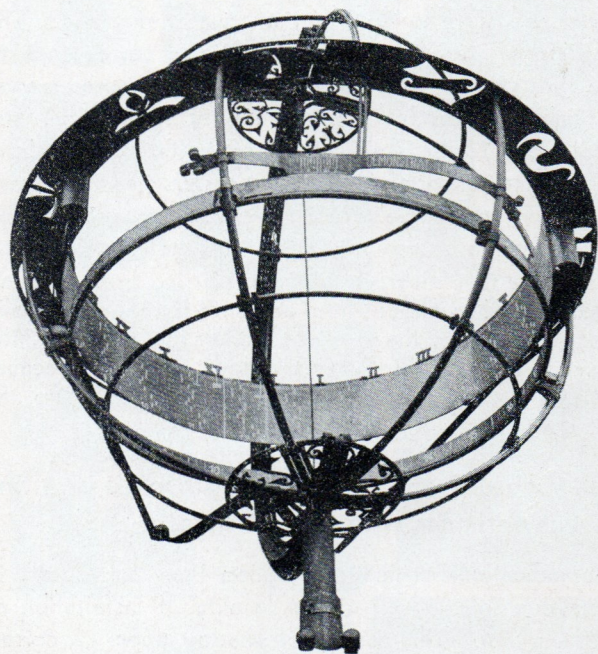


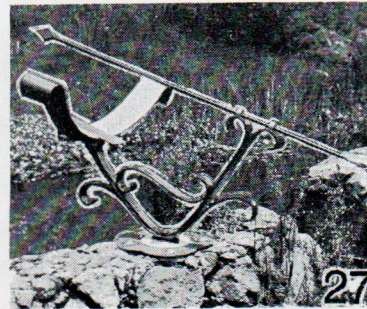
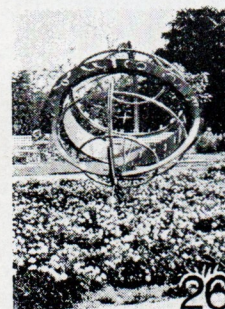
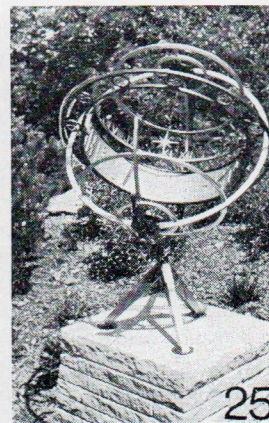
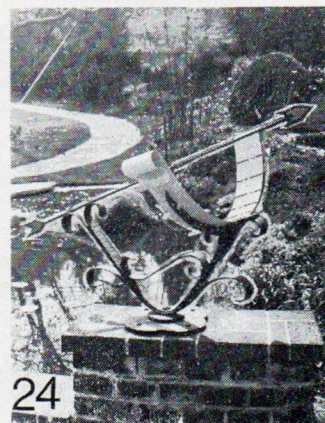
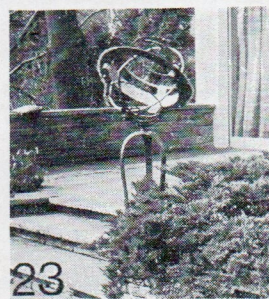
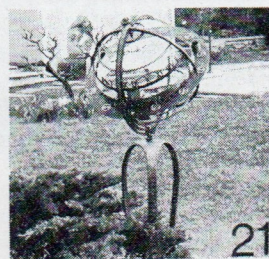
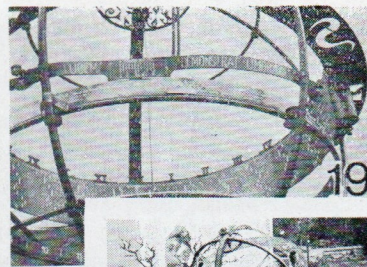
SUN - DIALS

ART OBJECTS OF TIMEKEEPING

IDH 553-20-35



CRONOMETRIA LOSKE



HOROLOGIUM SOLARIUM "GNOMONIC"

circum flecto aequatorialis

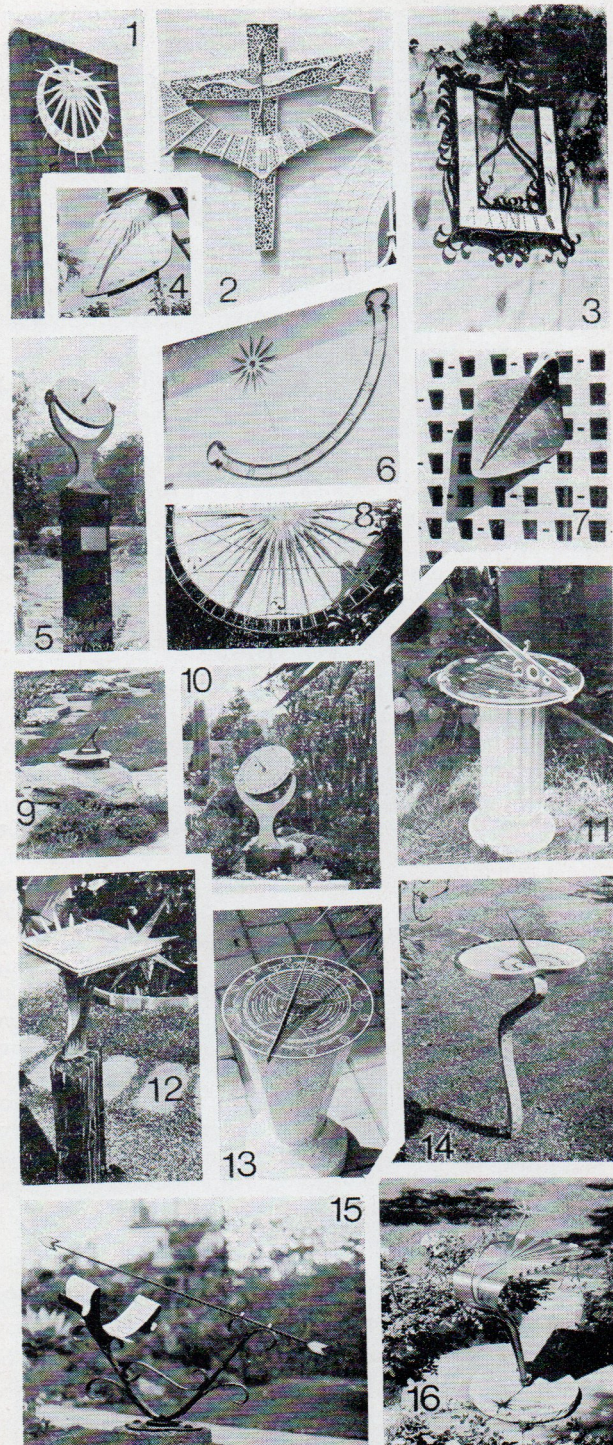


Sun dial with double dial-plate on a disk for the northern hemisphere. For a correct adjustment it is necessary that the mark S on the discs points out exactly towards geographic south; for this purpose the compass built in the base can be used. The inclination of the two shadow-casters C and D must correspond in each case to the (geographic) latitude of the place where the sun dial is installed. The angle by which accordingly the dial-plate A and B must be inclined from the vertical position, can be read off on the small disk E which has a graduation. If the sun dial for instance is installed on 30° latitude, the plane of the dial must correspond to the inclination resulting when they pass the division 30 on the disk E. Therefore the axis of the two shadow-casters is parallel to the earth axis and the dial to the equatorial plane. The position of the dial thus obtained also corresponds to the suns carrier during the so called equinoxes (aequinoctialis) of March 21 (beginning of spring-time) and September 23 (beginning of autumn). From these dates on the projection of the shadow-casters changes: starting from springtime's beginning, during summer and until autumn's beginning, dial A with the Roman ciphers is used for time measurement, and starting from autumn's beginning, throughout winter and until springtime's beginning, dial B with the Arabian ciphers. Dial A with the Roman ciphers always must show upwards, because otherwise the shadow of the pointer follows up the numerals backwards.

The measure of time of the sun dials and the two differences with normal time.

The indications of the determined time correspond to the "true solar time" of the locality of installation of the sun dial. The casting of shadow upon 12 corresponds to the "true" noon, that is to the daily highest position (culmination) of the sun.

The divergencies of this "true sun time" from normal time of all usual mechanical clocks are: first, the values of the time equation (aequatio temporis) for the "mean solar time" (according to the tables V and W on both sides of the base), an second, the values of the differences of degrees of longitude between the locality of installation of the sun dial and the meridian of longitude coordinated to the official normal time.



ART OBJECTS FOR HOUSE
AND GARDEN BY
ING. LOTHAR M. LOSKE

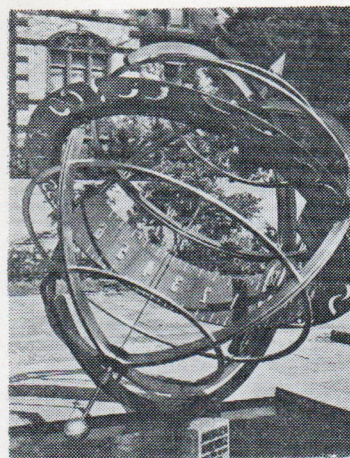


This so-called ecuatorial sun dial model "Belhora" is not only an especially attractive ornament for the garden, but is also at the same time interesting, instructive and a perfectly constructed astronomical instrument.

Each sun dial is an individual handicraft based upon calculations and design by Ing. Lothar M. Loske constructor of many famous monumental sun dials and astronomical instruments.



"Belhora" desarmed especial box for airfreight

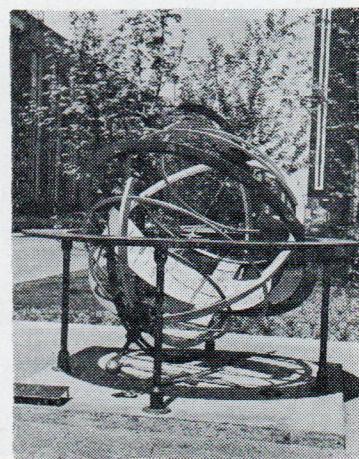


1957
City of
Switzerland

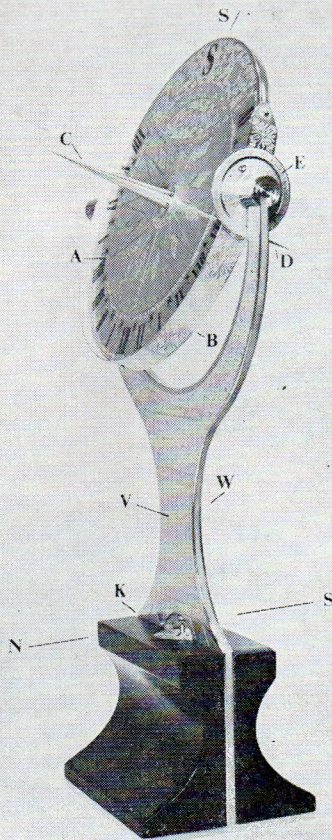
ASTRONOMICAL SUN DIALS



City of Frankfurt/M. Germany the world
greatest ecuatorial sun dial
designed and
constructed
by Lothar M. Loske



City of Basel
Switzerland
1956



"GNOMONIC"

bronze cauterized 12 1/2 in. high



The first difference

The table V and W called "aequatio temporis" only indicates the values for the 1. and 15. day of each month. The other values are situated in between according to the signature + or —.

If for instance the time equation indicates for some day minus 16' (16 minutes), this means that a correctly working mechanical clock in the same moment when the shadow of the pointer covers the number 12 of the dial disc, must indicate no more than 11 o'clock 44 minutes. On the contrary, the value of the time equation being plus 5 minutes, a correctly working mechanical clock must indicate already 12 o'clock and 5 minutes.

The second difference

In accordance with the world regimen of normal time, entire countries conform with the respective local time ("mean solar time") of a certain degree of longitude.

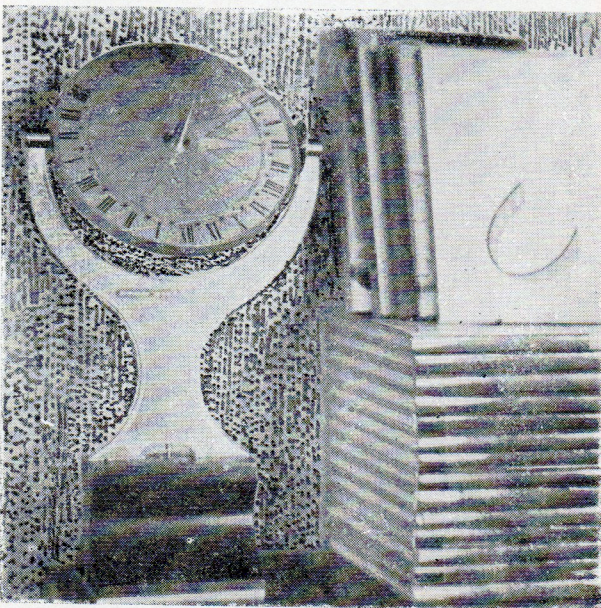
Examples: USA with 60°, 75°, 90°, 105° and 120° West.

México with 90° West

Europe with 15° West, 0° (world time) and 15° East.

Therefore all places which are not located on such a degree of longitude are obliged to adjust their clocks in accordance with the time of the legally determined meridian of normal time. When doing so, a difference of 1 longitudinal degree corresponds in each case to 4 minutes of time.

Example: If the sun dial is installed on a spot of the meridian 94 where 90° longitude are valid as meridian of normal time, the sun dial will always be late by the difference between both of 16 minutes (4x4 min.). Should the sun dial be located on 87° longitude, it will all the time be advanced by (3 x 4 min.) 12 minutes. This is due to the sun on 87° longitude arriving at its culmination already 12 minutes earlier ("true noon") than at the location of the zone time meridian, in this instance at 90° West longitude.



THE SUN DIALS

The fact that sun dials, being a venerable spiritual possession of long gone times, nowadays still are popular, is an evidence of the pleasant image they evoke about magnitude and beauty of the astronomical sciences. The theory of the sun dials —the GNOMONY— is considered the oldest science of chronometry and its base has always been thorough observation. Also GNOMONY always took part in all speculations of the astronomical sciences.

It is utmost interesting what sun dials can offer us, what knowledges they contain and how much we can learn about astronomy from them. Furthermore, it is a curious fact that the sun dial in principle can not be surpassed in one point by any modern technical clock, even by a chronometer, an electronic or even an atomic clock. All kind of appliances comprised under the name of clock can keep with more or less precision, according to their system, the time on which they are adjusted. But all these clocks are unable to measure or determine, respectively, the time by themselves. But the sun dial can do so.. When it seems to be "stopped" because the sun does not shine, nevertheless it continues "going" and determines once and again where we are regarding time and events in the universe. The sun dial, therefore, is an instrument for determination of time. Which also explains the fact that sun dials still have been used until end of the 19th. century, notwithstanding that mechanical clocks exist since at least 900 years. The deficiency of the mechanical clocks was that they did not keep the hours and minutes exactly enough over a large span. Once and again it was necessary to readjust them, and according to what? — according to sun dials and their indication of the sun's culmination, that is its highest position over the spot where the sun dials is installed, which also corresponds to the so-called astronomic noon.

"Astronomic noon" corresponds to the moment of the shortest shadow of the day and the point where it turns from West to East. Unfortunately the time measure from one astronomic noon to the next in the course of the year has not the same duration. This time measure is designated "true solar time".

It declines strongly from the usual normal time of the mechanical clocks.

Therefore sun dials often are suspected to work entirely wrong. But sun dials don't work wrong, they only indicated another time measure, different from that the observer has on his wrist watch.

Besides from this "true solar time" of the sun dials there are still the following time measures: the "mean solar time", the "normal time", the "world time" and the "sidereal time". But the declinations which exist between "true solar time" and "mean solar time" and also "normal time", can be marked on the dial-plate of a sun dial, even the divisions of a calendar. Of course it is not so easy to read off the normal time and in case also the date from a sun dial as from the dial-plate of a mechanical clock, but it is much more interesting and instructive.

The orientation of sun dials

The worth of a sun dial depends from its correct position regarding an imaginary earth axis and the horizontal plane of its standpoint, and also all other calculations of the dial-plates are made on this base. The especial denominations such as: "horizontal sun dial", "vertical sun dial", "equatorial sun dial" or "polar sun dial" also result from the position of the plane of the dial-plate of the sun dial regarding the earth's surface.

The systems differ from one another according if the extended plane of the dial-plate is parallel to the horizon, the zenith, one of the poles or the equator. And all sun dials —provided they have been built after the 15th. century— have in common that all their shadow-casters are parallel among themselves and also to the imaginary earth's axis.

The parallel position to the earth's axis which is necessary for each shadow-caster, results if one erects same from the horizontal position for the angle of the latitude of the standpoint of a sun dial and turns it to North.

As mentioned before, besides the hours lines for the "true solar time" can be drawn in still further indications on the dial-plate. One can mark the difference of the time equation ("aequatio temporis", which conducts to the direct indications of the so-called "mean solar time", and one may indicate also the difference of the zone time. This difference is always constant and results from the difference between the degree of longitude of the standpoint of the sun dial and the degree of longitude of the respective country which determines the legal normal time. Even calendar divisions with zodiac and its angles, as well as indications of duration of days can be marked. The previous condition for such manifold indications is, naturally, that the size of the dial-plate is sufficient, as in the case of that equatorial sun dial at Frankfurt/M., Germany with a diameter of 3,50 mts., in Basle Switzerland with 2,50 mts. or that equatorial sun dial in Zurich, Switzerland with a diameter of 1,80 mts.

The lateral illustrations permit to notice that the sun dial, a venerable spiritual property of far away times, is capable to occupy still nowadays a place as a jewel of modern art of the 20th. century.