

A FOUR-THOUSAND-DOLLAR WATCH.

BY PROF. WILLIAM ETZEL, M.A.

Visitors to the World's Fair can bear witness to the high degree of artistic and scientific workmanship attained by French watchmakers. Among these latter the firm L. Leroy & Co. deservedly enjoy special fame still enhanced by the neat miniature watch their representatives at St. Louis recently presented to Miss A. Roosevelt. This same firm has just completed a new masterpiece—already awarded, unfinished as it was, the grand prize at the Paris Exhibition in 1900—and which, though but a watch of 22 lines, can advantageously compete with the perhaps too famous clock of Strasburg. This watch is the achievement of one Mr. Junod who, for the past seven years, has been trying to satisfy therewith the scientific taste of Count A. A. De Carvalho Monteiro, of Lisbon and Rio de Janeiro. The watch has two dials (see cut), the second of which is protected by the case artistically decorated by Mr. Burdin, of Paris. The principal or front dial, besides the ordinary indications of the hours, minutes, and seconds, shows, on four small extra dials, the phases and ages of the moon; the days of the month and of the week (for 400 years); the year (for one century); the months, the seasons, the solstices and the equinoxes; a chronograph indicating the hours, minutes, seconds, and fractions of seconds for scientific observations; a spring development making known the exact moment the watch was last wound up; and indications, by a separate hand, of the mean solar time and of the equation of time.

The reverse side (protected by the case) bears a thermometer (Centigrade); a hair hygrometer; an aneroid barometer with corresponding altimeter for heights not exceeding 5,000 meters; 2 dials giving the hours of sunrise and sunset at Lisbon; a ratchet system permitting to rectify the setting without opening the case; the corresponding hour (and hence the longitude) of the different regions of the globe identified with 128 different cities; the firmament.

This latter indication is very interesting. In fact three firmaments are represented, viz., those of Paris, Lisbon, and Rio de Janeiro (of course but one at a time). The stars—tiny golden points—are not thrown upon these disks at random. For the firmament of Paris the constructor simply had to copy one of the numerous French celestial maps at his disposal; but for the firmaments of Lisbon (560 stars) and Rio de Janeiro (611 stars) he marked the co-ordinates D. and R. A. of each star. All the stars of the first three magnitudes are represented, together with a great many of the fourth, and such stars as present some degree of interest, e. g., the Pleiades, Mira Ceti, 61 Cygni, etc. Alcor could not be marked out, notwithstanding the interest attached to it, on account of its proximity to Z (Mizar) Ursa Maj. The horizon is so disposed that in the revolution of the disk, which executes the side-

real diurnal motion, the different non-circumpolar stars rise and set at their respective hours as determined astronomically. The quasi-elliptical form given to the horizon was calculated after an ingenious method of horizontal projection contrived by the constructor. The

likewise traced, and with remarkable exactness. Such a marvelous watch could but be a repeater, not only of the hours and the quarters, but also of the minutes elapsed since the quarters struck. Thus when the writer examined the works it was 11.19 A. M. On his touching a button, the watch's "rapid little pulse" first beat eleven, then a triple chime indicated a quarter past, and finally a tiny argentine bell struck four, making up 11.19.

Thus far the scientific description of what our readers will certainly agree to call a *chef d'œuvre*. Let us now give a short description thereof from an artistic standpoint. The case represents, by special order, and in beautiful *bas relief*, the Fates with their attributes, and Time, with his scythe and his clepsydra. In the center of these figures and, as it seems, notwithstanding the protestations of the artist, the monogram of the purchaser of the watch. Above the second Fate is the Brazilian globe, and beneath Time the coat of arms of Portugal. To the right—on the rim—is a fleury Roman cross and to the left another similar cross. Around the rim incasing the front dial are the twelve signs of the Zodiac.

The stem-winder is simply the crown of a count, surmounting a helmet, and whose enameled top conceals a very neat mariner's compass.

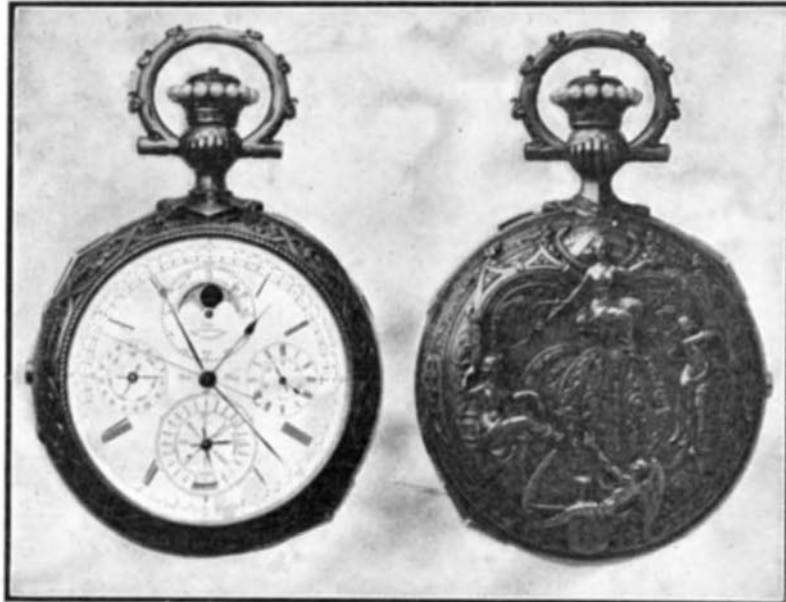
As was mentioned above, this watch has taken up all the leisure hours of the constructor for the last seven years and has been sold for the really not exorbitant sum of 20,000 francs (\$4,000). If other similar ones were ordered by wealthy amateurs of science and art they would neither require so much time nor be unsusceptible of further perfections; for in this case, as in all works of man, the first achievement is a *coup d'essai*; and besides, the astronomical and meteorological observatory of Besançon is constantly taking interest in the chronometric progress of the watchmakers of old Vesuntio.

A NOVEL WATER WHEEL.

BY DR. ALFRED GRADENWITZ.

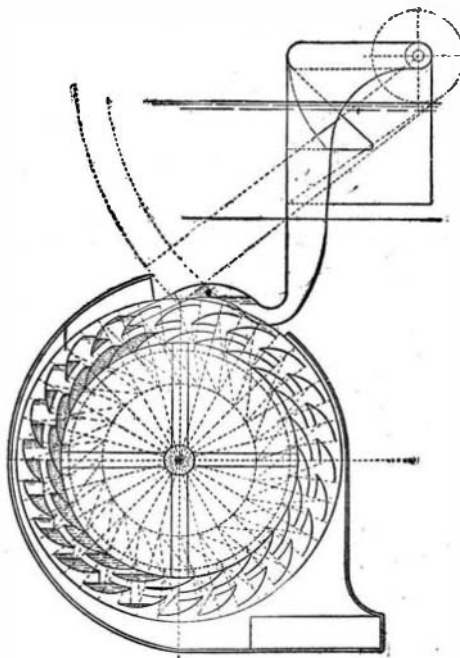
Overshot water wheels were designed long before the art of machine construction had reached any degree of perfection. But in spite of their simplicity their efficiency has been equaled only by a few complicated and expensive contrivances, such as Francis turbines, Pelton wheels, etc. There are, however, three drawbacks in ordinary overshot wheels: First, the impact of the water, as it rushes in rapidly, cannot be sustained and utilized adequately, the inflow tending to force the water accumulated in the wheel out of its buckets. (It should be borne in mind also that the water jet strikes only the upper edge of the bucket, splashing above the wheel.) Second, the wheel is filled before beginning its revolution up to only a quarter of its entire capacity, as, at the level of the axle, the water necessarily falls out of the buckets.

(Continued on page 22.)

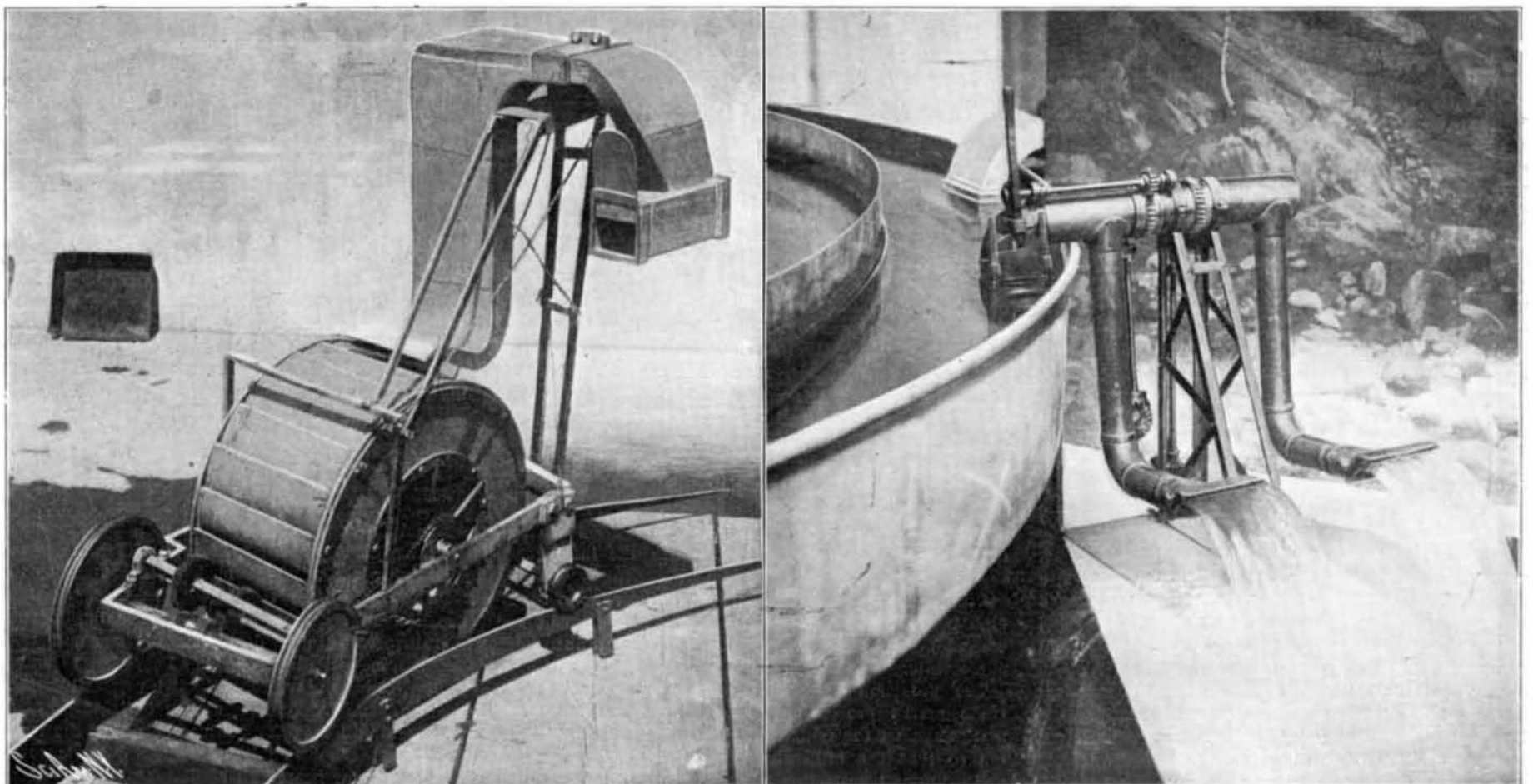


A REMARKABLE WATCH.

disk representing the firmament of Rio de Janeiro revolves in a sense inverse of the others, it representing the austral hemisphere with, of course, the magnificent Cross of the South. Naturally the Milky Way is



The Hydrolocomotive and Its Siphon.



The Hydrolocomotive on Its Track

Siphon of the Hydrolocomotive.

A LOCOMOTIVE DRIVEN BY WATER.