E. A. COCHRAN.

WATCH STEM WINDER AND PENDENT SET.

APPLICATION FILED MAY 11, 1910.

1,007,430.

Patented Oct. 31, 1911.

3 SHEETS—SHEET 1.

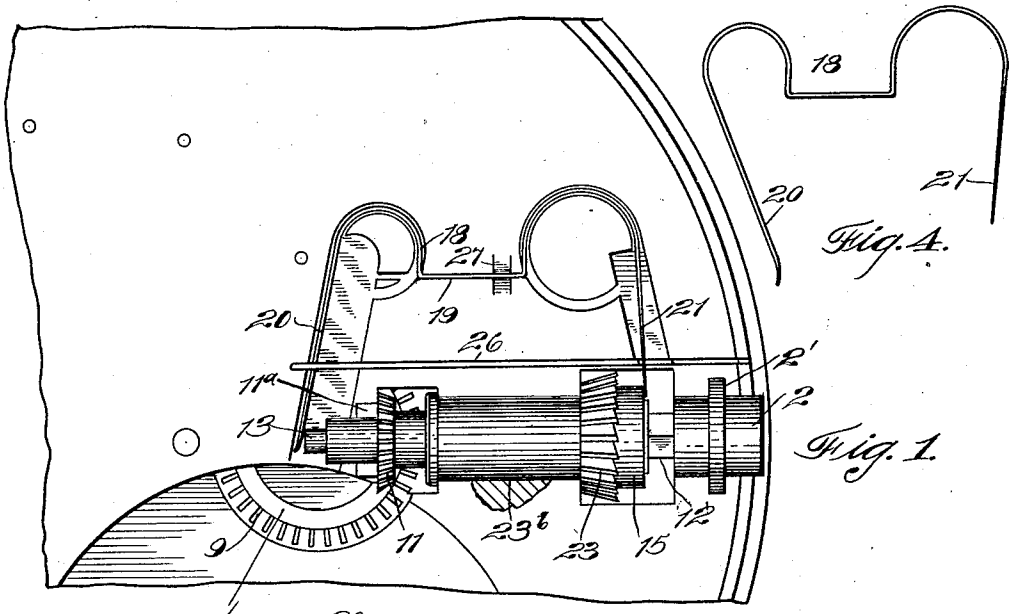


Fig. 4.

Fig. 1.

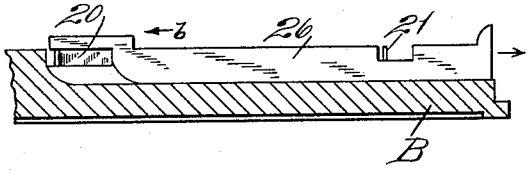


Fig. 5.

Fig. 14.

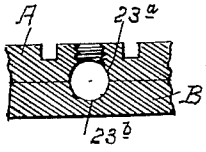
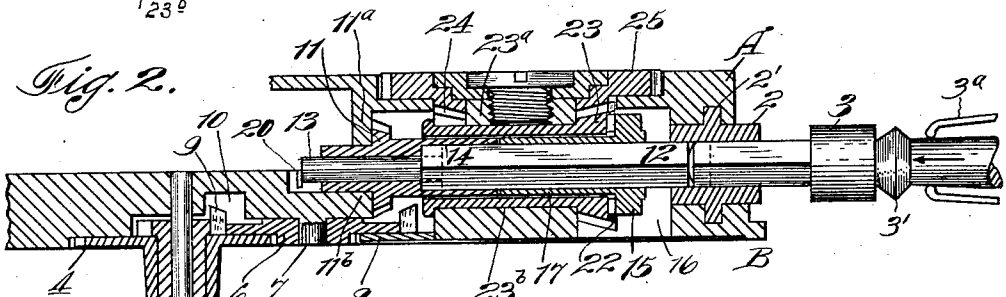


Fig. 2.



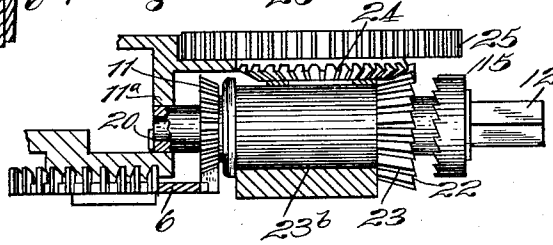


Fig. 3.

Witnesses;

F. E. Maynard.

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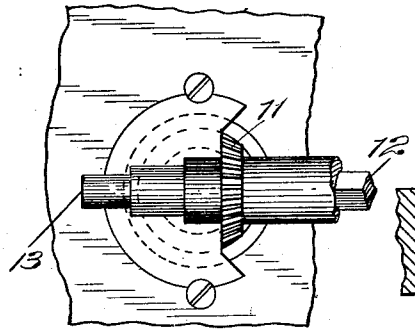
3 SHEETS—SHEET 2.

Fig. 7.



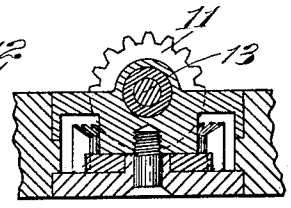


Fig. 8.

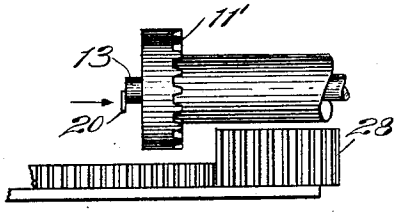


Fig. 9.

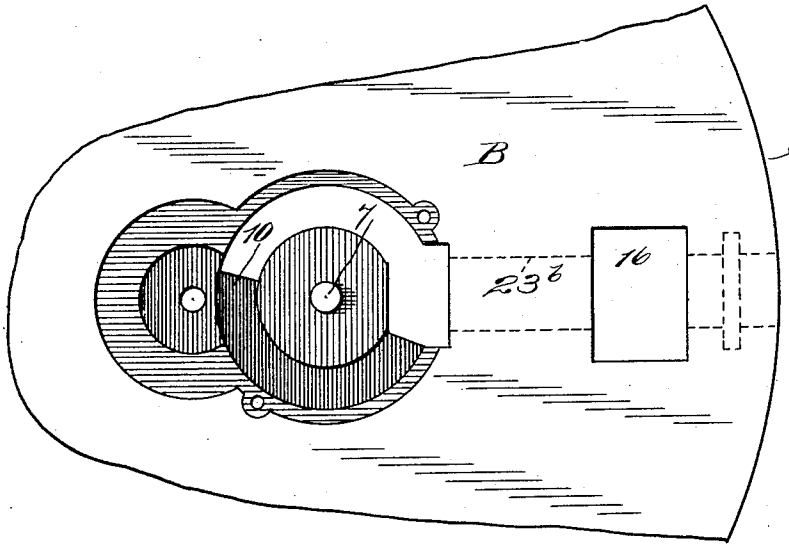


Fig. 6.

Witnesses;
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3 SHEETS—SHEET 3.

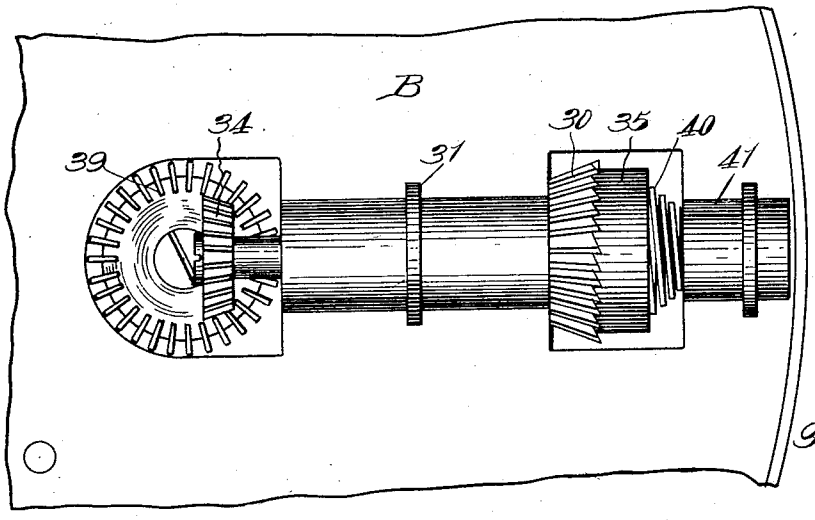


Fig. 10.

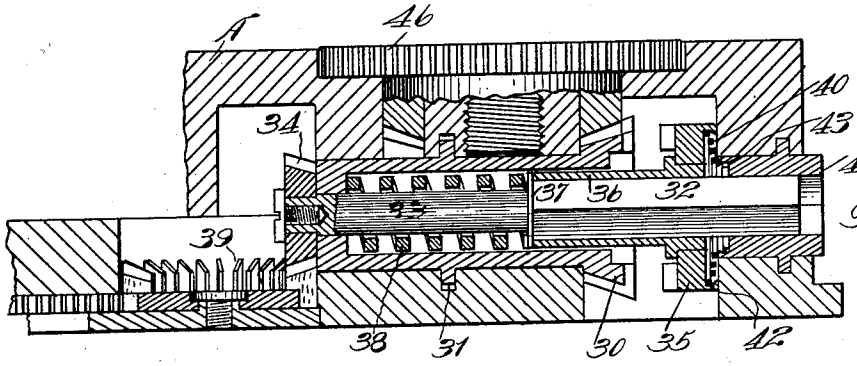


Fig. 11.

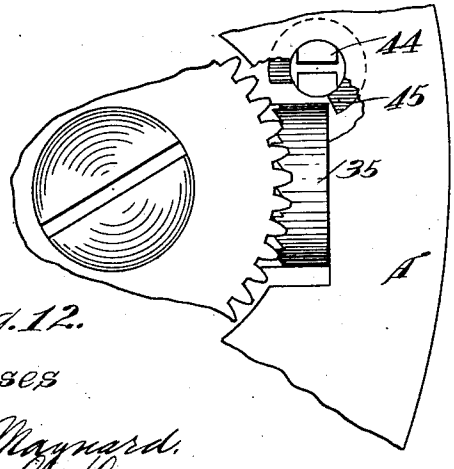
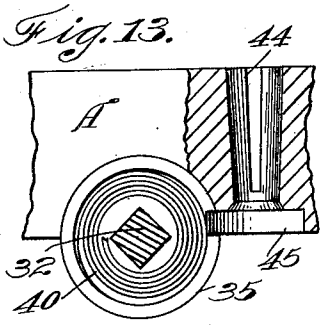


Fig. 12.

Fig. 13.



Witnesses

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UNITED STATES PATENT OFFICE.

EDWARD A. COCHRAN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF THREE-SIXTEENTHS TO L. SEIDENBERG AND THREE-SIXTEENTHS TO GEORGE M. DAVIS, BOTH OF SAN FRANCISCO, CALIFORNIA.

WATCH STEM WINDER AND PENDENT SET.

1,007,430. Specification of Letters Patent. **Patented Oct. 31, 1911.**

Application filed May 11, 1910. Serial No. 560,594.

To all whom it may concern:

Be it known that I, EDWARD A. COCHRAN, citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Watch Stem Winders and Pendent Sets, of which the following is a specification.

This invention relates to watches, and more particularly to winding and setting mechanism therefor.

Watches of the pendent and lever-setting and winding types, as at present designed and constructed, involve an excessive amount of machine work in the way of profiling, milling, drilling and tapping in order to form the upper and lower plates of the watch to receive the setting and winding mechanism. The amount of material removed from the plates is so great that expensive special machinery is required to perform the work, and much time is consumed, which, in conjunction with the complex setting and winding mechanism, with its numerous parts, goes to make up a large percentage of the cost of a watch, and adds to its intricacy.

It is, therefore, an object of my invention to provide a pendent winding and setting mechanism of such design and structure that a minimum amount of labor is required upon the plates, and to so design the plates that a long central bearing is obtained; to provide a simple, self-contained, automatic winding and setting mechanism; and to provide a clutch designed to follow directly in line with the movement of the winding stem, which is disposed between the winding pinion and the winding stem crown, and has its teeth formed on the front, instead of its back.

An important object is to provide a setting and winding mechanism which will shift synchronously with the operation of the winding stem; which does not require securing screws, extraneous reversing devices, or independent bushings of any kind, and which rests in long central bearings made for it in the plates.

A further object is to provide a mechanism of the class designated, which is at once reliable, comparatively inexpensive, and designed to facilitate assembling, cleaning and repairing the watch.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a plan of a portion of the lower plate, and the winding and setting mechanism. Fig. 2 is a transverse vertical section of the same, showing the parts in winding position. Fig. 3 is a sectional detail showing the parts in setting position. Fig. 4 is a plan of the shift spring. Fig. 5 is a sectional detail of the spring-throwing switch. Fig. 6 is a detail of the lower plate showing the minute wheel pocket and stud. Fig. 7 is a detail showing a modified form of transmission. Fig. 8 is a section of same. Fig. 9 shows a crown gear substituted for the bevel setting pinion. Fig. 10 is a plan view of a modified form of the mechanism. Fig. 11 is a sectional view of same. Fig. 12 is a plan view of a clutch shifter. Fig. 13 is a detail section of same. Fig. 14 is a detail sectional view of the bearing, 23^a.

The principal features of my invention may be embodied in a variety of detail structures, and I have shown the main elements of the device as clasped between the usual upper plate A and lower plate B of a watch, of which only enough is shown to illustrate the use and application of the mechanism.

In Figs. 1 and 2 are shown the usual stem socket 2 adapted to receive and guide the square winding stem 3, and in the lower plate B is mounted the usual hour wheel 4 and the cannon pinion 5. Adapted to mesh with the wheel 4 and pinion 5 is a minute wheel 6 mounted upon a stud or post 7 formed integrally upon the plate B, and a disk 8 secured to the plate holds the minute wheel in place. Suitably formed on one side of the wheel 6 are crown-teeth 9, for the clearance of which the plate B is circularly recessed, as at 10, Figs. 1, 2 and 6. These crown-teeth 9 are adapted to be engaged by a reciprocable setting pinion 11 of the setting and winding mechanism.

While it is a purpose to produce a struc-

ture of practical design, feasibility and utility, an important feature is the principle involved in the design and arrangement of the winding and setting mechanism. Heretofore the clutch and setting pinion have been formed in a single piece which was movable, by complex mechanism, oppositely to the winding stem. By my mechanism I eliminate the reversing mechanism and give to the clutch a motion the same in direction as that of the winding stem. To accomplish this great desideratum, a winding square 12 is mounted so that one end rests in the socket piece 2, and its rounded stem 13 passes through the hub of the setting pinion 11, a portion of the hub being provided with a relatively long, polygonal hole 14 to receive the winding square. Also slidably and turnably carried by the winding square 12 is a toothed clutch 15 disposed immediately adjacent the socket piece 2 and movable in a chamber 16, formed, jointly, by the upper plate A and lower plate B.

The clutch 15 is formed with a long hub 17 which abuts the contiguous end of the pinion hub, the relative or abutting position of the clutch and pinion hubs being maintained by a suitable, differential spring 18, Figs. 1, 4 and 5. The spring 18 is dropped into and retained in recess 19 formed in plate B, and has two arms or leaves 20 and 21, the leaf 20 being the stiffer or stronger and normally acting against the front end 13 of the winding square 12 or the hub of pinion 11. The shorter leaf 21 always abuts the rear end of clutch 15, thus the pinion 11 and clutch 15 are normally in contact at their hubs.

Referring to Figs. 1 and 2, the operation of the mechanism is as follows:—Pressure on the winding stem 3 pushes the winding square 12 forward until it abuts the setting pinion 11 at the shoulder formed by the spindle 13 and shifts the pinion out of mesh with the crown teeth 9 of the minute wheel 6. In this position the setting pinion is supported against its bearings 11^a and 11^b of the plates A and B, the spring leaf 20 has been distended, and the leaf 21 pushes the clutch 15 along the square 12 so that the clutch teeth are brought into mesh with radial teeth 22 formed upon the back of a winding pinion 23. This winding pinion is non-slidably, rotatably journaled in long, central bearings 23^a and 23^b formed in the plates A and B, and is in constant engagement with a gear 24 formed with or secured to an intermediate winding wheel 25, by which power is transmitted to wind the usual main spring, not here shown. Thus when the parts are in the position shown in Fig. 2, if the winding stem 3 be turned, the clutch 15, yieldably held in engagement with the winding teeth 22, will turn the winding wheel 25, and, though the setting pinion 11 is also turning, it does not affect the setting wheel 6. When it is desired to set the watch the winding stem 3 is pulled out a full stroke, and the strong leaf 20 of spring 18 throws the pinion 11 over and into mesh with the gear 9, also pushing the hub clutch 15 out of engagement with teeth 22 of the winding pinion 23, to the position shown in Fig. 3. Upon turning the stem, the pinion 11 moves the complementary setting wheel and this actuates the hour wheel 4 and cannon pinion 5. Therefore, it will be seen that I have furnished a direct-acting, self-contained, automatic winding and setting mechanism, and at the same time provide a safety-locking setting pinion, which will yield and slip from mesh with its coacting wheel 6 before pressure enough can be applied to the stem 3 to strip the gears, this being a desirable provision.

To facilitate the assembling, repairing and cleaning of the device, a switch 26 is let into the plate B in such manner that when it is pulled, as indicated by arrow *a*, Fig. 5, it engages spring leaf 21 and removes it from clutch 15; consequently the leaf 20 throws over the pinion 11 and the winding pinion and its contained gears may be bodily lifted from the bearings 23^b, the spring 18 remaining clasped in recess 19 of the lower plate B. By the same switch 26 a jeweler may "time" the watch when it is out of the case, by pushing the switch, as shown by arrow *b*, which will then engage the leaf 20 and carry it out of contact with the front hub of pinion 11. This allows leaf 21 to shift the clutch 15 into mesh with gear 23, and clutch hub 17 pushes the pinion 11 out of mesh with setting wheel 6, allowing the watch to run as though in its case. The only machine work required on this form of the plates A and B is to recess the plate B to receive the spring 18, and to receive the switch 26. The particular design of the spring 18 with its differential curved leaves 20 and 21 affords a simple, effective and cheap means for controlling the gear 11 and clutch 15, especially as no screws, levers, or extra elements are required to assist in the action or holding of the parts. By milling a small recess 27 in the plate B a small tool or pin may be inserted beneath the spring 18, whereby it is easily and safely removed without danger of its flying or being lost.

Figs. 7 and 8 illustrate an arrangement of the setting pinion 11 as it would be mounted in a standard make of watch, and Fig. 9 illustrates a form of crown gear or pinion 11′ substituted for the bevel pinion 11, and adapted to drive an intermediate spur gear 28.

Figs. 10 and 11 illustrate a modified form and arrangement of the clutch and pinion involving the same important principle of

a direct-acting, self-contained mechanism. In this adaptation of the principle the winding pinion 30 is still supported in central bearings in the plate and is flanged at 31 to prevent longitudinal movement. A winding square 32 passes through the hub of the pinion 30, and is turned down to form a stem 33, to the forward end of which is secured a setting pinion 34. Mounted upon the winding square 32 is a clutch 35, having a long hub 36 adapted to abut a shoulder 37 on the square, and within the bore of the winding pinion 30 is an expansion spring 38 reacting against the shoulder 37 to push the square 32 outwardly and carry the setting pinion 34 into mesh with minute wheel 39, or an intermediate one. When it is desired to wind the watch the winding square 32 is pushed inwardly, thus compressing the spring 38 and allowing the clutch 35 to engage complementary teeth of gear 30. The clutch is automatically shifted by means of a suitable spring 40 reacting between it and the socket piece 41, and I have found that by slightly undercutting the clutch, as at 42, and the socket-piece at 43, the spring will snugly seat itself and then when the winding pinion 30 is lifted from the lower plate all of the mechanism within it and also the socket piece remain in connected, assembled relation, or in other words are self-contained. Any suitable device may be utilized for shifting the clutch 35 when the works are out of the case, and a very simple, reliable and effective form is a split pin 44 inserted in the plate so that its interrupted flange 45 will be so disposed to the clutch that when the pin is axially turned in its tapered bearing the flange will engage the clutch and shift it into mesh with the teeth of gear 30. Fig. 10 shows the parts in the clutched or winding position, and if the winding square be revolved the winding pinion transmits power through the intermediate winding wheel 30. Manifestly the construction of the winding clutches and their relative springs permits them to wind the watch spring when the winding stem is turned in one direction, and also allows them to ratchet or slip backwardly over the winding pinion when the stem is turned backwardly, as is frequently done when a watch is being wound. In other words, the clutch winds when turned in one direction, and ratchets free when turned in the other, or backward, direction.

It is understood that this winding and setting mechanism is adapted to the American and other open and hunting case watches, and that the winding stem referred to throughout this specification is of the usual standard and has the customary annular cam 3′, which, coacting with the usual clutch 3^a, remains in either the winding or setting position after it has been shifted. In Fig. 2 the winding stem has been shifted to its innermost limits so as to open the case of the watch.

The socket piece or coupler 2 is provided with an annular ring 2′ turnable in the plates A, B, and the winding square is adapted to play axially in the polygonal socket to allow for the setting position, winding position, and the final inner position assumed by the square when the stem 3 is pressed to open a hunting case watch. The winding square 12 in the normal or winding position does not abut, at the shoulder of stem 13, against the hub of the setting pinion, sufficient clearance being allowed to permit the further inward movement of the square when the case is opened.

If desired, the pinion 23 may be turnably or freely mounted upon its long sleeve or hub.

Manifestly, the springs 38 and 40 may be omitted in the modified form shown in Fig. 11, and the differential spring 18 inserted and used in lieu thereof without any change in the form.

Having thus described my invention, what I claim and desire to secure by Letters-Patent, is:

1. In a watch winding and setting mechanism, a shiftable winding square having a cylindrical end, a non-slidable socket coupler supporting the other end of the square, a clutch slidable on said square, a winding pinion, plates concaved to form bearings for the winding pinion and preventing end motion thereof, and a differential spring having one arm effective against the clutch normally pressing it into engagement with the winding pinion, and another arm effective against the cylindrical end of the square.

2. In a watch winding and setting mechanism, a shiftable winding square having a cylindrical end, a non-slidable socket coupler supporting the other end of the square, a clutch slidable on said square, a winding pinion, plates concaved to form bearings for the winding pinion and preventing end motion thereof, and a differential spring having one arm effective against the clutch normally pressing it into engagement with the winding pinion and another arm effective against the cylindrical end of the square, and hubs having polygonal bores formed on the clutch and the setting pinion, whereby the setting pinion is thrust out of operative relation by the clutch.

3. A winding and setting mechanism including a winding square, a rotatable, non-sliding coupler supporting one end of said square, a slidable pinion mounted upon and supporting the other end of the square, a slidable winding clutch rotatably carried by the square, and a differential spring having one portion bearing against the clutch for

normally pressing said clutch into engagement with the winding pinion, and having another portion bearing against the opposite end of the square.

4. A winding and setting mechanism including a winding square, a rotatable, non-sliding coupler supporting one end of said square, a slidable pinion mounted upon and supporting the other end of the square, a slidable winding clutch rotatably carried by the square, and a differential spring having one portion bearing against the clutch for normally pressing said clutch into engagement with the winding pinion, and having another portion bearing against the opposite end of the square, said clutch being provided with one elongated hub effective to move the setting pinion axially.

5. In a watch, a non-sliding winding pinion having an extended hub, upper and lower plates concaved to journal the hub, a slidable winding clutch extending freely into the pinion and adapted to mesh therewith, a winding square supporting and slidable through said clutch and a spring member bearing against the clutch and another spring member bearing against the end of the square opposite to the clutch.

6. A winding mechanism comprising a tubular, externally supported winding pinion, radial teeth formed upon the back face thereof, a slidable clutch having an extended hub passing into the pinion, a winding square supporting and for revolving said clutch, a coupling member supporting one end of said square, and a shiftable setting pinion within which the other end of said square is supported and slidable.

7. A winding mechanism comprising a tubular, externally supported winding pinion, radial teeth formed upon the back face thereof, a slidable clutch having an extended hub passing into the pinion, a winding square supporting and for revolving said clutch, a coupling member supporting one end of said square, a shiftable setting pinion within which the other end of said square is supported and slidable, and a substantially V-shaped spring having arms effective against the clutch and against the front end of the square.

8. The combination in a pendent-setting watch, of an upper and a lower plate, a rotatable coupler piece non-slidably mounted in said plates, a winding square slidably supported in said coupler, a clutch rotatable by and slidable on said square and movable in the same direction therewith, a winding pinion having a tubular hub, bearings formed in said plates carrying the tubular hub and retaining the pinion against axial movement, a spring member normally effective against the clutch to hold the same in engagement with the pinion, and a spring member bearing against the front end of said square.

9. The combination in a watch, of a winding square, a coupler or socket piece in which said square may slide, a setting pinion turnable by said square, a winding clutch abutting the setting pinion, and a differential spring having an arm acting against the end of the winding square and the setting pinion to disengage the winding clutch when the setting pinion is in operative position and the winding square withdrawn.

10. In a watch, the combination of a winding clutch, a winding square for turning the same, a setting pinion, a differential spring having one arm effective against the clutch and another arm against the setting pinion, and a shiftable blade having notches whereby either one of the spring arms may be independently shifted away from its associated member, permitting the other arm to shift the elements.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWARD A. COCHRAN.

Witnesses:

CHARLES EDELMAN,

FREDERICK E. MAYNARD.