



WR PLUMB BOB NEWS

Information for plumb bob collectors

2008-10
Sept. 30, 2008



Editor: Wolfgang Ruecker

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History of chalk line instruments in relation to plumb bobs

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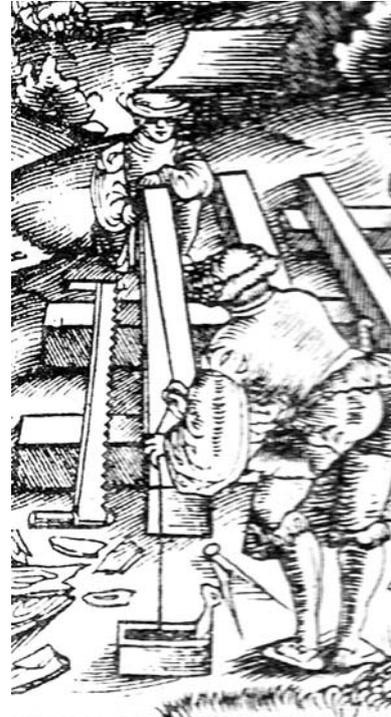
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1. INTRODUCTION:

The chalk line is a simple tool that allows a workman to draw a long straight line on a surface to act as a guide for some work to be done. Most commonly used by carpenters or masons, the line might serve as a reference to follow in order to saw a straight line in a board, or to form a true edge on a beam shaped with an adze, or for the mason, to align building blocks in a straight line along a footing.

The parts of a chalk box are a long string, a reel on which the string is wound, and a reservoir containing some sort of marking medium or pigment. The principle of all such devices is that the string is drawn through the reservoir and picks up on the surface fibers of the line, the "marking medium." The most common substances used were powders ground from soft rocks to make chalk (in a variety of natural colors) or black powder pulverized from wood charcoal. Liquids such as ink were also used to wet the line in color in order to "draw" or lay down a visible line. If a ring or a loop in the string is provided at the loose end of the string, in many applications, one man can draw the line himself. A nail would be used to hold one end of the string while the workman would control the reservoir and reel.



Carpenters
with chalk line 1531

Quite simply, the workman un-reels the line. The line passes through the reservoir, and the line becomes coated in the medium. The line is very gently carefully positioned over the board or foundation so as not to dislodge the powder or ink. Once the ends of the string are accurately positioned, the line is pulled taught. The string is then plucked, as harpists might play their instruments. "Snapping the line" in this particular way, shakes the medium loose, thus transferring the powder or ink from the string on to the working surface. Thus, a very useful straight line drawn.

Evidence of the development of this system of marking is found in Europe, Japan, China, the Phillipines, then later carried to the Americas. It is impossible to tell if there was just one original invention of this system.

One might ask at this point how or why the chalk box is related to the plumb bob, after all, that is the subject of this newsletter. Simply said, someplace late on in the course of the subtle development of the chalk box, it is discovered that if the reservoir and reel of the chalk box are made in a symmetrical and sometimes pointed shape, that the chalk box reservoir can behave as a weight very much like the bob of a plumb bob, and the chalk line can act like the plumb line attached to a plumb bob. Thus, a combination tool of some marketable significance was born. There are notable examples of this combination tool in different forms, advancements worthy of letters of patent in the late 19th and early 20th Centuries. Even today, combination chalk box, plumb bobs are a common tool form to purchase in a hardware store.

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2. CHALK LINES IN ASIA

The information I got from some www-sites and from ebay-sellers in China and Japan.

1. GENERAL

Japanese Carpenter's ink pot, or ink pad: The sumitsubo, unlike other carpentry tools, does not have a fixed shape or size. Nowadays the carpenter generally buys his sumitsubo, but in the past he would make it himself, sometimes taking pleasure in carving onto the ink pot. The main dish in the ink pot is called the ink-pool, sumi-ike 墨池. There is a depression containing silk wadding, sponge etc. that is soaked with a mixture of glue solution and ink, and attached to this is a wheel wound with thread, sumi-ito 墨糸. On the side of the pot there is a small plastic pointer with a needle fixed in it, and the end of the thread is attached to this needle. To draw a reference line on timber using a sumitsubo, first fix the needle in the required position on one side of the timber, and then, letting out the thread from the spool, move the sumitsubo to the other required position. Stop the sumitsubo in that position with the thread slightly stretched, and hold it down with the fingers of the left hand. Then with a finger of the right hand lift the thread up and let it go suddenly. The elasticity of the ink-soaked thread causes it to hit the wood and a straight line, used as the reference line, is drawn instantly. This procedure is known by carpenters as sumigake 墨掛け.

Relations between China and Japan:

Periodic dispatch of Japanese envoys to the Tang Dynasty in China was stopped 100 years after the construction of the Heian-kyo capital, in today's Kyoto, at the end of the 8th century, and this official disconnection with China started the "Japanization" of cultural assets received from China. Japanese people gave birth to and refined architectural styles and techniques that thus became unique to Japan, just like they invented their own phonetic letters or kana based on Chinese characters. Five-storied pagodas seen at some Buddhist temples are a typical wooden architectural technique. The wooden towers we see today have survived repeated earthquakes and typhoons over the centuries.

Sources:

The page of the TAKENAKA CARPENTER TOOLS MUSEUM in Japan.

<http://www.dougukan.jp/en/modules/tinyd8/index.php?id=2>

ebay seller okidokosales

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2. MAKING A SUMITSUBO

From the www blog of L. Angot living in Taiwan I took the information about making a Sumitsubo (as the carpenters did it in the past):

It all started with a blank of rosewood, that I had noticed laying outside on a pile of wood at a milling company here in Taiwan. I didn't know the wood was rosewood until the guy cut it, but I felt the wood was tough to resist Taiwan's succession of rain, wind and heat.

At the beginning, everything chiselled, sawn then shaped with rasps.



Making the wheel



Cutting the groove in the wheel



Chiselling the groove in the wheel

For the finishing, I used a scraper.

The pin looks like it is moulded; I shaped it so that it fits the user's fingers, somehow as when holding a pencil.



Sumitsubo: done

Bravo, well done! Thanks to Ludovic Angot from Taiwan to let us know how to make a sumitsubo.

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3. USE of the chalk line (sumitsubo)

Traditional sumitsubo has different parts in the body: the one is for winding the string, the other is for storing ink.

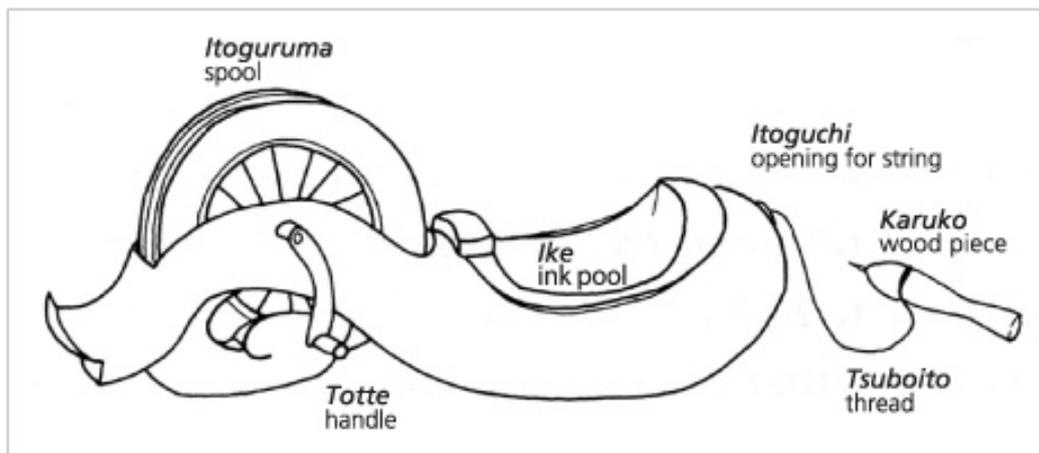
To draw a line, the sumitsubo is held in the left hand and the karuko's needle is fixed onto the surface determining the position of one end of the thread. The sumitsubo is gradually moved away from the karuko until the required length of the thread is unreeled at which point the rotation of the spool is stopped using the thumb.

With the index finger the thread is pressed down at the required end point of the line. Using the right hand, the thread is pulled upwards into tension and then suddenly released, consequently hitting the surface and leaving a straight line of ink onto any surface, regardless of the irregularity of it.

The sumitsubo is generally made of zelkova with partial reinforcement of the itoguchi with ceramic or brass. Traditionally they were made by the carpenters who used them, but nowadays they are generally produced by specialised craftsmen. It is now even possible to find plastic ones. Forms vary especially in terms of the use of a handle (totte) (it is said that carpenters in western Japan prefer handle-less spools, whereas those in the east prefer spools with handle) as well as the use of intricate designs and ornamentation.



Sumitsubos that use red earth pigment (bengara) instead of black ink are called shutsubo. Red pigment is used in cases where timber is used without scraping off the surface, such as when using polished natural trunks, because it can be washed away with water.



Sumitsubo part names (see picture right)

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4. DIFFERENT SHAPES OF SUMITSUBO

Since ink lines were found on the surfaces of timber used in the building of Horyuji temple, it is believed that the sumitsubo was already in use in the period in history (early 7th century) when the temple was constructed. The original shape is believed to be the so-called "split-end model (shiriware-gata)" which has two arms extending out of the ink pool to support a spool.



From WIKIPEDIA:

Hōryū-ji (法隆寺 *lit. Temple of the Flourishing Law*) is a [Buddhist](#) temple in [Ikaruga, Nara Prefecture, Japan](#). Its full name is *Hōryū Gakumonji* (法隆学問寺), or Learning Temple of the Flourishing Law, named as such because the site serves as a seminary as well as a monastery. The temple is widely acknowledged to have **some of the oldest wooden buildings existing in the world**, and is one of the most celebrated temples in Japan. ^{[1][2]}

In [1993](#), Hōryū-ji was inscribed as a [UNESCO World Heritage Site](#) and the Japanese government lists it as a [National Treasure](#).



The 8th century sumitsubo which was unearthed from the Sakane ruins, Hyogo, is of a split-end model. The "forgotten sumitsubo" found in the Nandaimon of the Todaiji temple, which is believed to be originating from the middle ages, is also of this model.

[Sumitsubo](#)
(Duplicate □ A8th century □ A Hyogo Prf. Sakane Remains)

8th century sumitsubo
(replica, around 8th century, Sakane ruins in Hyogo)



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The earliest evidence of using sumitsubo in Japan is of Horyuji. Dating back from the 7th century, sumitsubo have been a necessary tool for marking on woods.

The original sumitsubo has the wheel for winding the string that is fixed with the inkpot, which was found at many sites such as at the Soukon and the Nandaimon of Todaiji.

Sumitsubo and sumisashi in Todaiji

Nandaimon

(Duplicate 14th century ANara Prf. Todaiji)

Sumitsubo and sumisashi found in Nandaimon at the Todaiji temple

(replica, 13-14th century, Todai temple in Nara)



Drawing a line with a sumitsubo requires advanced knowledge and skill. It is believed to have been a rather esoteric tool until the middle ages, but with the subsequent gradual diffusion of carpentry skills, its usage also expanded changing its form to the one currently used in which the spool is placed into a depression and the body sometimes ornately decorated with carvings. A unique characteristic of the sumitsubo is the fact that they were made by the carpenters themselves, making them the only tool through which the ability and sensibility of the carpenter was revealed.

Since the middle medieval era, sumitsubo has become a common marking tool for many people. The more the users extend, the more its design becomes various.

Some sumitsubo is a box-like, the other is with decoration. Among many hand tools, sumitsubo would be the most artistic tool.

Different models of sumitsubo (1)

[Top row left to right: Hiroshima, Shamisen (traditional Japanese musical instrument), Biwa (Japanese lute). Bottom row left to right: Genji (Minamoto clan), Wakaba (young leaf), Funa (ship)]



Different models of sumitsubo (2)

[Top row left to right: Koi (Japanese carp), Tsurukame (crane and tortoise), Kame (tortoise). Bottom row left to right: Ebi (shrimp), Ichimonji (straight line), Jyun-ichimonji (quasi-straight line)]



Names can vary depending on the classification method and region.

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3. INTERNATIONAL HISTORY.

1. BASIC TOOLS

The basic tools used by different trades (carpenters, masons, stone-masons, painters,.....) were

- 1) a simple line, colored in ink and wound on a piece of wood, called snap line, ink line or chalk line and



- 2) a simple plumb bob



2. EUROPE

- C 2 a) In Europe they used a 5-piece-set
- A wooden container
 - A spool to wind up the line
 - The line itself
 - A colored thick (viscous) liquid made by pulverized charcoal mixed with water.
 - A handle with a ring at the bottom. The line was guided through this ring and pressed into the container with the ink. So the line was colored.

All these parts were easy to get or made on a building plot.



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C 2 b) Later wooden containers were replaced by handles and parts fashioned out of iron or brass. The color was made by a stone called reddle / ruddle, red chalk. (German: Rötel) In Austria the chalk line is called Rötelschnur = Red line). It was mixed with water to a thick liquid, later also used as powder.

The thick liquid would make bold easy to see lines on the wood surface.

Using a chalk line could be a very messy process; the skilled workman would have to take great not to spill the ink or mark the board before the line was correctly positioned.



Abb. 41 Schnurfäßchen, Schnur auf Haspel mit Einhalter; Tirol, 19. Jh. Höhe 115 mm, ø 131 mm

Der Schnurschlag

C 2 c) From Sweden I got a wooden box with a spool inside. This container is filled with white powder, so no excess powder can come out that was not adhered to the string itself.



C 2 c) These containers are still sold and used in our days (also in the USA).

From an ebay auction: 50 Meter (165') Chalk line ideal for all outdoor applications where lines are used especially for layout of athletic tracks, parking lots, tennis courts, playground games, airport runways, streets and highways, industrial aisle markings, all areas of construction, etc. The box is constructed of steel and has an extra large capacity. The unit is economical to operate requiring less manpower for faster layouts utilizing a snap line that extends up to 165 feet. Included with the Chalk Line Kit is a 5 lb container of white marking chalk. Colored chalks are available.



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3. JAPAN + CHINA

C 3 a) As well in Japan as in China the tools (chalk lines) were made by the carpenters and used during his working life. The shape is like a shoe with a wheel. Material: Wood. It was also used as a plumb bob (weight on a line), as you can see on the picture right. .



C 3 b) The Chinese also employed a more box-like reservoir, often decorated with brass parts and wood-carvings.



C3 c) Later chalk boxes were produced from brass. The shape was a pot with a reel attached to the side.



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C3 d) The variety of shapes is enormous. In China, symbolic themes of animals, dragons, lions, fishes, and the like are commonly found. The materials could be wood and brass, but many easy to find materials such as cow horn were also employed for certain parts. From the Philippines are many examples of reservoirs fashioned like male and female reclining figures. *Perhaps Adam and Eve, or the grand parents of the "Plumb Bob Barbara".* ☺



C3 e) Today these tools, especially in Japan, are mass produced in factories in the traditional shapes, no longer by individual carpenters. The material in these reproductions are plastics, not for collectors, but for tourists. ☺



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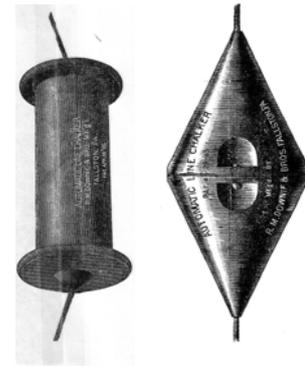
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4. AMERICA

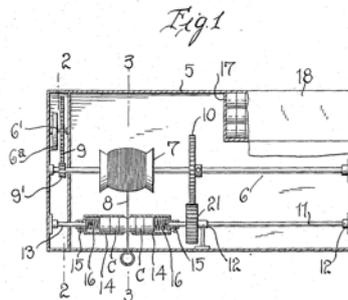
C 4 a) Americans were known to employ lumps of solidified chalk, over which the line was passed to give it a coating of powder. In this solid form, the dispenser part of the chalk box was eliminated. From the Downie Bros., we see a reservoir in a cylindrical shape fashioned out of tin, called "LINE CHALKERS", that held pulverized colored powders. The line as it was pulled through this container dispensed the powdered chalk on the line.



C 4 b) The first American patented chalk line is from 1867. (Carter's Pat US60657 May 28 67) see also my WR PATENT NEWS 2007 #20) It was a round brass box filled with powder. The line was stored on a wheel inside. The wheel was turned by a handle. In 1916 Carter was granted a patent US1168851 for a chalk line box with transmission



G. P. CARTER.
CHALK LINE MARKER.
APPLICATION FILED MAR. 6, 1916. Patented Jan. 18, 1916.
1,168,851.



C 4 c) In the 1885 patent granted to DOWNIE (see WR PATENT NEWS 2007-42) the chalk reservoir very literally takes on the shape of a plumb bob. In this "new idea", the bob is hollow and filled with chalk powder. Ingeniously, the plumb line passes through the center of the cap then directly through a hole in the tip. The string is knotted at each end so as to allow the plumb line to pass back and forth through the reservoir without be allowed to pass all the way through. A substantial bobbin is shaped into the neck to allow the plumb line to be wrapped when the tool was not in use. It is a modification of the tool C 4 a)



C 4 d) In this decorative example, a recoiling string mechanism is applied to an internal reel, thus the line is retracted into the chalk reservoir.



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5. COMBINATION TOOLS

C 5 a) The first practical and commercially successful combination tool joining chalk line with plumb bob was the RIDGELY from 1909 (US909846 CAVILLEER; see WR PATENT NEWS 2007 – 22).

The relatively small reservoir for holding the chalk and a securing pin built into the removable crank made this particular device useful for certain specific types of work, laying out of wall paper, for instance.

Similar combinations are found in Germany by KUKA



C5 b) To draw longer lines more useful to the mason or carpenter, larger reservoirs for the chalk were fashioned which when shaped symmetrically with a tip, serve a legitimate dual function of combining chalk box with plumb bob.

Through the 20th century the preferred material for the reservoir changes from brass and tin to easier to form aluminium or plastic.



C 5 c) Chalk boxes sold today frequently employ a gear reduction mechanism that allows the worker to save some time rewinding the line into the chalk reservoir, up to 4 times faster. Not unlike the Carter patent of 1916, these new mass produced models, employ smooth running moulded nylon gears, products of the plastics generation of manufactured parts.

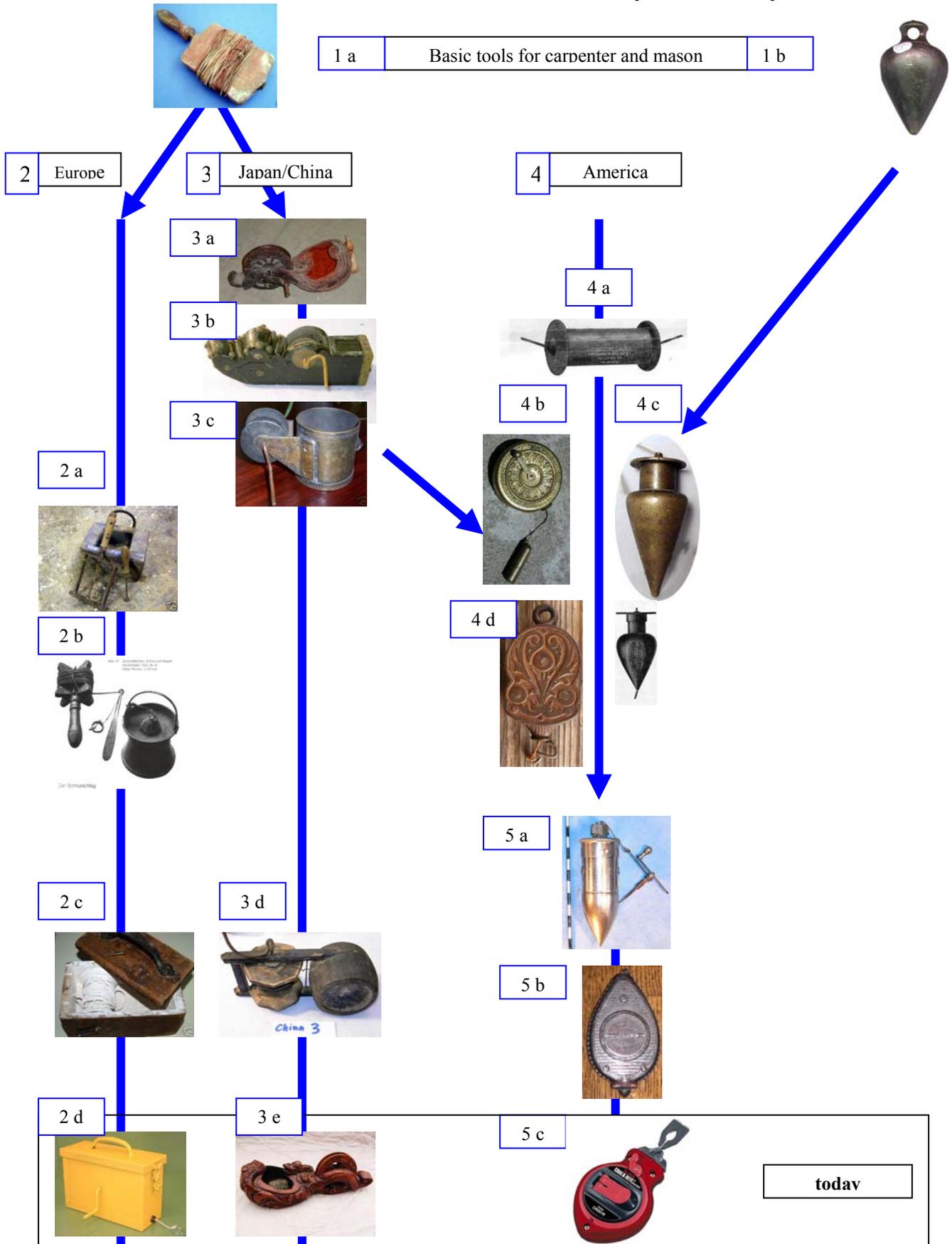
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4. INTERNATIONAL CHALK LINE HISTORY (overview)



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REMARK:

More details to this theme see WR PATENT NEWS 2007 number 20, 21,21u,22,22a,42,43,44 etc.

There exist two ways to get all these information:

- 1) You can by a CD with all 50 issues of the WR PATENT NEWS 2007 (in English) together with „THE PLUMB LINE CONTINUUM“, the only written descriptions about plumb bobs from 1991-1994.
\$25.00 free shipping worldwide.
- 2) Or I can send you single issues of these patent news on demand as an email attachment (PDF-file) for free.

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