

(No Model.)

2 Sheets—Sheet 1.

C. H. AUDEMARS.

STOP WATCH.

No. 253,338.

Patented Feb. 7, 1882.

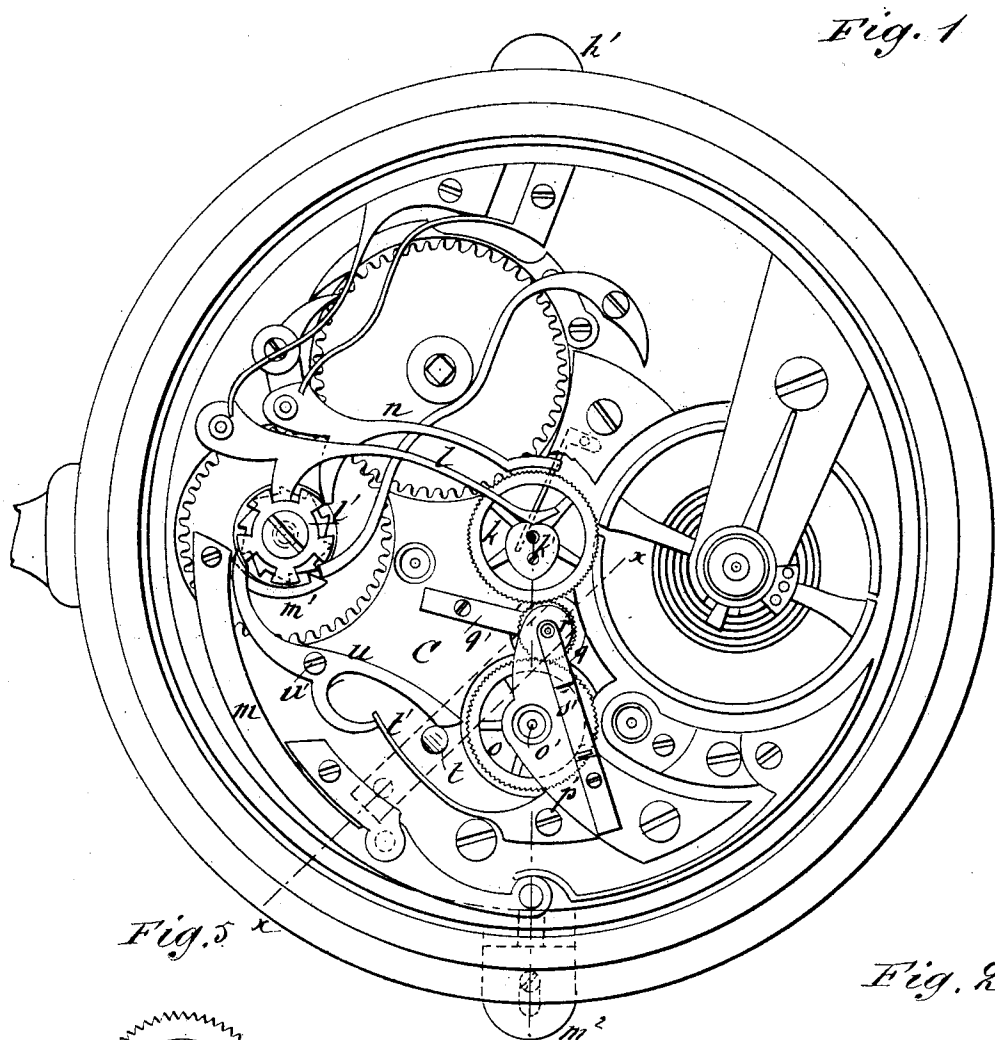
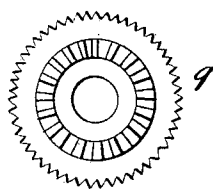


Fig. 1



WITNESSES:

C. Naveux

C. Sedgwick

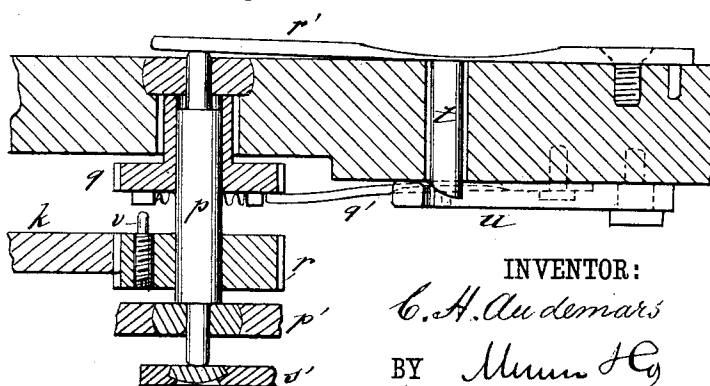


Fig. 2

INVENTOR:

C. H. Audemars

BY *Munroe & Co*

ATTORNEYS.

(No Model.)

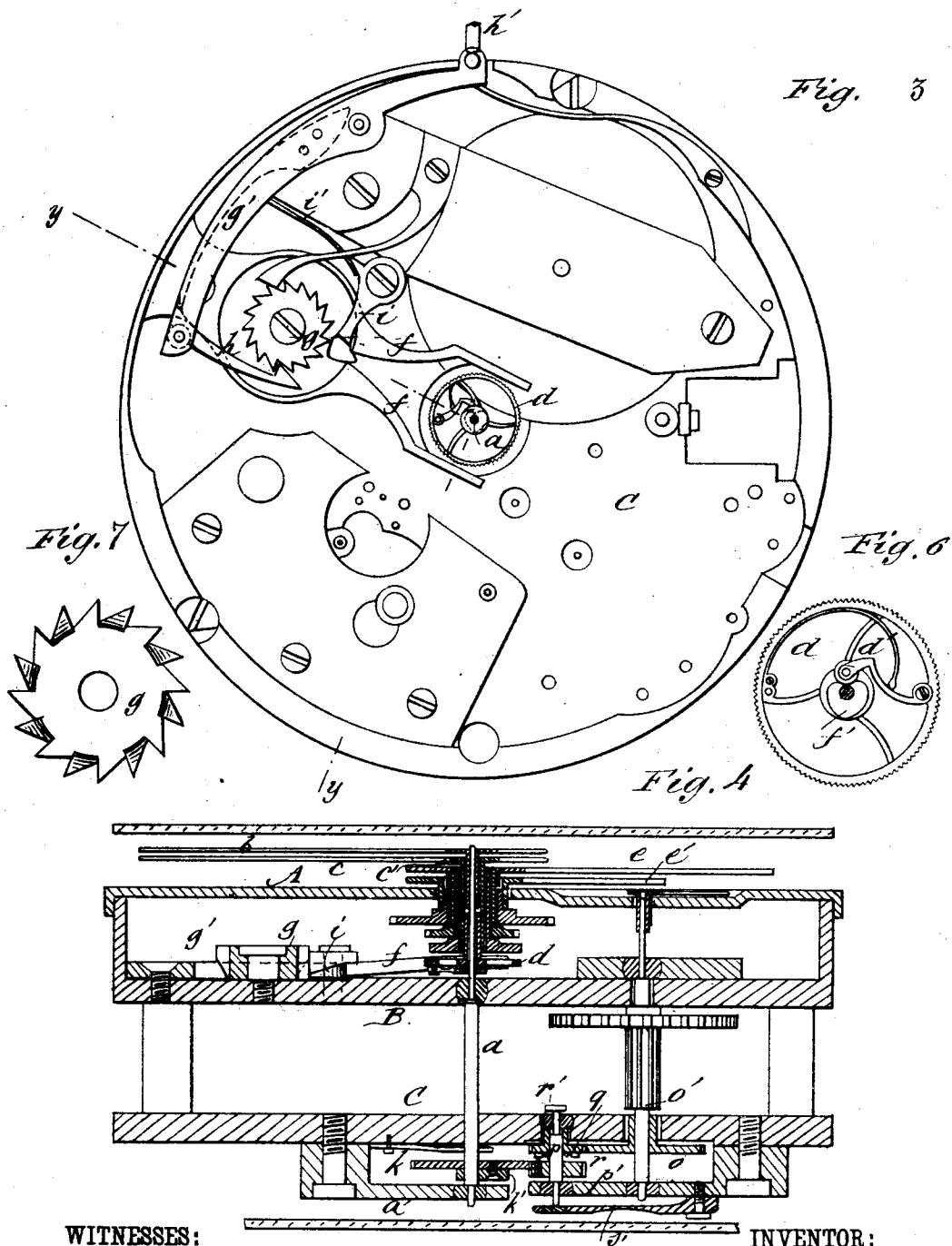
2 Sheets—Sheet 2.

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WITNESSES:

C. Neveu
C. Sedgwick

INVENTOR:

C. H. Audemars
BY *Mum & Co*
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UNITED STATES PATENT OFFICE.

CHARLES H. AUDEMARS, OF BRASSUS, SWITZERLAND.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 253,338, dated February 7, 1882.

Application filed June 23, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. AUDEMARS, of Brassus, Switzerland, have invented certain useful Improvements in Stop-Watches, of which the following is a specification.

The object is to simplify the construction and to relieve the watch of all friction which might interfere with its running.

The nature of my invention consists in the use of two pinions placed between the usual pinions, by which the stop-watch hands are driven from the second-hand of the watch, such two pinions fitted for being connected and disconnected with each other, and retained in either position by springs acting endwise of the arbor, with the result that the pinion gearing to the second-hand arbor is continuously in motion.

The construction and operation will be described in detail with reference to the accompanying drawings, wherein—

Figure 1 is a rear elevation of a chronograph containing my invention, showing the back plate and the mechanism thereon complete. Fig. 2 is a detail section, in larger size, on line *x x* of Fig. 1, showing the intermediate pinions, which are the principal feature of the invention. Fig. 3 is a face view of the back plate and the stop mechanism of the stop-watch. Fig. 4 is a cross-section taken on line *y y* of Fig. 3; and Figs. 5, 6, and 7 are enlarged views of certain pinions, referred to hereinafter.

Similar letters of reference indicate corresponding parts.

Referring to Figs. 3 and 4, A is the dial-plate, B the back plate, and C the small back plate. *a* is the central arbor, stepped at the back of the watch in a bridge, *a'*, and extending through the plates A B C, with a bearing in the back plate, B. *b* is one chronograph-hand, sustained on arbor *a* by a friction-sleeve. *c* is the other chronograph-hand, upon a sleeve, *c'*, that sets loosely around the sleeve of hand *b*; and *d* is a wheel on a sleeve that fits the arbor *a* next to plate B, and which sleeve and pinion carry the sleeve *c'* of hand *c*. The usual hands, *e e'*, of the watch are on sleeves around the sleeves of the hands *b c*, which sleeves carry pinions for their operation, as usual, by mechanism not shown. The wheel *d* on arbor *a* (shown in enlarged size in Fig. 6) has a rough-

ened edge, and is between spring-arms *f f*, fitted to bear on the wheel. On the arbor next to this wheel is fixed a heart-cam, *f'*, and a pawl-arm, *d'*, fixed on the wheel bears on the cam. *g* is a ratchet-wheel fitted for movement by a lever, *g'*, and pawl *h*; and *i* is a pivoted arm, the outer inclined end of which is between the spring-arms *f*. The arm *i* is placed contiguous to ratchet-wheel *g*, so that the teeth shall act in succession to force the cam end of the arm forward between the arms *f*, and thus press them upon the wheel *d*, the backward movement, by which the arms are relieved, being given by a spring, *i'*. A stem, *h'*, connected to lever *g'*, serves for use in giving the required movement to ratchet-wheel *g*. These parts, so far as described, are substantially similar to those used in ordinary split-second stop-watches.

Referring now to Figs. 1 and 4, *k* is a fine-toothed pinion fixed on arbor *a* outside the small plate C, and carrying a heart-cam, *k'*, engaged by a spring pawl-arm, *l*, that is moved to and from the cam by ratchet-wheel *l'*. *m* is a lever carrying a pawl, *m'*, and fitted for movement by a stem, *m''*, to operate the ratchet-wheel. A spring-arm, *n*, bearing by a projection on ratchet-wheel *l'*, extends to the wheel *k* to bear thereon, except when raised by the ratchet-wheel. These parts are also similar to those heretofore used.

o' is the second-hand arbor of the watch, carrying a pinion, *o*, adjacent to pinion *k*, but separate therefrom.

p is a short arbor supported between the pinions *o k* by bearings in the small plate C, and in a bridge, *p'*, the journals being elongated to allow endwise movement of the arbor.

q is a pinion loose on arbor *p*, and engaging the pinion *o* on the second-hand arbor *o'*.

r is a pinion fixed on arbor *p*, and engaging the pinion *k* of the stop-watch movement. A plate-spring, *q'*, (see Figs. 1 and 2,) fixed to plate C and taking beneath pinion *q*, retains the pinion in a position next to the plate and free from pinion *r*.

To the inner side of plate C is fixed a spring tongue or strip, *r'*, bearing on the end of arbor *p*, which projects slightly through the plate, and to the outer side of bridge *p'* is fixed a spring-tongue, *s'*, formed with a jeweled step

for the outer end of arbor *p*, which projects through the bridge. The inner spring, *r'*, is the stronger and retains the arbor in the outward position against the action of spring *s'*, which tends to force the pinion *r* in contact with pinion *q*. As shown most clearly in Fig. 2, the pinion *r* is of a width to remain in contact with pinion *k* in either position of its arbor *p*, and is fitted with a screw-pin, *v*, that projects from the inner side.

The pinion *q*, as shown in Fig. 5 most clearly, is formed on its outer face with fine teeth for engagement by the pin *v*.

In the plate C, beneath and attached to the spring-tongue *r'*, is a loose pin, *t*, having its outer end, which is projected by the spring *r'*, formed inclined or beveled. On the outer side of plate C a lever, *u*, pivoted at *u'*, bears by one end on the ratchet-wheel *l'*, while its other arm extends to the pin *t*, over which the lever-arm is moved by a spring, *t'*, when allowed by the movement of the ratchet-wheel.

The operation is as follows: When the stop-watch hands are not running the pinions *q* *r* are separated, and pinion *q* turns with the pinion *o*. With the first pressure on the stem *m*², and the consequent movement of ratchet-wheel *l'* to the extent of one tooth, the lever leaves the cam of wheel *k*. Lever *u*, freed from contact with the ratchet-wheel teeth, is moved by its spring against the bevel end of pin *t*, and the pin being thereby moved endwise, the spring *r'* is lifted from the arbor *p*. The spring *s'* being thus relieved, it raises arbor *p*, and the pin on pinion *q* engages the teeth on the face of pinion *r*, so that the pinion *k* and arbor *a* are instantly started. By a second pressure of the stem *m*² a reverse movement is given to lever *u*, the pin *t* and spring *r'* are released, and the arbor *p* moved to disengage the pinions *q* *r*. At the same time the ratchet-wheel *l'* forces the lever *u* against pinion *k* with the result to instantly stop the hands. With a third pressure of the stem, lever *u* is raised from the pinion *k* and lever *l* released, and the latter being forced upon the cam *k'*, the hands are carried back to the starting-point.

During the movement of the hands the hand *c* can be stopped by operation of the stem *h'*, which, acting on ratchet-wheel *g*, relieves the arm *i* and allows the arms *f* to clamp and hold the pinion *d*, which carries the hand *c*, while the hand *b* continues to move. A second pressure on stem *h'* acts to force the arms *f* apart by movement of arm *i*, and the pawl *d'* and cam *f'* will carry the hand *c* forward to the hand *b*.

I am aware of the Patent No. 202,041, granted April 2, 1878, to C. H. Meylan; but in this the second-hand wheel is pressed down by a spring into connection with a wheel on the minute-hand arbor of the watch-movement and produces a rubbing detrimental to the running of the watch, because it bears continuously on the wheel and is not counteracted. To avoid this I employ the two unequal springs, *r'* *s*,

and cause them to operate on the ends of the vertically-movable arbor *p*, and limit the movement of the arbor by the bridge *p'*, so that when the wheels are clutched by raising the wheel *r* up to the wheel *q* the merely supporting spring *q'* does not follow, press, or cause friction on the wheel *q*.

In Patent No. 202,041 the incline on the end of lever which raises the second-hand wheel out of connection with the wheel on the minute-hand arbor of the watch-movement acts only at one point on the periphery of wheel, and thus raises only one side, turning the arbor or pivot slightly out of a perpendicular and causing it to jam in its bearing. This difficulty is overcome by using in connection with unequal springs on the ends of the movable arbor the described mechanism for raising the stronger spring and allowing the weak spring to raise the arbor and wheel *r*.

In Patent No. 202,041, the chronograph second-hand wheel being clutched with and moved directly by the minute-hand wheel of the watch-movement, the watch-hand must be moved at the start according as the teeth are presented to receive the pin. To avoid this I do not connect these wheels directly, but by the intermediate wheels, *q* *r*, one loose and the other fast on the arbor *p*, so that the shock is taken up in the intermediate gear, and the watch-hand is not caused to make any improper movement.

Having thus described all that is necessary to a full understanding of my invention, what I claim as new is—

1. In a stop-watch, the combination, with the arbor *p*, which carries a fixed pinion, *r*, and a spring-supported loose pinion, *q*, of the two springs *r'* *s'*, of unequal power and arranged to bear upon opposite ends of said arbor, whereby the pinions are forced out of connection by a strong spring and into connection by a weak spring, for the purpose specified.

2. The loose pin *t*, bevel-ended and protruding through plate C, the lever *u*, pressed by a spring, *t'*, and the ratchet-wheel *l'*, movable by a stem, *m*², in combination with the spring *r'*, arbor *p*, and spring *s*, the spring *s* being weaker than the spring *r'*, whereby the weak spring *s* is allowed to raise the arbor *p* and wheel *r*, as described.

3. In stop-watches, the combination, with the pinion *k* on arbor *a* and the second-hand pinion on arbor *o'*, of the loose pinion *q* and fast pinion *r* on the same vertically-movable arbor *p*, the former gearing with pinion *o* and the latter with pinion *k*, said pinions *r* *q* having respectively pin and teeth on their opposite faces, as and for the purpose specified.

The above specification of my improvement in stop-watches signed by me this 4th day of June, 1881.

CHARLES H. AUDEMARS.

Witnesses:

PETER NAYLOR,
JAMES VAUCHEY.