(No Model.)

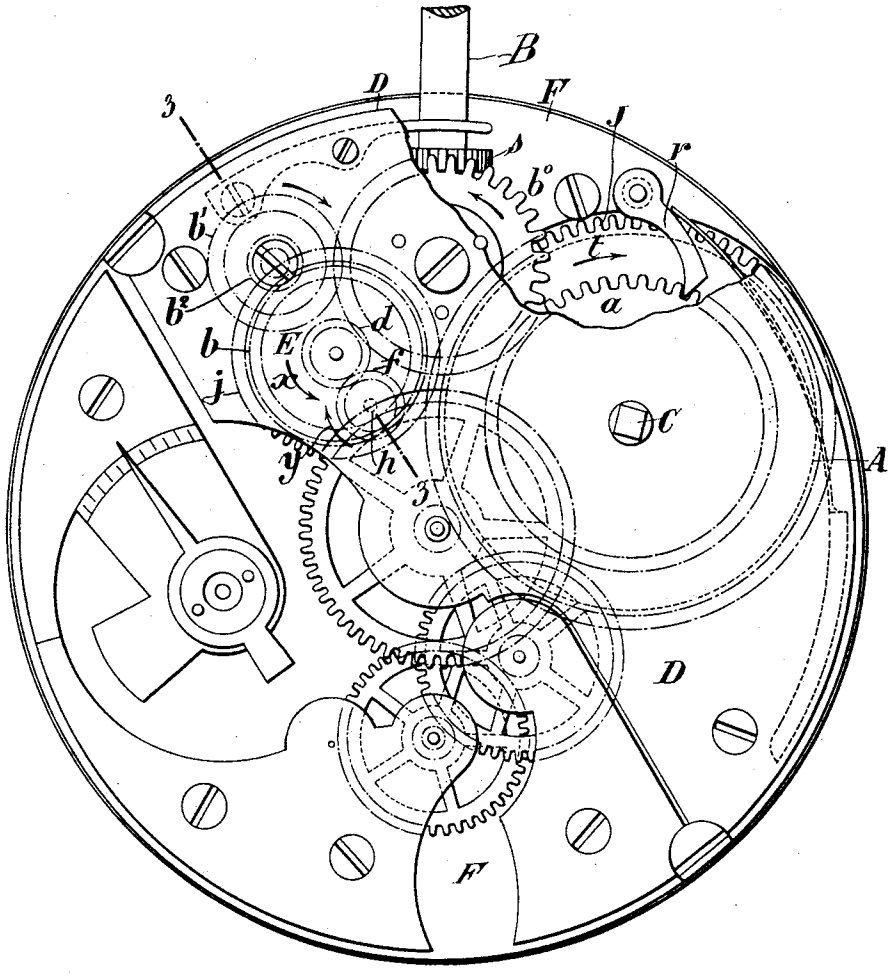
2 Sheets—Sheet 1.

E. ANTOINE.

WINDING INDICATOR FOR WATCHES.

No. 588,373. Patented Aug. 17, 1897.

FIG. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C

(No Model.) 2 Sheets—Sheet 2.

E. ANTOINE.

WINDING INDICATOR FOR WATCHES.

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FIG. 2.

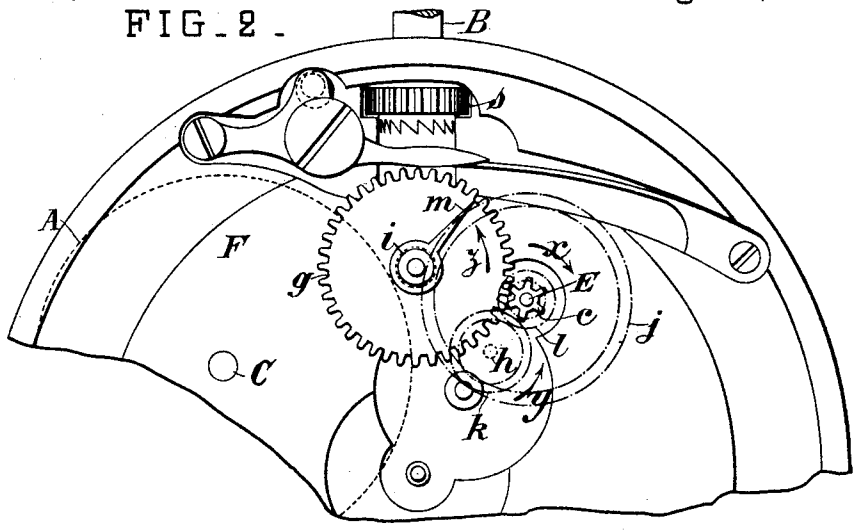


FIG. 3.

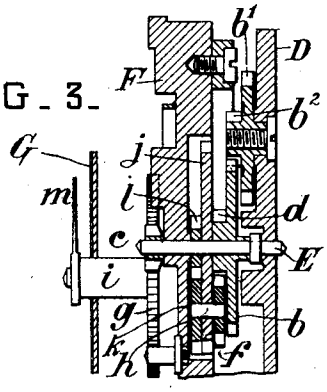


FIG. 4.

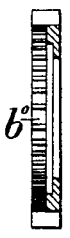


FIG. 6.

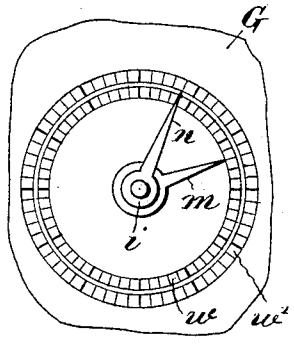
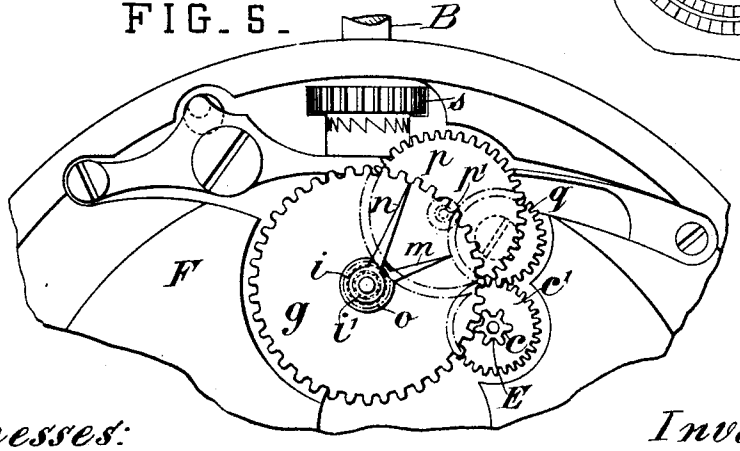


FIG. 5.



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UNITED STATES PATENT OFFICE.

ERNEST ANTOINE, OF BESANÇON, FRANCE.

WINDING-INDICATOR FOR WATCHES.

SPECIFICATION forming part of Letters Patent No. 588,373, dated August 17, 1897.

Application filed May 17, 1897. Serial No. 636,849. (No model.) Patented in Switzerland November 18, 1896, No. 13,340.

To all whom it may concern:

Be it known that I, ERNEST ANTOINE, a citizen of the French Republic, residing at Besançon, (Doubs,) in the Republic of France, have invented certain new and useful Improvements in and Connected with Watches, Clocks, and the Like, (for which a patent has been granted in Switzerland, No. 13,340, dated November 18, 1896,) of which the following is a clear and complete specification.

This invention relates to a device applicable to all timepieces operated by springs, whereby the extent to which the main or driving spring has been unwound can be seen at any moment, thereby indicating whether the timepiece needs winding up.

To enable my invention to be fully understood, I will describe it by reference to the accompanying drawings, wherein an embodiment thereof is illustrated.

Figure 1 is a face view of the movement of a watch having my device applied thereto, a portion of the top plate being broken away to show the gearing below it. Fig. 2 is a fragmentary view of the opposite face of the movement to that seen in Fig. 1 and showing the particular mechanism of this invention. Fig. 3 is a fragmentary section on line 3 3 in Fig. 1. Fig. 4 is a detached sectional view of the wheel b^0. Fig. 5 is a view similar to Fig. 2, showing the addition of a time-indicating hand. Fig. 6 is a view of the graduated circle on the dial for the hands m and n.

A represents the spring-barrel of the watch-movement; B, the stem-arbor; C, the spring-arbor; D, the top plate of the movement, and F the bottom or pillar plate nearest the dial G, Fig. 4.

The barrel A contains the main spring of the watch, and on its arbor C is fixed the ratchet-wheel a, the teeth of which are gear-teeth. The ratchet-wheel has the usual pawl r. (Seen in Fig. 1.) The teeth of the ratchet-wheel a gear with those of the winding-wheel b^0, Fig. 1, which latter, Fig. 4, turns loosely, being an intermediate and gears with a wheel b', also loosely mounted and integral with a pinion b^2, gearing with a wheel b, loose on its arbor E, which latter has a bearing in the top plate D and the bottom or pillar plate F, Fig. 3, and carries a pinion c on the same side of the pillar-plate as the mechanism seen in Fig. 2. The wheel b^0 has, as clearly shown in Fig. 4, a double set of teeth or crown and spur teeth, so as to enable the spur-teeth to gear with the wheels a and b' and the crown-teeth to gear with the winding-pinion s on the stem-arbor B. The pinion c gears with a wheel g, the boss i of which carries on the side nearest the dial G of the watch a hand or pointer m, adapted to move over graduations on the dial, the said graduations being divided in accordance with the number of hours that the watch is constructed to run at one winding.

The wheel b is made integral with a pinion d, which gears with a wheel f, Fig. 3, fixed on one end of an arbor h, mounted to rotate in a bearing in a wheel j, the opposite end of said arbor carrying a wheel k, which gears with a pinion l, fixed on the arbor E. The wheel j is loose on the arbor E and gears with the barrel-wheel J.

The pinion d and the wheel f are of the same diameter, while the diameter of the pinion l is only two-thirds of that of the wheel k. The relation between the teeth of the ratchet-wheel a and the wheels b^0 b' b and that between the teeth of the wheels J j are such that the angular displacement of the wheel j for one revolution of the barrel is three times as great as that of the wheel b for one revolution of the ratchet-wheel a. The arbor of the wheel g can be placed at any point on the straight line extending from the axis of the central wheel of the watch to the axis of the watch-pendant.

The relation between the number of the teeth of the pinion c and of the wheel g is arbitrary and depends both on the angular movement it is desired to give the hand or pointer m and on the position of the center of this wheel g.

The wheels and pinions a, b^0, b', b^2, b, j, J, d, f, k, l, c, and g may have, for example, the following number of teeth—viz., ratchet-wheel a, fifty-five teeth; wheel b^0, forty teeth; wheel b', twenty-four teeth; pinion b^2, twelve teeth; wheel b, forty-two teeth; wheel j, fifty-six teeth; wheel J, one hundred and ten teeth; pinion d, fifteen teeth; wheel f, fifteen teeth; wheel k, eighteen teeth; wheel l, twelve teeth; pinion c, six teeth, and wheel g, forty teeth.

The mechanism above described operates as follows: When the watch is wound up—that is to say, when the ratchet-wheel a is rotated in the direction of the arrow t by means of the winding mechanism, so as to cause the barrel-arbor C to wind up the mainspring—the wheel b^0, through the medium of the wheel and pinion b' and b^2, rotates the wheel b and the pinion d in the direction of the arrow x, Figs. 1 and 2, with an angular velocity equal to $\frac{55}{24}\times\frac{12}{42}$ of the angular velocity of the ratchet-wheel a, and the pinion d rotates the wheels f and k in the direction of the arrow y, Fig. 2, with an equal angular velocity—that is to say, with an angular velocity equal to $\frac{55}{24}\times\frac{12}{42}$ of that of the ratchet-wheel a or of the barrel-arbor C. This rotary motion of the wheels f and k or of the arbor h is transmitted by the wheels l c, which rotate in the direction of the arrow x, and with an angular velocity equal to $\frac{55}{24}\times\frac{12}{42}\times\frac{18}{12}$ or $\frac{165}{168}$ of the angular velocity of the ratchet-wheel a to the wheel g, so that the hand or pointer m, carried by the latter, will move over the graduations on the watch-dial in the direction of the arrow z. It is clear that for four revolutions of the barrel-arbor C the wheels l and c will make $4\times\frac{165}{168}=4\times\frac{55}{56}$ revolutions.

When the spring unwinds—that is to say, operates the watch-movement—the wheel j will be caused to move by the barrel-wheel J with an angular velocity equal to $\frac{110}{56}$ of the angular velocity of the barrel, and the wheel f will roll on the pinion d, kept immovable by the connection of the wheel b, through the medium of the wheels b^2 b' b^0, with the ratchet-wheel a, which is held by the pawl r, so that the wheel f moves around the arbor E in the direction of the arrow x, the said wheel f and its arbor moving with a velocity equal to $\frac{110}{56}\times 2$ of the angular velocity of the barrel. This planetary motion around the spindle E causes the wheel k and the wheels l c, respectively, to rotate in directions opposite to those of the arrows y x and the wheel g, as also the hand or pointer m, in a direction opposite to that indicated by the arrow z, the wheel k having during this movement an angular velocity of rotation around its axis equal to that of the wheel f and an angular velocity of translation around the arbor E equal to that of the wheel j, while the wheels b and c during this movement only have an angular velocity equal to $\frac{110}{56}\times 2\times\frac{3}{2}-\frac{110}{56}\left(1+\frac{3}{2}\right)$ of the angular velocity of the barrel—that is, $\frac{110}{112}$ of the angular velocity of the barrel. Now supposing the power of the mainspring to be such that it causes the barrel A to make four revolutions in the direction of the arrow t, the wheels f and k, operated by the wheel j, gearing with the barrel-wheel J, will, on account of their planetary movement—that is to say, a combination of movements of translation and rotation—cause the wheel l, and therefore the arbor E and the wheel c, to make $4\times\frac{110}{112}$ or $4\times\frac{55}{56}$ revolutions in the direction of the arrow x in such a manner that the wheel g and the hand or pointer m will be moved by the wheel f in a direction opposite to the arrow z and with the same velocity as they had in the direction of the arrow z when winding up the watch, and so that during the unwinding of the spring the hand or pointer will indicate on the graduations on the watch-dial the extent to which the said spring has been unwound.

My improvements are especially applicable to all long-running watches—that is to say, to watches which go at one winding for more than two days, as, for instance, watches which go for fifty-five or fifty-six hours—keyless, open-face, hunters or half-hunters, repeaters, and all other timekeepers having a going-barrel, and particularly to watches and timekeepers which run for more than forty-eight hours.

It is obvious that the arrangement above described with reference to Figs. 1, 2, and 3 can be utilized as an hour-counter if care be taken to wind the watch up fully—that is to say, to return the hand or pointer to zero on the graduated circle on the dial. In order that the arrangement may also serve as a minute-counter, the device as shown in Fig. 5 may be adopted. In this figure a hand or pointer n is used to mark the minutes. The cannon i' of this hand or pointer passes through the cannon i of the hand or pointer m as well as the wheel g and carries under the latter a pinion o, (indicated in dotted lines,) which gears by means of the wheels and pinion p, p', and q with a wheel c', fixed on the arbor E. The pivots on which the wheels and pinion p, p', and q freely turn are fixed to the bottom or pillar plate F. The hand or pointer n must necessarily move in the same direction as the hand or pointer m, and the diameters of the wheels and pinions c' q p' p o will be such that when the watch is going the hand n, moving over graduations on the dial, makes one revolution an hour. It is obvious that the hand n may receive its motion from the wheel g.

The graduated circles on the dial G will vary somewhat with the various kinds of movements, but in Fig. 6 I have shown how they may be arranged, the graduated limbs or circles in this view being lettered w and w'.

In a case like that described herein, where the timepiece runs fifty-six hours, the outer circle w will have sixty divisions or gradua-

tions and the inner or hour circle fifty-six divisions, but, as stated, the number of divisions of the inner circle will vary.

Having thus described my invention, I claim—

1. A timepiece having graduations on its dial, a hand m to traverse said dial and indicate the extent to which the mainspring of the watch is run down, and gearing between the spring-barrel and said hand, said gearing comprising the barrel-wheel J, the wheel j, in gear therewith and loose on the arbor E, the said arbor, gearing between said arbor and the hand m, the said hand, the ratchet-wheel a, on the spring-arbor, the said spring-arbor, C, the spring-pawl r, the intermediate wheel b^0, gearing with the ratchet-wheel and a loosely-mounted wheel b', the said wheel b', the wheel b, loosely mounted on the arbor E, the pinion b^2, integral with the wheel b' and gearing with the wheel b, the pinion d, integral with the wheel b, the arbor h, rotatively mounted in the wheel j and carrying, fixed on its ends, the wheels f and k, the wheel f being in gear with the pinion d, and the pinion l, fixed on the arbor E and in gear with the wheel k, whereby the wheels f and k have a rotary movement about their axes, and a movement of translation about the arbor E, substantially as set forth.

2. A timepiece having graduations on its dial, a hand m to traverse said dial and indicate the extent to which the mainspring of the watch is run down, and gearing between the spring-barrel and said hand, said gearing comprising the barrel-wheel J, the wheel j, in gear therewith and loose on the arbor E, the said arbor, gearing between said arbor and the hand m, the said hand, the ratchet-wheel a, on the spring-arbor, the said spring-arbor, C, the spring-pawl r, the intermediate wheel b^0, gearing with the ratchet-wheel and a loosely-mounted wheel b', the said wheel b', the wheel b, loosely mounted on the arbor E, the pinion b^2, integral with the wheel b' and gearing with the wheel b, the pinion d, integral with the wheel b, the arbor h, rotatively mounted in the wheel j and carrying, fixed on its ends, the wheels f and k, the wheel f being in gear with the pinion d, the pinion l, fixed on the arbor E and in gear with the wheel k, the hand m, on the same axis with the hand n, adapted to traverse graduations on the dial, and mechanism between said hand n and the gearing-driving hand m, whereby the hand n marks the time, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ERNEST ANTOINE.

Witnesses:

CHARLES LAUREALLY,

ALPHONS RYNUHIER.