



# TWO-CYLINDER

*Montblanc's Tourbillon Bi-Cylindrique, with its two concentric, cylindrical hairsprings, is the latest tourbillon watch from its Minerva movement factory.*

BY GIBBERT L. BRUNNER

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*Montblanc Tourbillon Bi-Cylindrique*

*The Tourbillon Bi-Cylindrique has a 47-mm-diameter case, a “mysterious” time display and a tourbillon with two tower-shaped hairsprings.*

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ighteenth-century watchmakers experimented with balance springs in many different shapes — cylindrical, spherical, conical — in their quest to design a spring that would oscillate with the greatest possible regularity while remaining perfectly concentric with the balance’s staff.

The tower-shaped or cylindrical hairspring traces its ancestry to 1782, when the English watchmaker John Arnold developed it for marine chronometers.

In 2008, Jaeger-LeCoultre made the first wristwatch with a cylindrical balance spring, the Gyrotourbillon 2.

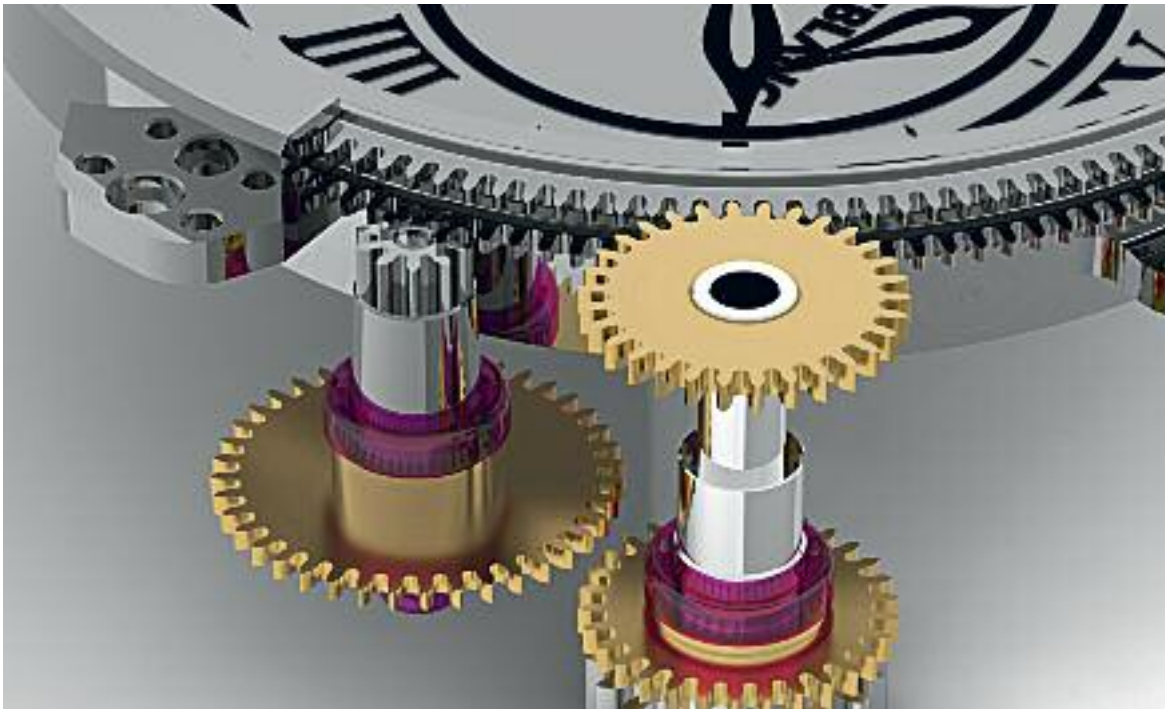
In January of this year, Montblanc came out with another, related innovation when it added the Tourbillon Bi-Cylindrique to its Collection Villeret 1858. In this watch, not one but two of

these ultra-light and highly complex tower-shaped springs work together to produce an ideal rate performance.

Montblanc is not the first to use two springs in a watch, or even in a tourbillon. Watch aficionados are familiar with the double balance springs in Audemars Piguet’s hand-wound Caliber 2899, which powers the Millenary Cabinet No. 5. In that movement, the hairsprings are positioned one atop the other and are oppositely attached to their studs, meaning their points of attachment are 180° apart. The ensemble oscillates in opposite directions, which provides greater equilibrium and offers better options for fine adjustment. The independent watchmaker Laurent Ferrier, formerly of Patek Philippe, has also recently in-

roduced a tourbillon with a double-balance-spring system.

In this tourbillon watch, however, Montblanc goes one step further, using two cylindrical balance springs of unequal diameters and inserting one inside the other. In terms of how they function, there’s no fundamental difference between a flat hairspring and a cylindrical one. In each instance, the spring is a flat strip of coiled metal. In conventional balance springs, these coils are coplanar and of progressively greater diameters, which can lead to a slight but noticeable eccentricity in the center of gravity. By contrast, the coils of a cylindrical balance spring, which are positioned one above the other, all have the same diameter, and this uniformity counteracts the center-of-



*Gears visible from the front turn two sapphire discs with steamed-on hands.*

gravity error. Furthermore, tower-shaped hairsprings “breathe” concentrically and symmetrically, which is essential for isochronic oscillating behavior.

The two balance springs have exactly the same torsional moment and when one of them dilates, the other contracts. This system, used here in a wristwatch for the first time, was developed in Montblanc’s workshops in Villeret, formerly the headquarters of the Minerva *manufacture*. The watchmakers who work in these ateliers take great pride in their ability to make balance springs from A to Z. Minerva’s Monique Wyssmueller is entrusted with the delicate job of adjusting balance springs so their interaction with the bal-

ance produces an ensemble that keeps time to within a maximum deviation of 10 seconds per day. Despite modern, computerized technologies that would make the process quicker and easier, Wyssmueller plies her trade with the aid of a small regulating device that looks as though her grandfather might have used it decades ago. (Tradition, it would seem, is still the watchword at Minerva.) When other watchmakers give the 47-mm-diameter Tourbillon Bi-Cylindrique its final adjustments, they further fine-tune the balance.

The “mysterious” time display — which uses sapphire discs with steamed-on “hands” rather than conventional

hands — can be traced to Montblanc’s Grand Tourbillon Heures Mystérieuses, which debuted in 2008 with an ordinary Breguet balance spring. The other element from that watch that is repeated here is the nickel-silver plate, with its stately diameter of 38.4 mm. Such a large plate was needed to accommodate an 18.4-mm one-minute tourbillon, which combines 95 parts yet weighs a mere 0.96 gram. Inside it is a massive Glucydur balance with a diameter of 14.6 mm. It’s not surprising that such a lavishly proportioned device cannot oscillate faster than 2.5 hertz, or 18,000 vph.

The entire hand-wound caliber is made up of 284 components. Before it is inserted into its case, the gears that propel the “mysterious” time display are positioned so they are visible from the front. This gives the owner, and other horological voyeurs, the opportunity to see exactly how the movement propels the discs.

Needless to say, a technological achievement of this sort cannot be produced in large numbers. Montblanc will make eight watches each in white-gold and rose-gold cases, priced at \$310,300 and \$296,800, respectively. ○

*FOR THE FIRST TIME IN A  
WRISTWATCH, MONTBLANC USES  
TWO CYLINDRICAL BALANCE SPRINGS  
OF UNEQUAL DIAMETERS AND  
INSERTS ONE INSIDE THE OTHER.*