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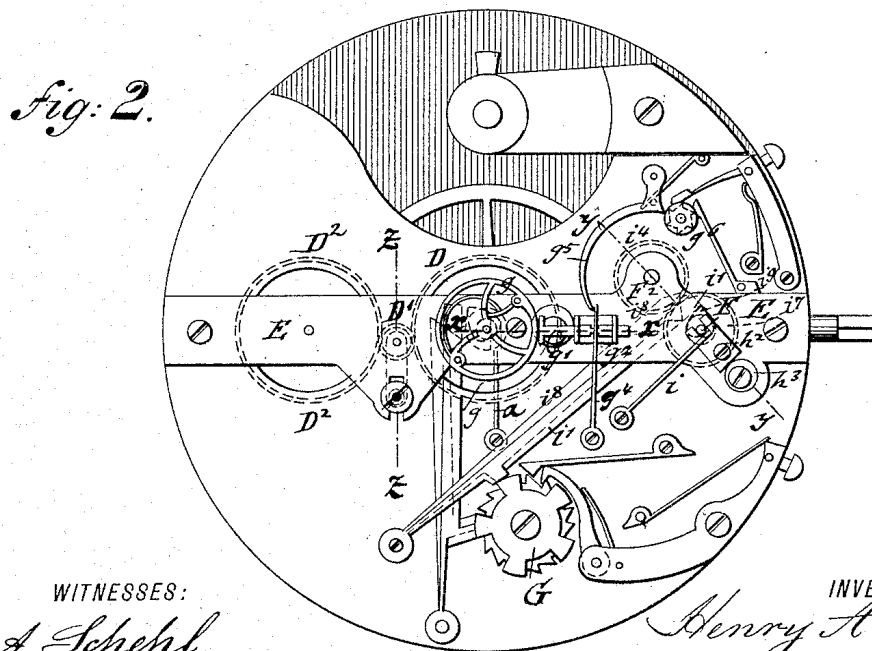
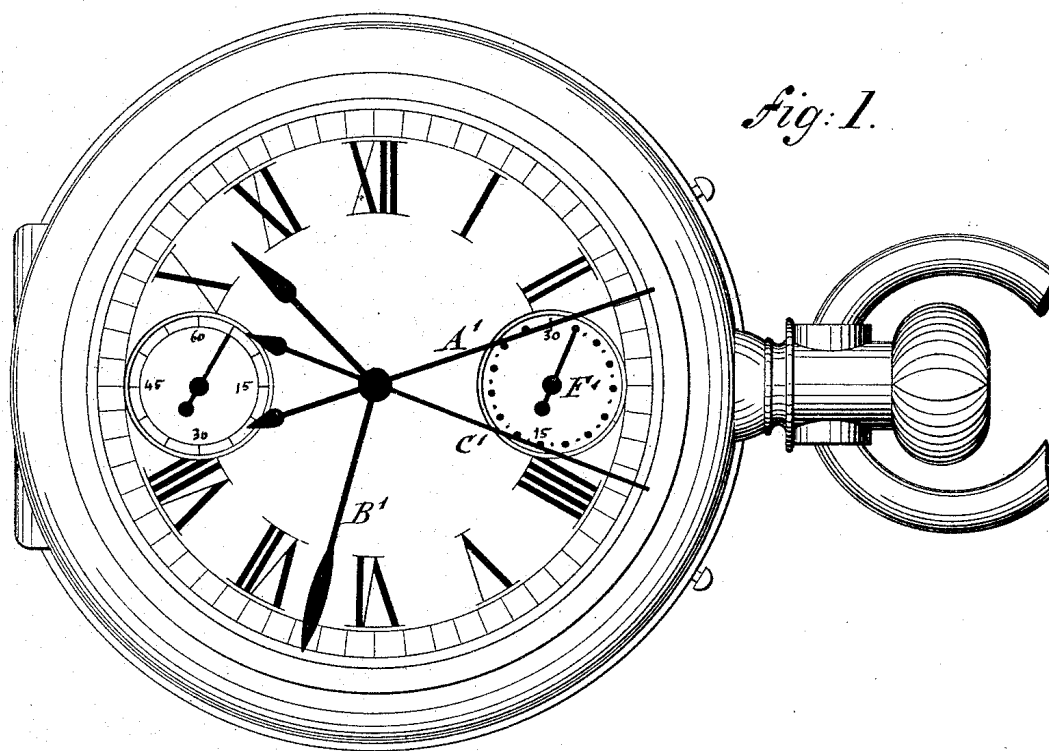
2 Sheets—Sheet 1.

H. A. LUGRIN.

STOP WATCH.

No. 353,795.

Patented Dec. 7, 1886.



WITNESSES:

A. Schehl.

Carl Karp

INVENTOR

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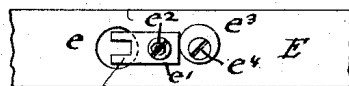
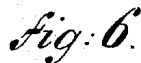
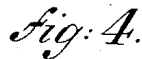
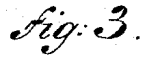
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2 Sheets—Sheet 2.

STOP WATCH.

Patented Dec. 7, 1886.



WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY A. LUGRIN, OF NEW YORK, N. Y.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 353,795, dated December 7, 1886.

Application filed March 12, 1886. Serial No. 194,963. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. LUGRIN, of the city, county, and State of New York, have invented certain new and useful Improvements in Stop-Watches, of which the following is a specification.

This invention relates to certain improvements in the stop-watch for which Letters Patent were granted to me heretofore, No. 243,143, dated June 21, 1881, said improvements being designed with a view to facilitate the working of the quarter-second hand and split quarter-second hand and of the auxiliary minute-hand; and the invention consists, essentially, of mechanism whereby the oscillatory arbor of the quarter-second hand is guided in an accurate and reliable manner and thrown into gear with the motion-transmitting gear of the watch-movement.

The invention consists, further, of an intermediate motion-transmitting pinion between the gear-wheels of the driving-arbor and the oscillating arbor of the quarter-second hand, said pinion being supported on an oscillating and laterally adjustable bridge.

The invention consists, next, of an improved brake by which the split quarter-second hand is stopped in a more effective manner.

The invention consists, finally, of an auxiliary minute-hand applied to an oscillatory arbor and means by which said arbor is guided and thrown into mesh with suitable transmitting-gearing actuated by the center wheel of the watch-movement.

In the accompanying drawings, Figure 1 represents a front elevation of my improved stop-watch. Fig. 2 is a plan view of the top of the movement. Fig. 3 is a detail vertical transverse section through the hollow arbors of the minute and quarter-second hands, showing the mechanism for guiding the arbor of the quarter-second hand and the brake for stopping the split quarter-second hand on line *xx*, Fig. 2. Fig. 4 is a vertical transverse section on line *yy*, Fig. 2, of the mechanism for actuating the auxiliary minute-hand, drawn on a larger scale. Fig. 5 is a vertical transverse section on line *zz*, Fig. 2, showing the motion-transmitting pinion and its oscillating bridge, also drawn on a larger scale; and Fig. 6 is a top view of the recessed adjustable guide for the arbor of the quarter-second hand and the arbor of the auxiliary-minute-hand, also drawn on a larger scale.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the arbor of the quarter-second hand A', which arbor is passed through the hollow arbor B of the minute-hand B'. The arbor A of the quarter-second hand A' is also made hollow, for admitting the passage of the arbor C of the split quarter-second hand C'. The hollow arbor A of the quarter-second hand A' rests by means of a shoulder, *b*, on a face shoulder or bearing, *b'*, of the hollow arbor B of the minute-hand, so as to be capable of a slight oscillating motion on this support. The arbor A of the quarter-second hand carries at its opposite end—that is to say, at the top of the movement—a gear-wheel, D, which gear-wheel is provided with minute-teeth and adapted to be thrown into mesh with an intermediate pinion, D', which receives motion from a minutely-toothed gear-wheel, D², that is keyed to the arbor of the fourth wheel of the watch-movement, as shown in Fig. 2. The oscillating end of the arbor A passes through an opening, *e*, of the top bridge, E, which opening is large enough to permit the free motion of the arbor A, so that its gear-wheel D is thrown in mesh with the intermediate transmitting-pinion, D'.

Immediately above the opening *e* is arranged on the top bridge, E, a recessed guide, *e'*, which is attached by a screw, *e²*, to the top bridge, E, said screw passing through a slot of the guide *e'*, so that the same has a certain play on the shank of said set-screw for adjusting the guide *e'*, as shown in Figs. 3 and 6. The exact adjustment of the recessed guide *e'* is accomplished by an eccentric, *e³*, which turns on a pivot, *e⁴*, and acts on the straight rear edge of the guide *e'*. By loosening the set-screw *e²* of the guide *e'* and turning the eccentric *e³* in one or the other direction on its pivot *e⁴*, the guide *e'* can be moved forward or back, so as to control the oscillating motion of the arbor A. The adjustable guide *e'* serves for guiding the arbor of the quarter-second hand, as well as for determining accurately the extent of its oscillating motion, so as to prevent any lost motion or slack of the same when throwing it in or out of gear with the motion-transmitting mechanism. The intermediate transmitting-pinion, D', is also cut with minute-teeth, and supported loosely on an arbor, *f*, that is attached to one end of a laterally-oscillating

bridge D^3 , which is applied by a pivot, f' , at its opposite end to the centrally-perforated set-screw, f^3 , as shown in Fig. 5. The set-screw f^2 screws into a sleeve, f^3 , which is
 5 guided by its neck in a recess, E' , of the top bridge, E , as shown in Figs. 2 and 5. The set-screw f^2 and sleeve f^3 serve to adjust the bridge D^3 forward or backward in the recess E' ,
 10 so as to produce thereby the exact relative position of the transmitting-pinion D' to the gear-wheels D^2 D . The upper rounded-off end of the pivot f of the loose bridge D^3 bears against the under side of the top bridge, E , so as to move
 15 freely thereon, while the bottom of the loose bridge D^3 moves on the top plate of the movement, it being retained in position between the sleeve f^3 of the top plate and the top bridge, E . As the supporting-bridge D^3 of the pinion
 20 D' is loosely connected with the set-screw f^2 , and as the pinion D' turns loosely on the pivot f of the oscillating bridge D^3 , the pinion D' adjusts itself readily to the positions of the gear-wheels D^2 D^3 and transmits the motion of the gear-wheel D^2 to the gear-wheel D , even
 25 if said gear-wheels should not be cut quite accurately true. In my former construction of stop-watch, shown in the Patent No. 243,143 of June 21, 1881, any inaccuracies in the shape or cut of the gear-wheels D^2 D resulted in the
 30 stopping of the quarter second hand, owing to the wedging in of the transmitting-pinion between said gear-wheels. The free play thus given to the pinion D' by the loose bridge facilitates the intermeshing with the gear-wheels
 35 D^2 D , and consequently the reliable transmission of motion to the arbor A of the quarter-second hand when the same is thrown into gear with the pinion D' . The support of the pinion on the freely-moving bridge also facilitates
 40 in a high degree the primary adjustment of the transmitting mechanism, as well as the readjustment of the same when the watch has been cleaned or repaired.

The arbor A of the quarter-second hand is
 45 provided with the usual stop-disk and heart-cam, (shown in Fig. 3.) that are actuated, respectively, by stop and return levers, which are actuated by a double ratchet-wheel, G , in the usual well-known manner in stop-watches, as
 50 shown in Fig. 2. A spring, a , presses the arbor A in the direction of the intermediate pinion, D' , so that as soon as the stop-lever is released the gear-wheel D is thrown in mesh with the pinion D' , and thereby the quarter-second
 55 hand set in motion. When the quarter-second hand A' is to be stopped, the stop-lever is applied to the stop-disk, which moves the arbor A sidewise against the tension of the spring a , and interrupts thereby the intermeshing of
 60 the pinion D' and gear-wheel D .

As the mechanisms employed for starting, stopping, and returning the quarter-second hand are well known, they require no further description.

65 The split quarter-second hand C' is also actuated by mechanism located at the top of the movement, said mechanism consisting of a

disk, g , on the arbor C of the split quarter-second hand, which disk is engaged at its circumference by a friction-brake, g' , that is guided
 70 in ways of a yoke-shaped guide-piece, g^2 , attached by a center screw, g^3 , to the top bridge, E . The shank of the friction-brake g' is recessed at a point intermediately between the uprights of the guide-piece g^2 , and engaged by
 75 a spring, g^4 , which spring serves to press the brake g' against the circumference of the stop-disk g . The end of the spring g^4 is engaged by a spring-actuated lever, g^5 , which lever is operated by a double ratchet-wheel, g^6 , as customary in stop-watches. When the lever g^5
 80 releases the spring g^4 , the friction-brake g' is applied to the stop-disk g and the "split" stopped, while the quarter-second hand continues its motion. When the lever g^5 engages the
 85 spring g^4 , the same is moved sidewise, and thereby the brake g' released from the disk of the arbor of the split quarter-second hand, as shown in Fig. 3. The split quarter-second hand
 90 flies then instantly back to the quarter-second hand by the usual tension device applied to the stop-disk g , and is returned with the same to the starting-point. The guide-piece g^2 is adjusted accurately in line with the arbor of the quarter-second hand by means of the center screw,
 95 g^3 , which acts as a pivot for the guide-piece g^2 , and is rigidly clamped by the screw g^3 . The friction-brake g' can thus be accurately adjusted in line with the arbor of the quarter-second hand and the recess of the guide g^2 , or,
 100 in other words, in line with the direction of oscillating motion of the arbor A . The brake g' follows, when applied to the disk for stopping the split by the action of its spring, the oscillating movements of the arbors of the
 105 quarter and split quarter second hands, and adjusts itself to the relative position of the disk g when the quarter-second hand is stopped.

An auxiliary minute-hand, F' , applied to an arbor, F , moves over an auxiliary dial,
 110 which is arranged symmetrically to the dial of the second-hand on the watch-dial. The auxiliary minute-hand F' is operated by transmitting-gearing from the center wheel of the watch-movement, its arbor being supported
 115 by a collar, h , on the bearing of a plate, h' , attached to the bottom plate of the watch-movement, as shown in Fig. 4. The opposite end of the arbor F of the minute-hand F' passes through an opening in the top bridge,
 120 E , and is guided by a recessed guide, h^2 , in the same manner as the arbor of the quarter second hand, said guide being adjusted by a pivoted eccentric, h^3 , as shown in Figs. 4 and 6.

The arbor F is adapted to be oscillated on
 125 its bearing h' by the action of a spring, i , which bears on one side of the same, and the action of a stop-lever, i' , that is actuated by the double ratchet-wheel G . (Shown in Figs. 2 and 4.) A minutely-toothed gear-wheel, i^3 ,
 130 on the arbor F is thrown into mesh with a transmitting gear-wheel, i^1 , keyed to an intermediate arbor, F^2 , said gear-wheel i^1 being also minutely toothed. The intermediate

arbor, F², is supported in bearings of the bottom plate of the movement, and of the top bridge, E, and receives continuous rotary motion by a pinion, i⁵, from the center wheel, i⁶, as shown in Fig. 4. When the stop-lever i' is released from the stop-disk, i'', the arbor F is oscillated by the action of the spring i, whereby the gear-wheel i³ is thrown into mesh with the transmitting gear-wheel i⁴, and thereby motion imparted to the auxiliary minute-hand. This is accomplished simultaneously with the starting of the quarter-second hand, as both are operated by the same double ratchet-wheel, G. The stopping, of the minute-hand is also accomplished by the action of the stop-lever i' and stop-disk i'' simultaneously with the stopping of the quarter-second hand, while it is returned to the starting-point by a lever, i⁸, heart cam i'', and double ratchet-wheel G simultaneously with the quarter-second hand. The oscillating movement imparted to the arbor of the auxiliary minute hand by the action of the spring and stop-lever, and the guiding of said arbor by the recessed adjustable guide, secure the quick and reliable throwing in or out of gear of the arbor of the auxiliary minute-hand with the motion-transmitting mechanism of the watch-movement, and produce the starting, stopping, and returning of the minute-hand simultaneously with and on the same principle as the quarter-second hand of the timing attachment.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a stop-watch, the combination of the oscillating and guided arbor of the quarter-second hand, a gear-wheel on said arbor, an intermediate transmitting-pinion supported on an oscillating bridge, and a gear-wheel on the arbor of the fourth wheel of the movement, substantially as set forth.

2. In a stop-watch, the combination of the oscillating arbor of the quarter-second hand, a gear-wheel on said arbor, a transmitting-pinion, a laterally-oscillating bridge supporting said pinion, means to adjust said bridge in a recess of the top bridge of the movement, and a gear-wheel on the arbor of the fourth wheel, meshing with the intermediate pinion, substantially as set forth.

3. In a stop-watch, the combination of the oscillating and guided arbor of the quarter-second hand, a gear-wheel on said arbor, a transmitting-pinion, a laterally-oscillating bridge supporting said pinion, a centrally-perforated set-screw to which the bridge is pivoted, a sleeve inclosing said set-screw and adjustable in a recess of the top bridge, and a gear-wheel on the arbor of the fourth wheel of the watch-movement, substantially as set forth.

4. In a stop-watch, the combination of the top bridge of the movement, having a guide-recess, a sleeve and set-screw adjustable in said recess, a bridge pivoted to said

set-screw, and a pinion pivoted to an arbor of the bridge and adapted to adjust itself to the positions of the gear-wheels on the arbors of the fourth wheel and of the quarter-second hand, substantially as set forth.

5. In a stop-watch, the combination of the oscillating arbor of the quarter-second hand, a top bridge having an opening through which said arbor is passed, a recessed guide on said top bridge, and means for adjusting said guide so as to control the extent of oscillating motion of the arbor, substantially as set forth.

6. In a stop-watch, the combination of the oscillating arbor of the quarter-second hand, a top bridge having an opening through which said arbor is passed, a recessed and slotted guide on said top bridge, a set-screw for said guide, and a pivoted eccentric for adjusting said guide, substantially as set forth.

7. In a stop-watch, the combination of the hollow oscillating arbor of the quarter-second hand, the arbor of the split quarter-second hand passing through said hollow arbor, a stop-disk on the arbor of the split quarter-second hand, a friction-brake arranged in line with the direction of oscillation of the arbor of the quarter-second hand, and mechanism for applying said brake to or removing it from said disk, substantially as set forth.

8. The combination of the hollow oscillating arbor of the quarter-second hand, the arbor of the split quarter second hand passing through said hollow arbor, a stop-disk on the arbor of the split quarter-second hand, a friction-brake arranged to engage the stop-disk, a yoke-shaped guide-piece for the brake, a spring for moving the brake toward the stop-disk, and a lever for removing the brake away from the disk, substantially as set forth.

9. The combination of the arbor of the auxiliary minute-hand, having a shoulder at one end, a supporting-plate having bearings for said arbor, mechanism for oscillating said arbor, a minutely-toothed gear-wheel keyed to said arbor, and an intermediate arbor having a gear-wheel meshing with the gear-wheel of the minute-arbor, and a pinion located below said gear-wheel and meshing with the center-wheel of the movement, substantially as set forth.

10. The combination of the oscillating and guided arbor of the auxiliary minute-hand passing through an opening of the top bridge, mechanism for oscillating the arbor, a recessed guide for the end of said arbor, and means for setting said guide so as to control the extent of oscillating motion of the minute-hand, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HENRY A. LUGRIN.

Witnesses:

PAUL GOEPEL,
SIDNEY MANN.