Idea and its history

The idea for CYCLOS arose from the unsatisfying double meaning of the usual 12-hour scale. Every point on the scale designates both the day's cycle and that of the night, without being able to differentiate between them. In the English speaking world one adds "ante meridian" or "post meridian" in order to make the distinction clear. The well known 24-hour clock, on which the hours are all ordered in one circle, has the disadvantage that one has to change ones perception of the angles of the hand in order to read the time.

As early as 1930 a start was made on solving this problem. Paul Schatz and Wolo Wundt, for example, developed the first two-phase wall clocks, but they never entered serial production. Without knowledge about this clock, the architect and designer John C. Ermel, working on an order for a new watch design, had the idea of making the difference between the cycles of day and night obvious. This could be achieved by using a radially adjustable hour hand. He arranged the scale of hours on a so-called "Pascal's spiral", a conchoid of a circle, a special cycloid achieved by overlapping the usual clockwise rotation with translation in the radial direction – in this case a sine curve with a cycle of 24 hours.

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The mechanism necessary for controlling such an hour hand took more than 10 years to develop and is a real marvel of Swiss watchmaking craftsmanship. In 1999 John C. Ermel applied for a Swiss patent on his idea, in 2000 for a worldwide patent. The clearest way of seeing how the system works is with the aid of the following illustrations:

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The CYCLOS dual-phase module: The visible hour hand is mounted on a finger, which is attached to a radially adjustable arm beneath the dial. In the cutaway view the gilded brass gearwheels A, B, C and E are visible underneath the arm (light-gray). The dark-grey pin in the left foreground located in gearwheel E guiding the arm is the guide pin F.

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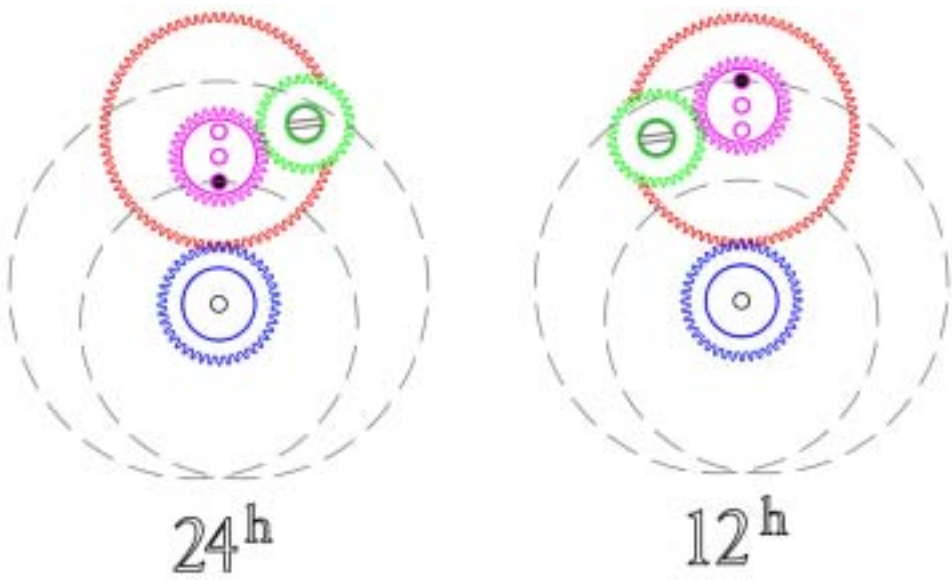

The gearwheels A (blue), B (red), D (green) and E (magenta) at 12h midnight and at 12h noon: The black point indicates the guide pin F and the broken curve shows the Pascal spiral.

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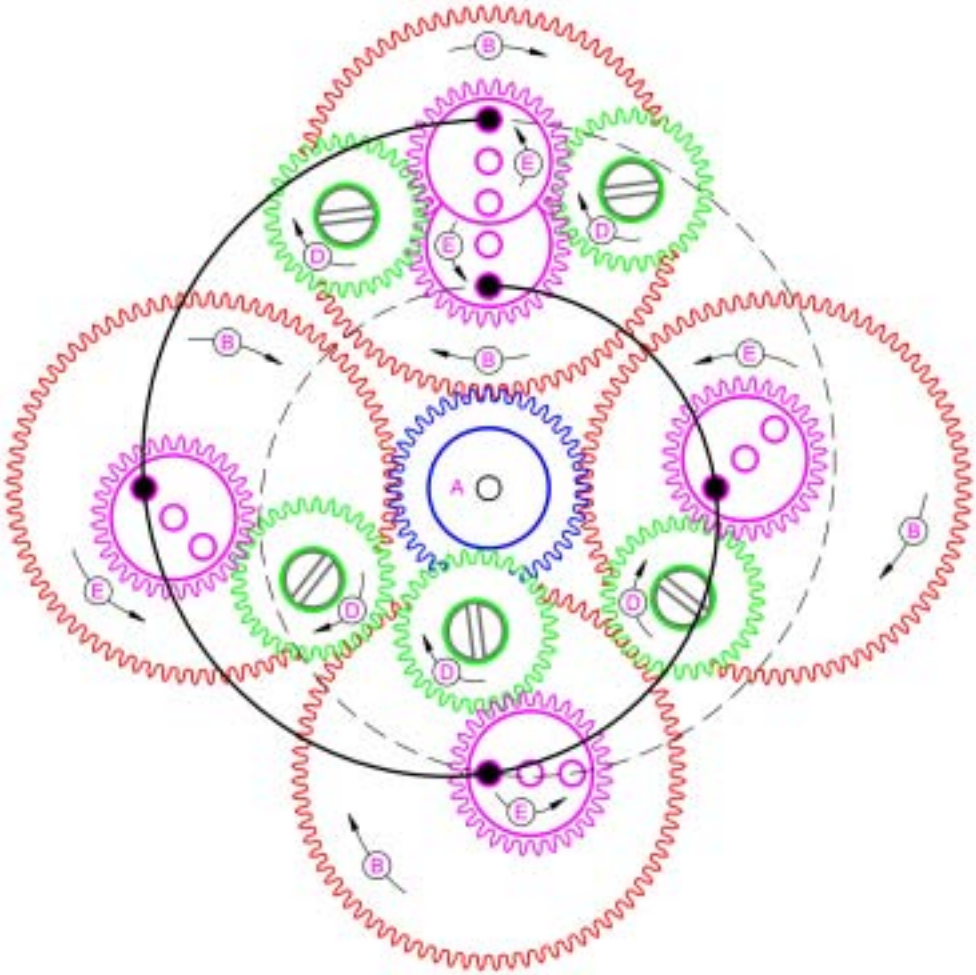

Simultaneous representation of 5 positions of the gearwheels A, B, D and E, namely at 24h/0h, 3h, 6h, 9h and 12h, which is synonymous with "ante meridian". Gearwheel A in the centre remains fixed, gearwheel B is twice as large and turns around A once every 12 hours and rotates 540° around itself during the same time period. Gearwheels D and E are mounted on bearings on B so that they can rotate and, in conjunction with other hidden gearwheels, correct the parallel axis. The Pascal spiral, which can be described mathematically by the formula $\Delta R_f = r_a + r_b \pm 2r_f \cos[(\varphi - 90°)/2]$, is formed in this way. In this formula ΔR_f represents the variable distance of the guide pin F from the centre, r_a = radius

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of gearwheel A, r_b = radius of gearwheel B (whereby $r_b = 2r_a$), r_f = distance of the guide pin F from the centre of gearwheel E.

The two initially available models indicate two phases in the course of the day in different ways:

- on the sporty "a.m./p.m." model, the hourly scale is formed by an outwardly winding spiral in red which indicates the hours "ante meridian", and an inwardly winding spiral in blue which indicates the hours "post meridian". The two phases are separated at 12 noon / midnight.

- on the elegant "day & night" model, one sees an outer loop in gold which indicates the daytime hours, and an inner loop in white which indicates the night time hours. Here, the two phases are separated from each other at 6h/18h.

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