(No Model.) 2 Sheets—Sheet 1.

G. B. ST. JOHN.

STOP WATCH.

No. 319,145. Patented June 2, 1885.

Fig. 1.

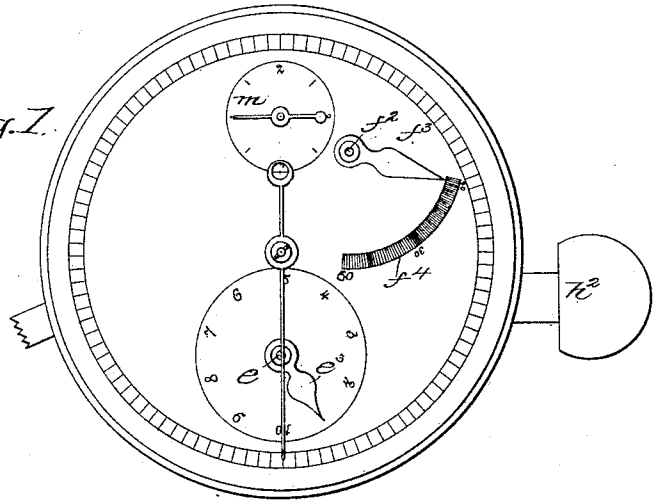
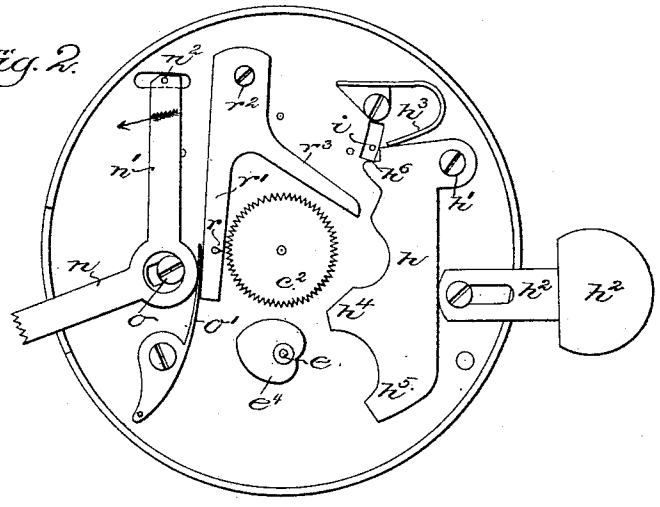


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

G. B. ST. JOHN.

STOP WATCH.

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Fig. 3.

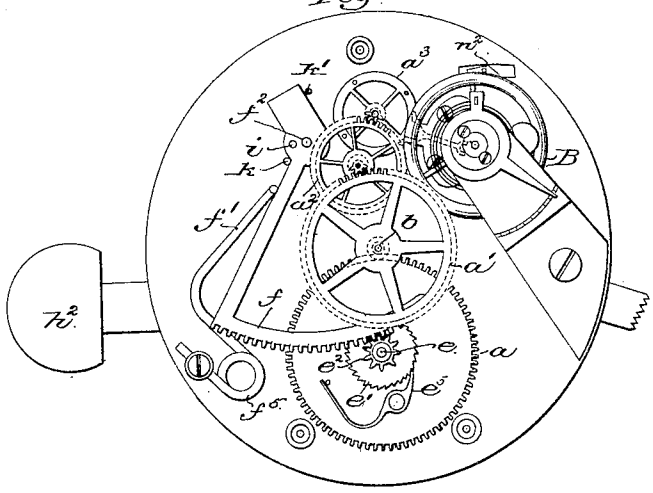


Fig. 4.

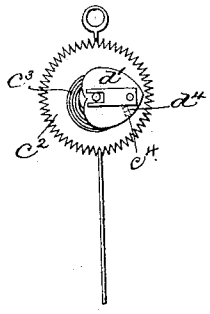
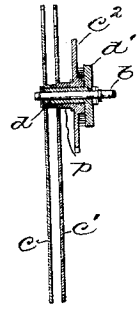


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE B. ST. JOHN, OF BOSTON, MASSACHUSETTS.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 319,145, dated June 2, 1885.

Application filed January 7, 1884. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. ST. JOHN, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Watches, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to a watch of that kind commonly known as "timers" or "stop-watches," such as are employed for measuring with extreme accuracy a short interval of time, as in timing a race; and the invention consists in various details of construction hereinafter described. The watch is provided with a split second-hand or two second-hands, which normally rotate in unison, and one of which may be stopped while the other continues to rotate.

The invention consists, partly, in a winding and restoring device by which the hands of the watch are all restored to a normal or zero point, and the mainspring of the watch at the same time wound with sufficient power to actuate the watch for a considerable length of time.

The invention also consists in a novel stopping device by which the entire train of the watch may be stopped and started at will, and by which one of the second-hands may be stopped while the train continues to move, carrying the other second-hand.

Figure 1 is a front view of a watch or timer embodying this invention; Fig. 2, a similar view with the dial and hands removed; Fig. 3, a rear view of the train, the rear plate being removed, and Figs. 4 and 5 details of the split second-hand.

The watch or timer contains a train of wheel-work, $a\ a'\ a^2\ a^3$. The arbor b of the wheel a' is at the middle of the watch, and the train is arranged to cause it to rotate once a minute, the said arbor being provided with the split second-hand $c\ c'$, the hand c of which is firmly connected with sleeve or hub, d, having a strong frictional connection with the arbor b, and provided with a heart-cam, d', by means of which it is restored to its normal or zero position by the restoring and winding device hereinafter described.

The arbor e of the wheel a, which is proportioned to rotate once in ten minutes, has loose upon it a ratchet, e', having connected with it a pinion, e^2, meshing with a segmental winding-gear, f, acted upon by the spring f', which constitutes the actuating or main spring of the train. The said arbor e has frictionally held thereon a minute-hand or pointer, e^3, having connected with it a restoring heart-cam, e^4, by which it is restored to the normal or zero position, as hereinafter described. The ratchet e' engages a pawl, e^5, on the wheel a in order to cause the said wheel and the remainder of the train to rotate with it when moved by the segment f and spring f', but to permit the said segment to be turned in the opposite direction to strain or wind up the spring without rotating the train, the ratchet and pinion then turning freely on the arbor e. The segment f is thus turned back to wind up the spring f', and the hands are at the same time all restored to their normal or zero position by means of the winding and restoring device h, consisting of a plate pivoted at h' and acted upon by a stem or push-knob, h^2, that may be operated from the outside of the case of the watch or timer, it being normally held in the position shown in Fig. 2 by a spring, h^3. The said plate h has projections or faces $h^4\ h^5$, acting upon the heart-cams d' and e^4, respectively, to restore the said cams and the hands $c\ c^3$, connected therewith, to the normal position in the usual manner, and the said plate is also provided with a shoulder or face, h^6, which acts upon a pin, i, connected with the segment f near its pivot, as shown, so that as the said plate h is turned on its pivot h', the shoulder h^6, engaging the winding-segment f by the pin i, turns the said segment in the direction to strain or wind up the mainspring f'. Stop-pins $k\ k'$ limit the movement of the winding-segment in either direction, and the arbor f^2 of the said segment is provided with a hand, f^3, which, in connection with a graduated segment, f^4, on the dial, (see Fig. 1,) will indicate a considerable number of minutes, the said hand being restored to the zero-point when the segment is turned in the operation of winding.

The wheel a^3 of the train forms a part of the escapement, which is of any suitable character, the said wheel turning for a considerable por-

tion of a revolution at each oscillation of the balance, so that, with the pointer *m* connected, it will indicate to fractions of a second, as is usual in watches of this character.

The watch may be instantly stopped or started by the stopping device, consisting of a lever, *n n'*, fulcrumed in a stud or screw, *o*, on the watch-plate, and having a sliding as well as a rocking movement on the said fulcrum, against which it is normally held by a spring, *o'*. The arm *n* of the said lever extends outside of the case of the watch, to enable it to be operated, and the arm *n'* is provided with a spring-finger, n^2, which, when the lever is in the position shown in Figs. 2 and 3, engages the periphery of the balance B of the watch, but which, when turned on its pivot *o* in the direction of the arrow, Fig. 2, disengages the said balance, at the same time imparting an impulse to it by which the escapement is positively set in operation.

The hub *d* of the cam *d'*, carried by the arbor *b*, and carrying with it the hand *c*, has loose upon it a hub, *p*, provided with a second-hand, *c'*, and a notched plate, c^2, the said hand being normally held in line with the hand *c* by a spring, c^3, having one end connected with the said plate c^2, and the other end with the cam *d'*, it normally holding the plate with a stop projection, c^4, resting against a projection, d^4, on the cam *d*, the said projections permitting the forward rotation of the hand *c* relative to the hand *c'*, in which rotation the spring c^3 will be more tightly coiled. The hand *c'* may be held stationary while the hand *c* and the remainder of the train continue to move, so that the hand *c'* will indicate the beginning of an interval of time to be measured, by means of a stop-projection, *r*, on a stop-arm, *r'*, pivoted at r^2 with some friction, so that it will remain in whatever position it is placed. The said arm *r'* is operated to engage the projection *r* with the notched plate c^2, and thus arrest the hand *c'* by the sliding movement of the lever *n* on its fulcrum, as will be at once seen by referring to Fig. 2, and this movement can take place when the arm *n'* of the stop-lever is in either position, so that the plate c^2 and hand *c'* may be locked before the train is released or started, or may be locked at any moment while the said train is moving without arresting the said train. The plate c^2 is released to permit the spring c^3 to restore the hand *c'* to its position of coincidence with the hand *c* by the movement of the restoring and winding plate *h*, which engages a finger, r^3, of the stop-arm *r'*, disengaging it from the said disk c^2, and permitting the hand *c'* to be restored by the spring c^3 into coincidence with the hand *c*, and the two hands *c c'* then to be together restored to the zero position by means of the heart-cam *d'*. It will be seen that the stop-lever *n n'* thus controls, also, the stop *r* for arresting the hand *c'* or splitting the second-hand, and it is of great convenience to have the splitting of the second-hand operated by the same stop that controls the train, whether the train is in motion or not. The plate *h* engages the arm r^3 and releases the hand *c'* before the projections h^4 h^5 h^6 act on the respective co-operating parts, so that the hand *c'* may also be released while the train is in motion without interference with the movement of the said train or other hands carried thereby.

In operation, when it is desired to measure an interval of time, as in taking the time of a race, the stop n^2 will usually be engaged with the balance, arresting the train with the hand *m* at *o*, and the push-knob h^2 then pressed inward, setting all the hands at the zero-point. Then the lever *n* is operated at the beginning of the interval to set the train in motion, and at the end of the interval the lever *n* is again operated to arrest the train, when the interval that has elapsed between the operations of starting and stopping may be read off at leisure to the fraction of a second. The main-spring *f'* has a coiled portion, f^5, in order to afford greater range of movement at the end of the spring, which bears against the winding-gear and moves in an arc nearly concentric with the said coiled portion, which is in such position with relation to the arbor f^2 of the segment *f* and the point at which the said spring bears against the said segment, that as the segment moves under the action of the spring or as the latter runs down, the point at which it acts upon the segment will travel away from the pivot of the said segment, thus giving the spring greater leverage in proportion as it runs down and its strength diminishes, so that the force transmitted from the segment to the train will remain substantially uniform as the spring runs down.

I claim—

1. The train of wheel-work and hands carried thereby, combined with a winding and hand-restoring device, whereby the hands are restored to the zero position and the main-spring wound at a single operation, substantially as described.

2. The train of wheel-work and the split second-hand composed of two hands, one moved directly by the train and the other having a spring-connection therewith, combined with a stopping device for the said spring-connected hand and an independent stopping device for the train of wheel-work, and a stop-operating device common to both the said stopping devices, substantially as described.

3. The split second-hand composed of one hand carried directly by the train of wheel-work and another hand having a spring-connection therewith and provided with a notched disk, combined with the pivoted stop-arm provided with a stop projection for the said disk, and the stop-lever having a pivotal movement for controlling the train, and a sliding movement, whereby it operates the stop-arm for the said notched disk, substantially as described.

4. The train of wheel-work and ratchet loose

cn the arbor of one of the wheels, and pinion connected therewith, combined with the toothed winding-segment meshing with the said pinion and the mainspring acting on the said segment, and a hand or pointer fixed on the arbor of the said segment, substantially as described.

5. The train of wheel-work, and toothed winding-segment, and mainspring acting thereon, and the hands frictionally held on the arbor of the wheels of the said train, combined with the winding and hand-restoring device, co-operating with the said segment and hands, whereby the spring is wound and the hands restored to their normal starting-points, substantially as described.

6. The winding-segment and spring acting laterally thereon, the said spring being arranged to act on the said segment between its pivotal point and the point of attachment of the spring, as described, whereby the spring acts with increasing leverage as its power is expended.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE B. ST. JOHN.

Witnesses:
JOS. P. LIVERMORE,
W. H. SIGSTON.