No. 755,313. PATENTED MAR. 22, 1904.

J. PETRILLO.

STOP WATCH.

APPLICATION FILED APR. 26, 1902.

NO MODEL.

Fig. 1.

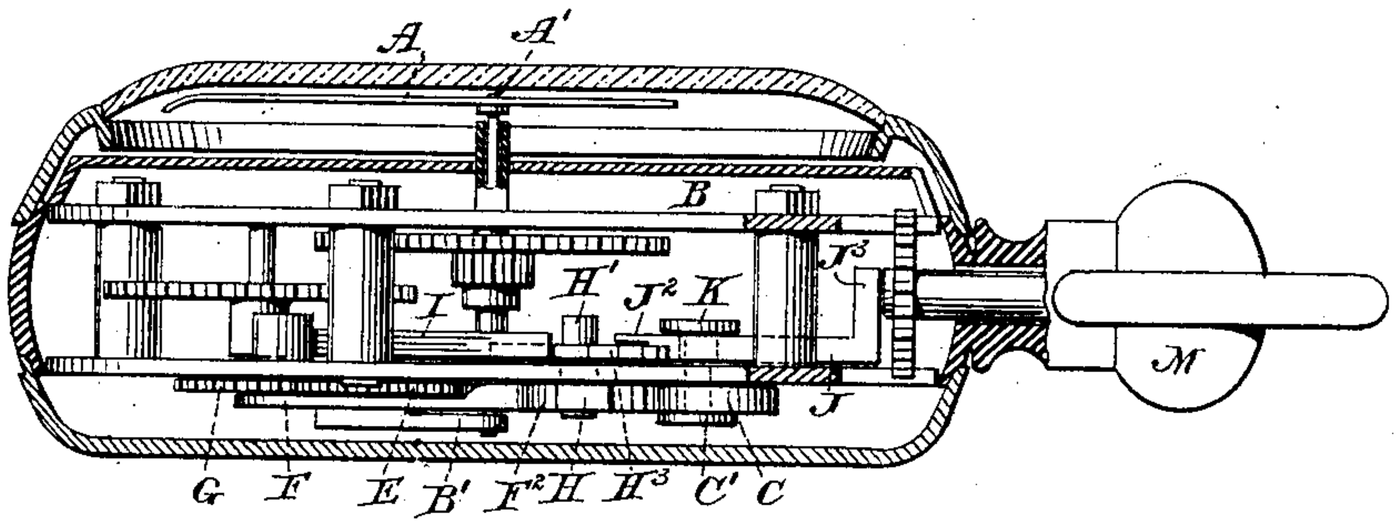


Fig. 2.

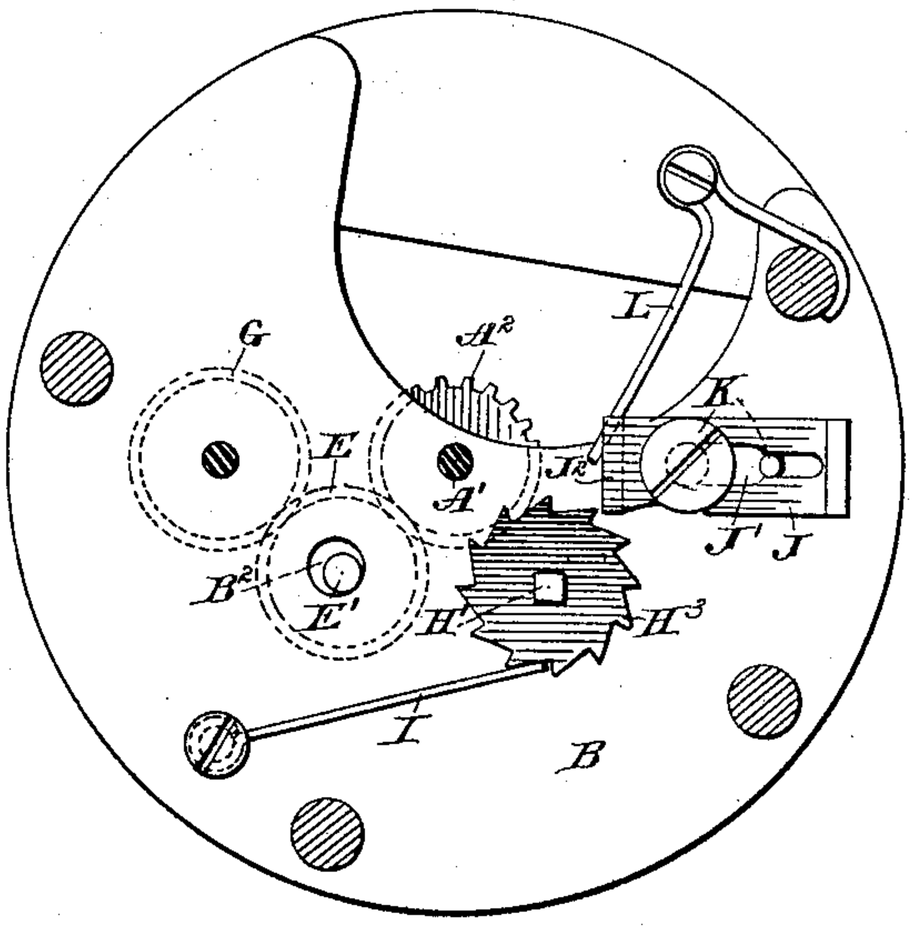


Fig. 3.

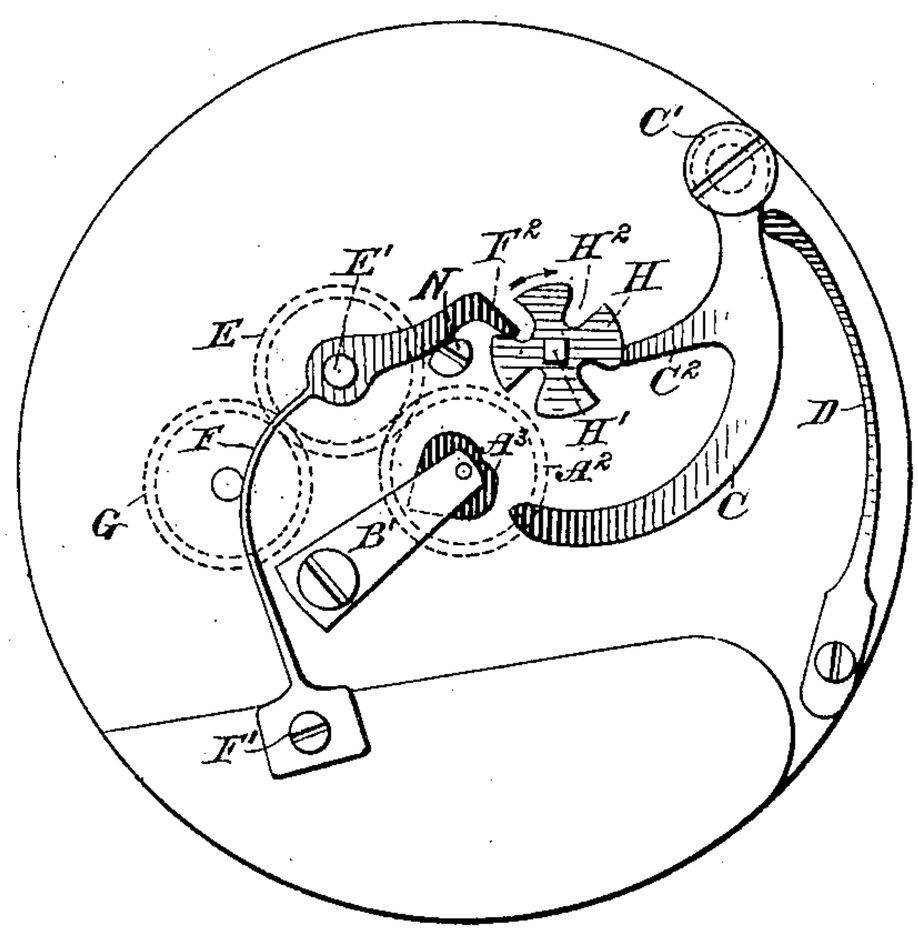
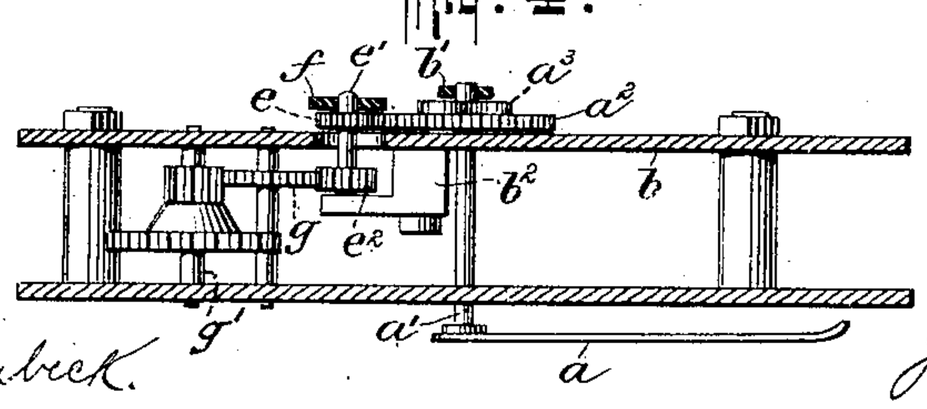


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOSEPH PETRILLO, OF BROOKLYN, NEW YORK, ASSIGNOR TO VICTOR NIVOIS, OF BROOKLYN, NEW YORK.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 755,313, dated March 22, 1904.

Application filed April 26, 1902. Serial No. 104,751. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH PETRILLO, a subject of the King of Italy, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented a certain new and useful Improvement in Stop-Watches, of which the following is a specification.

My invention relates to stop-watches; and it consists of the new construction and arrangement of parts hereinafter described, and pointed out in the claims.

Figure 1 is a sectional elevation of a watch embodying my improvement. Fig. 2 is a top plan thereof. Fig. 3 is a bottom plan, and Fig. 4 is a sectional elevation of another form of watch to which my invention is applied.

A is the timing-hand, which is mounted rigidly on a central spindle A′, on which is also rigidly secured a driven wheel A^2 and a heart-cam A^3.

B is the frame of the movement, and B′ is a bracket projected therefrom and serving as a bearing for one end of the spindle A′.

The heart-cam A^3 is adapted to be engaged by the wedge-shaped end of the fly-back arm C, pivoted at C′ and pressed inward by a spring D. The driven wheel A^2 is adapted to come into and out of engagement with a driving-wheel E, journaled on a stud E′, which is carried by a spring-arm F, secured to the frame B at F′. This arm has a tendency to carry the driving-wheel E into engagement with the driven wheel A^2, and in order to prevent the wheels from being pressed together with too great a force one end of the pin E′ is arranged within an opening B^2 of the frame B, thus limiting the inward movement of the pin and of the wheel E. The driving-wheel E is in permanent connection with the clockwork by engaging a wheel G, which is permanently driven.

In order to bring the driving mechanism and the fly-back mechanism into operation at the proper time, I provide an operating-cam H, secured rigidly to a spindle H′ and adapted to receive a step-by-step rotary motion by a mechanism to be described presently. This cam has a plurality of members or teeth (four as shown) with recesses H^2 between them, which recesses are adapted to receive the end F^2 of the arm F and a projection C^2 on the fly-back arm C. The relative arrangement of these parts is such as to secure the operation described hereinafter. The part of the arm F which lies between the arbor of the driving-wheel and the cam-wheel H is substantially rigid. That part of the arm which lies between the point at which it is attached to the frame of the watch and the arbor of the driving-wheel is very elastic and is curved as shown. This elastic or spring portion is so constructed that the tendency of the same is not only, as already indicated, normally to throw the driving-wheel and the driven wheel into mesh with one another, but also to throw the prong F^2 into the notch H^2 of the cam H. An important advantage of the curved spring-arm is that it insures practically instantaneous meshing of the driving-wheel with the driven wheel. When the spring-arm is released, the driving-wheel meets the driven wheel. In order to insure accuracy, it is important that the tooth of the driving-wheel nearest the driven wheel immediately fall into perfect meshing with two teeth of the driven wheel. The curving of the spring enables the driving-wheel to yield or give in any direction. In this way an instantaneous meshing is secured, especially in case the point of the tooth on the driving-wheel meets the point of a tooth on the driven wheel, in which latter case any serious jar of the mechanism is prevented by the tendency of the spring to yield. This is of importance particularly in the cheaper grade of stop-watches, for which my invention is more especially designed.

To impart a step-by-step motion to the cam H, a ratchet-wheel H^3 is secured to the spindle H′, said wheel having three times as many teeth as the cam H. A spring I holds the ratchet-wheel steady and prevents a return movement thereof. A push member J is mounted to slide about tangentially to the ratchet-wheel H^3 and to engage the same, so as to feed it the distance of one tooth at each inward movement. This slide is guided by one or two stationary pins K, working in a

longitudinal slot J′. The inner end of the slot is slightly wider than the pin K, so that the push member is capable of a slight lateral movement which enables it to move into the proper position at the end of its return or outward movement to engage the next tooth of the ratchet-wheel H^3. A spring L is employed to force the push member J both longitudinally outward and also toward the ratchet-wheel H^3 laterally. The inner end of the push member may be provided with a lip J^2, which serves the double purpose of affording a hold for the spring L and of properly guiding the push member relatively to the ratchet-wheel. Any suitable means may be employed for operating the push member. A convenient arrangement is that illustrated in Fig. 1, where the ordinary so-called "crown" M is arranged when moved inward to engage a projection J^3 on the push member J.

The operation is as follows: Let us assume the timing-hand A is held in its initial position by the engagement of the fly-back arm C with the heart-cam A^3, the driving-wheel E being at that time out of engagement with the driven wheel A^2. Upon then moving the crown M inward the cam H will be given a partial rotation and the mechanism will assume the position shown in Fig. 3. It will be seen that the fly-back mechanism is moved into an inoperative position, so as to release the timing-hand, and at the same time the end F^2 of the arm F drops into one of the notches H^2, thus bringing the wheels E and A^2 into driving engagement with each other. The timing-hand will therefore begin to move, since it is in driving connection with the clockwork. When it is desired to stop the timing-hand at the finish of the race, the crown M is again pushed inward to give a further partial rotation to the cam H. This will leave the position of the fly-back arm C unaltered, since the raised portions or teeth of the cam H are about twice as wide as the notches H^2. The arm F will be raised or moved outward so as to bring the wheel E out of engagement with the wheel A^2. This of course will cause the timing-hand to stop exactly at the point at which it happens to be, this indicating the exact time from start to finish. To bring the timing-hand back to its original position, the crown M is pushed inward again, when the cam will receive a still farther partial rotation, which will leave the position of the arm F unaffected, but will cause the projection C^2 to drop into one of the notches H^2, so that the end of the fly-back arm C will, under the influence of the spring D, strike the heart-cam A^3, and thus bring the timing-hand back to its original position ready for another start. It will thus be seen that the movement of the cam H is performed in three steps or periods and that the driving mechanism, as well as the fly-back mechanism, is operative during one of these periods and inactive during the other two. The two periods of inactivity, however, do not coincide, but succeed each other immediately. The timing of the mechanism is therefore as follows: first period, fly-back mechanism active, driving mechanism inactive; second period, fly-back mechanism inactive, driving mechanism active; third period, both mechanisms inactive.

The purpose of slightly enlarging the inner end of the slot J′ will, it is thought, be readily understood from Fig. 2, as this shows how the push member J is moved laterally toward the ratchet-wheel H^3 by the spring L, yet is allowed to move laterally in the opposite direction during the return movement of the push member, so as to practically clear the teeth of the ratchet-wheel.

Instead of limiting the inward movement of the pin or spindle E′ by the walls of the opening B^2, or in addition to this construction, I may provide an adjustable stop N, against which the arm F is carried by its elasticity. This stop, as shown, consists of a screw having a flat or irregular head, so that by turning the screw the extent of the inward movement of the arm F may be varied. This construction is of advantage in that it enables me to employ a cam H of ordinary construction and relative cheapness, since the notches H^2 need not be accurately made, as the stop N will always arrest the arm F at the same point, thus securing an absolutely uniform mesh of the wheels E and A^2. It will be seen that the axis of the wheel G, which rotates *in situ*, is located between the driving-wheel E and the point F′ at which the movable arm F is attached, thus insuring a good permanent meshing of the wheels E G.

I desire to call attention to the arrangement of the cam H on one side of the frame-plate B and of the ratchet-wheel H^3 on the opposite side of the said plate. By this arrangement the strains on the spindle H′ are minimized and a very strong construction is obtained. Another feature which simplifies and strengthens the mechanism is the construction of the arm F as a spring-arm, thus doing away with the use of a separate spring and securing a certainty of proper action, as already explained.

In Fig. 4 I have illustrated another form of my invention. Here the timing-hand *a* is rigid upon the spindle *a′*, journaled in the frame *b* and bracket *b′* and also carrying the driven wheel a^2. The latter is adapted to be engaged by the driving-wheel *e* at the upper end of the spindle *e′*, the lower end of which is stepped in a bracket b^2 in such a manner that the upper portion of such spindle can swing laterally to bring the driving-wheel *e* into or out of engagement with the driven wheel a^2. The spindle *e′* is permanently driven by means of a pinion e^2, meshing with a wheel *g*, which forms part of the movement. For instance, this wheel may be connected with the ordinary seconds-hand spindle *g′*, arranged eccentrically, while

the timing-hand *a* is at the center of the watch. The upper portion of the spindle *e'* is carried by the spring-arm *f*, corresponding to the arm F of the construction first described. This arm *f* has its movement limited by an adjustable stop of the character hereinbefore referred to. In other respects also the construction is the same as described with reference to Figs. 1 to 3. The operation being also practically the same need not be described again.

I desire it to be distinctly understood that the constructions shown in the drawings are only examples of the many possible forms of applying my invention. The central location of the timing-hand is by no means an essential feature; neither is the particular driving mechanism nor the operation from the crown, although both of the last-named features are useful. Nor is the prong F^2 an essential feature, for the end of the rigid portion of the arm F may be made to engage with the cam H without being made in the form of a prong. Other features, however, may be employed independent of these two features. The driven wheel A^2 a^2 is shown as mounted directly on the spindle of the timing-hand; but to secure the result indicated above it is sufficient that the driven wheel should be held to turn with the timing-hand. It will therefore be understood that various departures may be made from the constructions shown in the drawings within the scope of my invention as indicated in the appended claims. It will of course also be understood that my invention may be applied as an attachment to existing watch-movements. The watch may be used as a stop-watch only—that is, the timing-hand may be the only hand of the watch or the timing-hand may be used in addition to other hands, which remain permanently connected with the movement and will therefore indicate time in the usual way, so that the operation of the timing-hand will not interfere with the usefulness of the watch as a timekeeper.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a stop-watch, the combination of an actuating star-wheel, a driven wheel, a spring-arm carrying a driving-wheel for engagement with said driven wheel and engaging with said star-wheel, the said spring-arm having a spring-shank which is secured to the frame of the watch and is curved so as to enable the driving-wheel to yield in any direction, for the purpose of securing immediate and instantaneous engagement of the driving-wheel with the driven wheel.

2. The combination of a timing-hand, a stop mechanism and a fly-back mechanism for said hand, a cam mounted to turn and controlling the stop mechanism and the fly-back mechanism, a ratchet-wheel connected with the cam, an operating member arranged to slide adjacent to the ratchet-wheel and to engage the same, said member having a lip extending over the face of the ratchet-wheel and being also capable of moving transversely in relation to the ratchet-wheel, and a spring acting on said member with a tendency to throw it longitudinally outward and also transversely toward the ratchet-wheel.

In testimony that I claim the foregoing as my invention I have hereunto set my hand in the presence of two subscribing witnesses.

JOSEPH PETRILLO.

Witnesses:
JOHN LOTKA,
EUGENE EBLE.