(No Model.)

2 Sheets—Sheet 1.

O. F. DOMON.

STOP WATCH.

No. 305,159. Patented Sept. 16, 1884.

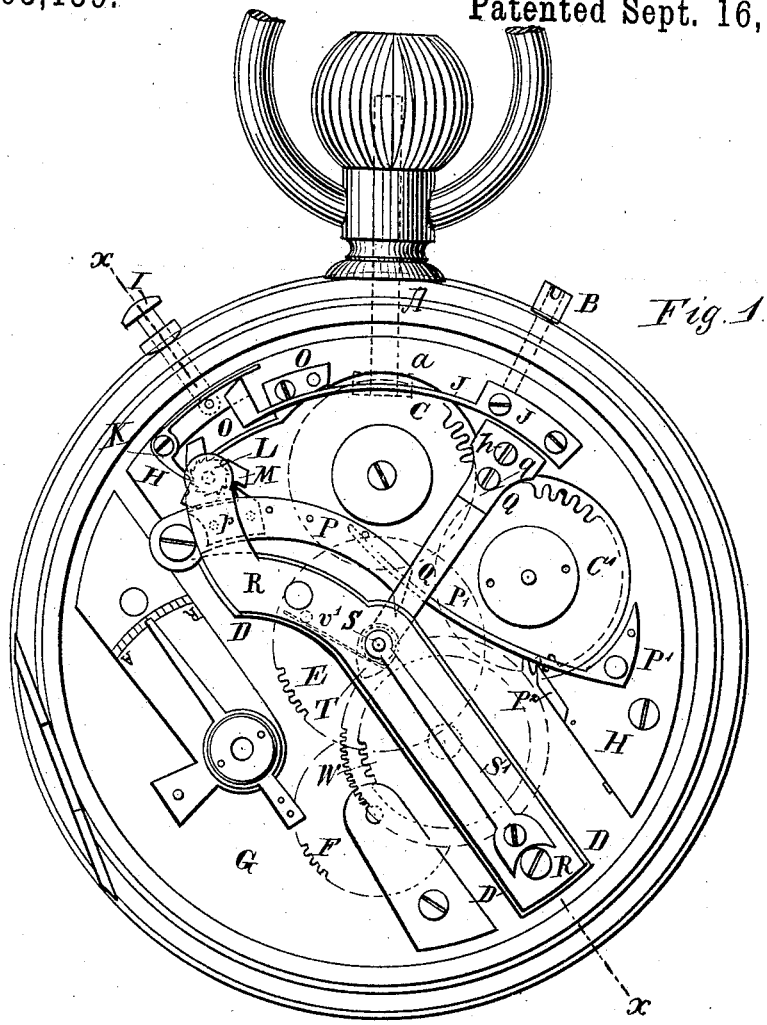

Fig. 1.

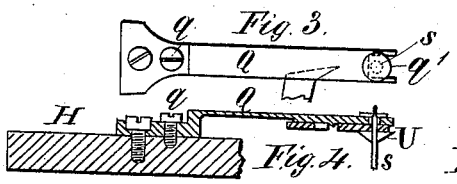

Fig. 3.

Fig. 4.

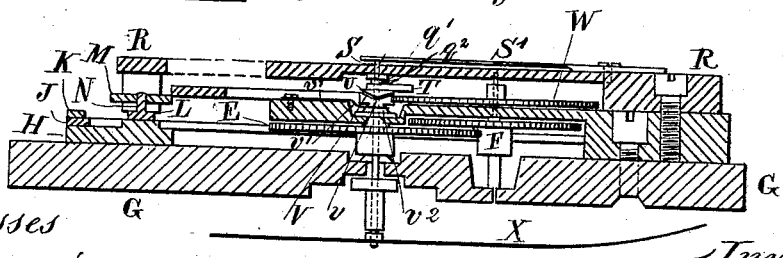

Fig. 2.

Witnesses

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(No Model.)

2 Sheets—Sheet 2.

O. F. DOMON.

STOP WATCH.

No. 305,159. Patented Sept. 16, 1884.

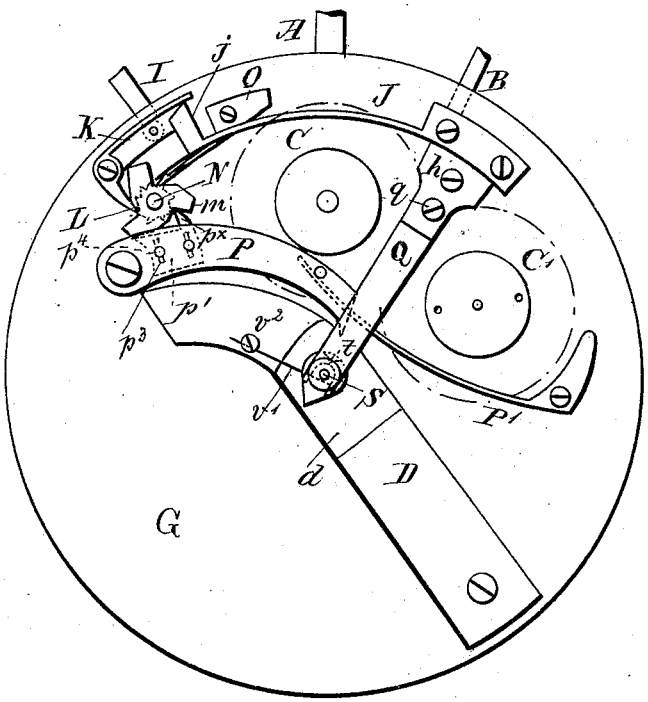


Fig. 1ª.

Fig. 5.

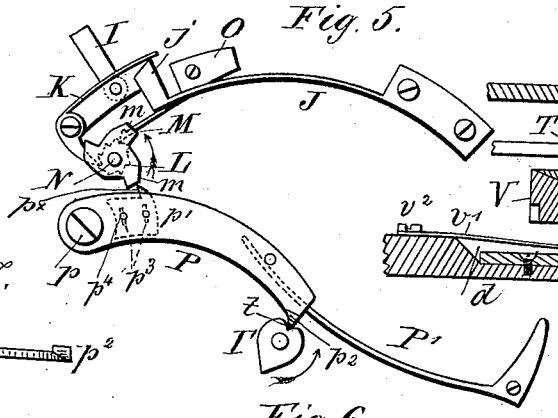


Fig. 8

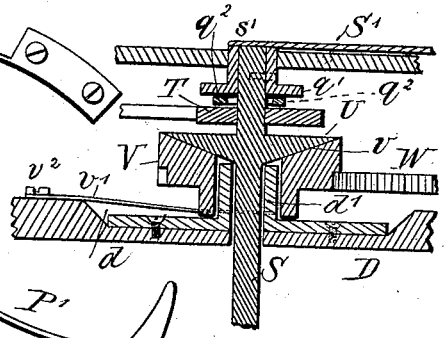
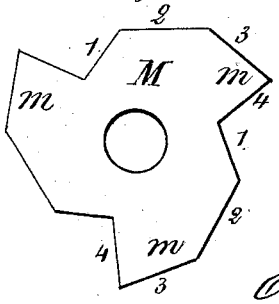


Fig. 7.

Fig. 6.



Witnesses:-
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L. W. Knotts.

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UNITED STATES PATENT OFFICE.

OVIDE FERDINAND DOMON, OF SELONCOURT, FRANCE.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 305,159, dated September 16, 1884.

Application filed December 12, 1882. (No model.) Patented in France August 5, 1882, No. 144,204, and in England September 23, 1882, No. 4,536.

To all whom it may concern:

Be it known that I, OVIDE FERDINAND DOMON, a citizen of the Swiss Republic, residing at Seloncourt, in the French Republic, have invented certain new and useful Improvements in Chronograph Attachments to Watches; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in stop mechanisms for watches, and has for its object to provide a mechanism of simple construction adapted for application to and cooperation with any suitable watch-movement, and whereby the course of the auxiliary or independent second-hand may be instantaneously arrested at any point of its movement.

It has for its further object to provide means whereby said independent second-hand may be brought to a fixed stationary point from any point of its course on the dial.

It has for its further object to provide means whereby loss of time by reason of the wear of the parts may be readily compensated by simple adjustments, and to construct the mechanism so as to facilitate the repairing or adjustment thereof without interfering with the watch mechanism, and vice versa.

It has for its further object to avoid the use of microscopically-toothed transmitting-gearing such as has heretofore been used, which gearing is liable to get out of order, and extremely difficult, if not impossible, to repair, all substantially as hereinafter fully described, and as shown in the annexed drawings, in which—

Figure 1 illustrates by a top plan view the general arrangement of the stop mechanism relatively to the mechanism of a watch. Fig. 1ª is a like view of the stop mechanism only. Fig. 2 is a section taken on line *x x* of Fig. 1. Figs. 3 and 4 are detail views showing, respectively, by a top plan view and a section, the actuating-spring whereby the independent second-hand is thrown into and out of gear with the watch-movement. Fig. 5 is a plan view of the mechanism actuating, and actuated by, the cam or snail M. Fig. 6 is a plan view of the cam or snail detached. Fig. 7 is an edge view of the lever operated by said cam, and Fig. 8 is a vertical sectional detail view of parts of the stop mechanism taken through the arbor of the independent second-hand.

In the above drawings the watch-movement selected as an illustration of the combination of such with my improved stop mechanism is the well-known stem winding and setting movement, though the said stop mechanism may be applied to any other suitable watch-movement, the main arbor of which is in this case made hollow, as usual, for the passage of the independent second-hand arbor.

Inasmuch as my invention does not relate to improvements in the watch mechanism itself, and as the mechanism of the style of watch with which the stop mechanism is combined is well known, it will only be necessary to briefly describe its principal parts and those parts which co-operate with the said stop mechanism.

In the above-described drawings, A is the winding-stem, and *a* its pinion; B, the setting-stem, and C C′ the ratchet and crown wheel, respectively, of the winding devices. D is the main cock-bridge; E and F, the main train of gearing and transmitting pinions; G, the main plate, and H the spring barrel-bridge, of the watch-movement.

The stop mechanism is constructed and arranged as follows: S is an arbor that extends through and rotates freely in the main arbor of the watch-movement, that carries the usual minute and hour hands. On its outer end the arbor S carries the independent second-hand X, Fig. 2, said arbor being of sufficient length to permit longitudinal motion thereof within certain limits without interference by the independent second-hand with the other hands of the watch. At the point where the arbor passes through the bridge D the said bridge is formed with a depression, *d*, to which is secured a flanged sleeve or barrel, *d′*, by means of screws or otherwise, as more plainly shown in Fig. 8. The arbor S passes loosely through

the barrel d', upon which barrel is loosely mounted a pinion, V, in the upper part of which is formed a conical recess, v, as shown in Figs. 2 and 8.

Instead of mounting the pinion V on a separate barrel, d', the main tubular arbor may be extended to form a bearing for said pinion, and the latter may be loosely mounted thereon.

The pinion V rotates once every minute, and is driven by a transmitting-wheel having one hundred and twenty teeth mounted upon the arbor of the transmitting-gear F. The pinion, therefore, has sixteen teeth in order to rotate the same sixty times an hour. Consequently the independent second-hand will move by steps or jumps of one-fifth of a second in its rotation upon the dial—movement which corresponds to that of the escapement.

I have selected the number one hundred and twenty as the number of teeth for the transmitting-wheel W and sixteen as the number of teeth for the pinion so as to make the movements of the independent second-hand proportionate to that of the hour, minute, and second hands of the watch. The wheel W, although having fine teeth, these are yet of sufficient dimensions to enable any skilled watchmaker to repair the same, such repair being extremely difficult, if not altogether impossible, in the usual stop mechanisms for watches, where two and three microscopically-toothed transmitting-wheels are employed.

To maintain the proper engagement between the pinion V and wheel W, whether the former rotates idly upon or with the arbor S, I employ a spring, v', secured by means of a screw, v^2, to the inner face of the bridge D, as shown in dotted lines in Fig. 1 and in full lines in Figs. 1^a, 2, and 8, the free end of said spring bearing against the hub of the pinion, or against the periphery thereof, above its teeth, as desired.

Above the pinion V, and formed on or rigidly secured to the arbor S, is a cone-wheel, U, constructed to fit into the conical depression v of the pinion V, by which latter the said cone wheel or disk U is rotated by frictional contact.

Upon the cone U, and rigidly secured to the arbor S, is seated a heart-shaped cone, T, the notch t of which coincides in position with that of the hour and minute hands when said hands have reached 12 o'clock, or the point where both indicate the same time. In other words, the notch t of the cam will point to 12 o'clock when in the normal operation of the watch and stop mechanism the three hands meet at that point. It is evident, therefore, that an actuating-lever, coming in contact with one or the other cam-faces of the cam T, or at any point thereof, will invariably rotate the same until said lever lies in the notch t thereof, the direction of motion of the lever being such that when its actuating face or nose lies in the notch t of the cam the further movement of both lever and cam will be arrested and said notch point to 12 o'clock. As the cam T is rigidly connected with the arbor S, as well as the independent second-hand, it is apparent that whenever the cam is actuated as described said hand will be returned to 12 o'clock. The hands may therefore be returned to a fixed starting-point, thus avoiding liabilities to errors in timing and rendering such timing more convenient. A small flanged barrel or sleeve, q', is rigidly secured to the arbor S in rear of the cam T and resting thereon, the inner end of the arbor being pivoted in a cock, R, and projecting a very little beyond it. Upon said inner end of the arbor S bears the free end of a spring, S', the heel of which is secured to the cock R by means of a screw. The tension of the spring S' tends to press the arbor forward toward the dial, to hold the cone U and pinion V in frictional contact.

Q is a spring secured by means of a screw, h, to the barrel-bridge H. The outer or free end, q^2, of the spring Q is forked, and said fork embraces the flanged barrel or sleeve q' on arbor S, as more plainly shown in Fig. 8. The arrangement of the barrel q' on arbor S relative to the cock R is such as to leave sufficient space between the flange at the upper end of said barrel and the under side of the cock when the stop mechanism is in its normal or operative condition to permit sufficient longitudinal movement of the arbor S to interrupt the frictional contact between the cone U and pinion V, and it is obvious that when said arbor S is displaced longitudinally and rearwardly it carries with it the cone U. The frictional contact between the latter and the pinion V being thus interrupted, the latter will rotate freely upon the barrel d', and the rotation of the arbor S, and consequently the movement of the independent second-hand, is arrested.

To facilitate the adjustment of the free end of the fork relatively to the flange on barrel d', either in adjusting said parts to properly co-operate or when the adjustment becomes necessary to compensate any wear thereof, I employ an adjusting-screw, q, located in front of the screw h, that secures the actuating-spring Q to the spring barrel-bridge H, whereby the free end of said spring may be raised or depressed, as required.

The displacement of the arbor S through the medium of the forked spring Q and the return of the independent second-hand to a fixed starting-point are effected in the following manner and by the mechanical devices which I will now describe.

I is a push-bar connected with a pawl, K, held in engagement with the teeth of a ratchet-wheel, L, by means of the forward or free end, j, of a spring, J, so that when the pawl is depressed through the medium of the push-bar I it will impart a partial rotation to the ratchet—that is to say, said ratchet will be rotated a distance equal to that between two of its teeth, and by means of a spring-pawl,

O, the ratchet-wheel L is held against backward rotation. The ratchet L is rigidly connected to or formed integral with a snail or cam, M, and both are loosely mounted upon a pin, by means of which the forward end of the cock or bridge R is secured to a pillar on the spring barrel-bridge H; or said ratchet and cam may be rigidly mounted on said pin and the pin arranged to rotate within the tubular pillar. The ratchet L has nine teeth and the cam M has three teeth, each of which has four inclined faces, 1 2 3 4, Fig. 6, of which those 1, 3, and 4 are practically or nearly of equal length, while the face 2 is considerably longer.

P is a curved lever pivoted upon a pillar, p, secured to the main plate G, and carrying on its under side a pawl, p', the nose p^x of which projects laterally into the teeth of cam M. This pawl p' may be made integral with the lever; but it is obvious that by such a construction it would be difficult, if not impossible, to compensate for any wear of the engaging parts. To facilitate this I form the pawl of a separate piece and connect the same with the lever in such a manner as to permit its ready adjustment thereon. This result I obtain by forming slots p^3 in the plate or shank of the pawl p', whereby it may be adjusted laterally by means of set-screws p^4 toward or from the cam-lever. In practice I form the slots on segments of circles the centers of which are that of the center of rotation of the lever P. The lever P at its outer or free end is provided with a wedge-shaped projection, p^2, at its free end, which projection, when the lever end, in its movement, passes under the outer end of the spring Q, will lift the spring, and with it the arbor S, through the medium of the flanged sleeve, against the tension of the spring S', to interrupt the contact between cone U and pinion V to stop the movement of the independent second-hand, as hereinafter more fully explained.

Instead of providing the lever with a wedge-shaped point, the spring Q may be provided on its front face with a projection having its lower face inclined rearwardly, with which the nose or point p^2 of the lever engages when moved forward by the cam M. On its front face the lever P has a stud or lug, against which bears the free end of a spring, P', that serves to return the lever to its normal position after it has been operated by the cam M, and P^2 is a spring that serves as an abutment for the spring P', and is secured to the edge of the spring barrel-bridge, the spring P' being secured to the rear face thereof.

When the stop mechanism is in its normal condition—that is to say, when the independent second-hand is in operation—the nose p^x of the pawl p' lies in the space-notch between two of the teeth of the cam M. If it is desired to stop the movement of the independent second-hand, the bar I is pushed inwardly, and, as above stated, the ratchet-wheel L is thereby rotated, through the medium of the pawl K, a distance of one tooth. As the ratchet-wheel has nine teeth, this movement will impart to the cam M one-ninth of a revolution. During this partial rotation of the cam M the nose of the pawl p' rides along the inclined face 1 of one of the teeth of the cam M, and is therefore pushed laterally, together with the lever P, a sufficient distance to bring the nose p^2 of the latter into engagement with the forked spring Q, whereby the latter moves the arbor S backward to interrupt the frictional contact between the cone U and pinion V and arrest the movement of the independent second-hand. On the release of the push-bar I the pawl K is again moved outward by the spring J and engages the next succeeding tooth of the ratchet L. As long as the parts are in the described position the independent second-hand remains stationary, as the arbor S is held against forward motion under the tension of the spring S' by the forked end of the spring Q. If, now, the push-bar L is again pushed in to impart a ninth of a revolution to the cam M, the pawl p' rides over the face 2, and the nose p^2 of the lever P is thereby pushed still farther toward the arbor S and brought in contact with the heart-shaped cam T, which is thereby rotated, and with it the arbor S and hand X, until the nose p^2 of said lever P lies in the notch t thereof, when the independent second-hand will stand at 12 o'clock, the said arbor being still held in the position stated, with the cone U out of engagement with the pinion V, which latter continues its rotation under the impulse of the transmitting-wheel W. By again depressing the push-bar I the cam M is again moved forward one-ninth of a revolution, and the nose of pawl p' rides over the peripheral face 3 of the cam and drops down along face 4, between the tooth passed over and the next succeeding tooth. In this latter movement of the cam M the pawl p' and lever P are carried by the spring P' to the limit of movement away from the arbor S, the said lever releasing the fork Q, and through the spring S' the arbor is again pushed forward. This brings the cone U into frictional engagement with the pinion V, and said arbor and the hand X will again be rotated by the wheel W. The parts will now have assumed their normal positions. The inclined face 2 of the cam is longer than those 1, 3, and 4; consequently the nose p^2 of the lever P traverses a greater distance when the pawl p' rides over it than when said pawl rides over the incline 1, to enable the lever to rotate the cam T to the desired point, whatever may be the position thereof at the time the movement takes place, to insure the returning of the independent second-hand to a fixed starting-point, or 12 o'clock. The peripheral face 3 of the cam does but slightly move the lever, which is immediately released by the dropping of the pawl p' down into the interspace between the

teeth along the face 4; hence the ratchet-wheel has to move forward a distance of three teeth while the cam-wheel is moved forward the distance of one tooth.

Having now described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with the push-bar I, forked spring Q, and the arbor S, of the lever P, its pawl p', and the cam-wheel M, the teeth of which are provided with inclined surfaces 1 2 3 4, and means for imparting to said cam-wheel one-ninth of a revolution at each depression of the push-bar, as described, for the purpose specified.

2. The combination of the push-bar I, spring-pawl K, ratchet L, cam-wheel M, lever P, its pawl p', and the forked spring Q of the arbor S, said parts being arranged for operation substantially as described, for the purpose specified.

3. The combination of the cam M and lever P with the pawl p', adjustably secured to said lever, as described, for the purpose specified.

4. The combination of the cam M, the teeth of which have inclined surfaces 1, 2, 3, and 4, means for imparting thereto a step-by-step rotation, the lever P, its pawl p', with the arbor S, the independent second-hand, and the heart-shaped cam T on said arbor, said parts being arranged for co-operation, as described, for the purpose specified.

5. The combination, with the pawl K, means for depressing the same, ratchet L, cam M, having inclined surfaces 1, 2, 3, and 4, lever P, its pawl p', forked spring Q, and arbor S, of the springs J, P′, and S′, for returning said parts into their normal condition after displacement by the action of the cam on said lever, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses, this 25th day of November, 1882.

OVIDE FERDINAND DOMON.

Witnesses:

EDWARD P. MACLEAN,

CAMILLE CHARROPPIN.