

(No Model.)

E. HEUER.

STOP WATCH.

No. 377,896.

Patented Feb. 14, 1888.

Fig. 1.

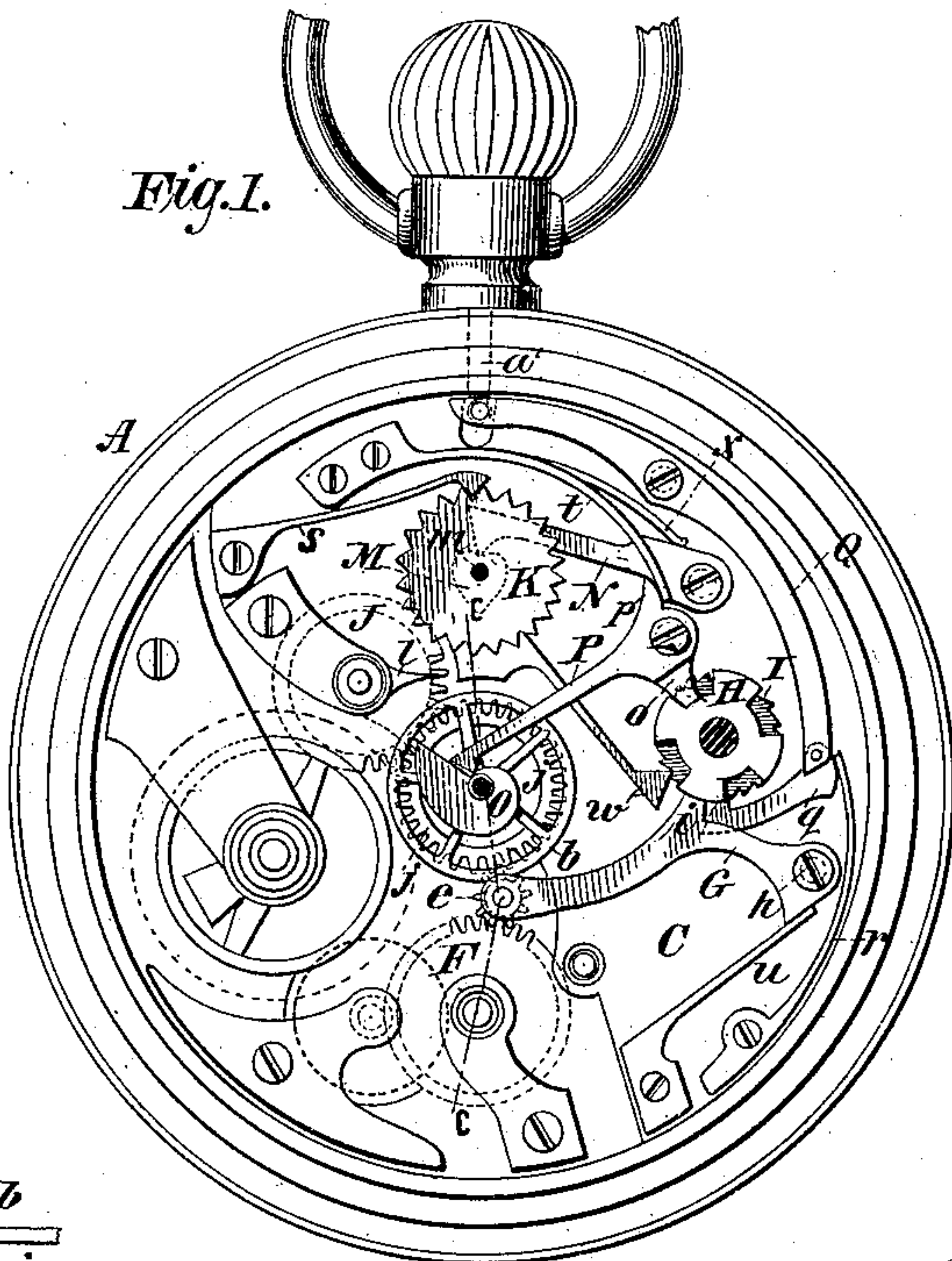


Fig. 3.

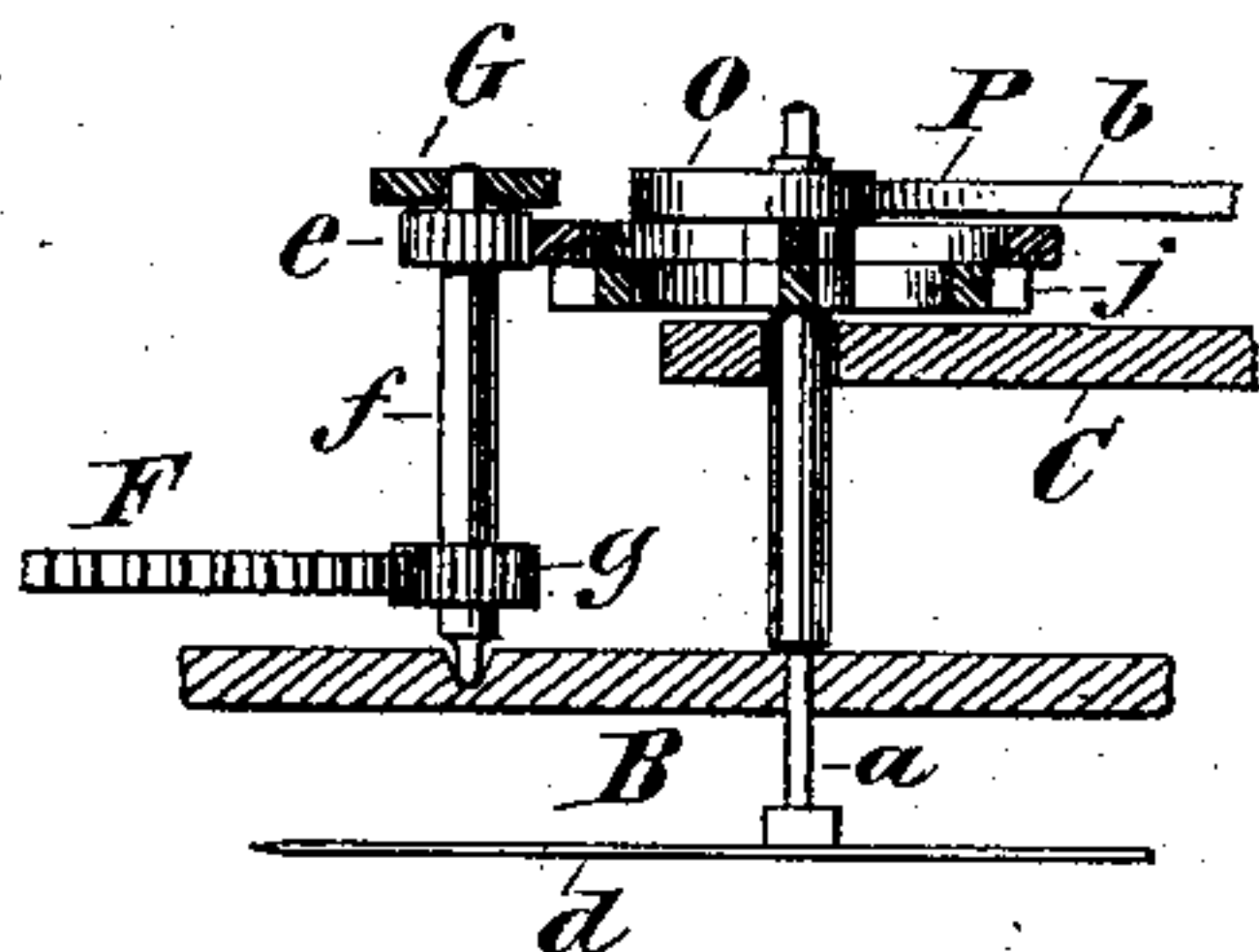


Fig. 4.

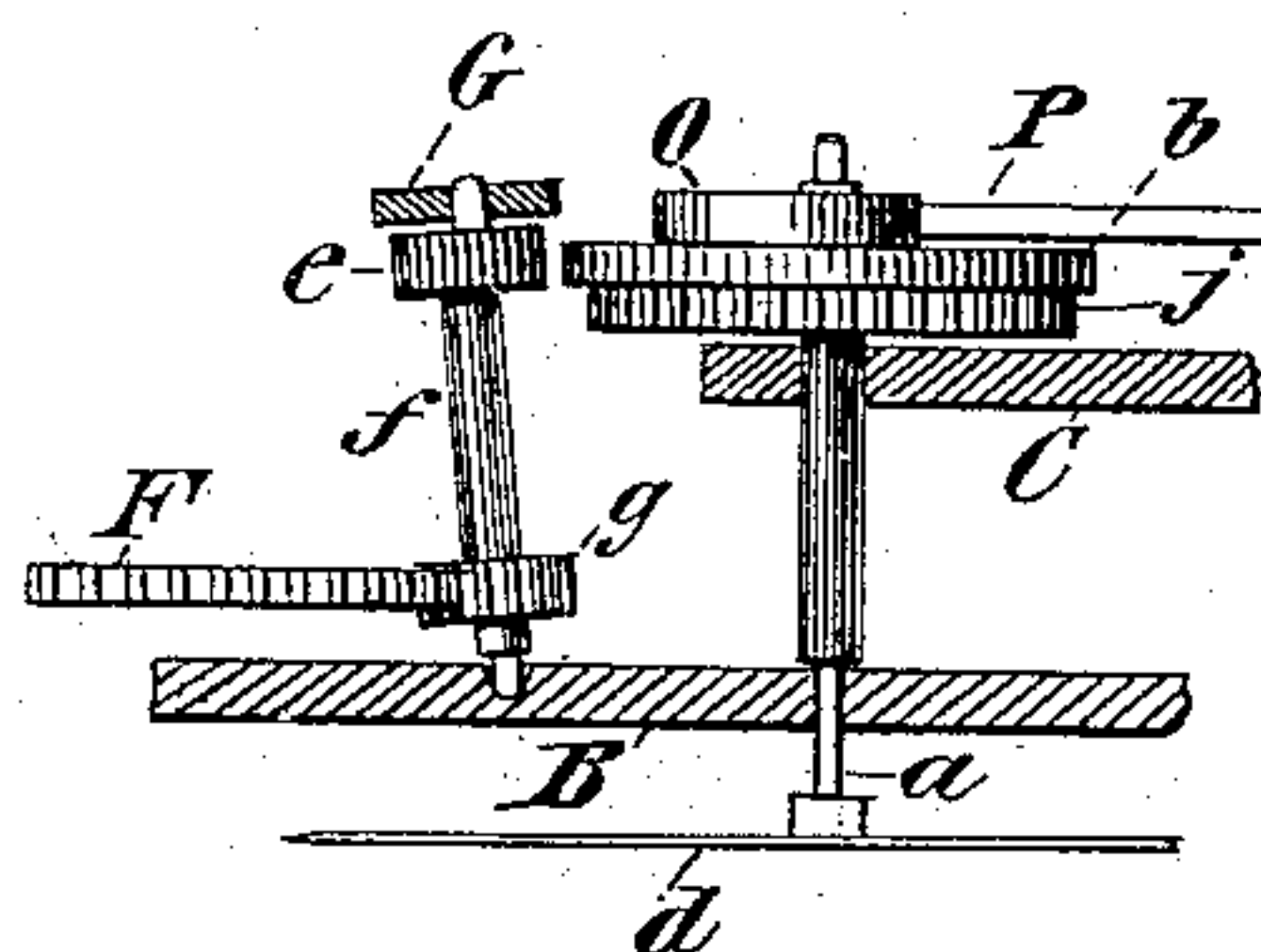
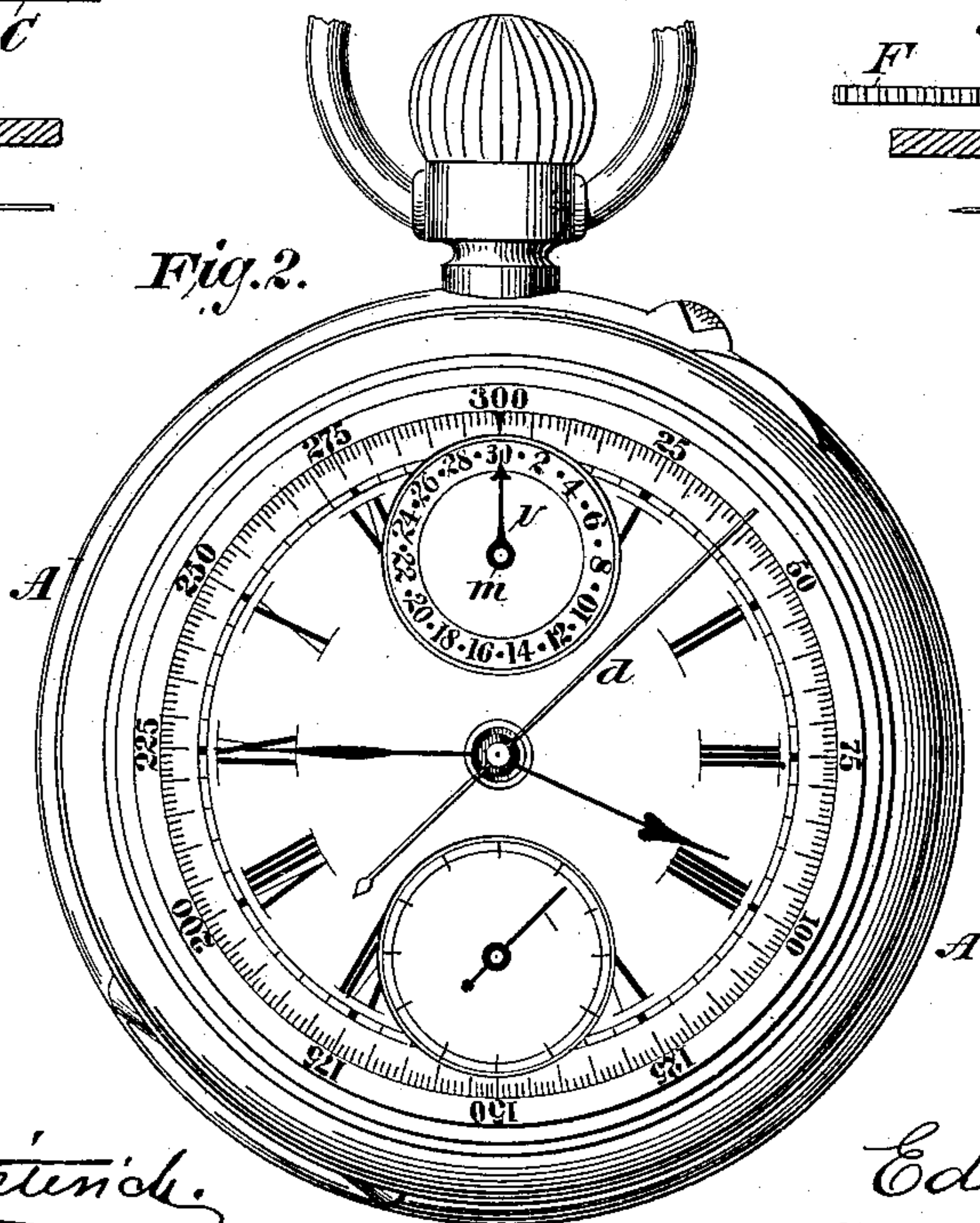


Fig. 2.



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STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 377,896, dated February 14, 1888.

Application filed April 20, 1887. Serial No. 235,487. (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, not yet numbered, both for fifteen years,) of which the following is a full, clear, and exact description.

10 The object of my invention is to provide a stop-watch with a hand for marking off fractions of one-fifth second, and another hand for recording the number of minutes elapsed while the seconds-fractions hand has been revolving, all in addition to the ordinary set of hands.

15 The invention consists in combining an arbor which carries a hand for marking off fractions of a second with an arbor carrying a hand for indicating the minutes. The first-mentioned arbor may be stopped or started by disengaging therefrom or engaging therewith the pinion which revolves it by means of a lever in which one end of the arbor of said pinion is journaled. This pinion is preferably operated from the second-wheel. The lever is acted upon by a cam-wheel which receives its movement from a lever actuated by the stem of the watch. The minute-indicating arbor is operated by suitable gearing from the seconds-fractions arbor and marks on the dial the number of revolutions made by the latter arbor, or the number of minutes elapsed from the time of starting. The seconds-fractions arbor is thrown back to the starting-point by means of a snail-shaped cam secured to it, which is actuated by a lever, which is in turn operated by the aforesaid cam-wheel. This lever strikes the snail-shaped cam, throwing it around till its squared portion strikes said lever, when the cam will come to rest. The minute-recording hand is returned to the starting-point by means of a lever which strikes a heart-shaped cam on its arbor, this lever being operated by the lever bearing against said snail-cam.

45 In the accompanying drawings, Figure 1 is a back view of a watch case and movement embodying my invention, the covers of the case being removed. Fig. 2 is a face view of the same, the dial plate and hands being shown in position. Fig. 3 is a sectional view taken

on the line *c c*, Fig. 1. Fig. 4 is a view similar to Fig. 3, showing the parts in different positions.

A is a watch-case.

B is the front plate, and C the back plate, of a watch-movement provided with an ordinary or suitable train of gearing.

a is the arbor of the seconds-fractions hand. The arbor *a* is journaled in the plates B and C. The end of arbor *a*, which projects through the plate B, receives the seconds-fractions hand *d*. Upon this arbor is also mounted the toothed wheel *b*, which gears with a pinion, *e*, mounted upon an arbor, *f*. One end of this arbor *f* is stepped in the plate B. The arbor *f* also carries a pinion, *g*, which gears with the seconds-hand wheel F. The opposite or free end of arbor *f* is journaled in a lever, G, which is pivoted to the back plate, C, at *h*. The lever G has a projecting heel, *i*, which is acted upon by a cam-wheel, H, hung on the back plate, C. A ratchet-wheel, I, is mounted upon the same pivot with the cam-wheel H, and so adjusted as to revolve in unison therewith.

Upon the arbor *a* near the wheel *b* is placed a toothed wheel, *j*, which gears with a toothed wheel, J, pivoted to the plate C. The wheel J carries a pointer or pin, *l*, which is so arranged that at every revolution of the wheel J said pin or pointer *l* will gear with and move a star-wheel, K, the distance of one tooth. This wheel K is mounted upon the minute-counter arbor *m*, which has secured upon its end the hand *v*. Upon the arbor *m* is secured a heart-shaped cam, M, which is acted upon by a lever, N, in the manner that will be hereinafter set forth. A spring, *s*, bears upon wheel K, as shown. Upon the arbor *a* is also mounted a cam, O. The wheels *j* and *b* and cam O are so secured to the arbor *a* as to revolve in unison therewith. The cam O is preferably made snail-shaped, as shown. The cam O is acted upon by a lever, P, pivoted to the plate C, which lever is provided with a projection, *o*, which is operated upon by the cam-wheel H, and also with a projection, *p*, which acts against lever N, as hereinafter described.

The ratchet-wheel I is revolved by means of the lever Q, carrying pawl *q*, which gears with said wheel I, the pawl *q* being pressed into engagement with wheel I by means of the spring

7. The opposite end of lever Q is acted upon by the stem *a'*. The ratchet-wheel I is kept from revolving in the reverse direction by means of a spring-pawl, *w*. The hour, minute, and second hands are carried by the watch in the ordinary or suitable manner.

To start the hand *d*, the stem *a'* is pressed inward, which, acting upon lever Q, revolves the ratchet-wheel I the distance of one tooth, the said wheel at the same time carrying with it cam-wheel H. One of the cams on cam-wheel H bears against the projection *o* on lever P and passes under same, which raises and keeps until the proper moment said lever out of engagement with the snail-cam O, and at the same time the projection *i* on lever G drops into the space between two cams on wheel H, being pressed into same by means of the spring *u*, as shown. When lever P is raised by wheel H, the projection *p* pushes the lever N out of engagement with the heart M, thereby leaving wheel K free to revolve. The aforesaid movement of lever G throws pinion *e* into engagement with wheel *b* on arbor *a*, which causes said arbor to revolve, at the same time carrying with it snail O and toothed wheel *j*, which latter wheel, gearing with toothed wheel J, revolves the same. When wheel *j* has made one complete revolution, wheel J will have made one revolution, and then the pointer or pin *l* will engage a tooth of star-wheel K and move same the distance of one tooth, which, carrying the hand *v* in the same direction as the hand *d*, will mark the number of minutes elapsed or revolutions of wheel *b* from the time of commencement. The wheel *b* may be geared so that the counter *d* will mark any desired fractions of a second on the dial-plate, it being arranged in the drawings to mark fifths of a second or three hundred points on the dial-plate. To stop the hand *d*, pressure is again brought to bear upon the lever Q by the stem *a'*, which again turns the wheel I the distance of one tooth, and one of the cams on wheel H, bearing on projection *i*, moves lever G backward, throwing the pinion *e* out of engagement with wheel *b*, as shown in Fig. 4. This second movement of wheel H does not change the position of the lever P. The wheel *b* being no longer revolved of necessity causes the hand *d* to cease moving, thereby marking on the dial-plate the numbers of fractions of a second elapsed. When it is desired to throw the hand *d* back to zero or the starting-point, another pressure is brought to bear by the stem upon lever Q, which, revolving wheel I the distance of one tooth, allows the projection *o* to drop between two cams on wheel H, and a spring, *t*, bearing upon the lever P, causes the free end of said lever P to strike the snail-cam O, which thereby revolves until the straight edge of said snail-cam strikes the end of lever P, as in Fig. 1, whereupon it ceases to move. Thus the hand *d* is returned to the starting-

point. At the same time that lever P drops into engagement with snail-cam O, the projection *p*, which has been bearing against lever N, causing same to be out of gear with heart M, is withdrawn from contact with said lever N, which allows same to strike the heart M, which then revolves until the lever N rests in the hollow part of the heart, when said heart can have no further movement until lever N is again raised. The minute-counter *v* will thereby be carried back to the starting-point. The lever N is pressed into engagement with cam M and lever P by means of spring *x*.

I do not broadly claim the combination, with a wheel for engagement with the stop-wheel, of an oscillating arbor carrying said stop-wheel, one end of said arbor being journaled in the plate or bridge and the other in a movable lever.

Having now described my invention, what I claim is—

1. The snail-shaped cam O and wheel *b*, both mounted upon the same arbor, *a*, the pinions *e* and *g*, both mounted upon arbor *f*, and driving-wheel F, in combination with the arbor *a*, vibrating arbor *f*, front plate, B, levers G and P, and cam-wheel H, and means for turning said cam-wheel, substantially as described, the arbor *f* being stepped in the plate B, and lever G, as specified.

2. The wheel *b* and toothed wheel *j* on arbor *a*, toothed wheel J, and pointer *l*, in combination with star-wheel K and minute-counter arbor *m*, all arranged so that the arbor *a* and arbor *m* will revolve and carry their respective hands over the face of the watch in the same direction, substantially as herein shown and described.

3. The wheel H, actuated from the stem of the watch and adapted to move levers P and G alternately and in unison, in combination with said levers, snail-cam O, and wheels *b* *j* on arbor *a*, and wheel J, carrying pointer *l*, star-wheel K, cam M, and separate lever N, all arranged so that the arbors *a* and *m* will revolve in the same direction, substantially as described.

4. In a stop-watch, the sliding stem *a'*, combined with means, substantially as described, for vibrating the arbor *f*, one end of which is stepped in the front plate, B, thereby throwing into gear with the train of the watch the arbor *a*, carrying the hand *d*, and the arbor *m*, of the minute-indicating hand *v*, and with means, substantially as described, for afterward throwing said arbors out of gear simultaneously and stopping both hands *d* and *v*, and for finally returning both said hands while they are out of gear with the train back to their respective zero positions, as specified.

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Witnesses:

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