

(No Model.)

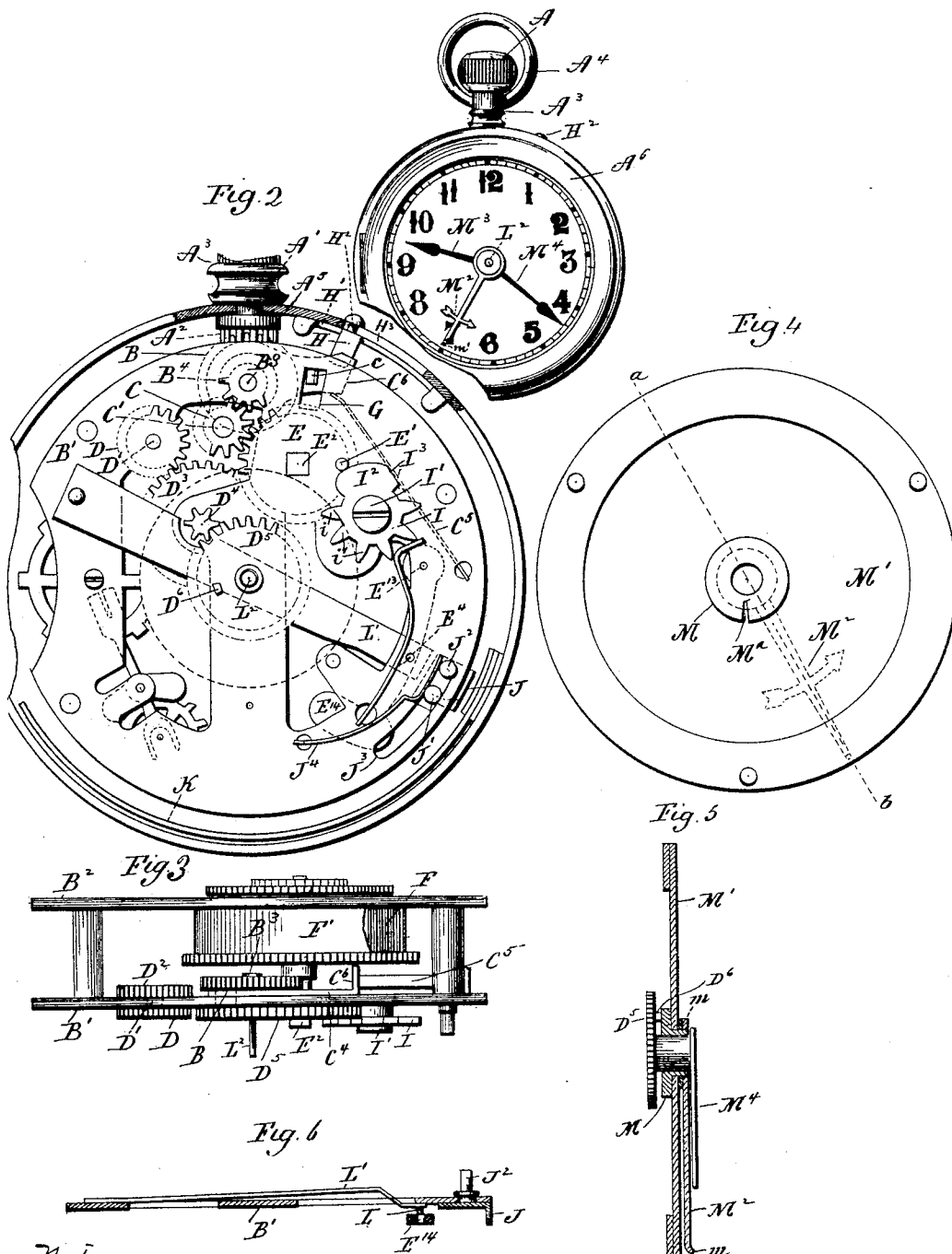
3 Sheets—Sheet 1.

A. BANNATYNE.
STEM WINDING ALARM WATCH.

No. 581,504.

Patented Apr. 27, 1897.

Fig. 1.



Witnesses.
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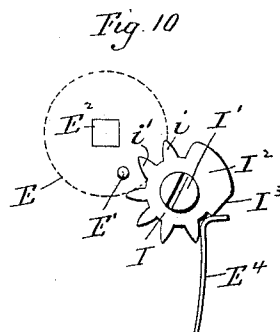
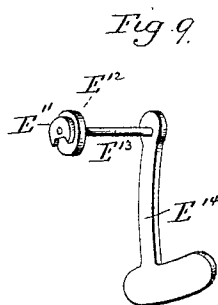
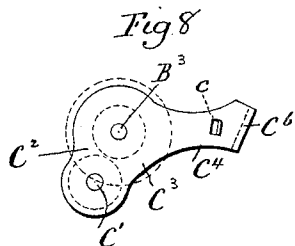
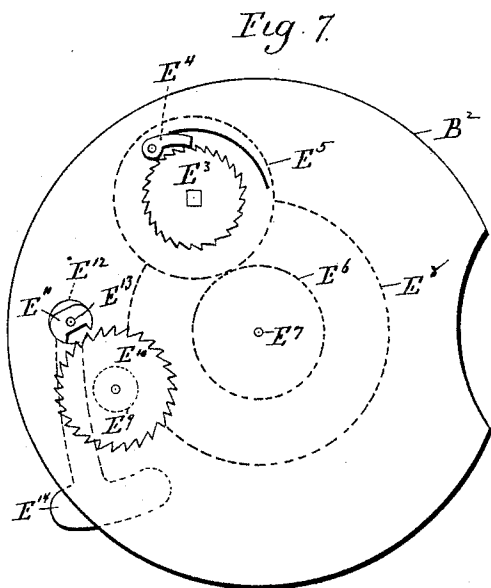
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3 Sheets—Sheet 3.

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Fig. 11.

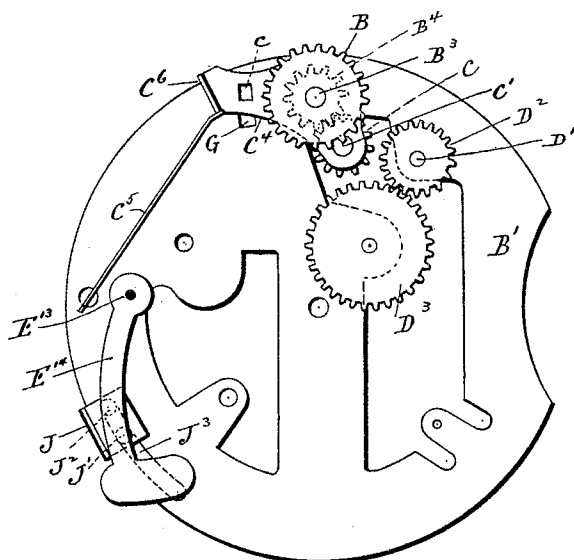
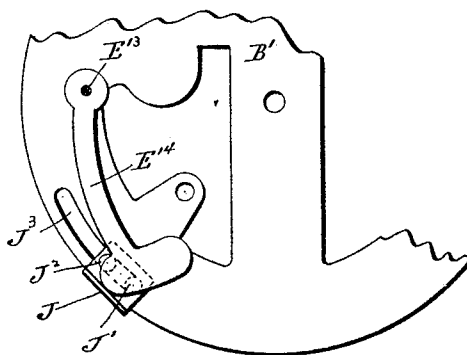


Fig. 12



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UNITED STATES PATENT OFFICE.

ARCHIBALD BANNATYNE, OF WATERBURY, CONNECTICUT, ASSIGNOR TO
THE WATERBURY CLOCK COMPANY, OF SAME PLACE.

STEM-WINDING ALARM-WATCH.

SPECIFICATION forming part of Letters Patent No. 581,504, dated April 27, 1897.

Application filed March 5, 1896. Serial No. 581,894. (No model.)

To all whom it may concern:

Be it known that I, ARCHIBALD BANNATYNE, of Waterbury, in the county of New Haven and State of Connecticut, have invented a new Improvement in Stem-Winding and Stem-Setting Alarm-Watches; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification.

Figure 1 is a view of a front elevation of a watch constructed in accordance with my invention. Fig. 2 is an enlarged view of the watchcase in section and showing the dial removed to exhibit the watch-movement in front elevation. Fig. 3 is a detached plan view of the watch-movement. Fig. 4 is a view on an inside elevation of the dial. Fig. 5 is a view of the dial in cross-section on the line *a b* of Fig. 4. Fig. 6 is a detached view of the front movement-plate, showing the alarm-watch in its relation to the alarm-set spring and the hammer. Fig. 7 is a reverse view of the watch-movement, showing the back movement-plate and the alarm-train. Fig. 8 is a detached view, in front elevation, of the oscillating lever. Fig. 9 is a detached perspective view of the hammer, together with the hammer-star and the alarm-verge. Fig. 10 is a detached view showing the main winding-wheel, the stop-wheel, and the stop-wheel spring in the positions which they have when the spring is coacting with the bevel of the stop-finger of the stop-wheel; Fig. 11, a view in inside elevation of the front movement-plate, together with some of the parts associated therewith; Fig. 12, a similar broken and less comprehensive view of the plate, showing the sliding switch in its closed or operative position.

My invention relates to an improvement in alarm-watches, the object being to produce a comparatively simple, compact, conveniently-operated, reliable, and durable alarm-watch of the stem-winding and stem-setting type.

With these ends in view my invention consists in a stem-winding and stem-setting alarm-watch having certain details of con-

struction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In carrying out my invention as herein shown I provide the watch with a crown A, which is secured to the outer end of a rotatable stem A', furnished at its inner end with a rigidly-attached pinion A², the said stem being mounted in the watch-pendant A³, which is furnished with a pendant-ring A⁴ and permanently secured to the central band A⁵ of the watchcase, which also comprises a bezel A⁶, containing a glass, and a back or cover, which is not shown. When the watch-movement is located properly within the case, the said pinion A² meshes into an intermediate winding-wheel B, located between the front and back movement-plates B' and B² and rigidly secured to the inner end of a short stud B³, the projecting outer end of which has rigidly secured to it an intermediate pinion B⁴, which bears against the outer face of the front movement-plate B'. The said intermediate pinion B⁴ is in constant mesh with an oscillating pinion C', located in the short arm C² of an oscillating lever C³, which is hung upon the stud B³ aforesaid, being interposed between the inner face of the front movement-plate B' and the intermediate winding-wheel B, as clearly shown in Fig. 3. The said oscillating pinion C meshes in one position into the outer intermediate setting-gear D, which is secured to the projecting outer end of a short shaft D', mounted in the front movement-plate B', and having the inner intermediate setting-gear D² secured to its inner end, the said gear D² meshing into the minute-wheel D³, carrying the minute-pinion D⁴, which in turn meshes into the hour-wheel D⁵, the same having a tubular shaft *d*, which projects outwardly through the short tubular arbor *m* of the alarm-cam M, as will be described later on. In the other position of the said oscillating pinion C the same meshes directly into the main winding-wheel E, carrying a stop-pin E' and secured to the outer end of the main winding-arbor E², the inner end whereof carries a ratchet-wheel E³, Fig. 7, the teeth of which are taken into by a spring-actuated pawl E⁴, carried by an annular gear-wheel E⁵, arranged concentrically

with the said arbor and meshing into an alarm-pinion E⁶, loosely mounted on a short stud E⁷, located in the back movement-plate B². The said pinion E⁶ is rigidly connected with
 5 a large alarm-wheel E⁸, also centered on the stud E⁷ and meshing into the alarm-pinion E⁹ of the alarm escapement-wheel E¹⁰, the teeth of which are engaged by the alarm-verge E¹¹, which is secured to a collet E¹²,
 10 staked upon one end of the hammer-arbor E¹³, which carries the hammer E¹⁴, a detailed view of which is shown in Fig. 9. The said annular gear-wheel E⁵, alarm-pin E⁶, alarm-wheel E⁸, alarm-pinion E⁹, and alarm escapement-wheel E¹⁰ constitute what I shall hereinafter term the "alarm-train," which is driven directly from the mainspring F, inclosed within the barrel F' and having its inner end connected with the arbor E² in the
 20 ordinary manner.

The oscillating lever C³ before mentioned is constructed with an outwardly-projecting stop-finger c, struck out of its arm C⁴ and adapted to enter a slot G, formed in the front
 25 movement-plate B'. When the lever is swung inward for meshing the oscillating pinion C into the outer intermediate setting-pinion D, the stop-finger c engages with the inner end wall of the slot and prevents the oscillating
 30 pinion C from being crowded into the said outer intermediate setting-wheel D so hard as to interfere with the actuation of the setting-train. In the outward movement of the oscillating lever the stop-finger c engages with
 35 the outer end wall of the slot G and merely prevents the lever from being thrown too far outward under the action of its spring C⁵. The said oscillating lever C³ is normally maintained by the said spring C⁵ in its winding
 40 position, that is to say, the position which it has when the oscillating pinion C is meshed into the winding-wheel E. The lever is swung inward on its fulcrum, which is the stud B³, for disengaging the oscillating pinion C from
 45 the winding-wheel E and for engaging the said oscillating pinion with the outer intermediate setting-wheel D by means of the beveled inwardly-projecting finger II, Fig. 2, of a sheet-metal slide II', longitudinally bowed
 50 to conform to the inner curvature of the ring A⁵ of the watchcase, between which and the slide sufficient friction is developed to hold the slide against accidental displacement. This slide is supported and operated by a
 55 headed pin H², passing outward through a slot H³, formed in the said ring, as shown in Fig. 2. When the slide is moved inward toward the pendant A³, the oscillating-lever spring C⁵ swings the oscillating lever C³ outward and holds the oscillating pinion C in
 60 engagement with the main winding-wheel E, the cam-finger II being at this time virtually retired, but when the slide is moved outward and to the end of the slot away from the pendant the beveled outer edge of the finger II
 65 engages with the transversely-bent end C⁶ of the arm C⁴ of the oscillating lever C³ and

causes the same to swing inward, whereby the oscillating pinion is lifted into engagement with the outer intermediate setting-
 70 pinion D.

The duration of the sounding of the alarm, and hence the amount of power which can be taken, so to speak, from the mainspring at one time for sounding the alarm, is fixed and
 75 regulated by means of a stop-wheel I, which may be said to be a modification of the so-called "Geneva" stop, extensively used in watches. This stop, as shown, is mounted to rotate upon a screw-stud I' and comprises six
 80 teeth, including the teeth i and i', and a broad stop-finger I², having a beveled face I³, which coacts, Fig. 10, with the stop-wheel spring E⁴, the same being secured to the outer face of the front movement-plate B² and having its
 85 free end bent to engage with any two of the teeth of the stop-wheel or the bevel of the stop-finger thereof and the tooth adjacent thereto. This wheel coacts with the stop-pin
 90 E', mounted, as aforesaid, in the main winding-wheel E.

The normal position of the stop-wheel I with reference to the stop-pin E' is shown in Fig. 2 of the drawings, which shows the said
 95 stop-pin engaged with the periphery of the stop-finger I². In winding the watch, supposing the stop-wheel to be in its normal position, the main winding-wheel rotates from right to left, whereby the stop-pin E' coacts
 100 with the stop-wheel, so as to turn the same from left to right. During the first revolution of the winding-wheel from right to left the pin E' engages with that end of the stop-finger I² of the stop-wheel which is adjacent
 105 to the tooth i of the wheel and moves the stop-wheel through the distance represented by one tooth thereof, the stop-wheel spring engaging with the two opposite teeth of the stop-wheel and holding it. Then during the
 110 second revolution of the winding-wheel the stop-pin thereof comes around again and engages with the tooth i of the stop-wheel on the side of the tooth lying adjacent to the tooth i', and the stop-wheel is carried one
 115 point farther to the right and held by the stop-spring. Now when the winding-wheel makes its third revolution from right to left the stop-pin engages the tooth i' of the stop-wheel and the same is moved a distance represented by
 120 one tooth, but this last movement of the stop-wheel brings the beveled face I³ of its stop-finger I² into engagement with the stop-spring E⁴. Then when in the further rotation of the stop-wheel I the said pin clears the said
 125 tooth i' altogether the spring operates on the said bevel to throw the stop back into the position which it had before the pin engaged with it on the third revolution of the winding-wheel. This action is repeated until the main-
 130 spring is fully wound, whereby the stop-wheel is always left in the same position.

An alarm switch or cut-off is located in the front movement-plate B', and consists, as shown, of a small bent plate J and two studs

J' and J², projecting forward through a segmental slot J³, formed in the plate, the stud J² being made long enough for manual engagement and also for engagement with a retaining-spring J⁴, which holds the switch or cut-off in either its active or retired positions, the length of the segmental slot J³ determining the length of throw which the switch or cut-off can have. In its active position the switch is interposed between the segmental alarm-bell K, secured by one end to and located within the ring of the watchcase, with which it is concentric, and the outer end of the hammer E¹⁴, and the switch not only prevents the hammer from striking the bell, but also it limits its outward movement to such an extent that the teeth of the hammer-verge E¹¹ are prevented from escaping from the teeth of the alarm escapement-wheel E¹⁰, whereby the alarm is cut off by the switch, not only because the same prevents the hammer from striking the bell, but also because the same restrains the action of the hammer so far that it ties up, so to speak, the escape of the alarm-train. The hammer, however, is normally restrained by the alarm-set mechanism, which, as shown, comprises a locking-pin L, arranged to engage with the shank of the hammer and located in the outer end of the alarm-set spring L', which is secured by its opposite end to the outer face of the front movement-plate B', the said spring having a central perforation for the passage through it of the center arbor L² of the watch-movement. The said alarm-set spring L' is constructed and arranged to exert a constant effort to spring away from the plate and withdraw the pin L from the path of the hammer. It is normally held inward, however, by means of a projection D⁶, extending outward from the outer face of the hour-wheel D⁵ and coacting with a cam M, which is mounted so as to turn under friction in the central opening of the dial M' of the watch, the said cam being constructed with a short tubular arbor m, which projects outward through the dial and has attached to it an alarm-set hand M², which is located close to the face of the dial and between the same and the hour-hand M³ and the minute-hand M⁴ of the watch. The extreme outer end of the alarm-set hand is bent outward, as at m', Fig. 4, to enable it to be engaged by the fingers and swept over the dial. It is also furnished, as shown, with a transversely-arranged arrow m³ to indicate which way it is to be turned.

When the projection D⁶ of the hour-wheel D⁵ drops off the step M^a of the cam M, which it must do once in twelve hours, the hour-wheel is allowed to move outwardly on the central arbor and the spring to recover and move outwardly for a sufficient distance to clear the locking-pin L from the hammer E¹⁴, which is then released. When the hammer is so released, it will be immediately vibrated by the alarm-train, which is always under the influence of the mainspring, provided only

that the alarm-switch is "off." If, on the other hand, the alarm-switch is "on," or, in other words, has been pushed into the blocking position, the hammer, when released by the alarm-set spring, will simply fly outward and engage with the switch, which will stand between it and the bell, and also prevent the alarm-verge from releasing the alarm escapement-wheel. The alarm-set spring will always be let off once in twelve hours, of course, and the main function of the alarm-switch is to provide for blocking the hammer when so released and when it is desired that the alarm shall not be sounded.

The setting of the alarm may be effected in either of two ways: One way is to open the face of the watch and engage the alarm-set hand by the fingers and turn it in the direction indicated by the arrow until it is brought to that point on the dial which indicates the time when it is desired to have the alarm go off. The other way of setting the alarm is to do it through the medium of the crown A after the setting-slide H' has been pushed outward into its setting position, so as to swing the oscillating lever inward and engage the oscillating pinion C with the outer intermediate setting-pinion D. Now suppose that the user of the watch is desirous at eleven p. m. of setting the watch so that it will sound an alarm at eight a. m. Having adjusted the watch for setting, as described, the crown A is rotated to turn the hands backward until the hour-hand M³ reaches the alarm-set hand M², at which time the projection D⁶ of the hour-wheel D⁵ will engage with the step M^a of the alarm-cam M. The hour-wheel now virtually picks up the alarm-set hand, and as long as the hour-hand is turned backward the alarm-cam and the alarm-set hand will go with it. Then when the alarm-set hand has been brought in this manner to register with the character "8" on the dial the crown is turned in the other direction, whereby the projection D⁶ of the hour-wheel will be caused to move away from the step M^a of the alarm-cam M, which will be left, while the hour-hand will then be brought back to indicate the real time, which we have supposed to be eleven o'clock. Now in the ordinary operation of the watch the projection D⁶ of the hour-wheel D⁵ will drop off the alarm-cam M at eight o'clock the next morning and the alarm-set spring will release the hammer, and the switch being "off" the alarm will be sounded.

It is apparent that in carrying out my invention some changes from the construction herein shown and described may be made. I would therefore have it understood that I do not limit myself to the exact form shown, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A stem-winding and stem-setting watch

having an alarm-train connected with and actuated by its mainspring, an alarm-set spring coacting with the said train for releasing the same, an hour-wheel coacting with the said alarm-set spring and provided with a projection extending outward from its outer face, gearing between the said hour-wheel and the winding and setting stem for rotating the hour-wheel in either direction, an alarm-cam located upon the inner face of the dial, having a step constructed to be engaged by the said projection, and formed with a short tubular arbor extending outward through a central opening formed in the dial in which it is frictionally held against rotation, having the tubular shaft of the hour-wheel passed outward through it, an alarm-set hand secured to the projecting outer end of the said alarm-cam arbor and located close to the face of the dial, and adapted at its outer end to be engaged for sweeping it in one direction or the other over the dial, an hour-hand secured to the projecting outer end of the tubular hour-wheel shaft which projects through the tubular arbor of the alarm-cam, a center arbor projecting outward through the tubular hour-wheel shaft, and a minute-hand secured to the projecting outer end of the center arbor.

2. In a stem-winding and stem-setting alarm-watch, the combination with a main winding-arbor, of a winding-wheel mounted upon one end thereof and provided with a stop-pin, a stop-wheel located upon the outer face of the front movement-plate in position to coact with the said pin, and constructed with a stop-finger having a beveled face, a stop-wheel spring arranged to coact with the teeth of the wheel and with the beveled face of the stop-finger thereof, an alarm-train connected with the other end of the main winding-arbor and located upon the outer face of the inner movement-plate, an oscillating hammer located between the two movement-plates and connected with the said train for being oscillated thereby, an alarm-set spring located upon the outer face of the outer movement-plate and coacting with the alarm-train so as to release the same, an hour-wheel coacting with the said spring and formed with a projection, and constituting a member of the time-train of the watch, setting mechanism operated by the winding and setting stem, and coacting with the said hour-wheel for turning it in either direction when the watch is adjusted for setting, an alarm-cam located upon the inner face of the dial of the watch and constructed with a step arranged to coact with the projection of the hour-wheel, whereby the alarm-cam may be set in any desired position through the medium of the hour-wheel, and a manual alarm-set located upon the outer face of the dial and connected with the said cam and adapted to be manually operated, substantially as set forth.

3. In a stem-winding and stem-setting

watch, the combination with the ring of the case thereof, of a sheet-metal setting-slide longitudinally bowed to conform to the inner curvature of the said ring within which it is located in direct contact, and held against accidental displacement by friction, and provided with an inwardly-projecting beveled finger, and with a headed operating-pin extending outward through a slot formed in the said ring; and an oscillating lever, the inner arm of which carries an oscillating pinion adapted to be alternately engaged with members of the time and winding trains of the watch respectively, and the outer arm of which is adapted to be engaged by the said finger of the slide for swinging the lever inward preparatory to setting the watch when the slide is moved inward toward the pendant thereof.

4. A watch having its winding-wheel provided with a stop-pin, a stop-wheel having teeth and having a stop-finger constructed with a beveled face, the teeth and finger of the watch coacting with the said pin, and a stop-wheel spring arranged to coact with the teeth of the stop-wheel and also with the said beveled face of the stop-finger thereof, whereby the said stop-wheel ceases to be rotated under the action of the winding-wheel and the stop-pin thereof after the beveled face of the stop-finger of the stop-wheel has been brought into engagement with the stop-wheel spring.

5. In an alarm-watch, the combination with the ring of the case thereof, of a segmental bell located within the said ring and secured at one end thereto, an oscillating bell-hammer located within the movement-plates of the watch in position to swing beyond the edges thereof for sounding the said bell, and a sliding switch or cut-off mounted for sliding movement in the edge of the front movement-plate in position to be moved between the bell-hammer and the bell so as to prevent the hammer from swinging outward and striking the bell.

6. In an alarm-watch, the combination with the inner and outer movement-plates thereof, of an oscillating bell-hammer located between the said plates, and an alarm switch or cut-off mounted in the edge of the front movement-plate and consisting of a small bent plate and two studs which project through a segmental slot formed in the plate in position to permit the said bent plate to be moved so as to be interposed between the hammer and the alarm-bell which is located within the watch-case.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

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EDWARD H. ALLEN.