

THE TIME IN CHINA BY THE SUN, WATER, AND FIRE.

While the sun and water have been more particularly employed by astronomers for telling the time, fire has specially served for indicating the vigils of the night. We have already had occasion to use this word vigils when speaking of clepsydras, and have referred to an ancient ordinance that enjoined the announcement of the vigils to the inhabitants by agreed-upon signals. We speak here of some customs that it is interesting to know about. The night was divided into five watches that began at sunset and ended at sunrise. As we have explained, these five parts were of greater or less length, according as it was winter or summer.

The announcing of the watches had a double purpose; in the first place it served to make the time known, and, in the second, to show that the watchman was on the alert. As it was formerly forbidden to walk about the streets at night, except in special

first quarter, the sentinel gives the drum a stroke and the other sentinel at once gives another upon the bell with the hammer. About the space of a Credo afterward, each of them gives the drum and the bell a stroke, and continues so to do up to the beginning of the second part of the night. Then each gives two strokes, and continues, as has been said, to the third watch, when they give three strokes. At the fourth watch they give four strokes, and at the fifth, five. At day break they redouble the strokes, as they did at nightfall. In this way, at whatever time of night one awakens, he hears, unless the wind be contrary, the signal of every watch and knows what the time is."

In the king's palace, at Peking, there is to be seen a drum and a bell upon high towers, and, in the city, two other towers with a drum and bell for announcing the watches. The city drum is 15 public cubits* in diameter. The palace bell is the largest in the world, and its sound is so piercing that it seems to be rather that of some musical instrument than of a bell. It is

were about as thick as a goose quill. They were burned in front of the pagodas, and were used for carrying fire from one place to another. These rods were often stuck into metallic vessels filled with ashes. This vertical position permitted of following their combustion with the eye (Fig. 1, D).

Since these rods gave no light in burning, they were only used for giving the hour in the house, which they at the same time perfumed. When the rods or cords had a certain length, they were twisted so as to form a spiral and conical figure (Fig. 3) that widened out at every revolution and reached two or three palms in diameter. Their combustion then lasted several days, and sometimes even a month or more. They were suspended by the center and were ignited at the lower extremity. The fire then ascended slowly and insensibly in following all the spirals. Five marks made upon these spirals served to indicate the five parts of the night. This method of measuring time was, it is said, so exact that

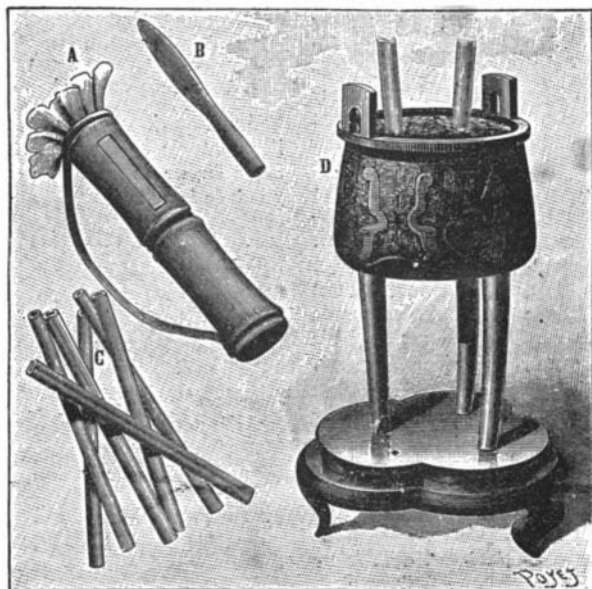


Fig. 1.—A B, BAMBOO FOR STRIKING THE NIGHT WATCHES. C ODORIFEROUS BURNING RODS. D. METALLIC VESSEL WITH BURNING RODS.

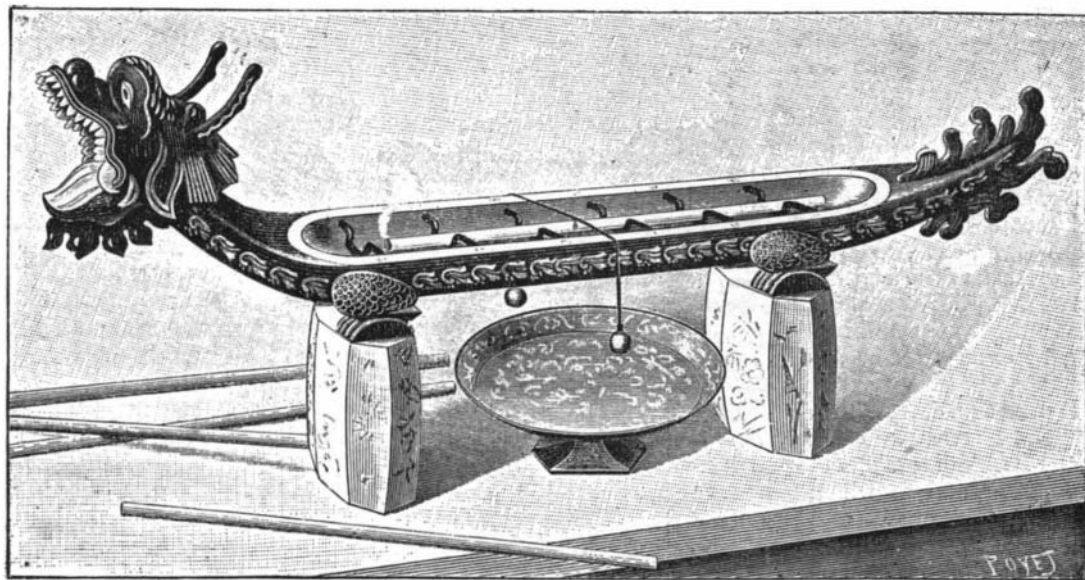


Fig. 2.—DRAGON FOR BURNING RODS TO MARK THE HOURS.

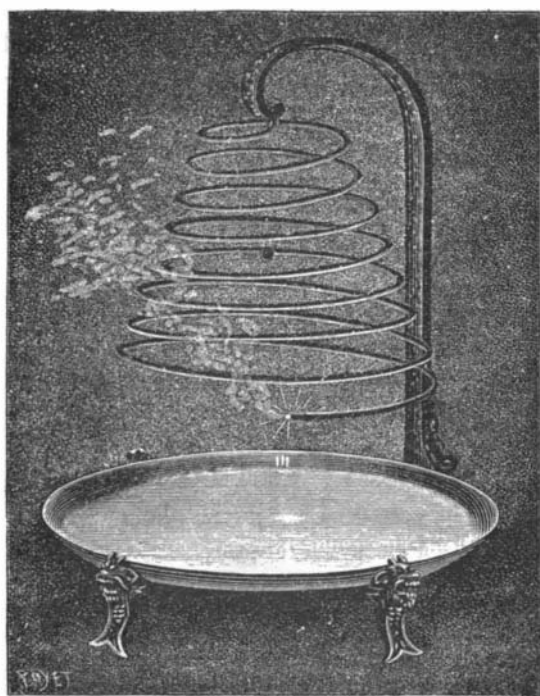


Fig. 3.—CHINESE SPIRAL FOR SHOWING THE TIME.



Fig. 4.—CHINESE CLOCK IN BLUE AND GOLD.

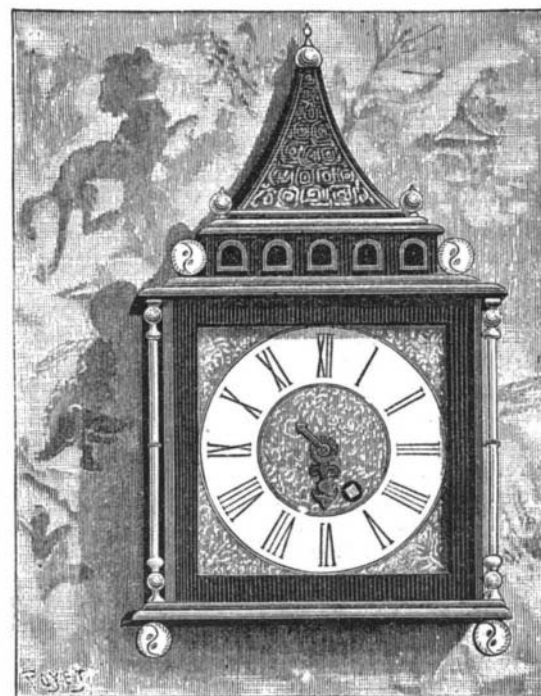


Fig. 5.—ANOTHER CHINESE CLOCK IN CARVED WOOD AND JADE.

cases, the guards had to keep watch and question every person who was met with outside of his house. Certain of these guards held in the left hand a hollow bamboo cylinder which they struck with the right hand, not only to give proof of their vigilance, but also to make the time known (Fig. 1, A, B). Sometimes this bamboo rod, instead of being cylindrical, had the form of a fish, 80 cm. in length by 15 in diameter. The officers who made the rounds often rode asses and were preceded by a soldier who carried a lantern.

Others had clappers attached to the arm, and to the number of two or more, leaving their post, went about acting upon them. The guards of a neighboring post answered them by striking the bamboo as above described. They thus proved that they were not asleep.

In 1668, Gabriel Magalhaens wrote, in his *Nouvelle Relation de la Chine*: "In all the cities and towns of the empire there are two towers, one of which is called the Drum Tower and the other the Bell Tower, from the top of which the night watches are announced. At the beginning of the night or of the vigil, the sentinel gives the drum several strokes, and the bell afterward answers him. Then, during the whole of the

this bell that serves for ringing the night watches in the city of Peking.

The manner of sounding the hours by striking a bell by hand by means of some instrument was also employed in Europe, and of old in certain belfries deprived of a mechanical clock, the watchman struck the hour upon the bell according to the indications furnished by a clepsydra, sand glass or other device. While the watches were struck, these words were sometimes heard sung out: "Obey your parents, respect the aged and your superiors, and commit no injustice."

Fire, as we have said, was used in China for measuring the watches. The Chinese proceeded as follows: They reduced a special wood to powder by rasping and braying it. They thus obtained a sort of pulp of which they afterward made cords and rods of various forms (Fig. 1, C). For the use of rich and educated persons, they employed woods of rarer species. These rods, which were scarcely more than a finger in length, reached, when made of the more ordinary kinds of wood, two and three meters, and

* The cubit is a little less than a Paris foot, which was 30 centimeters.

no error of any moment was ever detected. It is curious to compare this Chinese horary device with that employed in France in the middle ages. The duration of lighted candles or tapers also served then to mark the time of night. These candles were graduated just as the Chinese graduated their rods or cords. Saint Louis made use of this primitive method. Charles V also made use of these graduated candles.

The Chinese rods and cords spoken of above, while giving the time, also served as alarms. When a Chinese wished to rise at night at a given hour, he suspended a small weight of metal very exactly at the place in the rod or cord which the fire was to reach at the hour specified. The moment having arrived, the weight detached itself automatically and fell into a copper basin, and the noise of its fall was loud enough to awaken the sleeper. This method was as simple as it was economical, for a rod or a cord whose combustion lasted a day and a night cost but three farthings.

Fig. 2 represents a metallic dragon in the possession of the museum of the Louvre. It must have served only for the combustion of odoriferous rods.

We must now study what were the Chinese mechanical clocks with weights or motive springs in the seven-

teenth century, the epoch at which the Chinese knew the first that were imported from Europe (1654). Upon this subject we read in the memoirs concerning history, science and arts by the missionaries of Peking in 1782: The emperor, Young Tching, who reigned from 1723 to 1735, says in his preface to the sublime instructions of Cheng-tzu-Guogen:

"At the end of the Mings dynasty (first years of seventeenth century) Europeans having entered China, and having for the first time made one or two sun dials, the emperors of the Mings took them as a precious treasure. Toward the tenth year of Chun-Tchi (1654), the emperor Chi-Tzou-Hoang-ti received from these same Europeans a small clock which, of itself, struck the hours. It was not allowed to leave his side. Later on he obtained larger ones. Similar ones were made, as far as to external form and to internal wheels, but, since the method of working the springs so as to make them flexible and elastic was unknown, they were not correct.

"Since I have been reigning, having learned from some Europeans the method of working these springs, I have made hundreds and thousands of clocks that mark the time very correctly. I have had the striking clock mended that was first offered to the Emperor Chi-Tzou-Hoang-ti, and of which he was so jealous. It runs perfectly and I shall confide it to you presently. You, who are still young, have for your amusement ten or twenty of these clocks that strike of themselves and that I have given you. Do you not regard this as pleasing to you? You ought, then, to eternally recall, with a grateful feeling, the advantages that have been communicated to you by your ancestors and your father."

It was toward 1680 that Khang-hi created clock shops within the walls of the palace, and to which he called artisans and workmen from all parts of the empire. The monopoly of the trade was conceded to the Christian natives whom the missionaries had taught to work. These workmen, however, were not very skillful, for, more than a century afterward, three clocks presented to the emperor in 1795 by the embassy of the India Company, having been injured during the voyage, three clockmakers in the service of the court came to offer their services to the embassy; but the mechanic of the latter, not having been able to come to terms with them, refused their offer and preferred to them three missionaries residing in Peking, whom he considered more adroit, although they were not of the trade. In fact, the repairs were properly made. When we study the pieces

that the Chinese clockmakers have constructed, we find merely bad copies of European clocks. They have changed nothing in the movements adopted by them as models; and, as for the external form of the cases, they have given this, it is true, a Chinese character, but they have, nevertheless, produced nothing remarkable.

The Chinese have allowed themselves to be far excelled by the Japanese in mechanical finish and decorative art. The aspect of a Chinese clock sometimes revolts the eye through the mixture of Chinese and European elements found therein (Figs. 4, 5). The Chinese have produced no mechanical clockwork properly so called, but have been in this merely bad copyists.—La Nature.

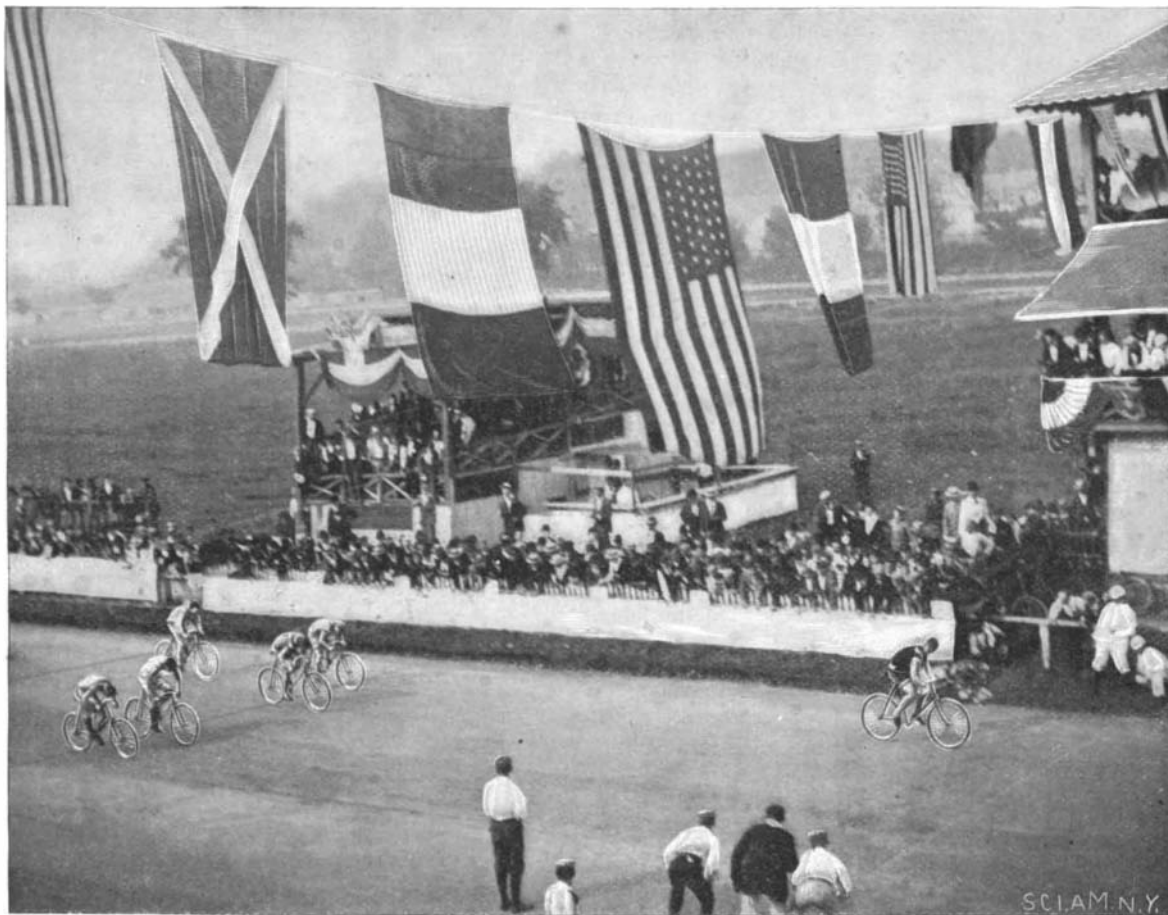
Uses of Air Jets.

A writer in Cassier's Magazine states that in turning soft steel shafting, it is customary to use water to which a certain percentage of sal soda has been added, in order that the water may not rust the finished work, and with a keen tool of the proper temper, and wide enough cutting edge to cover the feed, a very smooth and shining surface can be produced. By using a small air jet, that is air issuing from an orifice of about one-sixteenth inch in diameter, the work can be finished very much the same as if water is used. A smooth surface will be produced with this important difference, that the tool will not crowd, and, consequently, the shaft will be nearer true and straight when using a compressed air jet than when using water. The same sized air jet may be used to advantage at different

places around the shop. It is excellent for cleaning off benches and machines, and is much to be preferred to the common dust brush used for this purpose. It is also very convenient at the drill press for blowing out the chips in drilling and tapping bottom holes.

BICYCLE RACING AT SPRINGFIELD.

The programme of races of the Springfield Bicycle Club at its September tournament was one of unusual interest, and attracted the attention of wheelmen in all sections of the country. Many of the leading professional and non-professional bicycle riders participated, and the attendance was very large. This tournament has been styled the "American Cycling Derby," and our illustration represents the conclusion of the mile open race on the second day, with Walter C. Sanger winning. It has been generally conceded that Sanger rode the greatest races of the year on this track, and that he stands far above the common run of cycle racers, but it is said that Sanger personally lays great emphasis on the merits of the tires which he rode in these trials. They were the Vim tires made by the Boston Woven Hose and Rubber Company, and their peculiarity consists in a roughened surface, technically called a pebble tread, giving the tire a high speed record. Sanger entered and won in three events, the two mile handicap in which he won on the second day being a highly sensational and brilliant performance. The advantage of the pebble tire was well



SANGER WINNING IN A BICYCLE RACE AT THE SPRINGFIELD MEET.

shown in the race we illustrate. The bunch came slowly round the turn toward the open with half a dozen men in front of Sanger and Tyler. Sanger was very near the last man in the string. Directly on the point of the turn, the bunch began to go fast, and so great was their speed when they got to the head of the stretch that they had to swing wide, owing to the smooth surfaces of their tires. Sanger, having the roughened surface, simply held to the pole very closely, and by the time the rest of the bunch was ready to slide in toward the pole, Sanger was a good ten feet ahead of them. It was but an easy matter for him then to increase his lead until he finished far ahead, as is shown in the cut. Had his tires not been furnished with the pebble tread, he would have been obliged to have followed the bunch into the stretch, and lost the position which the tires gave him.

Not a Bad Idea.

In Germany when a man is convicted of the offense of beating his wife he is not locked up at once, but is allowed to continue at his work all through the week. At the end of the week he is looked after by the police, who put him into prison until Monday morning. His wages are taken from him and delivered up to his wife. On Monday morning he is handed over to his employer. If he will not then work, he is thrown into jail again, where, says the Newcastle Chronicle, there is no doubt he will have to work a great deal harder than he does when at his usual employment. In some countries this would be regarded as intolerable paternalism.

The Michigan Spread Eagle.

At the recent meeting of the American Bar Association at Detroit, Michigan, the address of welcome was delivered by Hon. Don M. Dickinson, who glorified the town and State as follows:

"A few days ago a Senator of the United States from the great State of New York referred to the city of Detroit as situated on the shores of Lake Michigan!

"Now, we would have him know, and all the rest of our friends of the Atlantic coast who have never been west of Buffalo know, that a commerce passes the port of Detroit in but the seven months of open navigation seven times as great, in tonnage of merchandise, as the entire year's carrying trade of the North Atlantic highway, and more than twice as great as the combined entries and clearances of the whole world at the ports of New York and Liverpool together. In the summer of 1893 a member of the Supreme Court of the United States—one of the most eminent men produced by this republic, and one of the greatest judges who ever wore the ermine—spent a month within sight of the two endless processions of shipping that pass each other on this water road. Mere statistics had not greatly impressed him, but the actual view of the living facts filled him with astonished conviction. To that visit more than anything else, I believe, does our fresh water Neptune owe his belt and spur of knight; for in December, 1893, the court gave to our lakes and connecting rivers the full legal title and dignity of 'high seas,' ranking with the oceans and seas of the world.

I say, in passing, that now, with our sister States of the Northwest, we are asking, with more and more urgency—nay, we will soon demand—from the United States, a free and, above all, a wholly American outlet to tide water, so that we may ship our goods to every open port on the earth without change of bulk.

"In agriculture, Michigan's resources can feed all the nations; in building material, we can build cottages and palaces for them all; we can gridiron the world with our iron and steel; and from our manufacturing can equip the lines with rolling stock. We produce the most and best iron of any State or nation.

"Our copper product is now at least half of the world's supply. Copper mining is remunerative, but I suggest to our fellow citizens of the United States from abroad that it would pay us better if the government would open its mints to the free and unlimited coinage of copper as money, impose the legal tender quality, fix a ratio (at any figure—that is not material) with gold

and silver, and then maintain the parity of the three metals with all the financial resources of the republic, 'independently of and without waiting for the assent of foreign nations.' Michigan would like this, and if it should turn out well, we might, following Lycurgus, try it with our iron by and by. But that's another story, as Kipling would say."

Tuberculosis.

Professor Delépine, writing on this subject, has shown that—taking very large numbers as the basis of his estimate—at least 16 per cent of cattle are afflicted with this disease; and that, whereas in some districts it may be comparatively rare, there are parts in which a non-tuberculous cow is the exception. Pigs also are affected in the same manner, although not to the same extent, about one in every thirty-six being attacked by the disease. Cats and dogs also are subject to tuberculosis, and it is to be feared from their exceeding friendliness may be a source of danger to children with whom they play. Although the form of tuberculosis with which poultry are affected differs in some particulars from that of man, it is a very common disease, and commits great ravages in poultry yards. But any animal which conforms with man's habit of dwelling under artificial shelter is apt to contract tuberculosis, and so it is that whether they be monkeys, camels, giraffes, antelopes, llamas, lions, tigers, foxes, tapirs, zebras, etc., they all, according to Professor Delépine, are liable to tuberculosis when they are kept in menageries.—Hospital.