

(No Model.)

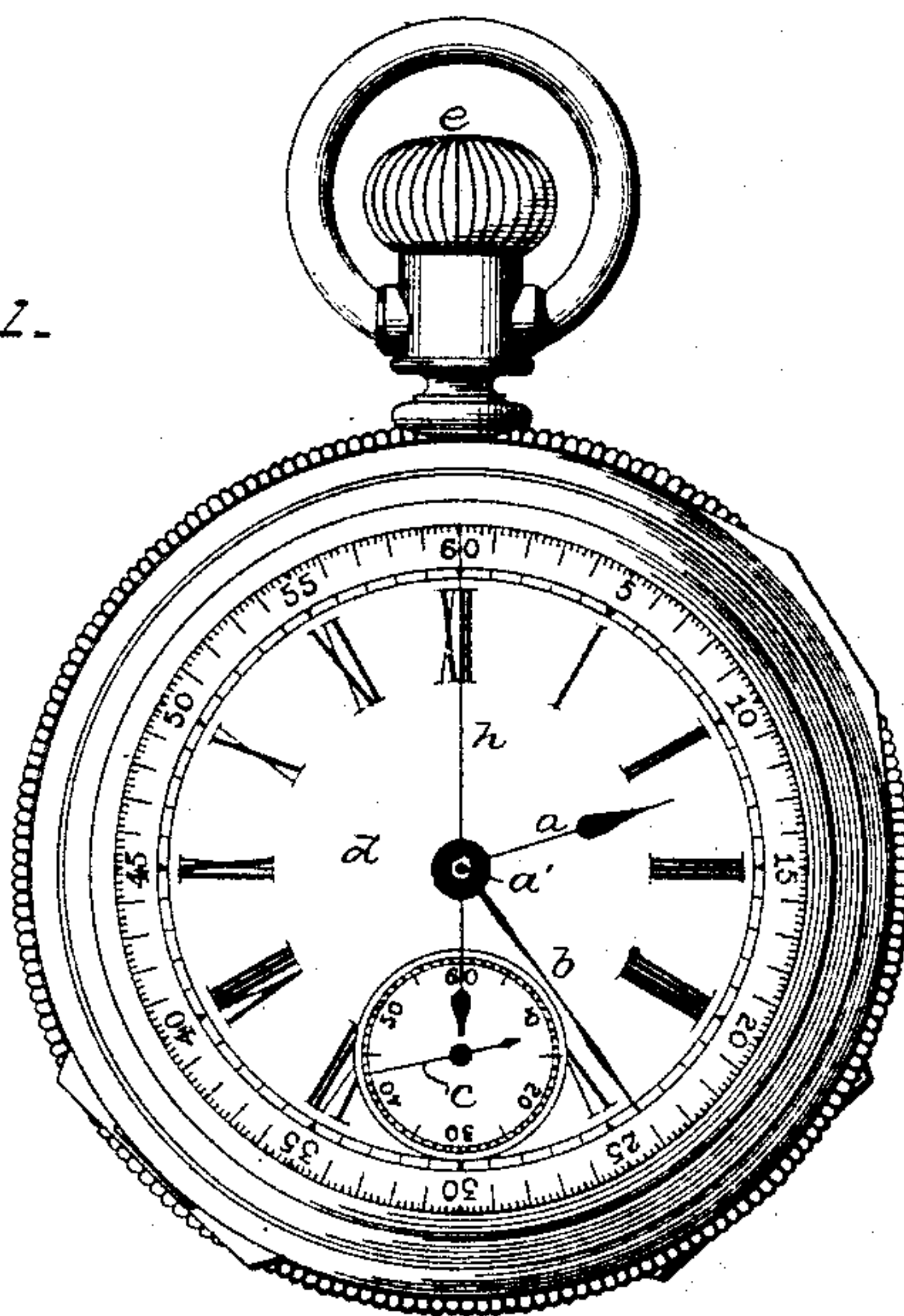
2 Sheets—Sheet 1.

H. J. EISEN.  
STOP WATCH.

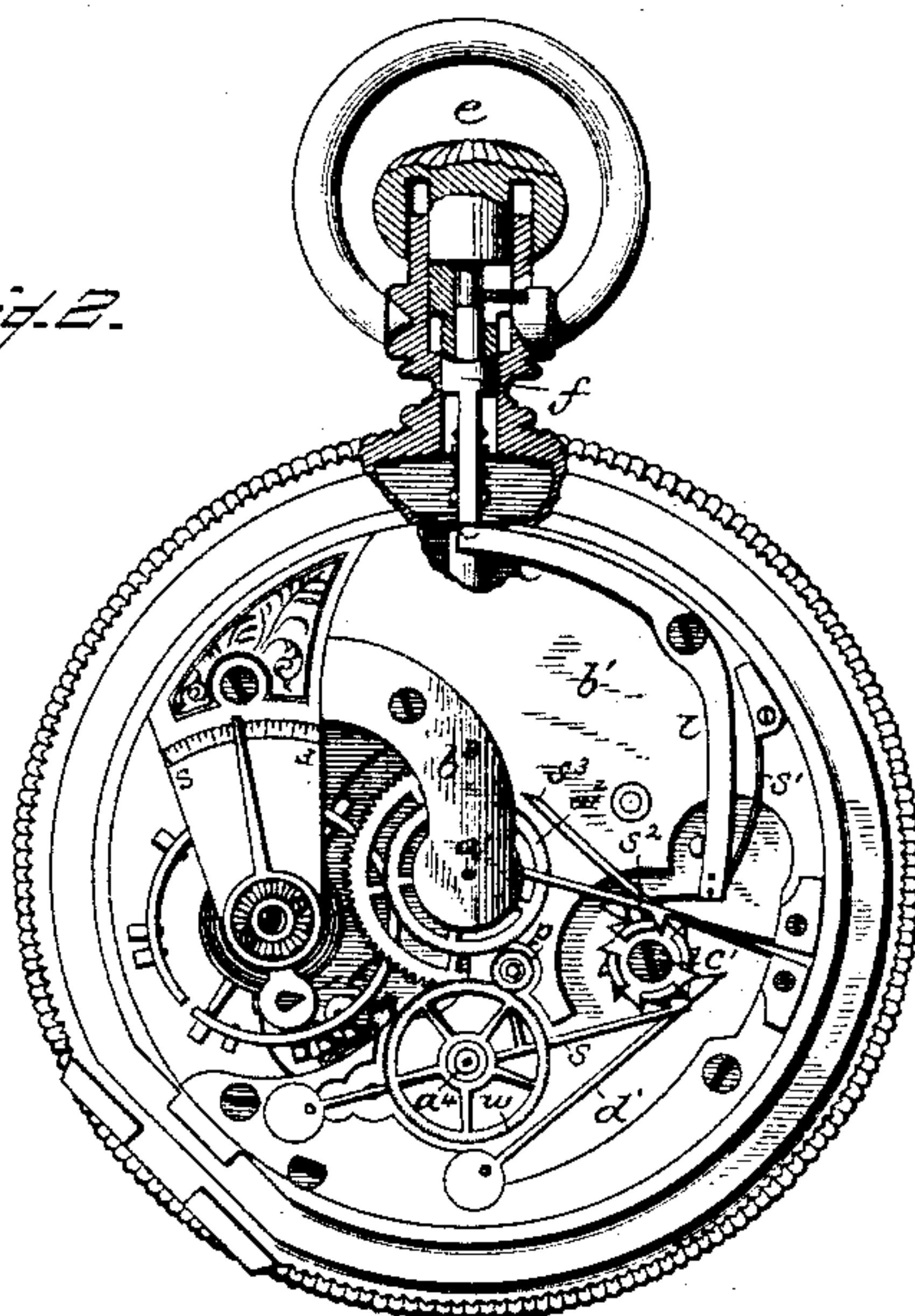
No. 437,683.

Patented Oct. 7, 1890.

Fig. 1.



342.



Witnesses

"Wm. Leiden."

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Inventor

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By his Attorney

*W. L. Brown*

H. J. EISEN.  
STOP WATCH.

No. 437,683.

Patented Oct. 7, 1890.

Fig. 3

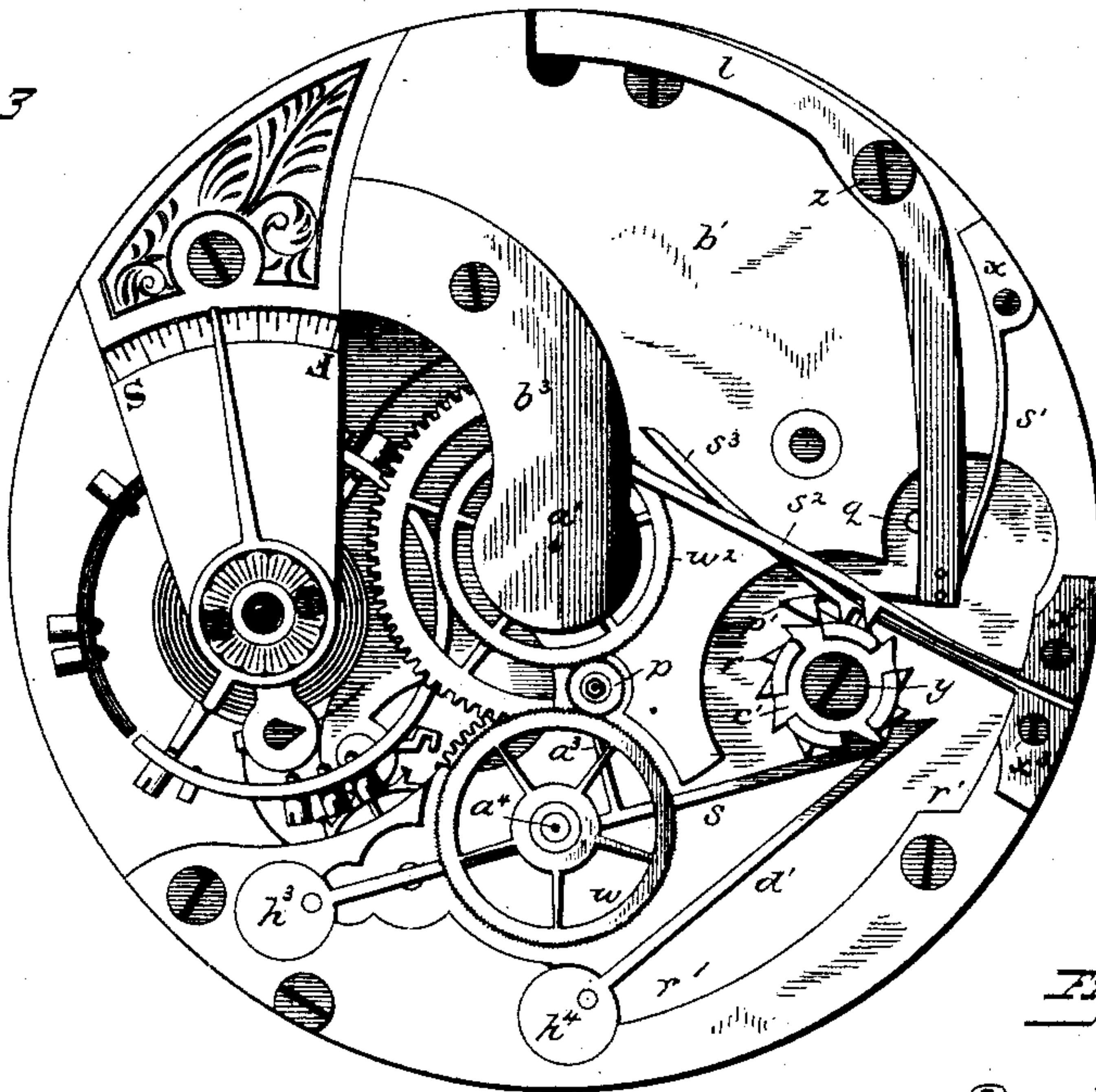


Fig. 4

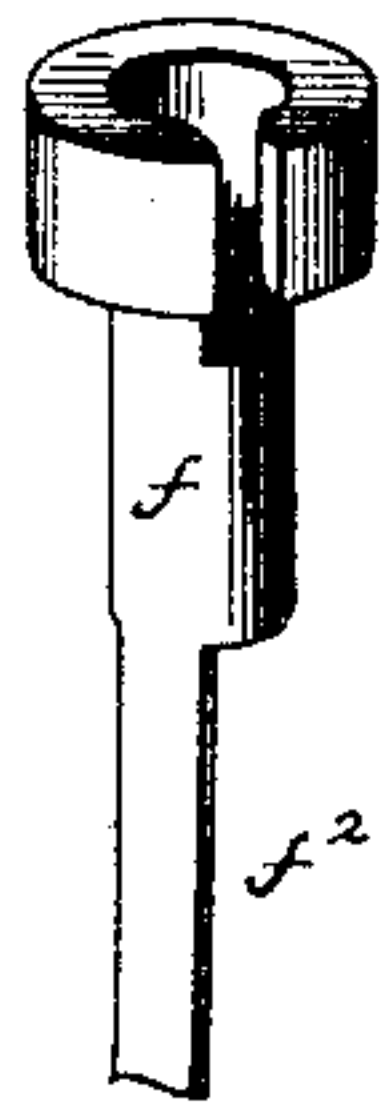


Fig. 6

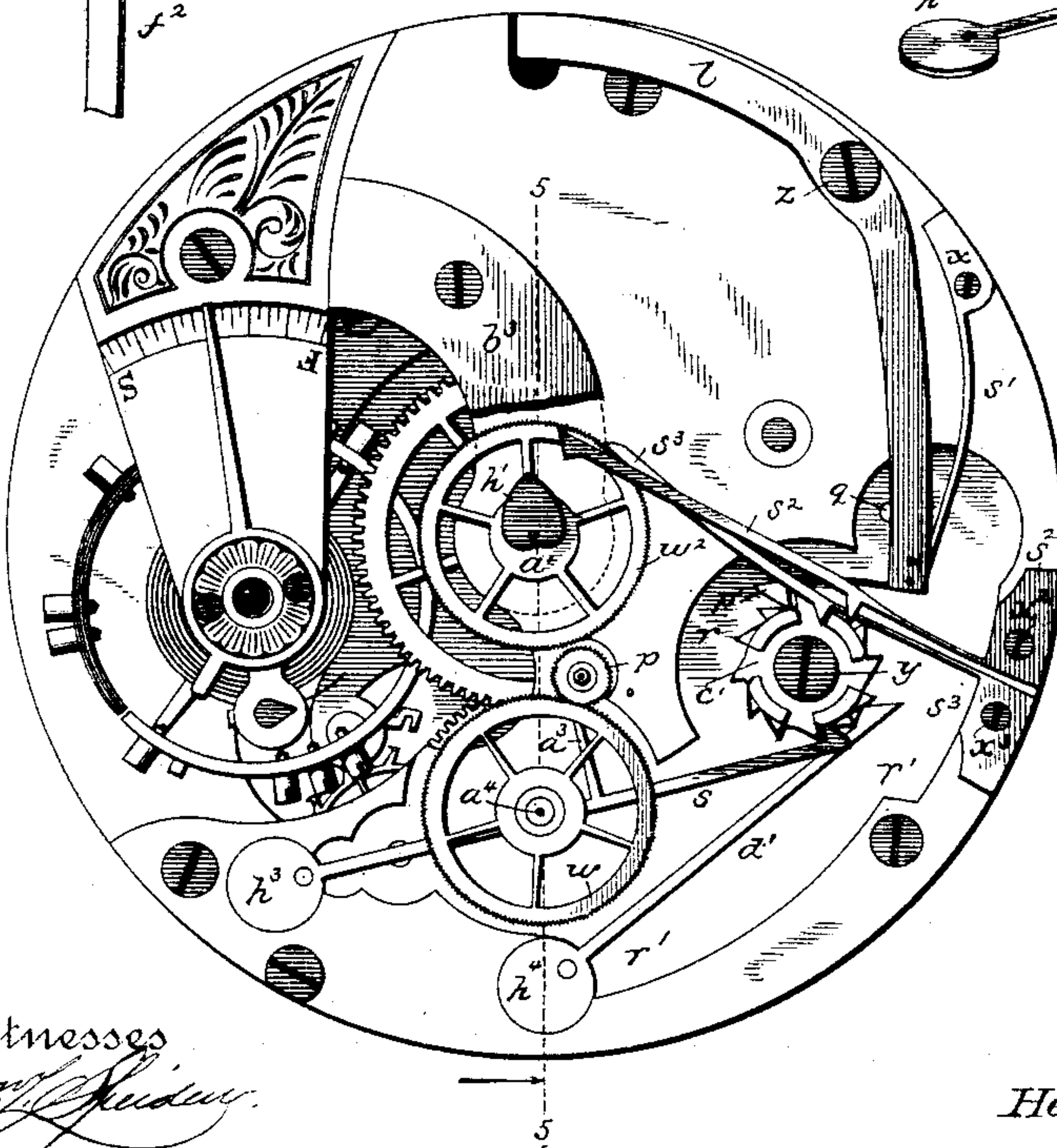


Fig. 7

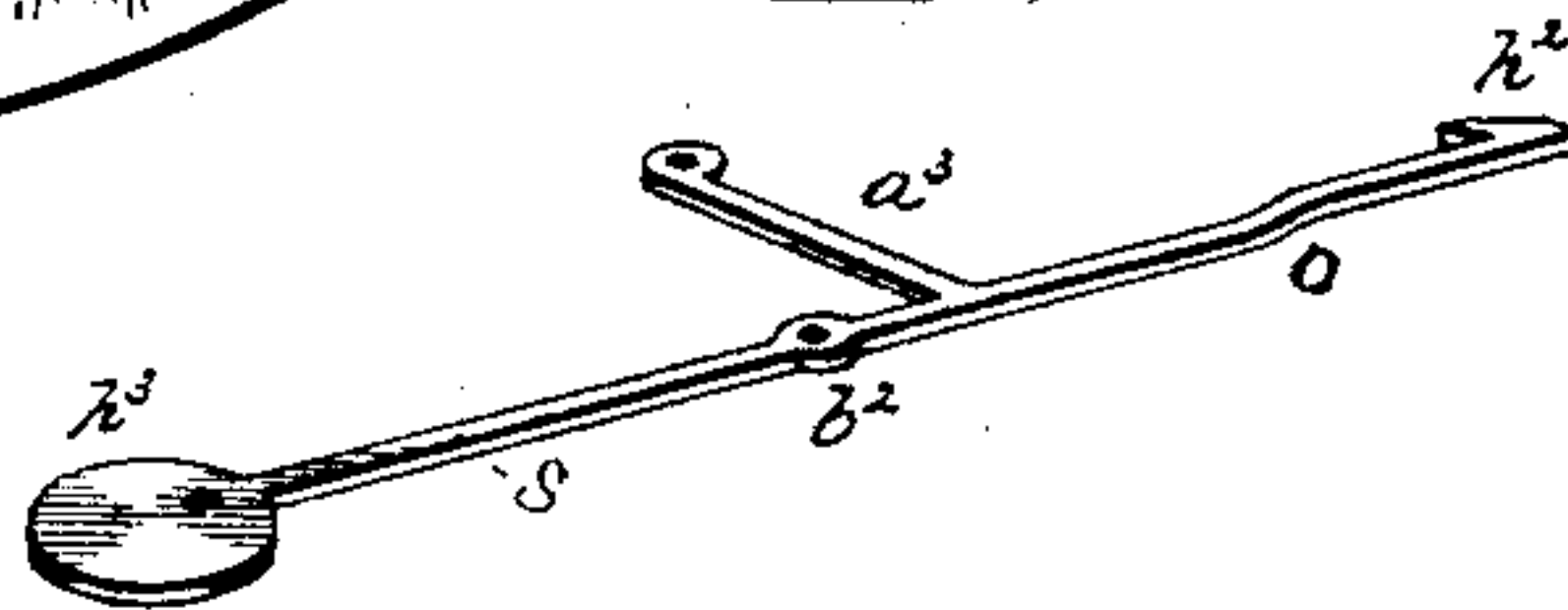
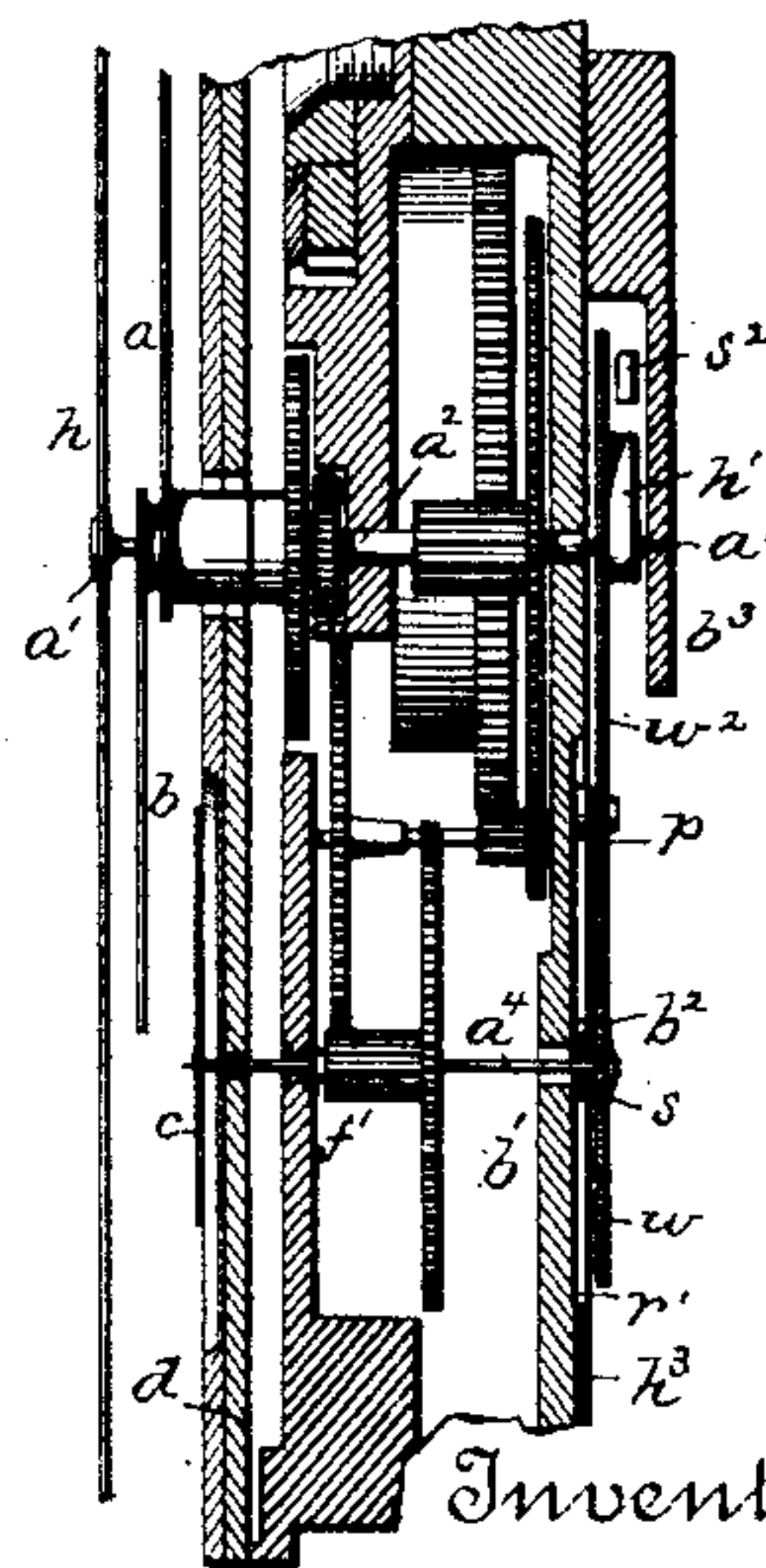


Fig. 8



Witnesses  
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# UNITED STATES PATENT OFFICE.

HERMAN J. EISEN, OF BROOKLYN, NEW YORK.

## STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 437,683, dated October 7, 1890.

Application filed May 17, 1890. Serial No. 352,126. (No model.)

*To all whom it may concern:*

Be it known that I, HERMAN JOSEPH EISEN, a citizen of the United States, and a resident of Brooklyn, in the State of New York, doing  
5 business at No. 39 Maiden Lane, New York city, have invented a new and useful Improvement in Stop-Watches, of which the following is a specification.

This invention relates to that class of stop-  
10 watches in which a split-seconds hand is driven from the fourth-wheel arbor of the main train, and primarily to those in which the split-seconds hand is under the control of a cam-wheel that is turned step by step at  
15 will, the split-seconds hand being started by a first actuation of the cam-wheel, stopped by a second actuation thereof, and reset or returned to its starting-point by a third actuation of the same.

20 The present improvement consists in certain novel combinations of parts, hereinafter set forth and claimed, whereby fine-toothed wheels, which constitute the split-seconds train, are meshed and unmeshed by move-  
25 ments in and out of the fourth-wheel arbor itself without at all interfering with the main train of the watch. The movable bearing of the fourth-wheel arbor and a lever and spring to coact with the same and with the cam-  
30 wheel are combined in a single simple part, which in the preferred arrangement also supports a pinion in constant mesh with the outer wheel of the split-seconds train, and a pair of spring-levers to coact, respectively, with the  
35 stop-wheel and with the heart-cam on the split-seconds arbor are adapted to be raised and lowered in proper succession by the cam-wheel at one and the same side of the latter.

The general objects of the invention are to  
40 dispense with every unnecessary part, to prevent lost motion, and to construct the stop mechanism on a principle that is applicable to the movements of various makes of watches which have not heretofore been converted into  
45 stop-watches.

Two sheets of drawings accompany this specification as part thereof.

Figure 1 of these drawings is a face view of a stop-watch, illustrating the invention. Fig.  
50 2 is a back view of the same with its back and cap-bezel removed. Figs. 3 and 4 are magnified back views of the works removed

from the case, showing the split-seconds train "started" and "stopped," respectively. Fig. 5 represents a section on the line 5 5, Fig. 4; 55 and Figs. 6 and 7 are perspective views of certain parts detached. Portions shown in section in Figs. 2 and 4 are broken away to expose parts behind.

Like letters refer to like parts in the several 60 figures.

The split-seconds hand *h*, Figs 1 and 5, of the particular stop-watch shown in the drawings, revolves in front of the hour, minute, and seconds hands *a b c* before a suitable dial 65 *d* at the face of the watch, and the split-seconds train, hereinafter described, is arranged at the back of the main movement, as shown in Figs. 2 to 4, together with the whole of the starting, stopping, and resetting mechanism, 70 excepting a tubular slide or follower *f*, (shown detached by Fig. 6,) which coacts with the movable crown *e* of the stem of the watch, as shown in Fig. 2. This is the preferred arrangement, and for clearness the following de- 75 scription will be confined to the improved movement, as shown.

The fourth-wheel arbor *a*<sup>4</sup> of the main train has an ordinary front bearing in the front plate *f*<sup>1</sup> of the works, except that it is adapted 80 to oscillate therein, and care is taken that its hole in the dial *d* permits such oscillation. It has no bearing in the back plate *b*<sup>1</sup> of the main movement, but passes freely through an opening in the same, and has its back bearing 85 *b*<sup>2</sup> in a combined spring and lever *s*. (Shown detached by Fig. 7.) The back pivot of the arbor *a*<sup>4</sup> is extended through the movable bearing thus formed, and carries outside of the same the outer wheel *w* of a fine-toothed 90 split-seconds train. A stud-pivot for a pinion *p* in constant mesh with said outer wheel *w* is carried by an arm *a*<sup>3</sup> of said spring-lever *s*, and the center wheel or stop-wheel *w*<sup>2</sup> of the train (the split-seconds train) is fast on 95 the arbor *a*<sup>4</sup> of the split-seconds hand *h*. This arbor *a*<sup>4</sup> has its front bearing within a tubular minute-hand arbor *a*<sup>2</sup>, Fig. 5, and its back bearing is a small back plate *b*<sup>3</sup> attached to said back plate *b*<sup>1</sup>. Immediately behind said 100 back bearing and outside of said wheel *w*<sup>2</sup> said arbor *a*<sup>4</sup> is provided with its heart-cam *h*<sup>1</sup>, exposed to view in Fig. 4. Normally the fourth-wheel arbor *a*<sup>4</sup> is perpendicular to the



front and back plates  $f' b'$ , and is steadily supported in this position by the spring-lever  $s$ . The split-seconds train is open, said pinion  $p$  being in mesh only with said outer wheel  $w$ , which turns continuously with the fourth-wheel arbor, and the split-seconds hand  $h$  is kept at zero or the starting-point by the coaction with said heart-cam  $h'$  of the beveled head of a spring-lever  $s^2$  in an ordinary manner. The watch is represented as in this condition in Figs. 1 and 2. In starting the split-seconds hand from zero by a pressure on the crown  $e$  a finger  $f^2$ ; Fig. 6, at the inner end of said follower  $f$  coacts with the upper end of a lever  $l$ , Figs. 2 to 4, attached at mid-length by a pivotal screw  $z$  to said back plate  $b'$ . A spring-pawl  $p'$ , Figs. 3 and 4, carried by the lower end of said lever  $l$ , coacts with a ratchet-wheel  $r$  of twelve teeth, which carries on its outer side a cam-wheel  $c'$  of four notches, and turns on a screw  $y$ , Figs. 3 and 4, tapped into said back plate  $b'$ . Said cam-wheel thus receives a one-twelfth turn. A beveled projection at mid-length on said spring-lever  $s^2$ , which normally occupies one of said notches, as in Fig. 2, is cammed out and supported against a solid portion of the periphery of the cam-wheel, as in Figs. 3 and 4, so as to free the heart-cam  $h'$ . The beveled head  $h^2$ , Fig. 7, of said spring-lever  $s$ , which normally presses against a solid portion of the periphery of the cam-wheel between two of said notches, as in Fig. 2, is permitted to enter a notch, as in Fig. 3, and swings inward. The back end of the fourth-wheel arbor  $a^4$  and the stud-pivot of the pinion  $p$  are carried inward therewith, so as to close the split-seconds train  $w p w^2$ , as shown in Fig. 3, and the hand  $h$  instantly starts at the speed of the seconds-hand  $c$  and in the same direction. When the crown  $e$  is freed from pressure, it is re-elevated by a spring  $s'$ , Figs. 2 to 4, attached to the back plate  $b'$  by a screw  $x$ , Figs. 3 and 4, and pressing against the lower end of said lever  $l$ . Should the crown be held down no harm can result. A stop-pin  $q$ , Figs. 3 and 4, limits the movement of the lever  $l$  by said spring  $s'$ , and a spring-detent  $d'$  in constant mesh with said ratchet-wheel  $r$  keeps the cam-wheel steady and prevents retrogression. To stop the split-seconds hand, the crown  $e$  is again depressed, and through the follower  $f$ , lever  $l$ , pawl  $p'$ , and ratchet-wheel  $r$  the cam-wheel  $c'$  is turned from its position represented by Fig. 3 to its position represented by Fig. 4. During this actuation of the cam-wheel the spring-lever  $s$  is cammed out to its said normal position, reopening the split-seconds train, and a spring-lever  $s^3$ , previously held back by the coaction of a beveled mid-length projection thereon with the solid portion of the periphery of the cam-wheel, as in Figs. 1, 2, and 3, is permitted to press against the periphery of the stop-wheel  $w^3$ , so as to instantly arrest the rotation of the latter, and thus to stop and hold the hand  $h$  at that point of the dial where it happens to be. To reset

the split-seconds hand to zero or the starting point, the crown is again depressed and the cam-wheel is turned as before, the effect this time being to cam back said spring-lever  $s^3$ , so as to free the wheel  $w^2$ , arbor  $a'$ , and hand  $h$ , and immediately thereafter to permit the spring-lever  $s^2$  to spring inward against the periphery of the heart-cam  $h'$ , so as to turn the latter and therewith said arbor  $a'$  and hand  $h$  and to retain the hand at zero, as before described. This completes the cycle of operations and restores the parts to the positions represented by Figs. 1 and 2, as above. The ratchet-wheel  $r$  is arranged within a depression or surface recess  $r'$ , Figs. 3 to 5, formed in the back plate  $b'$ , and circular holding ends  $h^3 h^4$ , Figs. 3 to 5 and Fig. 7, on said spring-lever  $s$  and detent  $d'$  are let into said back plate to the same plane and pinned fast. An offset  $o$ , Fig. 7, in the spring-lever  $s$ , adapts its head end to work outside of the detent  $d'$  and to coact with the cam-wheel. The fixed ends of the spring-levers  $s^2 s^3$  are attached, adjoining each other, to the main surface of the back plate  $b'$  at its perimeter by screws  $x^2 x^3$ , Figs. 3 and 4. Said lever  $s^2$  is set so as to work across and outside of said lever  $s^3$ , and the beveled projection of the former is formed nearer the perimeter of the back plate than that of the other, so that it cannot spring inward until after the stop-lever  $s^3$  is cammed out of contact with the fine-toothed periphery of the stop-wheel.

Details which have not been specified may be of any approved description, and I do not limit my respective claims as to mechanical details except as therein stated.

The main movement represented in the drawings is of an ordinary make well known to the trade and forms no part of this invention.

In applying stop mechanisms constructed on the same principle to watch-movements of other makes the arrangement of some of the parts will be changed, and other like modifications will suggest themselves to those skilled in the art.

Having thus described the said improvement in stop-watches, I claim as my invention and desire to patent under this specification—

1. The combination, with a split-seconds hand and its arbor, of a fourth-wheel arbor, a movable back bearing for the latter, and a fine-toothed split-seconds train, the outer and stop wheels of which are carried by said fourth-wheel arbor and by said split-seconds arbor, respectively, substantially as hereinbefore specified.

2. In combination with a movable fourth-wheel arbor, a spring-lever forming its movable bearing, substantially as hereinbefore specified.

3. The spring-lever  $s$ , constructed with the bearing  $b^2$  and arm  $a^3$ , in combination with the fourth-wheel arbor  $a^4$ , pivoted in said bearing and carrying the wheel  $w$  at its back



end, the pinion  $p$ , pivoted on said arm, in constant mesh with said wheel, the stop-wheel  $w^2$ , meshed by said pinion at will, a split-seconds arbor on which said stop-wheel is fast, and a split-seconds hand carried by the front end of said arbor, substantially as hereinbefore specified.

5 4. The adjoining spring-levers  $s^2 s^3$ , having beveled mid-length projections at different

distances from their fixed outer ends, in combination with the cam-wheel  $c'$ , heart-cam  $h'$ , stop-wheel  $w^2$ , arbor  $a'$ , and split-seconds hand  $h$ , substantially as hereinbefore specified.

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Witnesses:

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