2 of page 53.
3. Hand that points to numbers on the clock face.
4. The square pattern affixed to the text is the old seal of the Nakanoshima Library where the original book is kept.
5. A type of screw.
6. “*Sun*” was a unit of measurement for length. Old units of length included *jō*, *shaku*, *sun*, *bu* and *rin*. These were units of a decimal system. *Bu* was also used as a weight unit for mercury (see the note of page 139). In the Edo period different measurement systems were used in combination. Also, the units used differed slightly according to period and to profession. For instance, the system used in carpentry was different from that used in dressmaking. The most commonly used Japanese measurements for length, which were used by carpenters, are shown in the following conversion table:

1 <i>jō</i> = 3.03 m = 3.313 yd	1 <i>shaku</i> = 0.303 m = 0.994 ft	1 <i>sun</i> = 3.030 cm = 1.193 inch
1 <i>bu</i> = 3.03 mm = 119.30 mil	1 <i>rin</i> = 0.303 mm = 11.93 mil	
7. This diagram should have originally included a line to indicate the part. As it is missing, the translator has added it, in red.



内がくろくも惣圖

第の左の方より斜みえらるづつ

三枝金三枝ともふそとく名あり後子詳み

ちるん

- A) Whole diagram: interior karakuri
- B) Diagram: as viewed diagonally from front-left
- C) Pillar for bell-striking
- D) Back
- E) Central board
- F) Hole for balance
- G) Wind-cut wheel (rotating fan)
- H) Back third wheel
- I) Back second wheel
- J) Back board
- K) *Yuki-wa* ('snow-wheel')¹
- L) Back first wheel
- M) Central board
- N) Front first wheel
- O) Front board
- P) *Tsuku*² for inserting the clock face
- Q) Front second wheel
- R) *Gyōji-wa*³
- S) Left
- T) Front
- U) Right
- V) Bell board
- W) Bell-striking hammer
- X) *Mitsu-eda-gane* (three branched metal bar)

The three branches each have their own name. This will be explained in further detail later.

1. This wheel controls to strike the bell and the shape of the wheel resembles the crystal structure of snow, which may explain the origin of its name, "snow-wheel".
2. "*Tsuku*" seems to have meant "set" or "push" and refers to the protrusion.
3. *Gyōji-wa* is the equivalent of the crown wheel of the western timepiece. "*Gyōji*" means "sumō referee" and "*wa*" means "wheel". A *gyōji* is traditionally equipped with a fan which he waves to control and judge the fighting. Perhaps the Edo period Japanese associated the motion of two fans on the verge of the escapement with the motion of the *gyōji*'s fan.

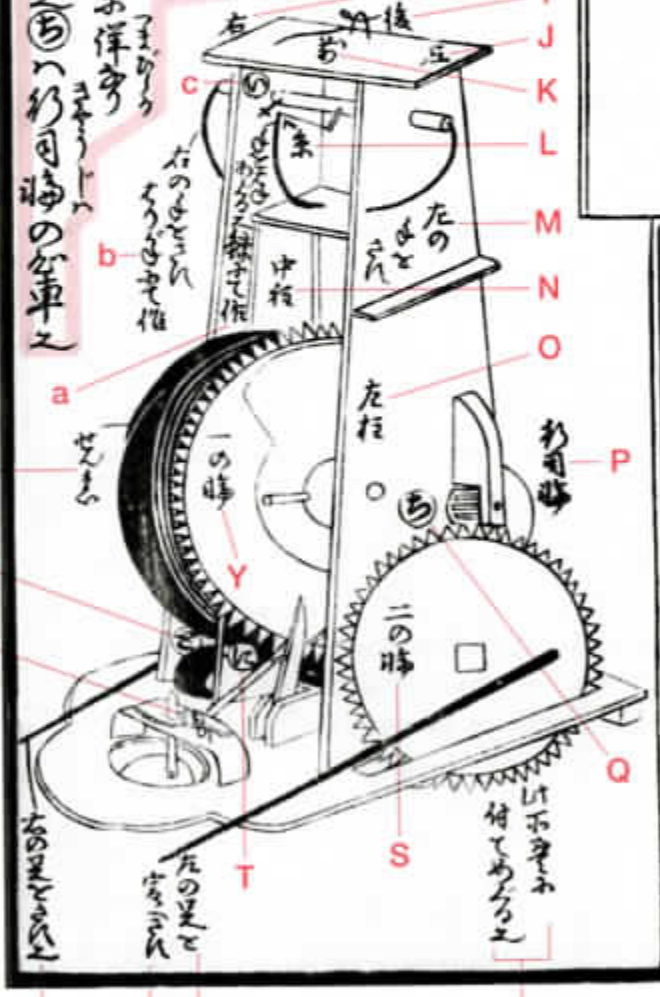
玩物之部 茶運人形

人形の持ち形 茶番のうしろ
 ちやんとと垂けば人形向ふは行く
 茶碗と入れれば行き止るも茶
 見とおけはあといえくまてえの
 所へどろ之を内かくれば次身
 左のおと

人形肉がらを惣茶

おのたれ方
 よう斜み見
 前後左右の
 人形みたりて
 定む以下ま
 こまおからふ
 へー

⑤いよとよの
 うまうとあまてゆえ
 ⑥はにほへ
 右の人形のり
 仕組之次の方お洋子
 ⑦いせんまのそーち
 へり目輪の公車之

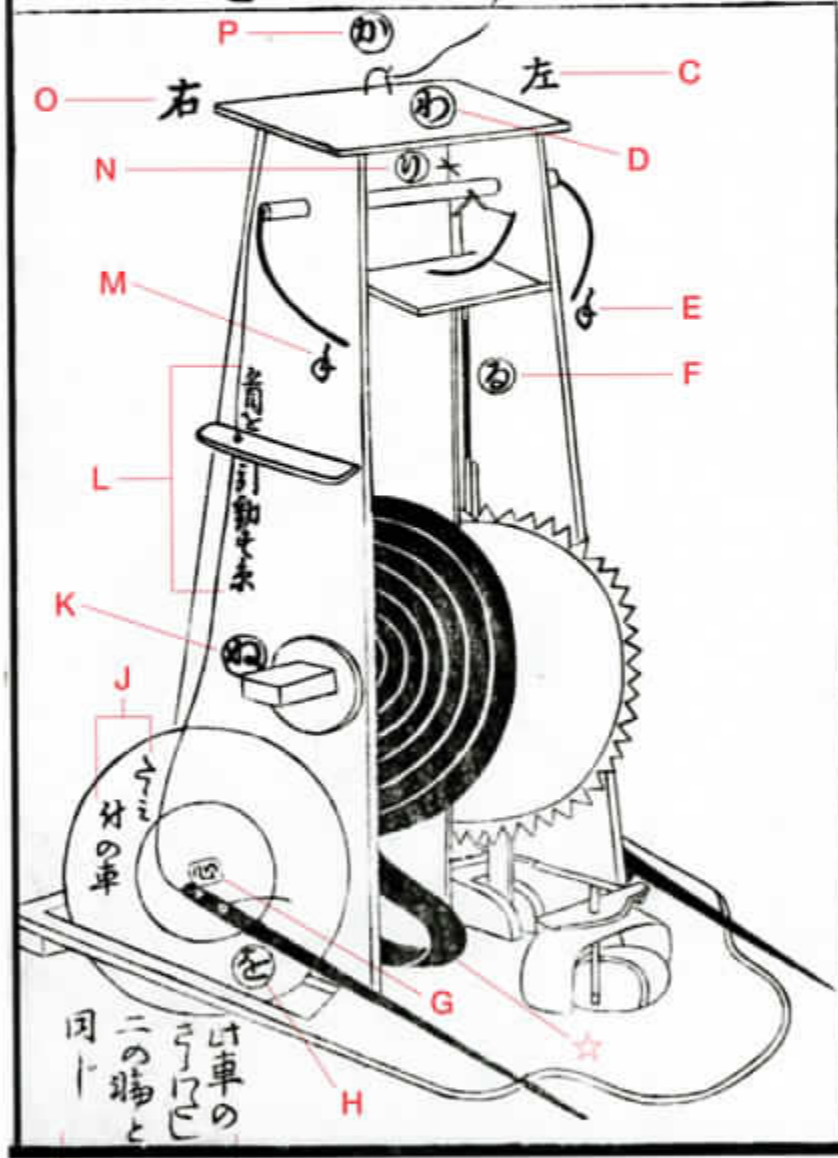


- A) Section concerning toys
- B) Tea serving doll
- C) When the teacup is placed on the saucer held by the doll, the doll proceeds forwards. When the teacup is taken, the doll stops, and when the teacup is replaced, it turns around and returns to its original position. The interior karakuri is as follows.
- D) The whole structure
- E) Whole diagram of the interior karakuri of the doll
- F) Diagram: as viewed diagonally from front-left. The front, back, right and left are determined by the doll's [front, back, right and left]. The following [instructions] must be understood according to this.
- G) ㉞ limits the level to which the hands are raised.
 ㉟, ㊱, ㊲, ㊳ and ㊴ are all [mechanisms] for the structure which operates the doll's returning action. The detail is shown in the following partial diagram. ㊵ is the end of the mainspring. ㊶ is the wheel connected to the axle wheel of the *gyōji-wa*.
- H) Right
- I) Back
- J) Left
- K) Front
- L) String
- M) Put the left hand here.
- N) Central board
- O) Left board
- P) *Gyōji-wa*
- Q) ㊶
- R) This part is put on the board and turns.
- S) Second wheel
- T) ㊲
- U) Put left foot here.
- V) Put right foot here.
- W) ㊳
- X) ㊵
- Y) First wheel
- Z) Mainspring
- a) Makes hands rise. Make this from whalebone.
- b) Insert the right hand here. Make this from wire.
- c) ㉞

A
同前の右より斜に見たる勢

①ハもせ下方のかきとりとありあり又ゆるくと止むるものとくくせ
 付の分も小御ありあり②磁とくくせんまのをまむるあり
 ③葉見をととさのけとさまるはゆるめて④外打付の弦はたおて心か

右へあせ打左へ
 うらべー是是を
 右とよとんせら
 為あり又あ乃
 ごとく磁(音)とく
 ごとく糸と付るこ
 ④わい(曲)くびを
 さとあつと
 ④か此く(首)と
 うごとく糸と
 さとて



- A) Diagram: the same, as viewed also diagonally from front-right.
- B) ㊶ is to limit the lowering of the hands. The stopper used to restrict forward movement is also tied up [here]. The detail is shown in the partial diagram. ㊷: the key is inserted and the mainspring is wound.
- ㊸: the structure that restricts forward movement when the teacup is removed. The rivet fixing ㊹ must be hammered into the part shifting forward from the axle on the left. The left [rivet] must be hammered into the part shifting backwards on the right. These are necessary for the operation of the walking action. Also, the string for moving the head is put at the end, as the diagram indicates. ㊺: the head is affixed here.
- ㊻: the string to move the head is tied to this ring.
- C) Left
- D) ㊶
- E) Hand
- F) ㊸
- G) Axle
- H) ㊹
- I) The diameter of this wheel is the same as that of the second wheel.
- J) *Tatami-tsuki no kuruma** (wheel attached to straw mat)
- K) ㊷
- L) String to pull and move the head
- M) Hand
- N) ㊶
- O) Right
- P) ㊻
- ☆) See the note 4 of page 107.

* Hereafter written as "*tatami-suri no kuruma*", which means "moving wheel on straw mat".