(No Model.) 2 Sheets—Sheet 1.

A. LECOULTRE.

STOP WATCH.

No. 355,403. Patented Jan. 4, 1887.

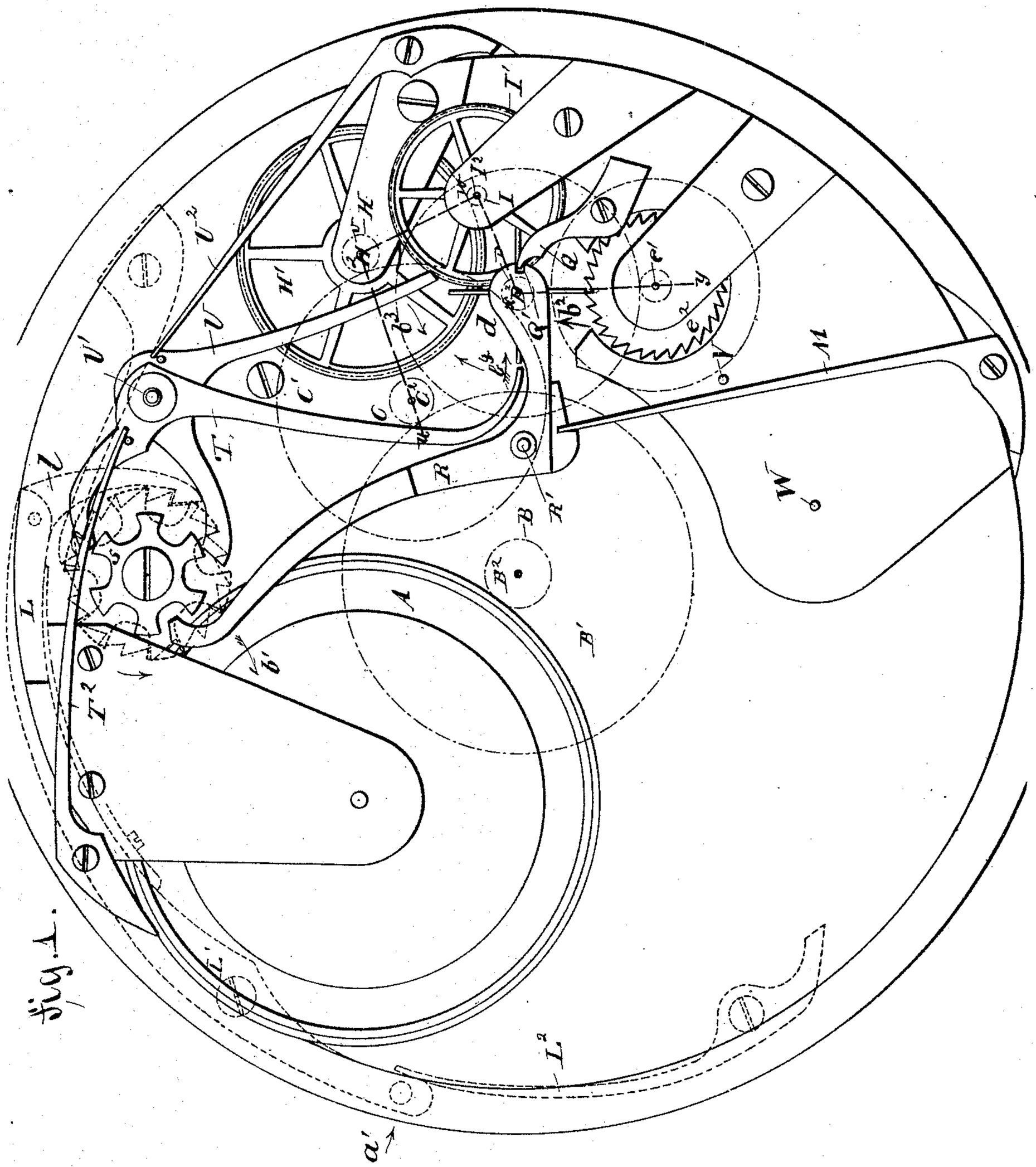

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

A. LECOULTRE.

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Fig. 4.

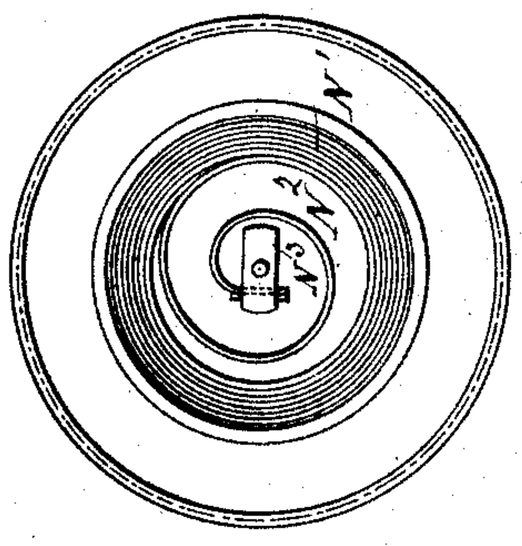


Fig. 2.

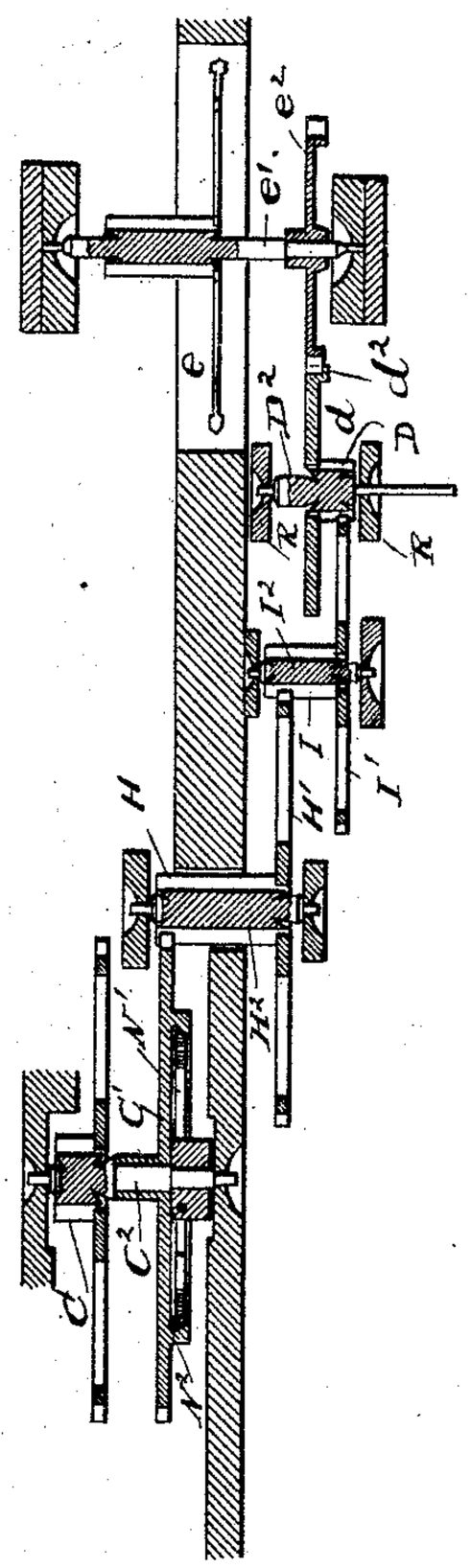
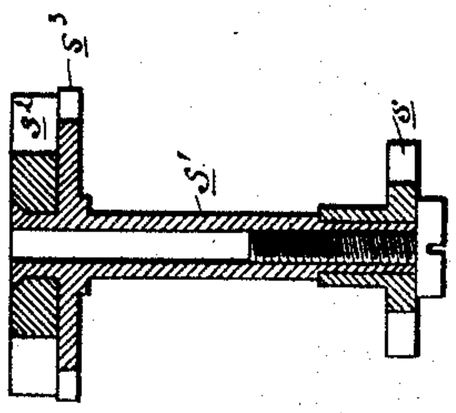


Fig. 3.



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UNITED STATES PATENT OFFICE.

AMI LECOULTRE, OF BRASSUS, VAUD, SWITZERLAND.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 355,403, dated January 4, 1887.

Application filed June 19, 1886. Serial No. 205,622. (No model.)

To all whom it may concern:

Be it known that I, AMI LECOULTRE, of Brassus, canton of Vaud, in the Republic of Switzerland, have invented certain new and useful Improvements in Watches, of which the following is a specification.

This invention relates to certain new and useful improvements in that class of watches provided with a stop-watch hand and with a small hand for showing fractions of seconds—for instance, one-fourth, one-fifth, one-sixth, &c., as may be desired.

The object of my invention is to provide a watch in which the stop-watch mechanism and an independent split-seconds hand are operated by one and the same spring, which also operates the ordinary watch mechanism.

The invention consists in the combination, with a watch, of an independent split-seconds mechanism operated by a special train of gearing from the mainspring, one of the wheels of the train being loose on its arbor and having a friction-spring for driving it.

The invention also consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a face view of a watch of my improved construction, some of the wheels being omitted. Fig. 2 is a sectional view on line *u v w x y*, Fig. 1. Fig. 3 is a cross-sectional view of the wheel for operating the levers for throwing the split-seconds-hand mechanism in and out of gear and throwing the stop-watch mechanism in and out of gear. Fig. 4 is a view of the under side of the transmitting-wheel provided with the spring.

Similar letters of reference indicate corresponding parts.

A is a cog-wheel of ninety teeth, driven from the mainspring and engaging with the pinion B, having twelve teeth, which pinion is mounted on the same arbor, B^2, with the cog-wheel B′, having eighty teeth and engaging with the pinion C, of ten teeth, on the arbor C^2. On the arbor C^2 the cog-wheel C′ is mounted, which engages with the pinion H, mounted on the arbor H^2, carrying the cog-wheel H′, engaging with the pinion I on the arbor I^2, also carrying a cog-wheel, I′, engaged with a pinion, D, mounted on an arbor, D^2, carrying the four-armed wing *d*, which arbor D^2 is journaled in the forked end of the angle-lever R, pivoted at R′, and having its other end adjacent to the rim of the wheel *s*, mounted on one end of a shaft or sleeve, *s*′, provided at its opposite end with a toothed wheel, s^2, and the ratchet-wheel s^3. A hook-pawl, *l*, engages with the teeth of the ratchet-wheel s^3, and is pivoted to one end of the lever L, pivoted at L′. A spring, L^2, fixed to the frame of the works, acts on that end of the lever L opposite the one provided with the hook-pawl *l* and presses it outward—that is, in the inverse direction of the arrow *a*′. Two levers, T and U, are pivoted at U′, one end of each lever T and U being adjacent to a circular line described by the outer ends of the wings of the wheel *d*, and the opposite ends of said levers being adjacent to the rim of the toothed wheel *s*. A spring, U^2, fastened on the plate of the works, acts on the lever U and presses the end of the lever toward the rim of the wheel *s*, and the spring T^2, fastened on the frame of the works, acts on the lever T and presses the same against the rim of the wheel *s*. A spring, M, fixed to the frame of the works, acts on an offset or shoulder of the lever R, and presses one end of said lever against the rim of the toothed wheel *s*. A lug or bridge, Q, fixed on the frame of the works, has one end passed into a notch in one of the shanks of the forked end of the lever R, which lug Q is to limit the movements of the said lever R.

The arbor *e*′, carrying the wheel *e*, with which the anchor engages, also carries a toothed wheel, e^2, the teeth of which can engage with the teeth or wings of the wheel *d*. A lug, d^2, is formed on one of the wings of the winged wheel *d* and projects from the plane in which the wheel revolves.

The wheel C′ is not mounted rigidly on its arbor C^2, but is provided in one face with a dovetailed recess, N^2, in which a spring, N′, is coiled, one end of the spring being fastened on the arbor or cross-piece N^3 of the same, and the other end of the spring resting against the beveled side of the recess in the wheel C′ in such a manner that said end of the spring can slide on the end of the recess 2.

W is the pivot of the balance-wheel. V is the pivot of the anchor or other oscillating lever.

The operation is as follows: During the time that the split-seconds mechanism is in operation one end of the lever R is in one of the notches of the wheel *s*, as shown in Fig. 1, and the wings of the wheel *d* can engage with the teeth of the toothed wheel e^2, the ends of the other levers, T and U, resting on the ends of the teeth of wheel *s*, their opposite ends of teeth being in such a position that they cannot engage with the wings of the wheel *d*. For each oscillation of the balance-wheel the toothed wheel e^2 is moved the distance of one tooth, and thereby the wheel *d* is released once for each oscillation of the balance-wheel and can make a one-fourth turn, said wheel *d* being revolved from the arbor C^2 by means of the cog-wheel C′, previously described. The spring N′ has a tendency to uncoil, and thus its free end is pressed against the side of the recess in the wheel C′, thus producing sufficient frictional contact to revolve the wheel C′ the moment that the wheel *d* is released. The tension in the spiral spring N′ presses the outer end of the spring against the side of the recess in the wheel C′, but said spring also has a tendency to revolve the wheel C′. Said spring is being continually wound from the arbor C^2, and is at all times kept at a high tension. The spring N′ is dependent entirely upon the mainspring, and serves merely to transmit the motion, even when the wheel *d* is released. The gearing is so proportioned that the wheel *d* revolves one-fourth for each quarter-second, and makes one revolution per second, so that the split-seconds hand on the arbor D^2 indicates quarter-seconds. When it is desired to stop the split-seconds mechanism, the lever L is pushed inward in the direction of the arrow *a*′, whereby the wheel *s* is turned such a distance that the end of the lever R is on the end of one of the teeth of the wheel *s*, whereby that end of the lever R on the rim of the wheel *s* is moved in the direction of the arrow *b*′ and the other end in the direction of the arrow b^2, whereby the winged wheel *d* is disengaged from the toothed wheel e^2. At the same time one end of the lever U drops into one of the notches of the wheel *s*, whereby the opposite end of the lever is moved in the direction of the arrow b^3, and said end projects into the circle described by the ends of the wings of the wheel *d*, thus causing one of the wings to strike against the end of said lever U, whereby the said wheel is stopped and cannot be revolved any longer. Only the wheel *d*, the pinion I, the cog-wheel I′, the pinion H, the cog-wheel H′, and the cog-wheel C′ are stopped, but not the arbor C^2 on which said wheel C′ is mounted, for the reason that said cog-wheel C′ is loosely mounted on its arbor, and is only driven by friction—that is, when no resistance is offered to the several gear-wheels of the train for operating the split-seconds mechanism. The tension of the spring N′ produces sufficient friction to cause said wheel to be revolved from the arbor C^2, to which one end of the spring N′ is fastened.

When the wheel *d* is stopped, as stated above, the resistance offered is greater than the friction produced by the spring N′, and the free end of said spring slides on the sides of the recess N^2 in the wheel C′. This does not interfere with the works of the watch.

When it is desired to throw the split-seconds hand back to zero—that is, back to the point from which it is to start—the lever L is again pushed in the direction of the arrow *a*′, whereby the wheel *s* is again rotated a short distance. The said wheel *s* acts on the lever U, thereby moving that end adjacent to the wheel *d* in the inverse direction of the arrow b^3. At the same time one of the teeth of the wheel *s* acts on one end of the lever T, whereby the opposite end is moved in the direction of the arrow b^4, so that said end projects into the circle described by the ends of the wings of the wheel *d*. The end of the lever T is in a plane above or below that in which the wheel *d* revolves, and the projection d^2 on the wheel *d*, which projects from the plane in which the wheel revolves, strikes against the end of the lever T and stops the wheel *d*, so that the said wheel *d* always stops in such a position that the split-seconds hand connected with said wheel is at zero of the dial over which said split-seconds hand revolves. I have provided the projection d^2 on only one of the wings of the said wheel d^2. Whenever the split-seconds mechanism has been stopped and the hand is to be thrown back to zero, the wheel *d* is released and permitted to revolve until its projection strikes the lever T. In some cases—for instance, when the wheel *d* has been stopped at the quarter-second—said wheel only makes a quarter of a revolution in its return movement, and when, for instance, the split-seconds hand is stopped at the three-quarter second, said wheel *d* makes three-quarters of a revolution during its return movement.

When it is desired to start the split-seconds mechanism, the lever L is again pushed in the direction of the arrow *a*′, whereby one end of the lever R is permitted to move into one of the notches of the wheel *s*, and the other end of said lever is moved in the inverse direction of the arrow b^2, and the wings of the wheel *d* are engaged by the teeth of the wheel e^2.

A stop-watch of any approved construction is provided in the watch, and is started and checked from the wheel s^2 in the usual manner.

In my improved watch the ordinary works, the stop-watch, and the split-seconds mechanism are all operated from the same spring, and no special driving-spring need be provided for the split-seconds mechanism. By providing the above-described mechanism I am enabled to drive the split-seconds mechanism from the mainspring at any time, and when the split-seconds mechanism is checked at any time it does not interfere with the remaining parts of the watch.

The stop-watch and split-seconds mechanism are operated at the same time, as the wheels *s* and s^2 are on the same shaft and are

turned at the same time. Whenever the stop-watch is stopped, the split-seconds mechanism is stopped at the same time. The stop-watch and split-seconds mechanism are also started and brought back to zero at the same time.

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

1. In a watch, the combination, with a shaft or arbor, of two toothed wheels and a ratchet-wheel mounted on the same, a split-seconds-hand mechanism, and levers controlling the same, which levers are acted upon by one of the toothed wheels, substantially as shown and described.

2. In a watch, the combination, with the mainspring, of the arbor C^2, driven by gearing from said mainspring, the wheel C′, mounted loosely on said arbor and having a recess in one face, a spring secured on the arbor within the recess and having one of its ends resting against the side of the recess, a train of gearing operated by said loose cog-wheel, and split-seconds mechanism operated by the train of gearing, substantially as shown and described.

3. In a watch, the combination, with the mainspring and usual watch mechanism, of the pivoted lever R, the winged wheel *d*, pivoted in one end of the same, gearing for revolving said wheel *d* from the mainspring of the watch, and a ratchet-wheel, e^2, engaging with the winged wheel *d*, and also operated from the mainspring of the watch, substantially as shown and described.

4. A watch constructed with a mainspring and usual watch mechanism, a pivoted lever, R, toothed wheel *d*, pivoted in one end of the same, the levers T and U, and the toothed wheel e^2, all combined substantially as shown and described.

5. A watch constructed with the usual mainspring and watch mechanism, the toothed wheel *s*, the lever R, the winged wheel *d*, pivoted in one end of the lever R, said winged wheel having a projection projecting from the plane in which the wheel revolves, and the stopping-levers T and U, all combined substantially as shown and described.

6. In a watch, the combination, with the mainspring and usual watch mechanism, of the pivoted lever R, having the notch Q′, the stop-lug Q, projecting into said notch, the winged wheel *d*, pivoted in the end of the lever R, gearing for operating the lever *d* from the mainspring, and the stop-lever U, all combined substantially as shown and described.

7. In a watch, the combination, with the mainspring and usual watch mechanism, of the lever R, the toothed wheel *d*, pivoted in one end of the same, a train of gearing for operating said toothed wheel from the mainspring, the spring M, acting on the lever R, and the toothed wheel *s*, substantially as shown and described.

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

AMI LECOULTRE.

Witnesses:

JEAN ALP. SCHNIFGAUBEL,

LYELL T. ADAMS.