MODERN SUNDIALS.

In some former articles we endeavored to show how much ingenuity and artistic feeling were displayed in the construction of sundials before the telegraphic transmission of time and the advent of the cheap watch. We did not then believe that the sundial was still in current use, and our object was particularly

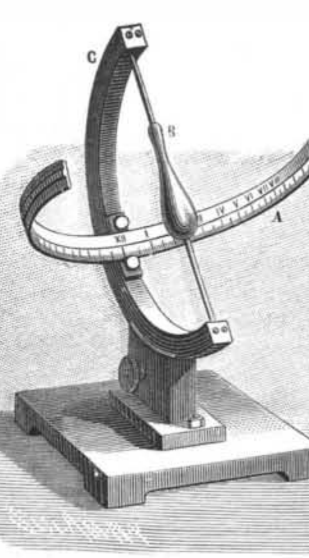


Fig. 2.—OLIVER'S MEAN TIME SUNDIAL.

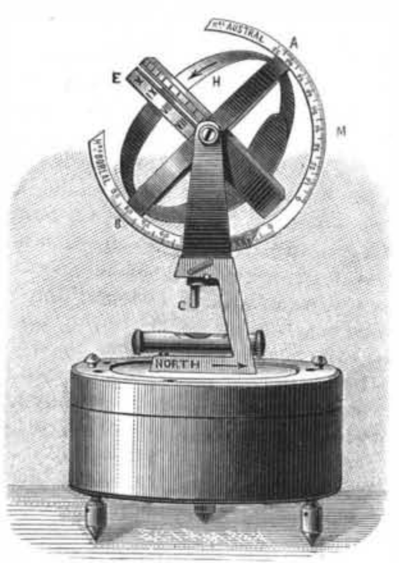


Fig. 3.—FLECHET'S UNIVERSAL SUNDIAL.

to insist upon the utility of its study as regards the teaching of cosmography. Since then, new documents have reached us, furnished in part by the readers of *La Nature*. We have thus learned, not without some surprise, that the sundial is still frequently employed. Under a complex form, it may be adapted to various uses, while of very simple construction, but of large dimensions, it permits of attaining sufficient precision for the regulation of watches of medium accuracy. Finally, in certain of these instruments, a special arrangement permits of directly reading the mean time. Such, for example, is the case with the dial devised by

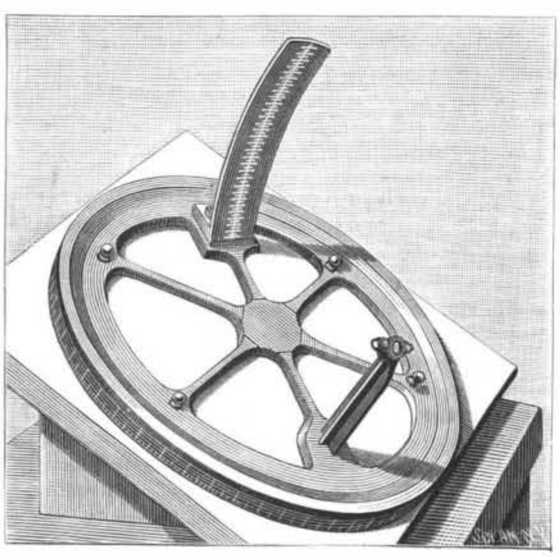


Fig. 1.—THEVENOT'S SUNDIAL.

Major General Oliver (Fig. 2). The time is read upon an equatorial circle, A, while the shadow is projected, not by a simple rod, but by an enlargement, B, of the style, the section of which is given by the well known curve of the equation of the time. According to the season, the time will be read to the right or left of the shadow. The circle, C, carries a division in degrees that permits of regulating the instrument for all the boreal or austral latitudes.

Fig. 1 represents a dial constructed by Mr. C. Thevenot. It consists of a sort of bronze wheel 767 millimeters in diameter carried by an axle that revolves in an aperture formed in a marble table upon which the wheel is exactly applied. This table is inclined toward the horizon by an angle equal to the complement of the latitude of the place, the line of the greatest slope being oriented from north to south. In this way, the axle of the wheel is parallel with the axis of the world. A lens of about 50 centimeters focus projects the image of the sun upon a piece curved into an arc of a circle and carried upon the wheel at a point diametrically opposite. The observation consists in bringing the image upon the median line of the arc of a circle. The time is then read upon the circumference of the wheel opposite an index sealed in the marble. The dimensions of the apparatus constructed by Mr. Thevenot are such that a minute of time corresponds to a length of 1·6 millimeters at the circumference. It seems that it is possible without difficulty to determine the true time within a few seconds. The mean time is deduced therefrom by adding to it the equation of the time given in a table.

The dial (Fig. 3) constructed by Flechet, as long as thirty years ago, is much more complex. It is designed for observations in traveling, and can be arranged, under a small bulk, in a box that serves as a support for it when it is desired to effect a measurement. It consists, like several of the instruments previously described: (1) of a meridian circle, M, cut away on the side toward the sun so as not to interfere with the observation; (2) of an equator, E; and (3) of a horary circle, H, movable around the axis, A B. The circle, H, is provided with a small hole corresponding to a circular hollow of the circle, E. It is through this that pass the solar rays that form a luminous point upon a screen carried by the circle, H, and upon which has been traced the curve of the mean time, accompanied with dates of four to four days for the entire year. The instrument revolves around an axis, C, placed vertically by means of the level that the instrument carries. Let us suppose that we have regulated the instrument according to the latitude of the place by means of the division of the circle, M. It will remain for us to put the latter in the meridian. To this effect, we direct the horary circle toward the sun, so as to form the image upon the curve of the mean time. We know that this curve must be described in one year by the image of the sun, which must recede from or approach the equator of the instrument at the same time that the sun itself recedes from or approaches the terrestrial equator. Turning, then, simultaneously, the dial around the axis, C, and the circle H, around A B, we make the luminous point describe a part of the curve, and we fix the instrument when such point marks the date of the day of the observation At this moment we are sure that the circle, M, is in the meridian and that the circle, H, indicates the actual time upon the equator. Up to here the instrument does not differ essentially from a very old sundial that we have already described. But the curve of the mean time will permit us to determine even the latitude of the place, if we do not know it. It will suffice for this to observe the passage of the sun at noon. To this effect, let us place the horary circle upon the midday of the instrument, and let us give the axis, A B, an inclination such that the image of the sun shall form upon the curve of the mean time at the place corresponding to the date of the day of observation. If the operation has been begun before noon, we shall see the image descend upon the curve. It will be carried back constantly by lowering the axis, A B. The motion will gradually become slower, and will soon cease entirely. The axis, A B, will then be parallel with the axis of the world, and it will suffice to read the position of the circle, M, in order to know the latitude. Starting from this moment, the instrument will be able to serve for determining the hour.

Of all the sundials constructed up to the present, the latter is doubtless the completest, and the one that is best adapted for all the approximate determinations that one may have to make on a voyage. In this respect it is worthy of having the attention of explorers called to it.—*La Nature.*

HICKORY WOOD CARVED BY WORMS.

We recently received from a valued correspondent a strip of hickory wood, the surface of which is ornamentally carved or grooved as represented in our engraving. Our correspondent writes as follows:

"I send you a piece of hickory wood beautifully carved by the worms, which perhaps will be of some interest.

"Some days ago, in cording up storewood, I came across this piece, which is a curiosity to me. It appears that the eggs were deposited in a central groove made by the insect parallel with the grain of the wood, and after being hatched the larvæ began to 'cut' the wood, each one at a certain angle, which is uniform throughout. I account for the gradual widening of each groove by the growth of the worm.

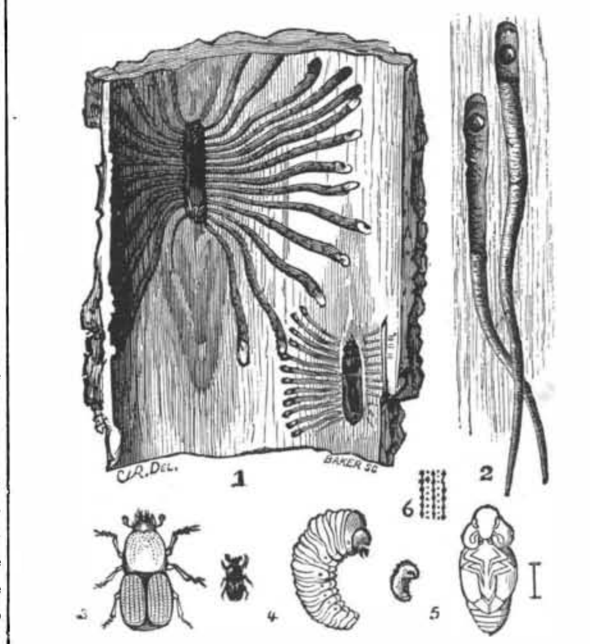
"It will also be noticed that the outside worms turned their course and worked parallel to grain of the wood, but in no case does it seem that any one cut across his brother's pathway. However, when one died, those on each side soon found it out and began to draw closer to each other, until they were at an equal distance apart. All the pieces I examined were the same as the one I send you. There is something beautiful about the 'carving,' at least, and to my mind is worthy of notice and study. Hence I send this piece to you, believing that it would not prove uninteresting to the Scientific American.

"Arthur R. Spaid.

"Wilmington College, Wilmington, Ohio."

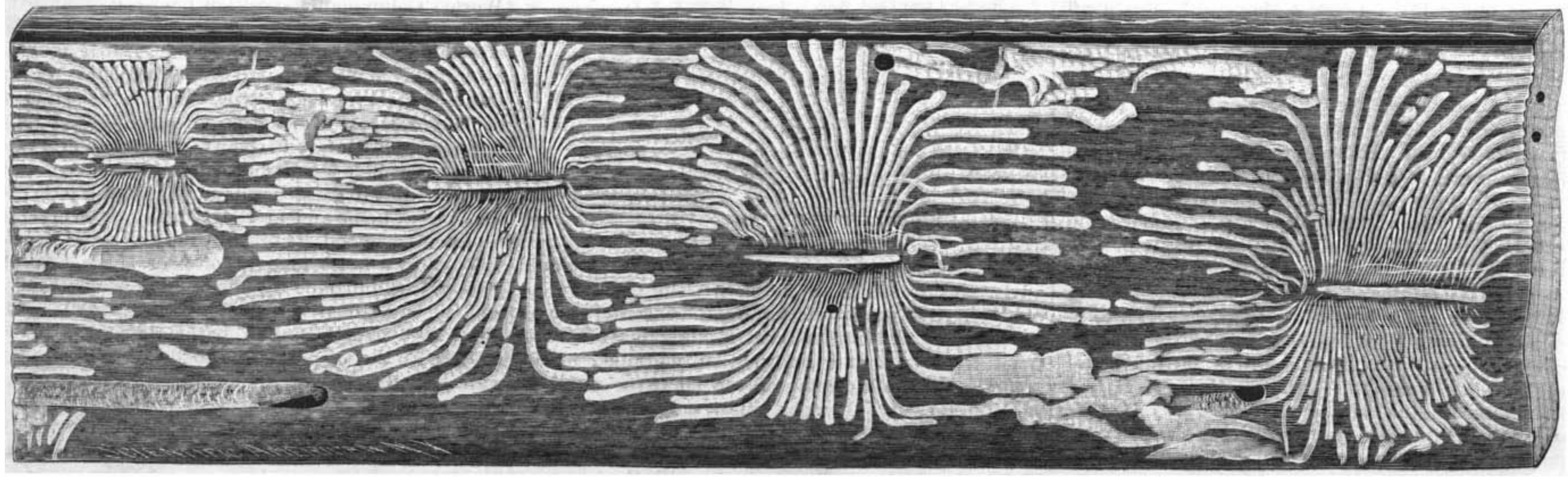
The specimen was so interesting that we submitted it to Dr. C. V. Riley, entomologist, of the Department of Agriculture, who has favored us with the following:

Reply by Professor C. V. Riley.—The specimen sent by Mr. Spaid is a very fine illustration of the workings



THE HICKORY BARK BORER. (*Scolytus 4-spinosus.*)

of the hickory bark borer, and his remarks both as to the non-crossing of the burrows and the closing up of the space left by any of the grubs which die are quite correct and are true of almost all of the bark borers belonging to the family Scolytidæ. This particular species was first illustrated and described by me in the *Prairie Farmer* for February 2, 1867, under the name of *Scolytus caryæ*, and a fuller account of it is given in



HICKORY WOOD CARVED BY WORMS.