

THE CHRONOSPHERE—AN EMPIRE CLOCK.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

The accompanying engraving illustrates an ingenious and useful horological novelty that has recently been perfected by an English inventor, Mr. J. H. Overton, and which is described as an Empire clock. As the name implies, it is a universal time-piece, for not only does it give the correct time all over the world, but supplies in a glance the difference in the times between all places on the earth's surface and the correct mean time at any town or place in the eastern or western hemisphere. Moreover, it demonstrates the actual rotation of the earth on its axis in the twenty-four hours, as well as the actual speed of the earth.

The clock is made in two sizes and patterns, but the principle of design and operation is fundamentally the same in both instances. There is a terrestrial globe inclined at $23\frac{1}{2}$ degrees similar to that used in schools and suitably mounted. The diameter of this globe varies from 3 to 4 inches, according to the size of the clock. It completes one revolution about its axis in the course of twenty-four hours in the same direction as the earth itself revolves. Parallel with the equator is a fixed ring dial upon which are inscribed the numerals representing the twenty-four hours with sub-divisions, the hours from 6 P. M. to 5.45 A. M. being engraved in black, and from 6 A. M. to 5.45 P. M. in red, to distinguish the twelve hours before and after meridian. The meridians of longitude are 15 degrees apart. When any meridian is adjusted to its own mean time all the other meridians denote their own mean time and each meridian will continue to do this correctly throughout the twenty-four hours. In order to determine conveniently the time at any desired spot on the earth's surface relative to another point, such as New York, there is an adjustable and movable guide fitted with a pointer which turns with the globe, and whereby the time is indicated in the hour ring just as the hand of an ordinary clock at any place. This guide is held in position by means of a small knob which enables it to be turned in an easterly direction without moving or changing the position of the globe, and it can be set over any town where the chronosphere is to be permanently used. As an example, the clock is installed in New York and it is desired to ascertain the relative time in London when it is 12 noon in the first-named city. The guide is set to stop over New York, and the pointer indicates this city's mean time. The guide is moved eastward until it is brought over London and the hour 4:46 P. M. is instantly shown on the ring dial. The guide is then turned eastward and brought over New York, upon reaching which point it will stop and click, denoting that it is over the place at which it is adjusted for permanent use, when it again indicates correct New York time. The guide is easily adjusted to stop over any part of the globe where the timepiece is permanently used.

In the second type of chronosphere the terrestrial globe is of 8 inches diameter and it indicates the relative times between any two places. In this case the globe should be secured in the manner later explained before the guide is moved. For instance, the chronosphere is permanently used in London. It is 1 o'clock there, and it is desired to ascertain what would be the time in Peking when it is 3 o'clock in Vienna. The pointer is set to indicate 1 o'clock in London, and the guide is brought over Vienna. The globe is then turned together with the guide by means of the milled screw at the top of the sphere, until the pointer indicates 3 o'clock on the hour ring. By tightening the milled screw, the globe is then secured in that position so that it will not revolve in either direction—east or west—and the guide is then turned until it is exactly over Peking. Instantly the pointer indicates the Peking time on the hour ring when it is 3 o'clock in Vienna. The top screw is released and the guide is carried eastward, until it is brought over London, when it stops. The milled screw at the top of the globe is released and the latter rotated in an easterly direction until it stops itself, so that the pointer once more indicates actual London time, that is 1 o'clock, plus the minutes that the experiments have occupied in determining the relative times between Vienna and Peking.

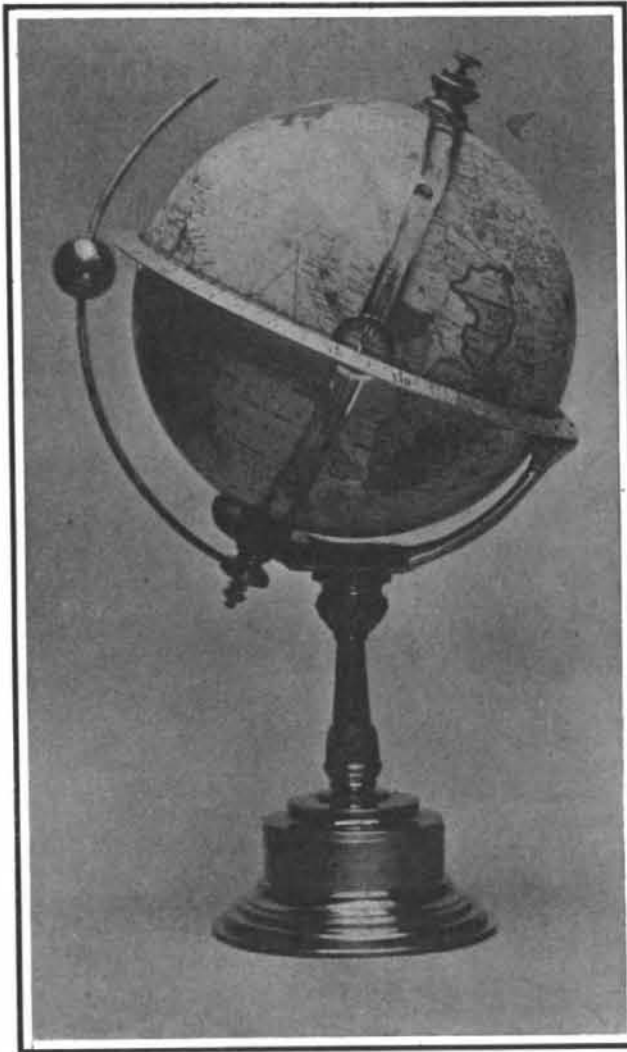
The globe mechanism is so designed that after displacement from local time in order to carry out any such investigations as are described above, it will when brought by the hand back to the local time, stop itself in the correct position for the pointer to indicate actual local time once more. If desired the guide can be easily adjusted for merely permanent use as in the smaller model. Moreover, if required, a sun attachment can be fixed in position, whereby the height of the sun in degrees above the horizon is shown for every day of the year. This fitting renders the clock capable of more extensive use in schools and colleges. The total heights of the two models

are 12 and 15 $\frac{1}{2}$ inches respectively, so that they occupy but a small space. It is only necessary to bear in mind that the guide and the globe must be turned in an easterly direction only, and when setting time, to exercise care that the guide be over the place at which it is adjusted for permanent use, and that the globe has been turned eastward until it has come to a stop.

For schools and colleges the clock is especially useful, since it enables one to demonstrate in the concrete the daily rotation of the earth from west to east, the difference in time arising from such rotation corresponding to the difference in longitude, that is 15 deg. longitude east or west, one hour's difference, or four minutes for each degree east or west of the standard meridian; and the exact relative position of every place in the world and its exact position at any time in relation to the light of the sun, that is by day or night, as well as certain phases of solar phenomena by means of the sun attachment. The clock requires winding only once a week, and its steadiness and accuracy in running are distinctly noticeable features. It should prove of marked utility to steamship and railway companies as well as to other commercial enterprises having an extensive trade overseas.

THE FIGUREHEAD AND ITS STORY.

From time immemorial the seagoing vessel, whether a creation of wood and hemp or of iron and steel,

**THE CHRONOSPHERE.**

Showing time ring, pointer or hand of clock, and sun attachment.

has presented herself as an almost human individuality to the eyes of her crew. From the earliest ages those little differences between craft of the same type which are only perceptible to the trained eye of the seaman were recognized to be insufficient to distinguish one individual ship from another. Hence ships were variously ornamented and named by their owners and commanders, who frequently adopted one of the numerous deities of heathen mythology as especial protector of their vessel and of those who intrusted themselves and their fortunes to its keeping. As in almost every branch of antiquarian research, we look to the ancient Egyptians for the earliest information on the subject. These wonderful people were among the very first recorded ocean travelers, and shipbuilding with them had at an early date quite attained the proportions of an art. Many of their boats were elaborately painted and decorated and among their decorations the figurehead stands out somewhat prominently. The sacred ibis, the lotus, and the phoenix were favorite designs; sometimes placed on the raised-up prow itself and at others rather behind it as in the one illustrated. Note the huge eye that is painted on the bow just below the figure. This peculiar badge is very illustrative of the general feeling that a ship is endowed with a personality of its own, and in one form or another it has maintained its position on the bows century

after century up to the present day, in which it is often seen on the bows of Maltese *dysos* and other gaudily painted European craft, to say nothing of its almost universal use in China. "If no have eye, how can see?" asks the Chinese sailor; and the expression "Right in the eyes of her" is still usual among our own seamen, meaning as far forward in the ship as possible. The ships of the Greeks and Romans preserved the "eye" on their bows and carried a distinguishing emblem or figurehead (*parson*) at the bow while their tutelary deities were generally given a billet at the stern. All these vessels had their distinguishing devices and figureheads in addition to which those named after mountains and rivers had a lion or a crocodile respectively painted or carved in relief on either bow. Numbers of representations of these may be seen on old coins.

A special class of Phœnician vessels had a figurehead representing a horse and were therefore known as *hippi*, the idea of riding over the sea as on horseback being evidently the origin of the adornment. It is interesting to note that in the year 112 B. C. one of these figureheads was found thrown up on the east coast of Africa and brought to Egypt, strong circumstantial evidence that some early Phœnician mariners had already doubled the Cape of Good Hope.

Ramming being the most usual form of attack among the ancients in their sea engagements, the bow decoration often took the form of the head of a ram or of a wild boar, the well-known butting tactics of these animals rendering the figure very appropriate.

When Rome in the days of her decadence lost the command of the sea the most formidable navies were those of the Scandinavian sea robbers, the famous Vikings. The term "Viking," by the way, has nothing to do with the English word king, as is often supposed, but is derived from *vik*, a creek or fiord, and *ing*, meaning "the son of." The word thus should be translated "the sons of the fiords"—a very good descriptive name for these Norse sea rovers. Their vessels—the famous long-ships—were adorned with figureheads. But the Viking's conception of this form of ship ornamentation started from a standpoint quite different from that of the ancients. It was not so much a distinctive design or a religious emblem. Its intention was to strike terror into an enemy. What form of reasoning led up to it is well described by Baring-Gould in his "Strange Survivals and Superstitions":

"In the Egil's Saga, an old Icelandic chief is said to have taken a post, fixed a horse's head at the top, and to have recited an incantation over it which carried a curse on Norway and the king and queen; when he turned the head inland it made all the guardian spirits of the land to fly. This post he fixed into the side of a mountain with the open jaws turned toward Norway. These figures were called *nith-stangs*. The *nith-stang* was primarily the head of the victim offered in sacrifice, lifted up with an invocation to the god to look on the sacrifice, and in return carry evil to the house of all who wished ill to the sacrificer.

"The figurehead of a warship was designed in like manner to strike terror into the opponents and scare away their guardian spirits. An Icelandic law forbade a vessel coming within sight of the island without first removing its figurehead, lest it should frighten away the guardian spirits of the land."

Here, then, we have the *raison d'être* of the Viking figurehead, and the annexed reproduction of an old drawing in Strutt's "Chronicle of England" shows not only a figurehead of this period but actually a *nith-stang* in combination with it.

It is obvious that the word head comes directly from the *nith-stang*, and although the advent of Christianity abolished the barbarous form of witchcraft which it exemplified, yet the figurehead and hence the "head" of the ship remain terms in constant use to this day. In the drawing referred to it will be observed that the actual bow terminates with the head and neck of some animal which is probably intended for a dragon. This fabulous monster has always been a favorite emblem in all ages and from China to Wales, in both of which widely separated countries it occupies a prominent position in the national heraldry. In all cases it probably has been taken as the symbol of malevolent power capable of inflicting evil upon the human race. In the Bible the dragon is always represented in this light, and its wings, serpent form, claws, and fire-spouting mouth render it formidable in "the air above, the earth beneath, or in the waters under the earth." With the *nith-stang* theory before us we can well understand the old Scandinavian sea-rovers being very partial to its use as a figurehead. The dragon, too, from its power was also frequently adopted as a mark of chieftainship or sovereignty. It was the badge of the famous King Arthur, the ensign of the Merovingians and of the Saxons at the battle of Hastings. An-

(Continued on page 101.)