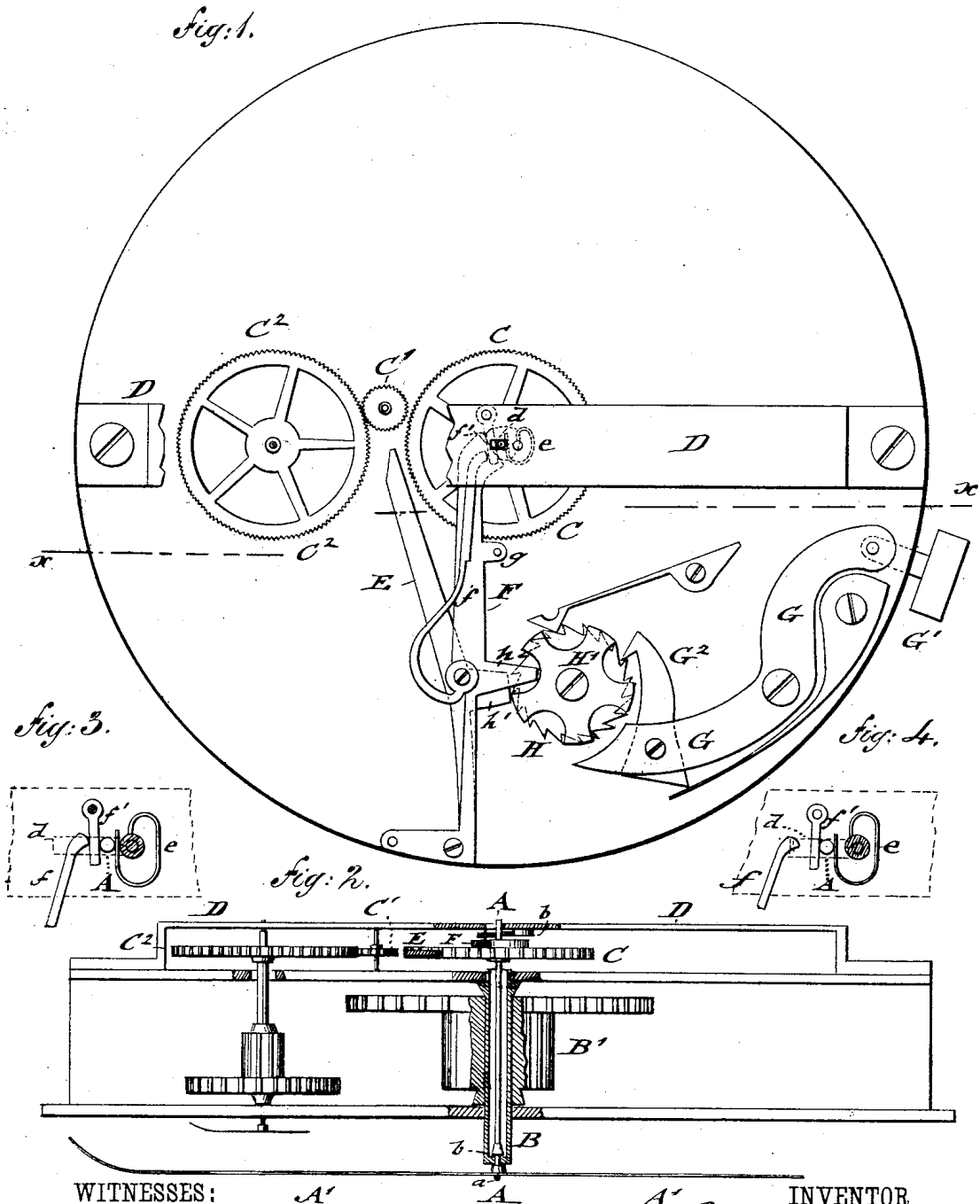


(No Model.)

H. A. LUGRIN.
Stop Watch.

No. 243,143.

Patented June 21, 1881.



WITNESSES:

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STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 243,143, dated June 21, 1881.

Application filed November 15, 1880. (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 has reference to improvements in stop-watches used for timing races, by physicians, and for other purposes; and the invention consists in passing the arbor of the quarter-second hand through the hollow arbor of the center-wheel of the watch-train, and supporting the former by a shoulder near its front end on an end collar of the hollow arbor, so that the arbor of the quarter-second hand may oscillate on this support. To the opposite end of the arbor of the quarter-second hand is keyed a gear-wheel, which is thrown into gear with an intermediate pinion operated by a transmitting-wheel of the fourth wheel of the watch by a friction-spring after withdrawing the returning-spring and shifting-lever of the arbor of the quarter-second hand. The oscillating end of the arbor is guided in suitable manner and its gear-wheel thrown out of gear with the intermediate pinion by a return-lever, which bears on the circumference of the gear-wheel. The quarter-second hand is then returned to the point of starting by the usual shifting mechanism, and held in this position by the retaining-spring and an intermediate oscillating arm, the return-lever being at this point removed from the gear-wheel of the arbor. To start the timing-hand the shifting-lever and retaining-spring is carried away from the heart-cam and arbor by a suitable ratchet, pawl, and lever mechanism, which also actuates the return-lever of the arbor.

In the accompanying drawings, Figure 1 represents a top view of my improved stop-watch drawn on an enlarged scale, with part of the top bridge broken away to show the working parts below. Fig. 2 is a vertical central section of the same on line *x x*, Fig. 1; and Figs. 3 and 4 are detail views of the mechanism for shifting the arbor of the quarter-second hand and throwing the gear-wheel of the same, respectively, out of or into gear with the transmitting-pinion.

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 center-wheel B' of the watch-movement. The arbor A of the quarter-second hand A' passes by a short end stud or pin, *a*, through a central perforation in the face-collar of the hollow arbor B, and rests, by means of a shoulder, *b*, upon the face-collar of the hollow arbor B', so as to be capable of a slight oscillating motion upon this support.

To the opposite or top end of the arbor A is keyed the actuating gear-wheel C of the quarter-second hand A', which gear-wheel is provided with minute teeth, and adapted to be thrown into gear with an intermediate pinion, C', which receives motion from a gear-wheel, C², fixed upon the arbor of the fourth wheel of the watch-train.

The top end of the arbor A is guided in a slot, *d*, in the top bridge, D, said slot being in line with the arbor of the fourth wheel, and of sufficient length to admit the arbor A to oscillate sufficiently for throwing the actuating gear-wheel C into gear with the transmitting-pinion C'. In place of the guide-slot *d* of the top bridge, a guide-arm or any other equivalent device may be used. A friction-spring, *e*, presses upon one side of the arbor A and shifts the arbor A and its gear-wheel C toward the pinion C' as soon as the opposing pressure upon the other side of the arbor is removed. The spring *e* also serves to retain the gear-wheel C in gear with the transmitting-pinion C' after it is thrown into gear therewith.

For the purpose of throwing the actuating gear-wheel C out of gear with the pinion C', a return-lever, E, is employed, which is pressed by its spring-shank against the circumference of the gear-wheel C, so as to carry the same with its arbor sidewise in the slot of the bridge and withdraw the gear-wheel C from the pinion C'. During this motion the lower part of the arbor A changes but imperceptibly its position on the seat of the hollow arbor of the center-wheel, as the oscillating motion required for withdrawing the gear-wheel C from the pinion C' is not considerable, owing to the

smallness of the teeth. As soon as the gear-wheel C is thrown out of gear with the pinion the shifting-lever F, which is used in all stop-watches, is carried back upon a heart-cam of the arbor A, and thereby the quarter-second hand returned to the starting-point. The shifting-lever F is in this case on the same side as the return-lever E, which is released from the gear-wheel at the same moment when the shifting-lever engages the heart-cam, so that the return-lever cannot in any way injure the minute teeth of the gear-wheel C or impede the motion of the same.

The arbor A is held in ungeared position by means of a retaining-spring, *f*, which bears on a pivot-arm, *f'*, which extends transversely across the slot *d* of the bridge of the arbor A, opposite to the contact side of the spring *b*.

Whenever it is desired to start the quarter-second hand and throw the actuating gear-wheel C into gear with the pinion C', the shifting-lever F, as well as the retaining-spring *f*, have to be released from the heart-cam and pivot-arm *f'*, respectively, the shifting-lever being first thrown back sufficiently, so that a fixed pin, *g*, of the same engages the spring *f* and carries it along with the lever and away from the pivot-arm *f'*. As the pressure on the arbor is thereby released, the friction-spring *b* is thereby enabled to throw the arbor A and gear-wheel C toward and into gear with the transmitting-pinion C'.

The different levers and springs by which the quarter-second hand is started, stopped, or returned to the starting-point are actuated by any suitable lever, ratchet, and pawl device, that shown in the drawings consisting of a fulcrumed lever, G, which is operated by a push-pin, G'. A pivoted spring-pawl, G², at the opposite end of the fulcrumed lever G, engages a ratchet-wheel, H, to which a face-plate, H', with larger spurs and intermediate recesses, is secured. A check-pawl retains the ratchet-wheel when the spring-pawl is sprung from one tooth of the ratchet into another. By depressing the push-pin G' the pawl G² moves the ratchet H, which engages, by one of the enlarged spurs of its face-plate, H', a projecting heel, *h*, of the shifting-lever F, so as to force the lever, and with it the retaining-spring *f*, back clear of the arbor A. The friction-spring *b* is thereby enabled to throw the arbor A sidewise, securing the intermeshing of gear-wheel C and pinion C', and the starting of the quarter-second hand. During this motion of the ratchet-wheel the heel *h'* of the return-lever E has remained in contact with the face of one of the larger spurs of the face-plate, so as to keep the same off the gear-wheel C. The next depression of the push-pin G' and the corresponding motion of the ratchet-wheel H throws the heel *h'* of the return-lever E into the adjoining recess of the face-plate H and applies thereby the lever E to the gear-wheel C, withdrawing the same from the pinion C' and stopping the quarter-second hand. During this motion of the ratchet-wheel, the heel of the shifting-lever has been

in contact with the outer surface of the enlarged spurs of the face-plate, which holds the shifting-lever clear of the heart-cam. A third depression of the push-pin G' brings the heel *h'* of the return-lever E again on the outer surface of the next spur of the face-plate H, so as to withdraw the lever E and remove it from the gear-wheel, while, simultaneously, the heel of the shifting-lever F drops into the next recess, so as to apply the end of the shifting-lever F to the heart-cam and the retaining-spring *f* to the pivot-arm *f'*, by which the quarter-second hand is returned to the starting-point, and the arbor A of the quarter-second hand prevented from following the pressure of the friction-spring *b*. The arbor A is now ready for the next starting of the quarter-second hand on throwing the shifting-lever and retaining-spring clear of the heart-cam and arbor.

The construction described is adapted for use with any watch-movement, it being arranged on the top of the same. It can also be worked in connection with any other wheel of the movement in place of the fourth wheel, if desired.

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

1. In a stop-watch, the combination, with the hollow arbor of the center-wheel, having a perforated end collar or seat, of the arbor of the quarter-second hand, which is supported on the collar of the hollow arbor by a shoulder or enlargement, so that the arbor of the quarter-second hand is adapted to oscillate thereon, substantially as and for the purpose set forth.

2. The combination of the oscillating and guided arbor of the quarter-second hand with a friction-spring pressing on one side and a retaining-spring and pivot-arm pressing on the other side of the arbor, substantially as described.

3. In a stop-watch, the combination, with the hollow arbor of the center-wheel, of the arbor of the quarter-second hand, which passes through the former, and with means, substantially as described, whereby the front part of the arbor of the quarter-second hand is supported, so that its opposite end may be oscillated, substantially as specified.

4. The combination, in a stop-watch, of the oscillating arbor of the quarter-second hand, having a shifting heart-cam, a shifting-lever having a projecting pin and a returning-spring, and a ratchet, pawl, and lever mechanism, whereby the shifting-lever is first removed from the heart-cam, and then the retaining-spring released from the arbor, substantially as specified.

5. In a stop-watch, the combination of an oscillating and spring-pressed arbor of the quarter-second hand and its actuating gear-wheel, a return-lever, a shifting-lever, and a retaining-spring, all at one side of the arbor, and a ratchet, pawl, and lever mechanism, whereby the retaining devices of the arbor are first released, the return-lever next applied to

the gear-wheel, and, finally, the return-lever released from the gear-wheel and the retaining devices applied, so that the quarter-second hand is either started, stopped, or returned to the starting-point, substantially as set forth.

5 6. In a stop-watch, the combination of the oscillating and spring-pressed arbor of the quarter-second hand and its actuating gear-wheel, a return-lever, and a shifting-lever having a retaining-spring, and a ratchet, pawl, and lever mechanism, whereby the return-lever is

applied to the gear-wheel, while the shifting-lever and retaining-spring are released from the gear-wheel, after which they are reapplied thereto, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 10th day of November, 1880.

Witnesses: HENRY A. LUGRIN.

PAUL GOEPEL,

CARL KARP.