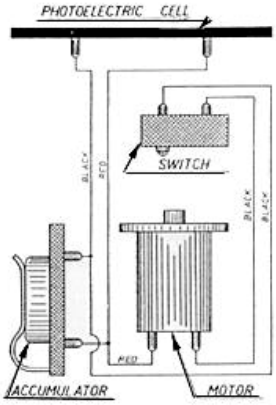
THE PATEK PHILIPPE LIGHT-WOUND CLOCK

by Walt Odets

Nearly a half century ago–in 1950–Patek Philippe began marketing an extraordinary invention, the "light-wound" table clock. The clock required no regular winding and, after ull charge, was capable of running in complete darkness for a year. Furthermore, Patek claimed a very impressive accuracy of within one second a day.

To place the light-wound clock in historical perspective, 1950 was also the year that Patek introduced the Gyromax balance wheel, which at the time seemed an important development for the future of the wristwatch. It would be only two years later that Patek would introduce a "fully electronic clock, i.e. without moving parts," and still another year–1953–before Patek introduced its first automatic wristwatch. Just a year after the automatic Patek introduced the first "nuclear-powered" timepiece, "deriving its energy from a radio-active isotope." And finally, in 1958, Patek produced its first quartz-controlled clock. This is an interesting history for a company that is, today, so strongly associated with conservative and traditional mechanical wristwatchs.

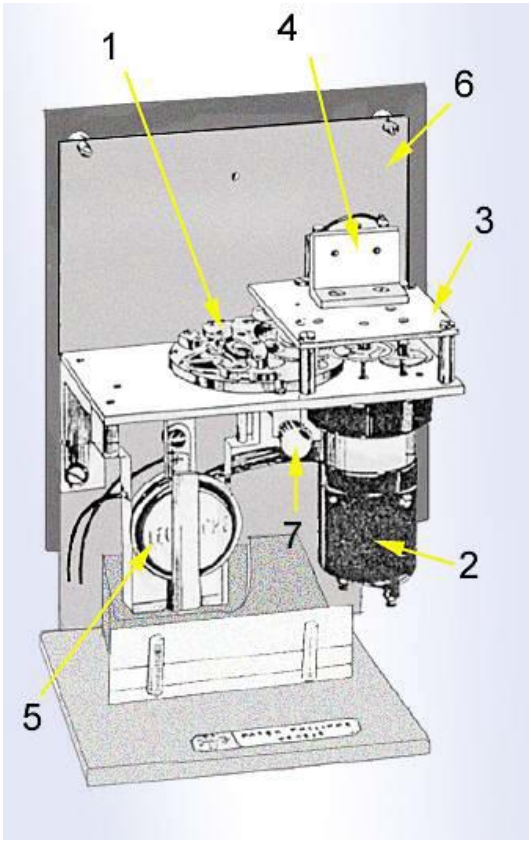
A DESCRIPTION OF THE CLOCK



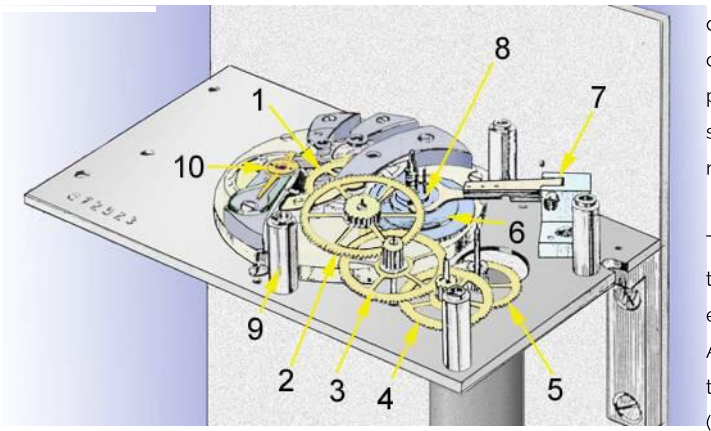
By contemporary standards, the Patek light-wound clock is a technological anomaly and peculiarly primitive. It combines what were, in 1950, state-of-the-art electronics (including very expensive photoelectric cells) with a traditional Patek mechanical hand-wound movement, a modified caliber 17"'-150. As shown in the schematic **at left**, a photoelectric cell (lying under the top dome of the clock case) was used to charge a capacitor ("accumulator"), that, through a mechanical switch, powered a motor that–wound up the watch! As illustrated **below right**, the components of the clock were assembled on a vertical plate behind the dial and a horizontal plate that carried the movement, the switching mechanism, and a "demultiplication" gear train that reduced motor speed for winding. The movement is indicated at **1**, the winding motor at **2**, the demultiplication gear train bridge at **3**, the motor switch plate at **4**, the storage capacitor at **5**, and the back of the dial at **6.** The hand-setting knob is shown at **7.**

THE MOVEMENT

The caliber 17"'-150 is a 17 ligne (38.25 mm), 2.90 mm tall, 18,000 beat per hour hand-wound movement. It runs in 18 jewels, without shock protection. While the earlier version of the clock used a micrometric swan's neck fine regulator, later versions of the clock were equipped with a Gyromax balance and free-sprung overcoil hairspring (without regulator). In the light clock, Patek specifies the normal amplitude at "slightly under 270 degrees measured with the minute hand set at 6 or 12 o'clock." This is necessary because the amplitude increased between 2 and 5 o'clock due to the "falling" force of the relatively heavy, vertical-mounted minute hand. The frequent motor winding action also caused an increase in amplitude. Because of both influences, an intial amplitude of 270 to 310 degrees–a normal range for most healthy watch movements dial down–would have produced excessive amplitude and knocking of the escapement.

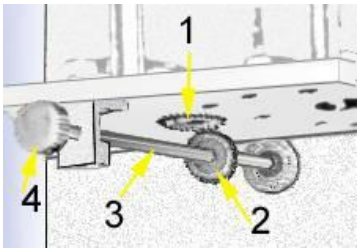


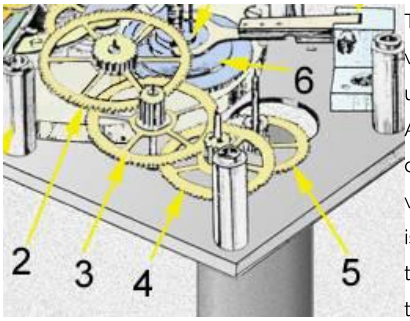
As illustrated **at left** (with the winding train bridge and mainspring barrel gear removed), the movement is a conventional Patek full-bridge movement. The earlier traditional micrometric regulator is illustrated here (**10**). In the later Gyromax version, as with any Patek watch so equipped, a



quarter-turn of a pair of balance weights provided about a seven second correction of rate.

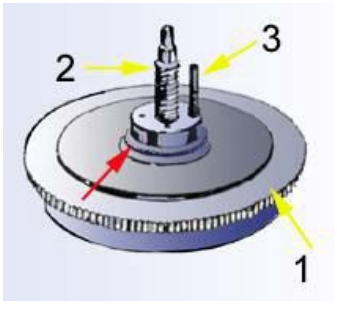
The conventional nature of the movement ends at the center wheel. As illustrated at **right**, power transmission from the (horizontal) center wheel to the (vertical) motion work of the hands is accomplished with a *bevel gear* (**1**) and *cannon-pinion spindle* (**2**). Because the bevel gear requires considerable backlash, the backlash that would otherwise be visible in the hands is eliminated with a Teflon "*hand brake*" (**3**), a sophisticated material for 1950. The Teflon brake, Patek instructs, "acts without oil." The hand-setting knob (**4**) is carried on the rearwards extension of the cannon-pinion spindle.

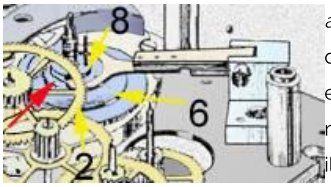




The winding train and mainspring barrel are, of course, also unconventional. As illustrated at **left**, the motor shaft drive gear (**5**) drives a series of reduction gears (**4**, **3**, and **2**), which wind the mainspring barrel (**6**). This gear train is not unlike an enlarged version of the kind of reduction train that exists between the rotor and barrel in an automatic watch. In both cases, the train reduces the high-speed, low-torque output of the rotor (or motor) to the slow-speed, high-torque input needed to wind the mainspring inside its barrel.

The spring barrel, as illustrated in detail **at right**, provided the connection between the mechanical movement and the electronics. Instead of a ratchet wheel, the otherwise conventional mainspring barrel (**1**) carries a *driver* (**3**) and *release nut* (**2**). The release nut carries a large wheel driven by the pinion gear of **2**, as illustrated at **left**. (The large wheel on the barrel is removed in this illustration.) The *angled ring* at the base of the driver and release nut (**red arrow**) carries the forked extension of one of the switch arms. As the barrel drives the movement, it rotates clockwise (as seen from the top plate, as illustrated), gradually raising the forked arm (onto the higher section of the angled ring) and closing the switch contact. Approximately





one-half unwinding rotation of the barrel initiates rewinding. Consequently, one half turn of rewinding moves the fork back to the lower section of the ring, and winding is stopped.

As a full wind represents approximately five turns of the barrel, the mainspring tension is thus kept relatively constant. Because such tight regulation of mainspring tension diminishes any effects of deficient isochronism, this close regulation of mainspring is certainly an important contribution to the running regularity of the clock. A permanent horizontal (dial-down) position and stationary use are others. During vibration and timing, the movement could be adjusted for optimum running in a single position. Patek advised that daily rate could be observed by noting the position of the minute hand, but always in relation to the same point on the dial (to avoid errors introduced by irregular graduation on the dial). As a preferred alternative method, a mark was engraved on one arm of the fourth wheel (the "seconds wheel," revolving once per minute) to index against an adjacent fixed point in the movement. This method, Patek advised would allowing adjustment of rate "to the nearest second."

The Patek light-wound clock is a very impressive piece of work for 1950. And, in some odd way, it is even impressive today.

ABOUT AUTHOR (HTTP://WWW.TIMEZONE.COM/2002/09/16/THE-PATEK-PHILIPPE-LIGHT-WOUND-CLOCK/#)

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