

(Model.)

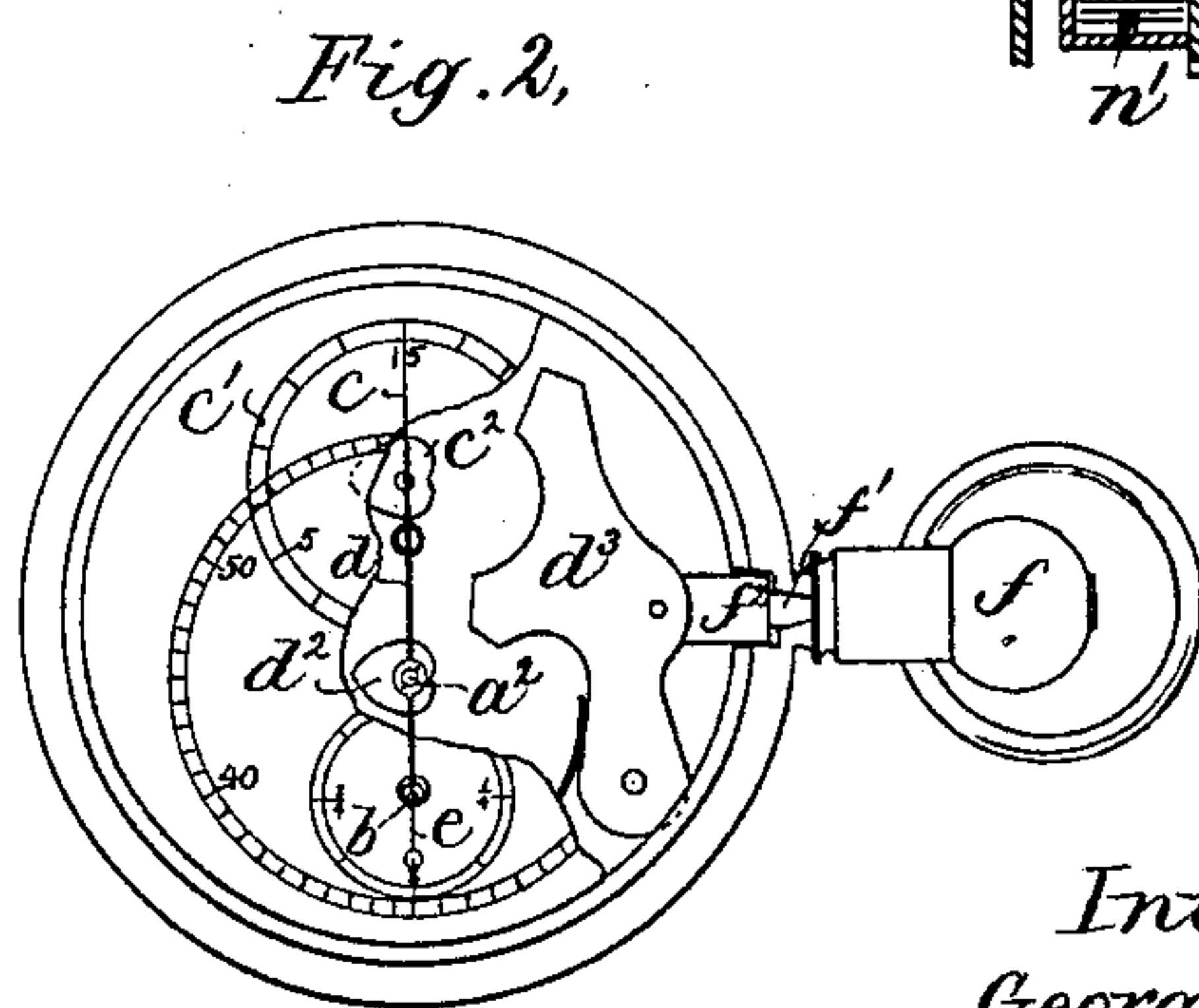
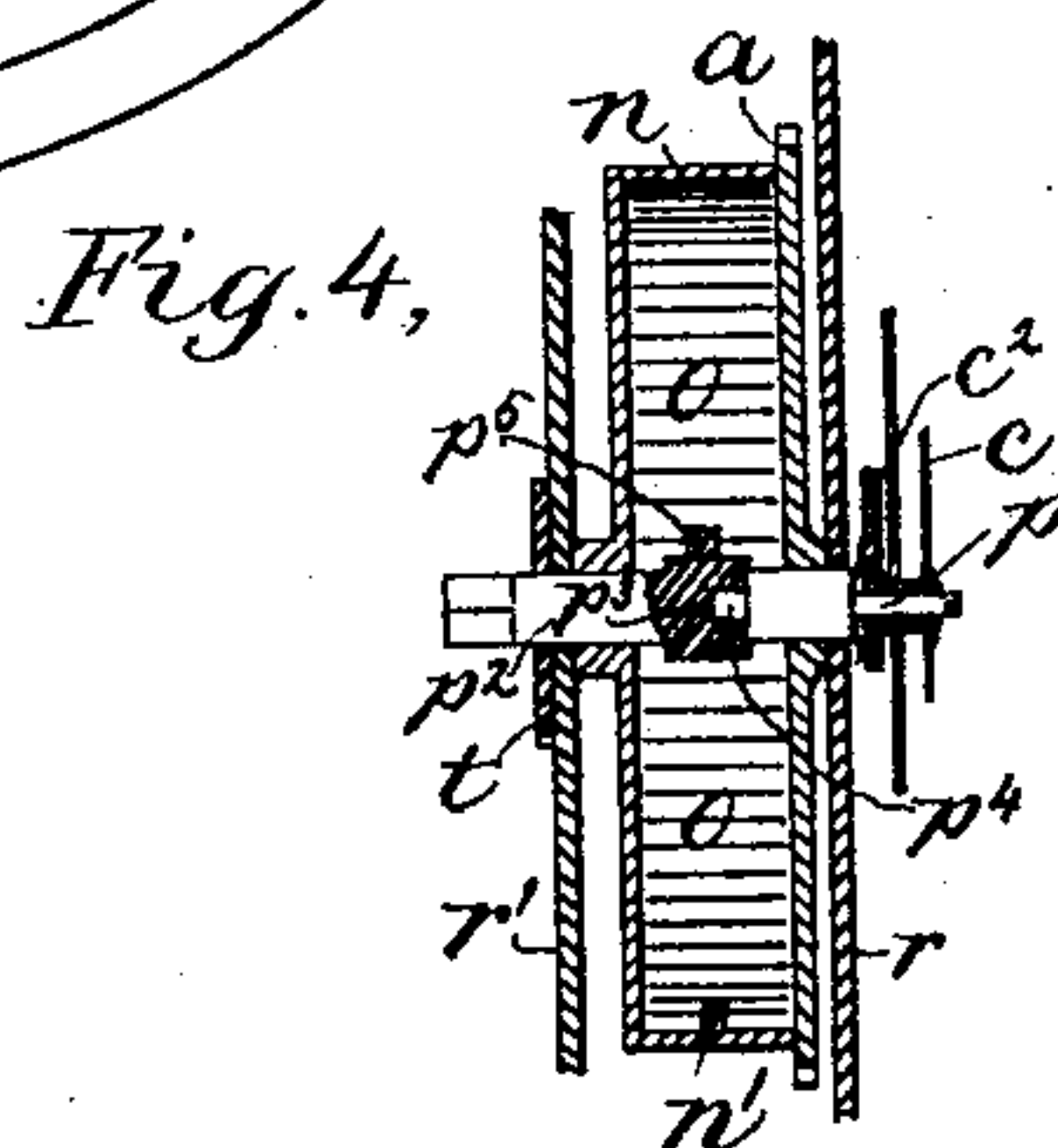
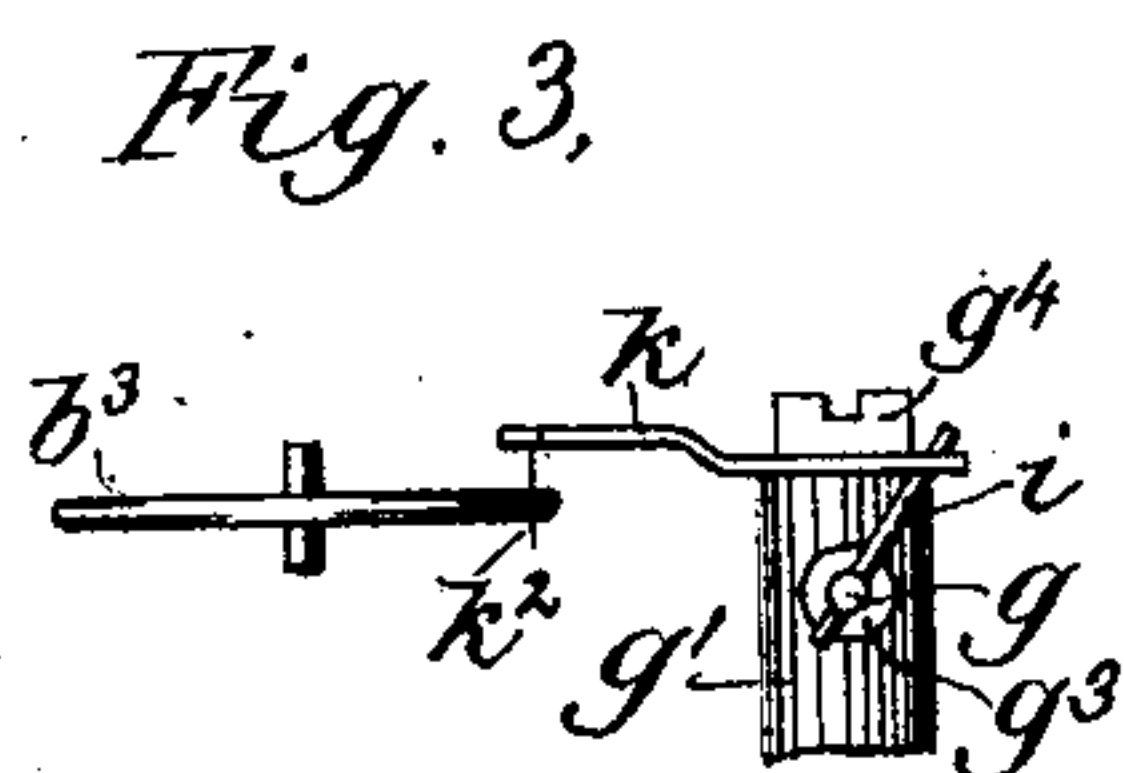
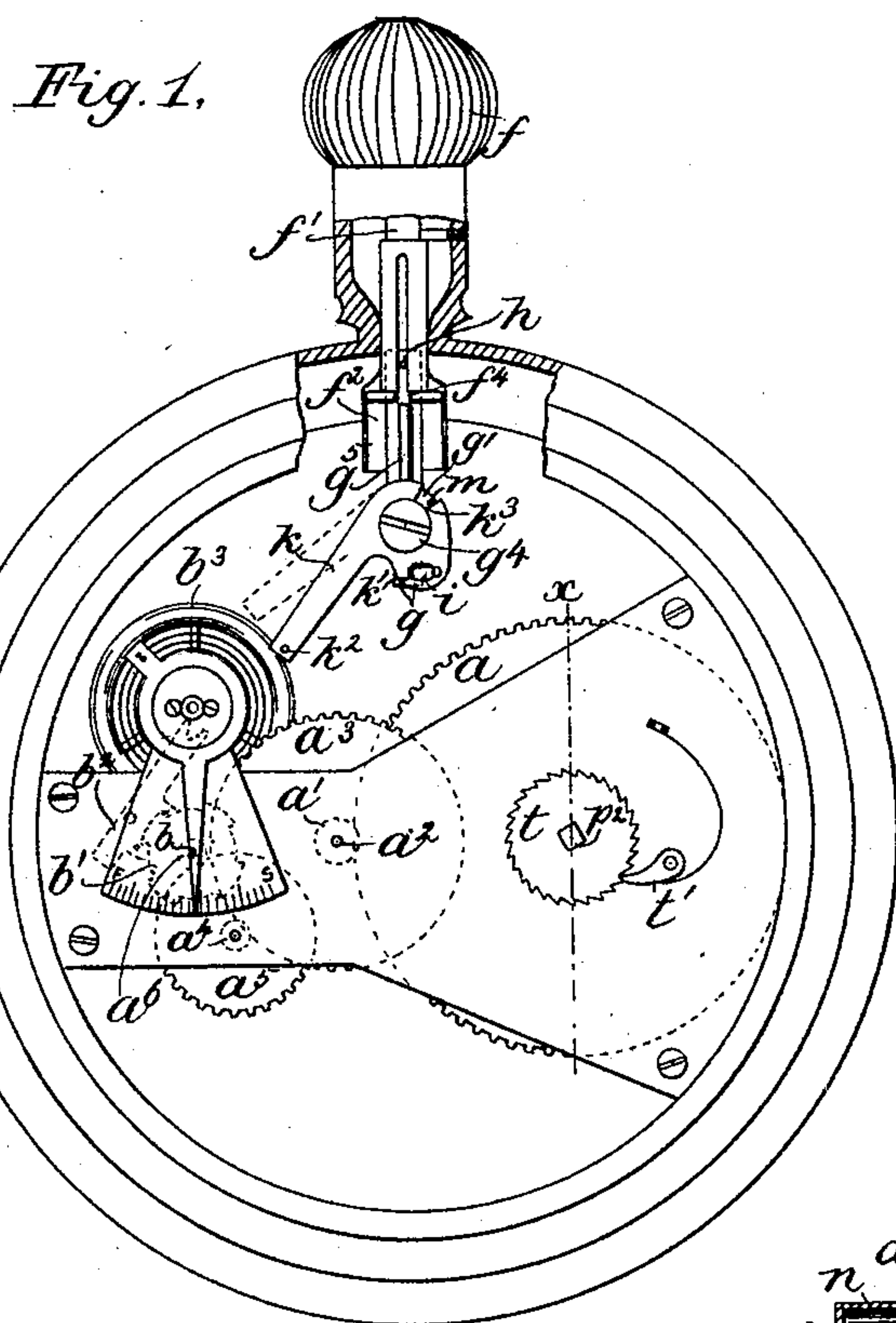
2 Sheets—Sheet 1.

G. B. ST. JOHN.

STOP WATCH.

No. 360,828.

Patented Apr. 5, 1887.



Witnesses,
Jas. J. Maloney.
H. P. Bates.

Inventor,
George B. St. John
by Jos. P. Livermore
Att'y.

(Model.)

2 Sheets—Sheet 2.

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Fig. 5,

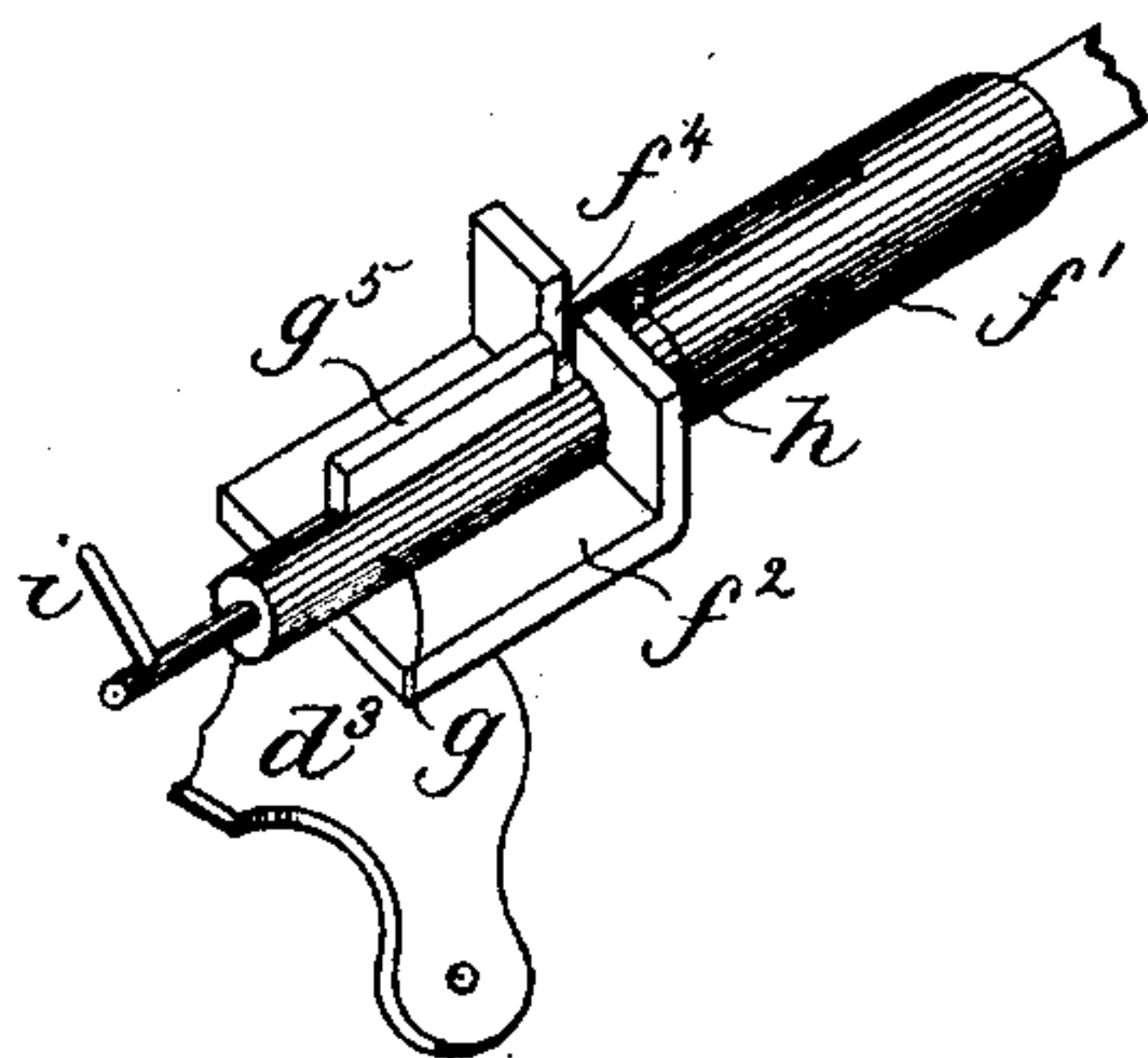
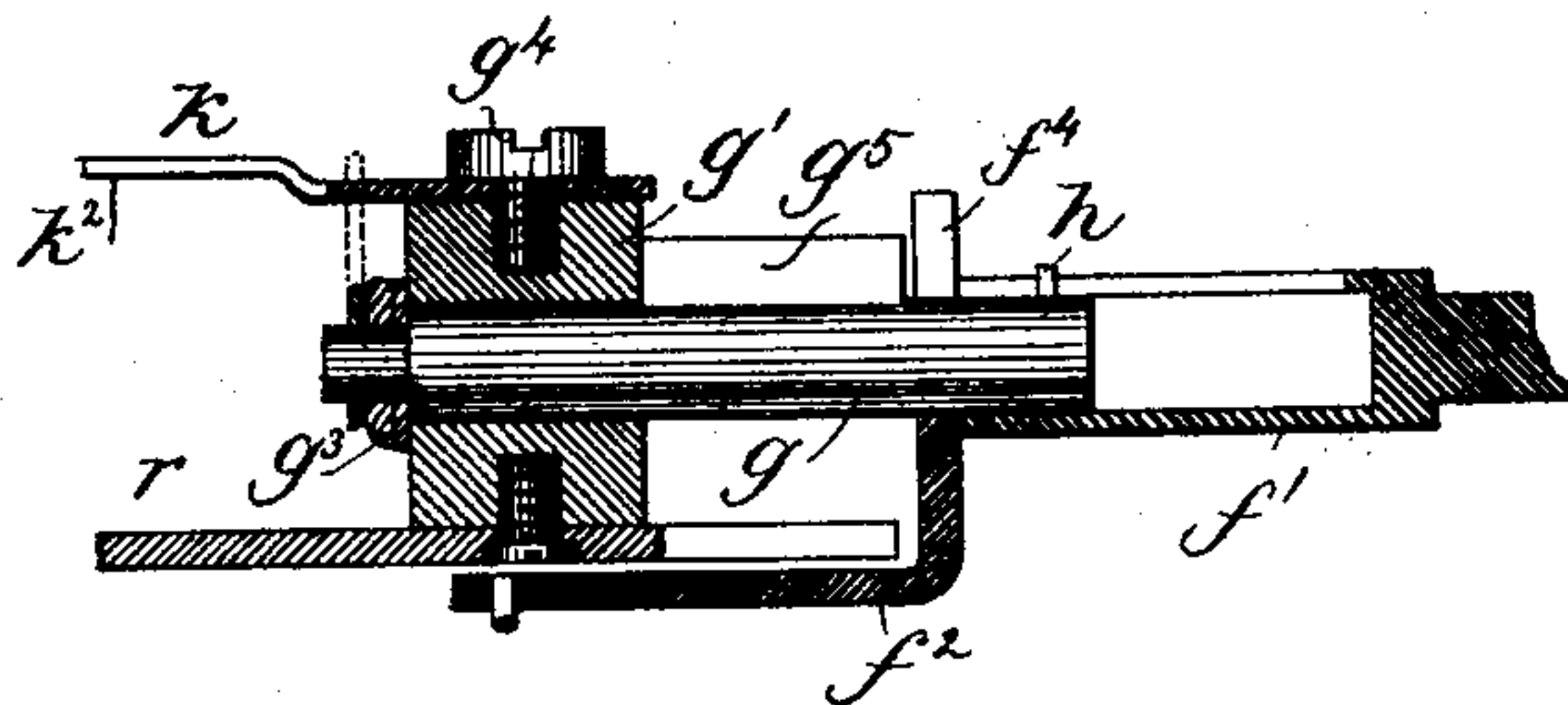


Fig. 6,



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UNITED STATES PATENT OFFICE.

GEORGE B. ST. JOHN, OF BOSTON, ASSIGNOR TO THE STANDARD THERMOMETER COMPANY, OF PEABODY, MASSACHUSETTS.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 360,828, dated April 5, 1887.

Application filed December 26, 1885. Serial No. 186,762. (Model.)

To all whom it may concern:

Be it known that I, GEORGE B. ST. JOHN, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Stop-Watches or Timers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is embodied in a stop-watch or timer such as employed for determining to the nearest fraction of a second small periods of time, the watch not being intended to run continuously, but to be started from a zero-point and run for a period of not usually more than half an hour or an hour.

The invention consists, partly, in a novel starting and stopping device operating by a slight rotary movement of the stem or pendant-knob of the watch, and also in the novel construction of the mainspring-barrel and winding-arbor, by which the said spring drives the main or primary wheel of the train, and also is connected with and turns one of the hands of the watch, which hand is used in connection with a suitable graduated circle to indicate the lapse of minutes.

The invention also consists in an interlocking device co-operating with the stopping device and the setting-back device, by which the hands are turned back to the starting-point or zero position when the watch is stopped, the said interlocking device preventing the hands from being turned back or forward accidentally or otherwise while the watch is running, so that a time record cannot be falsified by thus setting the hands and making the time indicated appear shorter or longer than the time that has really elapsed.

Figure 1 is a rear view of a stop-watch or timer embodying this invention on a scale larger than the actual size; Fig. 2, a front elevation of the watch, showing the dial and hands and setting-back mechanism on a smaller scale; Fig. 3, a detail showing the stopping device in end elevation; Fig. 4, a section on line *x*, Fig. 1, showing the mainspring-barrel and connected parts; Fig. 5, an enlarged detail, showing in perspective the stopping and starting device and adjacent parts, and Fig. 6 a longitudinal section of the said parts on a larger scale.

The train may be the same as commonly employed in watches of this class, consisting of the main or actuating wheel *a*, meshing with a pinion, *a'*, on an arbor, *a''*, provided with a wheel, *a'''*, meshing with a pinion, *a''''*, on an arbor provided with a wheel, *a'''''*, meshing with a pinion, *a''''''*, the arbor *b* of which carries the escape-wheel *b'*, co-operating with the lever *b''* and balance *b'''*, which may be and preferably are the same as shown in Letters Patent No. 313,962, granted to me March 17, 1885. The train is so arranged that the axis or arbor of the main wheel *a* and the arbor *a''* and the arbor *b* are in line with one another across the face of the watch, these three arbors being intended to carry the minute-hand *c*, the second-hand *d*, and the fractional second-hand *e*, (see Fig. 2,) the latter of which makes a complete rotation once in a second, while the arbor *a'* and hand *d* rotate once in a minute, corresponding to the second-hand of an ordinary watch, and the hand *c* rotates once in fifteen minutes; and the circle *c'*, co-operating with it on the face of the dial, is divided into fifteen parts, so that each division represents a minute, and the number of whole minutes that elapses between the moment when the watch is set in operation and stopped is indicated by the pointer *c*, the additional fraction of a minute by the pointer *d* to the nearest second, and the additional fraction of a second by the pointer *e* to the nearest one-eighth of a second, which is the time occupied by one beat of the balance *b'''*, or the time between two successive movements of the escape-wheel.

The pointers *c* and *d* are frictionally connected with their arbors in the usual manner and provided with setting-back mechanism, shown as the usual heart-cams, *c''* *d''*, and co-operating lever *d'''* for setting them back to the zero-point. The setting-back lever *d'''* is shown as operated to set the pointers *c* and *d* back to zero by a lengthwise movement of the pendant-knob *f* of the watch, which knob is provided with a sleeve, *f'*, that engages a slide-bar, *f''*, connected with the said lever *d'''*, the said sleeve moving telescopically on a shaft, *g*, having a bearing in a post, *g'*, (see Fig. 3,) in which it is free to turn, but is prevented from moving longitudinally by a shoulder or projection, *g''*, engaging one side of the said post *g'* and a

washer, g^3 , at the other side thereof. The shaft g is provided with a pin, h , engaging a longitudinal slot in the sleeve f' , or is otherwise connected with said sleeve in such manner that it will accompany it in the rotary movement of the sleeve, but will permit the independent longitudinal movement of the latter, by which the hands are restored to the zero-point, as before mentioned.

10 The shaft g is provided with a radial finger, i , engaging an opening, k' , in a lever, k , pivoted upon the end of the post g' and held in place thereon by a screw, g^4 . The said lever k projects out toward the balance-wheel b^3 , as shown in Figs. 1 and 3, and is provided with a spring-finger, k^2 , which engages the edge of the said balance-wheel when the lever is in the position shown in full lines, Fig. 1, the said pin k^2 then being slightly out of the line connecting the axis of rotation of the balance and of the lever k . The said lever k is provided with a notch, k^3 , which receives a stop-pin, m , on the upper end of the post g' , which limits the movement of the said lever on the said post, so that when moved from the dotted to the full line position it will come to rest with the finger k^2 still in contact with the balance. In moving the lever k from the full to the dotted line position, the finger k^2 will pass across the line joining the centers of the balance-wheel and the lever, and in this movement the periphery of the bearing-wheel will force the said pin k^2 toward the axis of the lever, the pin being sufficiently elastic to admit of this movement; and the moment it has passed the center line it will, by its elasticity, tend to continue the movement both of the balance and lever in the same direction as before, and will thus give a sudden throw both to the balance and lever, carrying the latter forward to its dotted-line position and giving an impulse to the balance, which will set it in vibration without fail. The opening k' , engaged by the actuating-finger i of the stop-lever, is sufficiently wide to admit of considerable lost motion of the lever with relation to the said pin, so that the latter is free to be moved by the impulse derived from the elasticity of the pin k^2 , as just described, and consequently the balance will be started by a sudden and quick impulse, however slow the movement of the pin i' may be, thus insuring the effectual operation of these parts as a stopping and starting device for the watch.

55 The setting-back mechanism for the hands is locked and prevented from operating while the watch is running by a locking device co-operating with the actuating-shaft g for the stop-lever k , the said locking device consisting of a radial rib or projection, g^5 , on the said shaft g , which, when the said shaft is in the position shown in Fig. 1, retaining the stop-lever k in full-line position with the balance arrested, is in line with a notch, f^4 , in the slide f^2 , that operates the setting-back lever d^3 , thus permitting the said slide f^2 to be moved and

the hands set back. When, however, the shaft g is turned to disengage the stop-finger k^2 from the balance, the projection g^5 is moved out of line with the notch f^4 , and thus prevents the slide f^2 from being moved as long as the watch is running, so that the position of the hands cannot be changed accidentally or otherwise during the period of time measured between the starting and stopping of the watch.

75 The main driving-wheel a of the train is connected with the usual barrel, n , inclosing the mainspring o and provided with a pin or catch, n' , with which the outer end of the mainspring is connected in the usual manner, and the arbor of the said wheel and barrel is divided into two parts, one part, p , being connected with the said wheel and barrel, to accompany them in their rotary movement, and passing out through the front plate, r , of the watch, where it is provided with proper devices for actuating the pointer c , which thus rotates with the same speed as the wheel a , being, as before mentioned, frictionally connected therewith, so that it may be turned or set back without corresponding movement of the said wheel. The other part, p^2 , of the arbor is arranged to turn independently of the part p , being, preferably, provided with an axial socket, p^3 , receiving a projection, p^4 , of the part p , so that the two parts are retained in line with one another and have the same effect for steady- ing and guiding the wheel a in its rotary movement as the usual winding-arbor. The part p^2 is provided inside with the usual hub and pin, p^5 , engaged with the inner end of the mainspring o , and it projects through the rear plate, r' , of the watch, where it is provided with the usual ratchet, t , co-operating with a pawl, t' , on the said plate, for holding the mainspring under tension, and is squared or provided with a milled head or otherwise adapted to be engaged and turned by the operator for the purpose of winding the watch in the usual manner.

I claim—

1. The combination of the balance of a watch with a stop-lever provided with an elastic pin which engages the periphery of the balance and a pendant-stem having a rotary movement and engaged with the said stop-lever, substantially as described.

2. The combination of the balance with the pivoted stop-lever having a notch and a pin therein, which limits the pivotal movement of the said lever, and an opening, combined with a shaft connected to rotate with the pendant-knob and provided with a finger entering the opening of the stop-lever, which is wider than said pin, for the purpose of providing for lost motion between the lever and pin, substantially as described.

3. The combination of the balance with the pivoted stop-lever having an opening, combined with a shaft connected to rotate with the pendant-knob and provided with a finger entering the opening of the stop-lever, which is

wider than said pin, for the purpose of providing for lost motion between the lever and pin, substantially as described.

4. The combination of the balance with the
5 pivoted stop-lever having a notch and a pin therein, which limits the pivotal movement of the said lever, and an opening, combined with a shaft provided with a finger entering the said opening of the stop-lever and a sleeve con-
10 nected with the pendant-knob and engaged with the said shaft, substantially as described.

5. The combination of a stop-lever and its actuating-shaft provided with a locking pro-
15 jection and the pendant-knob connected to rotate with said shaft and slide longitudinally

thereon, combined with setting-back mechanism for the hands, provided with a slide actuated by the pendant-knob in its longitudinal movement, and provided with a notch co-operating with the projection on the actuating- 20 shaft for the stop-lever, as described, whereby the hands can be set back only when the watch is stopped, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two sub- 25 scribing witnesses.

GEORGE B. ST. JOHN.

Witnesses:

SAML. C. LORD,
B. B. RAMAGE.