

(No Model.)

E. HEUER.
STOP WATCH.

No. 377,897.

Patented Feb. 14, 1888.

Fig. 1.

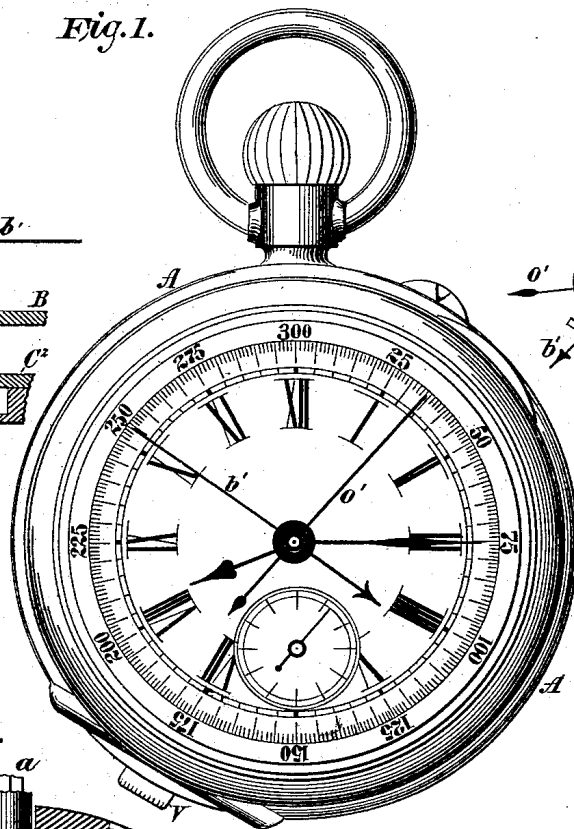


Fig. 6.

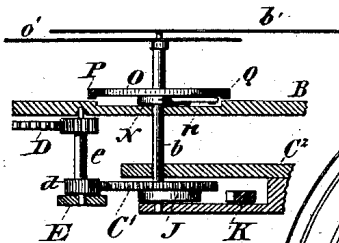


Fig. 4.



Fig. 2.

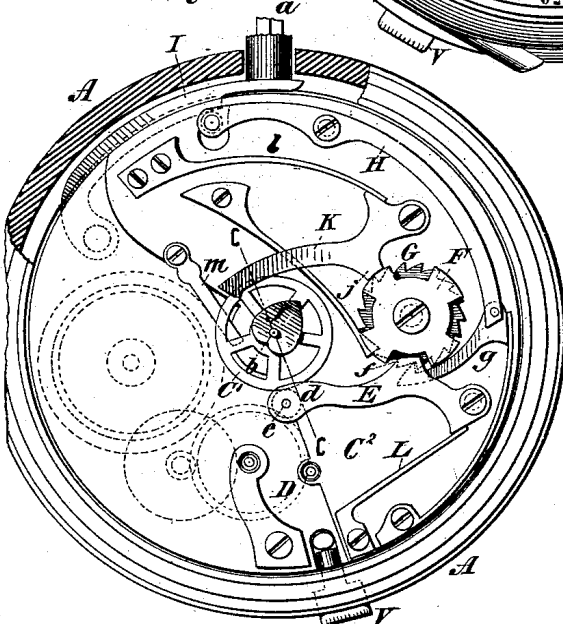


Fig. 7.

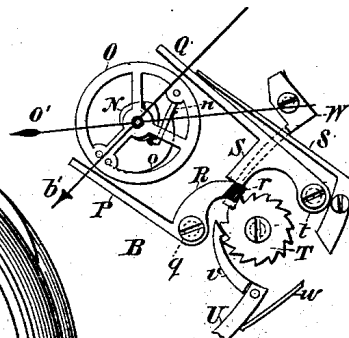


Fig. 5.

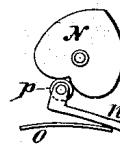
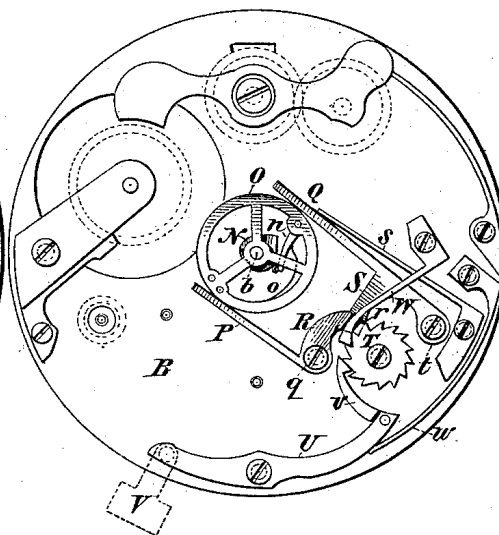


Fig. 3.



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STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 377,897, dated February 14, 1888.

Application filed April 20, 1887. Serial No. 235,488. (No model.) Patented in Germany February 6, 1887, and in France May 3, 1887.

To all whom it may concern:

Be it known that I, EDOUARD HEUER, of Bienne, Switzerland, have invented new and useful Improvements in Watches, (for which I have obtained patents in France May 3, 1887, and in Germany February 6, 1887, for fifteen years, not yet numbered,) of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a face view of a watch provided with my improvements. Fig. 2 is a back view of a movement provided with my improvements, the watch-case being partly broken away. Fig. 3 is a face view of the movement. Fig. 4 is an edge view of a ratchet-wheel, T. Fig. 5 is a face view of a cam and pawl used in connection with my improvements. Fig. 6 is a section on line *c c*, Fig. 2; and Fig. 7 is a detail view of the brake mechanism for one of the hands, the brake-levers being free from the hand-carrying wheel.

The object of my invention is to provide a watch carrying the ordinary set of hands with two extra hands for marking off and counting fractions of a second.

The invention consists in attaching to an arbor a heart-shaped cam, which is acted upon by a lever to return it to or keep it at the starting-point. This arbor is revolved by means of suitable gearing from the second-wheel and may be thrown in and out of gear with said second-wheel at the desired time by means of a lever to which its pinion-arbor is pivoted. To this arbor is attached a hand, which is carried over the dial of the watch. This hand marks the fractions of a second. Beneath the dial-plate this arbor has secured to it another heart-shaped cam, which acts upon a wheel mounted upon said arbor by means of a pawl attached to said wheel, and which is pressed into engagement with said heart-shaped cam by means of a spring. This wheel carries a hand similar to the other second-fraction hand. These two hands may revolve in unison. To stop the hand carried by the wheel, levers are brought to bear upon the periphery of said wheel, which act as a brake to stop it at the desired point. These levers are operated by suitable ratchet-and-pawl

gearing, which presses them toward and from each other, and when opened will allow said wheel to fly back to the starting-point, the cam and spring-pressed lever causing it to do so, and will then also allow it to revolve freely with the cam.

A in the accompanying drawings represents a watch-case.

B is the face-plate, and C² the back plate, of a watch-movement which is provided with the ordinary or suitable train of gearing. Secured rigidly to arbor *b* is a wheel, C', having a milled or roughened periphery, which gears with a pinion, *d*, having a similar periphery, and which is carried by an arbor, *e*, one end of which arbor is pivoted loosely in the face-plate B, and at that end it is provided with a pinion which gears with the second-hand wheel D. The opposite end of arbor *e* is journaled in an arm or lever, E, pivoted to the plate C². The lever E is provided with a projection, *f*, which is operated upon by a cam-wheel, F, pivoted to the plate C². Attached to the same pivot with the wheel F is a ratchet-wheel, G, so arranged as to revolve in unison with wheel F. The ratchet-wheel G is revolved by means of a pawl, *g*, and lever H, the free end of which lever H is acted upon by a lever, I, pivoted in the movement, which is in turn operated by the stem *a* of the watch-case; but the lever H may be actuated by different means, if desired. A heart-shaped cam, J, is rigidly secured to the arbor *b*, so as to revolve in unison with wheel C'. This cam J is acted upon by a lever, K, pivoted to the plate C². The lever K is provided with a projection, *j*, which bears against the cam-wheel F. The end of arbor *b*, projecting through plate B, is provided with a hand, *b'*. To start the hand *b'*, the cam-wheel F is revolved the distance of one tooth by pressing on the stem *a*, which communicates motion to the wheel G, and thereby also to wheel F. The first movement of wheel F raises the lever K out of engagement with the heart-shaped cam J by pressing on and passing under the projection *j*, and at the same time allows the projection *f* on lever E to pass into the space between two arms on said wheel. This movement of lever E allows a spring, L, to throw the pinion *d* into engagement with wheel C' on arbor *b*, and, as arbor *e* is always

in engagement with the second-wheel D, by means of its other pinion it now revolves arbor *b*, which carries hand *b'* over the face of the dial. To stop the hand *b'* at any desired moment, pressure is brought to bear upon the stem *a*, which causes one of the arms on wheel F to pass under projection *f* on lever E, thereby throwing pinion *d* out of engagement with wheel C'. Thus the hand *b'* is stopped suddenly. This movement of wheel F does not move lever K. To return the hand *b'* back to zero, or the starting-point, pressure is again brought to bear upon the stem *a*, which moves wheel F one tooth and allows the projection *j* on lever K to pass between two arms on wheel F. The free end of the lever K will then strike the heart-shaped cam J and cause same to revolve until the end of lever K rests on the hollow part of said cam, when the cam can no longer revolve. In this position the hand *b'* is at zero. A spring bears upon the lever K, causing it to snap with some force onto cam J. A spring-lever, *m*, bears upon wheel C' and acts as a brake to prevent its too free movement.

Upon the arbor *b*, outside of the plate B, is also rigidly secured a heart-shaped cam, N. Hung loosely upon arbor *b*, beyond cam N, is a wheel, O. This wheel O carries a pawl, *n*, which is acted upon by a spring, *o*, carried by said wheel O, which spring presses pawl *n* into engagement with the cam N. This pawl *n* has pivoted in its free end the ruby-wheel *p*, which runs upon the periphery of cam N. (See Fig. 5.) To revolve the wheel O, the pawl *n* is so adjusted that its free end will rest in the hollow of the heart-shaped cam, (see Fig. 5,) and as said cam revolves it will carry the wheel O with it.

A hand, *o'*, is secured to a sleeve on the wheel O, which surrounds the arbor *b*. This hand *o'* is normally beneath the hand *b'*. Two levers, P Q, are pivoted to the plate B, as at *qt*. These levers P and Q have projecting arms R S, which bear against each other, as shown. The arm R has a beveled portion, *r*. These arms R and S are kept against each other by means of the spring *s*, which bears against the lever Q. A ratchet-wheel, T, is hung on plate B, so as to bear against the arm R of lever P. Every alternate tooth on wheel T is beveled or cut away, as at *u* in Fig. 4, to match the beveled portion *r* on arm R. The ratchet-wheel T is actuated by means of a lever, U, and pawl *v*, the free end of which lever is pressed upon by a sliding pusher, V, which passes through the case A. A spring, *w*, bears against the lever U and keeps it and the pawl *v* in position with reference to the ratchet-wheel T. A spring-pawl, W, engages the ratchet-wheel T to prevent its revolving in a direction the reverse of its movement by the lever U. The levers P and Q are normally out of contact with the wheel O, and are held in that position by a full tooth on the ratchet-wheel T bearing against the arm R of lever P, which in turn presses against the arm S, thereby

keeping the levers P and Q out of contact with the wheel O.

To start the split-second hands *b' o'*, the stem *a* is pressed upon, which throws the lever K out of engagement with the heart-shaped cam J on arbor *b*, at the same time allowing the lever E to throw the pinion *d* into engagement with the wheel C', and as the arbor *b* revolves, carrying with it the cam N, the wheel O, carrying the hand *o'*, will be revolved by the intervention of the pawl *n*, acting upon cam N, as before stated. To stop the hand *o'*, while the hand *b'* still revolves, pressure is brought to bear against the pusher V, which moves the ratchet T the distance of one tooth. This movement brings a beveled tooth, *u*, opposite the beveled part *r* of the arm R, which allows said part *r* to pass under the tooth *u*. This latter movement permits the two levers P Q to press against the wheel O, which act as a brake, instantly stopping the same. The pointer *b'* is still revolving, but may be stopped by pressing upon the stem *a*, as before described. The hands *o' b'* are then separated from each other, as shown in the drawings, *b'* having continued to move after *o'* was stopped. To return them both to the starting-point, the ratchet-wheel T is first revolved the distance of one tooth by the pusher V, which causes a straight-edged tooth to strike the arm R, pushing the same, and thereby moving the levers P and Q out of contact with the wheel O. The wheel O will then instantly revolve until the pawl *n* drops into the hollow part of the cam N, when it ceases to revolve. The wheel O is caused to revolve by means of the spring *o* pressing pawl *n* on cam N. The two hands will then register. Pressure upon the stem *a* will then return the two hands *b'* and *o'* to the starting-point, the cam N carrying the wheel O, and consequently *o'*, with it.

If a person desires to time anything, the speed of a horse, for instance, both hands are first brought to the starting-point or zero. As the horse starts, both hands *b'* and *o'* are started together by pressing on stem *a*. When the horse has reached the quarter-mile post or first counting-point, pressure is brought to bear against pusher V, which stops hand *o'*, the levers P and Q being pressed against the wheel O, through the medium of ratchet T and arms R and S, as before described. The hand *b'*, however, continues to move. The time when hand *o'* stopped is now taken count of on a separate register. The hand *o'* is now started again to catch up to hand *b'* by pressing on pusher V, so that a straight-edged tooth on wheel T pushes the arm R, thereby separating levers P Q, which allows wheel O to revolve till pawl *n* drops into the hollow part of cam N, when said wheel O can have no further play. The hands *b' o'* now move together once more. When the horse has arrived at the next counting-point, the hand *o'* is stopped again by pressing on pusher V, as before stated, the time taken, and hand *o'* caused to catch up to hand *b'* again by pressing on pusher

V, as before stated, and so on as many times as there are counts to be taken during the running of the horse. The hands are then jointly stopped by pushing on stem *a*. The hands may then be both brought back to zero together by first pressing on pusher V, which will cause hand *a'* to register with hand *b'*, in the manner above described, when, by pressing on stem *a*, hand *b'* will be returned to zero by the lever K snapping onto cam J, and wheel O will be carried with it by the pawl *n* on wheel O resting in the hollow part of cam N.

Having now described my invention, what I claim is—

1. The arbor *b*, cam J, and wheel C', rigidly secured thereto, levers K E, pinion *d*, vibratory arbor *e*, carrying said pinion, wheel D for driving arbor *e*, and cam-wheel F, operated from the stem *a*, in combination with the cam N, rigidly secured to arbor *b*, and wheel O, loose on arbor *b*, and operated by cam N, the arbor *e* being journaled at one end in the lever K, whereby the pinion *d* may be thrown into and out of gear with the wheel C', while the arbor *e* is still being driven by the wheel D, substantially as described.

2. The ratchet-wheel T, having alternating cut-away teeth *u*, in combination with lever P, and arm R on said lever, said arm R having the beveled portion *r* to correspond with the beveled tooth *u* on wheel T, all arranged so that the pressure of a straight tooth of wheel T on arm R will move lever P out of contact with wheel O, substantially as described, and for the purposes set forth.

3. In a watch-movement, the arbor *b*, cam N, wheel O, spring-pressed pawl *n*, engaging said cam and provided with a roller, *p*, in combination with levers P Q, having arms R and S resting against each other, the arm R, having a beveled portion, *r*, ratchet-wheel T, having alternating beveled teeth *u*, and lever U, for operating wheel T, all arranged so that the pressure of a straight tooth of wheel T on arm R will move lever P and also lever Q, by means of arm S, out of contact with wheel O, substantially as described.

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Witnesses:

G. HUYERCUM,
GUSTAVE LEHMANN.