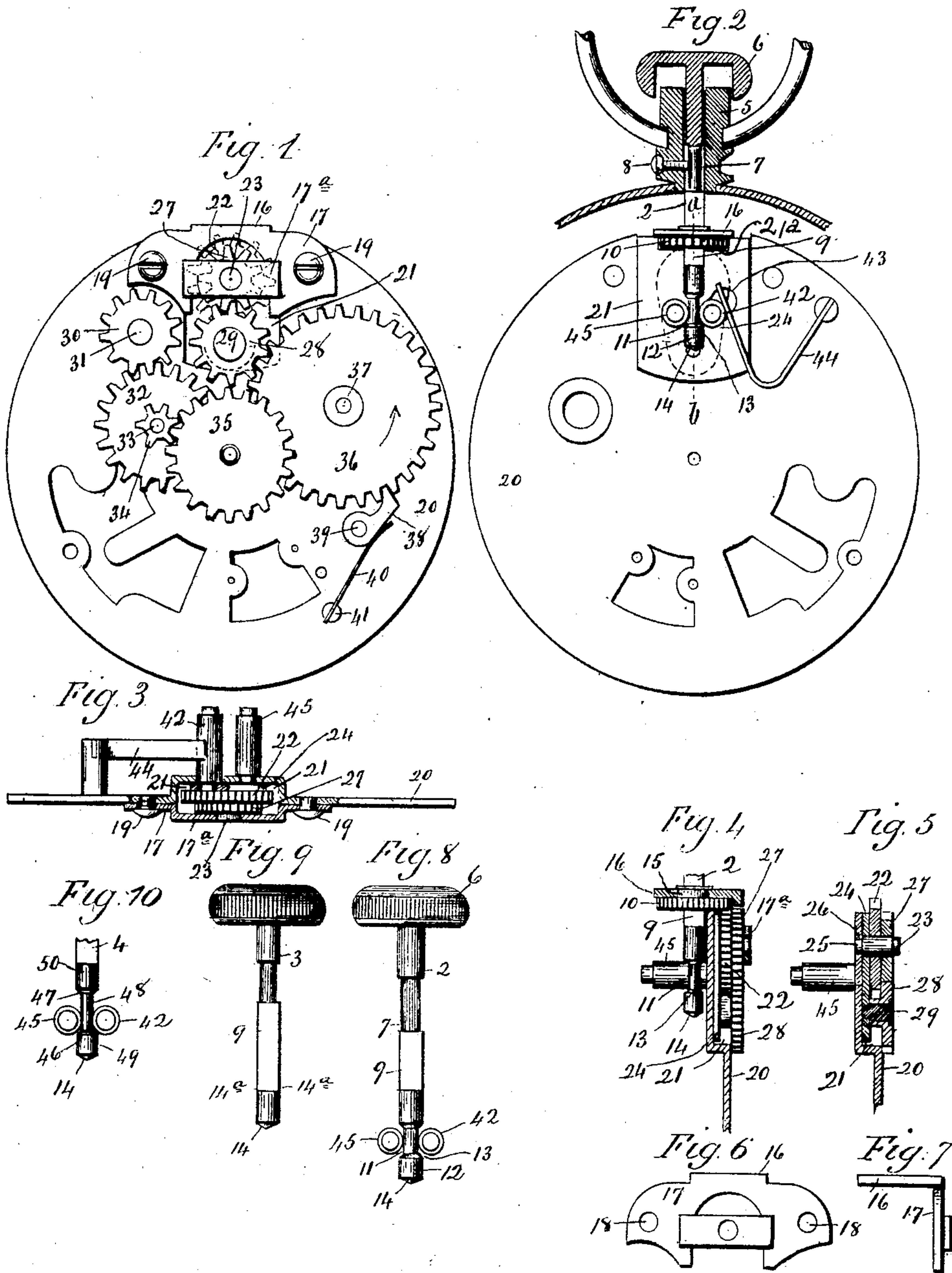


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PATENTED AUG. 27, 1907.

A. BANNATYNE.
STEM WINDING AND STEM SETTING WATCH.
APPLICATION FILED DEC. 21, 1906.



Witnesses
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STEM-WINDING AND STEM-SETTING WATCH.

No. 864,402.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed December 21, 1905. Serial No. 292,684.

To all whom it may concern:

Be it known that I, ARCHIBALD BANNATYNE, a citizen of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have
5 invented a new and useful Improvement in Stem-Winding and Stem-Setting 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
10 part of this specification, and represent, in—

Figure 1 a front view of a watch movement containing my improvement. Fig. 2 a broken view of the watch in rear elevation with the rear movement plate removed and the pendant stem shown in vertical section.
15 Fig. 3 a plan view of the front movement plate, showing parts of my improved mechanism applied to it. Fig. 4 a broken vertical section on the line *a—b* of Fig. 2 with the pinions and wheels in elevation. Fig. 5 a
20 view in vertical section with the bridge removed and the wheels and pinions in vertical section. Fig. 6 a detached view in front elevation of the bridge. Fig. 7 an edge view thereof. Fig. 8 a detached view of the fixed and movable studs with the pull stem in position
25 for winding. Fig. 9 a corresponding view of the studs with the push stem in position for winding. Fig. 10 a corresponding view of the studs with a broken view of the push-and-pull stem in position for winding.

My invention relates to an improvement in stem-winding and stem-setting watches, the object being to provide such watches with a simple and reliable stem-winding and stem-setting mechanism constructed with particular reference to being converted, by merely
30 changing the stem, from a "pull set" to a "push set", or vice versa, or from a "push set" or "pull set" to a "push-and-pull set".

A further object of my invention is to provide for detaching the winding and setting mechanism from the movement without removing the movement from the
40 case and without removing any portion of the time train.

With these ends in view, my invention consists in a watch having certain details of construction and combinations of parts as will be hereinafter described and
45 pointed out in the claims.

For the purpose of illustration, I have chosen to illustrate the watch as furnished with a pull stem 2, which, however, may be replaced by a push stem 3 or a push-and-pull stem 4, these three stems being differentiated
50 from each other as required to convert the watch from a "pull set" to a "push set" or vice versa, or to a "push and pull set", all without in any way changing any other part of the watch. The outer end of the stem 2 is made round in cross section for its bearing in the
55 pendant 5 and provided with the usual winding crown

6. Midway of its length it is formed with a wide annular recess 7 for the reception of a retaining screw 8 in the pendant 5. Below the recess 7 the stem is squared to form a key 9 whereby it is coupled with a driving pinion 10 through which it is free to move back and
60 forth. Below the key 9 the stem is reduced in diameter to form a clearance space 11, while at its extreme lower end it is formed with a locking-head 12 formed at its upper end with a conical operating surface 13 and at its lower end with a conical point 14. 65

The driving pinion 10 aforesaid is formed with an upwardly extending hub 15 adapting it to be mounted so as to turn loosely in the horizontal arm 16 of a bridge 17 the ends of which are formed with perforations 18 for the reception of screws 19 by means of which the
70 bridge is fastened to the front movement plate 20 directly over an interior chamber 21 formed in the plate by striking a portion of the same inward. At the upper end of the chamber 21, the said front movement-plate is cut away to form a horizontal bearing edge 21^a
75 upon which the lower surface of the driving pinion 10 may bear and which will take the downward thrust upon the pinion due to the inward thrust through it of the stem 2. The driving pinion 10 which is thus permanently connected with the bridge in which it is free
80 to rotate in either direction, itself meshes into a driving wheel 22 located at a right angle to it and turning loosely upon a stud 23 mounted in the upper end of a swinging plate-like carrier 24 and having its inner end reduced in diameter to form a journal 25 entering a
85 bearing hole 26 in the front-plate 20.

As shown, the bridge 17 is formed with a cross piece 17^a in which the reduced outer end of the stud 23 is supported, though this is not essential. The driving wheel 22 carries upon its outer face a concentric power
90 compounding pinion 27 turning with it, having fewer teeth and meshing into a winding and setting wheel 28 turning upon a stud 29 mounted in the lower end of the carrier 24.

I call the pinion 27 as I may here explain, a "power
95 compounding" pinion because by being smaller in diameter than the wheel 22 and also smaller in diameter than the wheel 28, it effects a gain in power represented by its differentiation in diameter with respect to the said wheels. 100

When the carrier 24 is swung from right to left upon the stud 23, the teeth of the wheel 28 mesh into the intermediate setting wheel 30 which turns on a stud 31 and meshes into a minute wheel 32 which turns on a stud 33 and carries a pinion 34 meshing into the hour
105 wheel 35 of the watch. The minute wheel 32 meshes into the ordinary cannon pinion which is not shown, but located beneath the hour wheel 35 in the usual manner. When, on the other hand, the carrier 24 is swung from left to right on the stud 23, the wheel 28 110

is meshed, as shown in Fig. 1, into a ratchet wheel 36 on a winding arbor 37. In order to hold the ratchet wheel and thus prevent the spring (not shown) from unwinding, I employ, as shown, an ordinary ratchet pawl 38 mounted upon a stud 39 and actuated by the spring 40 mounted in a split stud 41, all of ordinary construction.

For swinging the carrier 24 into its winding and setting positions respectively, I provide it with an inwardly extending stud 42 passing inward through a segmental slot 43 in the front movement plate and engaged by a spring 44 which exerts a constant effort to swing the carrier from left to right into its winding position in which the wheel 28 is meshed into the ratchet-wheel 36. This spring is necessary to keep the wheel 28 in mesh with the ratchet-wheel 36 during what is called "back ratcheting" in winding the watch. The operating stud 42 coacts with a similar stud 45 fixed in the front movement plate 20 and projecting rearwardly therefrom, the two studs 42 and 45 being respectively movable and fixed. These studs are located close together as shown in Fig. 3 with just space enough between them for the reception and operation of the inner end of the pull stem 2, the fixed stud 45 constituting, as it were, a fulcrum for the operation of the movable stud 42. When the studs are in the positions shown in Fig. 2, the clearance portion 11 of the stem 2 is between them. In this position the watch is ready for winding. To set the watch, the stem is pulled outward, bringing its conical operating surface 13 into coaction with the studs 42 and 45 whereby the stud 42 is swung from right to left against the tension of the spring 44 and the carrier 24 correspondingly swung from right to left whereby the wheel 28 is disengaged from the wheel 36 and brought into mesh with the intermediate setting wheel 30, the stem being pulled outward sufficiently to locate its locking-head 12 between the studs, whereby the spring 44 is prevented from swinging the carrier back from left to right into its winding position; as the locking-head 12 is cylindrical it does not prevent the free rotation of the stem 2 for setting. After the watch has been set, the stem is thrust inward to bring its clearance space 11 into registration with the studs 42 and 45 and permit the spring 44 to restore the carrier to its normal or winding position. The conical point 14 of the stem permits the insertion of the same into normal position in the movement.

If it is desired to convert the watch from a "pull set" to a "push set", I replace the pull stem 2 by the push stem 3 without any change of the mechanism itself. The stem 3 is normally located entirely above the two studs which are forced apart against the tension of the spring 44 by the conical end 14 of the stem, whereby the carrier is swung into its setting position in which it is held by the parallel sides 14^a of the lower end of the cylindrical stem, these sides corresponding to the locking-head 12 of the pull stem 2. Again, without any change whatever in the mechanism by replacing either the stem 2 or the stem 3 by the push-and-pull stem 4, I may convert the watch into one in which the stem is pushed inward for setting as well as pulled out for setting. To this end the stem 4 is formed with a conical surface 46 and with a corresponding conical surface 47, these surfaces being located at the opposite ends of a

clearance space 48. This stem also has two cylindrical locking portions 49 and 50. Normally, or when the watch is in position for winding, the studs 42 and 45 are located in the space between the conical surfaces 46 and 47. If the stem is pushed inward, the conical surface 47 will separate the studs and bring the locking portion 50 into play for holding the carrier in its setting position; while on the other hand, if the stem is pulled outward, the conical surface 46 will coact with the studs to bring the carrier into its setting position in which it will be held by the locking-portion 49 of the stem.

The stems 2, 3 and 4 are, as shown by Fig. 2, all made smaller in diameter than the diameter of the central bore of the pendant 5 so that they are free to tilt laterally, as it were, therein to a degree sufficient to permit their lower ends to move laterally with respect to the fixed fulcrum 45 whereby the full diameters of the lower ends of the stems may be taken advantage of instead of the radii as heretofore. For example, when the stem 2 is pulled outward, its conical operating-surface 13 engages with the stationary stud 45 and the stem is deflected from left to right for a distance represented by the difference between its full diameter and its diameter in its clearance space 11. This movement of the stem from left to right correspondingly moves the movable stud 42 mounted in the swinging carrier 24. At the same time the stem 2 is being bodily deflected from left to right as above described by the coaction of its surface 13 with the stationary stud 45, its surface 13 is coacting with the movable stud 42 to move the same from left to right a distance represented by the distance between its full diameter and its diameter in its clearance space 11. It follows, therefore, that the bodily movement from left to right of the stem permitted by its adaptability to tilt, contributes, as it were, to the movement of the movable stud 42 from left to right due to the direct coaction of the stem with it. In this way the full diameter of the stem is taken advantage of, and, I may if I desire, reduce the stem in diameter one-half. This principle of providing for the tilting or lateral as well as the longitudinal and rotary movement of the stem, applies equally well to the stems 3 and 4. I may add that the driving-pinion 10 journaled loosely in the horizontal arm 16 of the bridge 17 forms, as it were, a fulcrum or point of purchase for the lateral tilting of the stem.

I would have it understood that I do not limit myself to the exact construction shown and described, but hold myself at liberty to make such departures therefrom as fairly fall within the spirit and scope of my invention.

I claim:

1. In a stem-winding and stem-setting mechanism for watches, the combination with a longitudinally and laterally movable and rotary stem, of fixed and movable instrumentalities coacting directly with the said stem, the said movable instrumentality moving laterally with respect to the stem for reducing the required longitudinal movement thereof.

2. In a stem-winding and stem-setting mechanism for watches, the combination with a movable carrier upon which one or more members of the said mechanism are mounted, a stud carried by the said carrier, a fixed fulcrum coacting with the said stud, and a longitudinally and laterally movable and rotary stem coacting directly with the said stud and fulcrum for moving the carrier

from its winding to its setting position whereby by making the stem laterally movable the extent of its longitudinal movement may be reduced.

3. In a stem-winding and stem-setting mechanism for watches, the combination with a movable carrier upon which one or more gears of the said mechanism are mounted, a stud carried by the said carrier, a fixed fulcrum, and a longitudinally and laterally movable and rotary stem having one or more beveled operating-surfaces coacting with the said stud and fulcrum for moving the carrier from its winding into its setting position.

4. In a stem-winding and stem-setting mechanism for watches, the combination with a movable carrier, of an operating-stud carried thereby, a stationary fulcrum adjacent to the said stud, and a longitudinally and laterally movable and rotary stem having a clearance space, one or more conical operating-surfaces and a cylindrical operating portion for coacting with the said stud and fulcrum, the latter moving the stem laterally and hence the stud in addition to the direct movement of the stud by the surfaces of the stem.

5. In a stem-winding and stem-setting mechanism for watches, the combination with a swinging carrier, of an operating stud extending inwardly therefrom, a stationary stud adjacent to the operating stud, and a longitudinally and laterally movable and rotary stem coacting directly with the said studs for moving the carrier from its winding into its setting position.

6. In a stem-winding and stem-setting watch, the combination with the front and rear movement plates thereof, of a swinging carrier located in front of the front movement-plate, an operating-stud carried thereby and extending inward therefrom between the two plates, a stationary stud mounted in one of the plates and located between them adjacent to the said operating-stud, and a longitudinally and laterally movable and rotary stem passing between the said studs and coacting directly with them.

7. In a stem-winding and stem-setting watch, the combination with the front and rear movement-plates thereof, of a swinging carrier located in front of the front movement-plate, an operating stud carried thereby and extending inward therefrom through the front movement-plate and into the rear movement-plate, a stationary stud mounted in the front movement-plate and located adjacent to the operating-stud, and a longitudinally and laterally movable and rotary stem passing between and coacting directly with both of the said studs for moving the said carrier from its winding into its setting position.

8. In a stem-winding and stem-setting watch, the combination with the front and rear movement-plates thereof, the front plate being formed with an exterior chamber produced by striking a portion of it inward; of a swinging carrier located in the said chamber, a removable bridge spanning said chamber to confine the swinging carrier therein, an operating-stud mounted in the carrier and extending inwardly through the front movement-plate into the space between the two movement-plates, a stationary stud mounted in one of the plates and located adjacent to the said operating stud, and a longitudinally and laterally movable and rotary stem passing between the said studs and coacting directly with them for moving the carrier from its setting into its winding position.

9. In a stem-winding and stem-setting watch, the combination with the front and rear movement-plates thereof, of a bridge removably applied to the front movement-plate, a swinging carrier confined in place by the said bridge, a driving pinion mounted in the bridge, and a longitudinally and laterally movable and rotary stem coacting with the carrier for moving it from its winding to its setting position and fulcruming for its lateral movement in the said pinion.

10. In a stem-winding and stem-setting mechanism for watches, the combination with a front movement-plate struck inward to form an exterior chamber, of a swinging carrier located in the said chamber, a removable bridge extending over the said chamber and formed with a rearwardly extending horizontal arm, a driving pinion loosely journaled in the said arm and having a square opening, and a longitudinally and laterally movable and rotary

stem passing through the said opening and coacting with the carrier for moving it from its winding to its setting position.

11. In a stem-winding and stem-setting mechanism for watches, the combination with the front and rear movement-plates thereof, of a removable bridge applied to the front movement-plate, a removable carrier confined in place by the said bridge, a driving pinion journaled in the said bridge, and a removable stem passing through the said driving pinion, the said bridge, carrier and stem being removable without removing the movement from the watch case.

12. In a stem-winding and stem-setting mechanism for watches, the combination with the front and rear movement-plates thereof, of a removable bridge applied to the front movement-plate, a driving pinion mounted in the said bridge, a removable carrier confined in place by the said bridge, a stud upon which the said carrier swings, a driving wheel meshed into by the said pinion and mounted upon the said stud, a winding-and-setting wheel carried by the carrier and driven by the said winding wheel, and a winding and setting stem passing through the said driving pinion which it rotates and in its longitudinal movement through the said pinion moving the said carrier from its winding to its setting position.

13. In a stem-winding and stem-setting mechanism for watches, the combination with a front movement-plate struck inward at its upper end to form a chamber the upper portion of which is cut away to form a horizontal bearing edge, of a carrier located in the said chamber, a bridge confining the said carrier in place and having an inwardly extending horizontal arm, a driving pinion journaled in the said arm in position to rest upon the said bearing edge, gears coacting with the said pinion, and a longitudinally and laterally movable stem passing through the said pinion and coacting with the carrier for moving the same from its winding to its setting position.

14. In a stem-winding and stem-setting watch, the combination with a movement-plate thereof, of a bridge removably secured thereto, a driving pinion mounted therein, a movable carrier, a driving wheel carried thereby, a power-compounding pinion concentric with and turning with the said driving-wheel, a winding-and-setting wheel carried by the carrier and driven by the said power-compounding pinion, and a stem for swinging the carrier from its winding into its setting position.

15. In a stem-winding and stem-setting watch, the combination with a movement-plate thereof, of a bridge applied to the said plate, a swinging carrier, a stud mounted in the said carrier and supported by the said plate and bridge, a driving pinion carried by the said bridge, a driving wheel mounted upon the said stud and meshed into by the said pinion, a winding-and-setting wheel carried by the said carrier and driven by the said wheel, and a longitudinally movable stem engaging the said carrier for moving the same from its winding to its setting position.

16. In a stem-winding and stem-setting mechanism for watches, the combination with a swinging carrier, of an operating stud carried thereby, a stationary stud located adjacent thereto, and a laterally and longitudinally movable and rotary winding-and-setting stem passing between the said studs and having a clearance space and conical operating-faces respectively located at the opposite ends thereof, whereby the stem may be used to convert the watch from a "push set" to a "pull set" and vice versa.

17. In a stem-winding and stem-setting mechanism for watches, the combination with a swinging carrier, of an operating stud carried thereby, and a stationary stud located adjacent thereto, the said studs being arranged for the passage between them of a longitudinally movable stem and constructed to have their upper and lower faces engaged thereby for its coaction with them to swing the carrier from its winding to its setting position.

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

ARCHIBALD BANNATYNE.

Witnesses:

FREDERIC C. EARLE,
GEORGE D. SEYMOUR.