(No Model.)

W. N. CLIFFORD.

WATCH WINDING MECHANISM.

No. 406,702. Patented July 9, 1889.

FIG. 1.

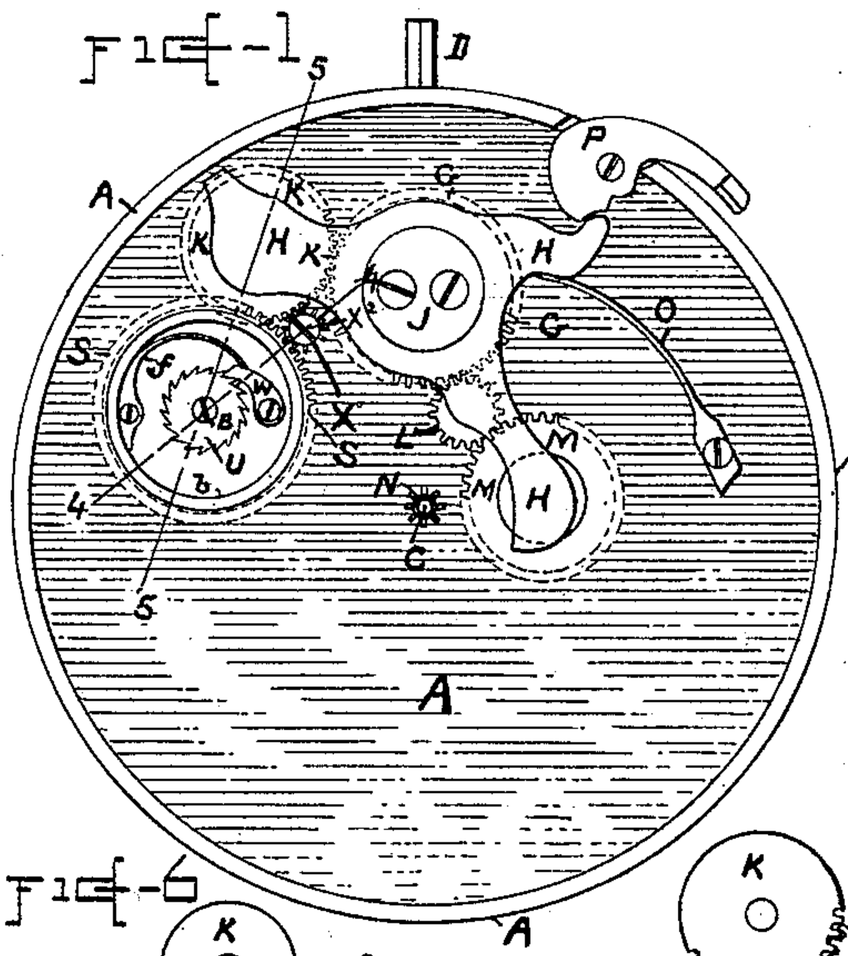


FIG. 2.

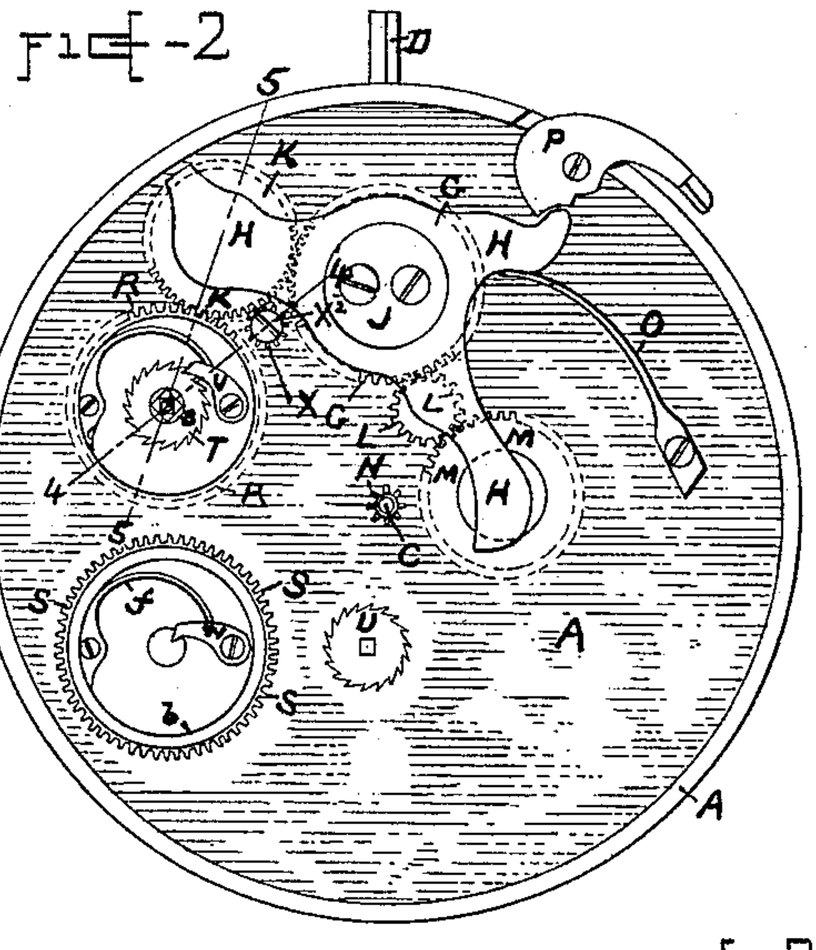


FIG. 6.

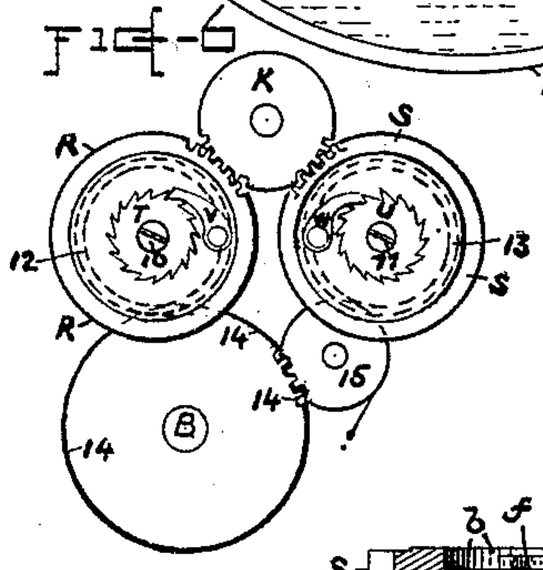


FIG. 7.

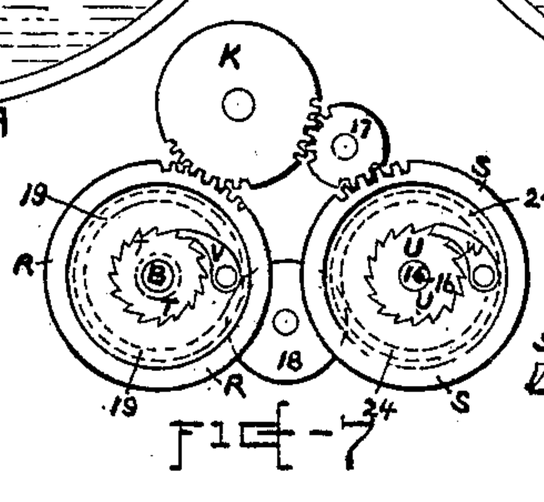


FIG. 8.

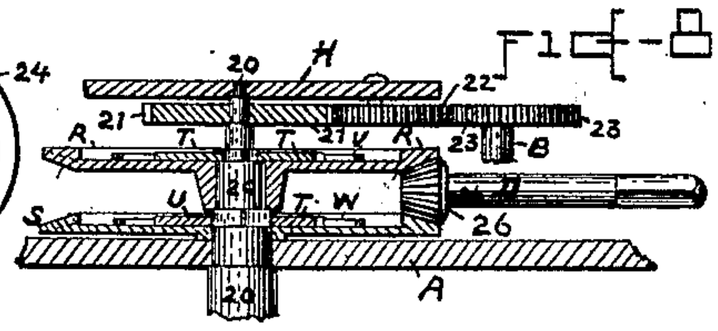


FIG. 5.

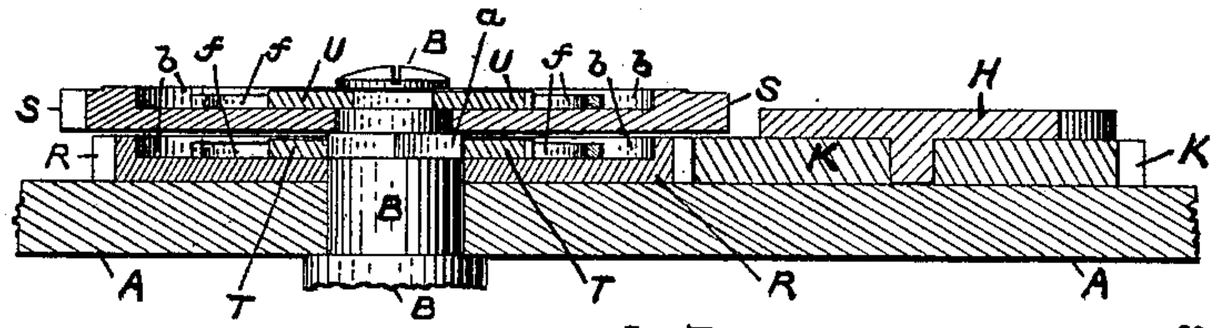


FIG. 9.

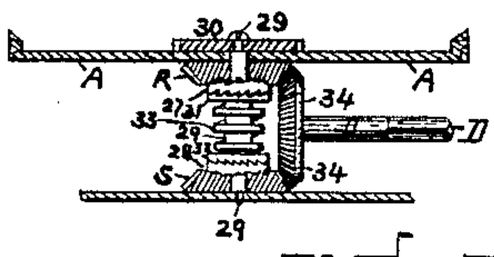


FIG. 4.

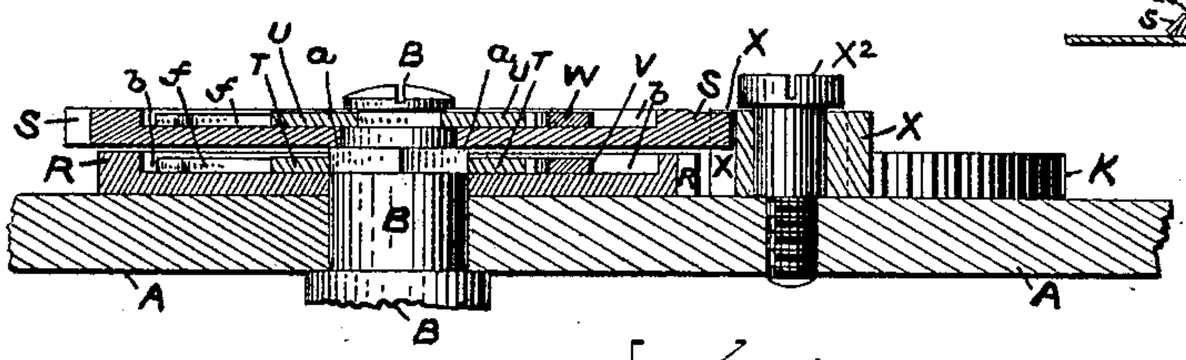
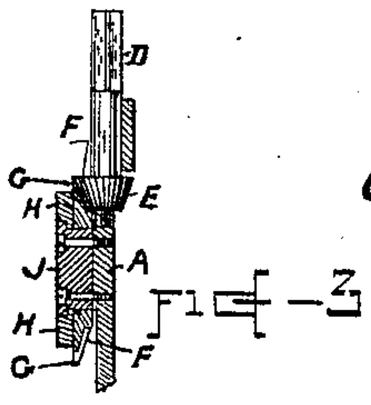


FIG. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

WHEELOCK N. CLIFFORD, OF WALTHAM, MASSACHUSETTS.

WATCH WINDING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 406,702, dated July 9, 1889.

Application filed February 9, 1888. Serial No. 263,527. (No model.)

To all whom it may concern:

Be it known that I, WHEELOCK N. CLIFFORD, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Mechanism for Winding Mainsprings and Setting Hands of Watch-Movements, (applicable to other mechanical movements embracing a wound spring for actuating same,) of which the following is a full, clear, and exact description.

This invention relates particularly to mechanism for setting the hands and winding the main or actuating spring of a watch-movement from the rotation of a winding-stem, preferably located and turning in the pendant-knob of the watch-case, and whereby the winding of the mainspring will be secured in either direction of rotation of said stem.

The mechanism of this invention, in substance, consists of two gear-wheels, each loosely turning on a stud, or preferably an arbor, and an arbor common to both, and the mainspring-arbor of the watch-movement, two ratchet or clutch wheels, one for each of said loose gear-wheels, two pawls or clutches arranged in one direction of rotation of said loose gear-wheels to engage and in the other direction thereof to pass freely over the ratchet or clutch wheels and to rotate them in opposite directions, and a rotatory arbor or winding-stem suitably connected to both of said loose gear-wheels, preferably located and turning in the pendant-knob of the watch-case, all combined together and arranged so that by turning said rotatory arbor in either direction the mainspring-arbor will be rotated in one direction only and a direction to wind the mainspring, all substantially as hereinafter described.

In the drawings forming part of this specification, Figure 1 is a plan view, enlarged, of the outer face of the pillar-plate and of the mechanism, in one form of its arrangement, of this invention for winding mainsprings, and in which the two loose gear-wheels and the two ratchet-wheels are arranged in common upon the mainspring-arbor. Fig. 2 is a similar view to Fig. 1, showing one of the loose gear-wheels and its ratchet-wheel detached and placed on the pillar-plate at one side of the mainspring-arbor. Fig. 3 is a detail sectional view, as hereinafter appears, on the central or axial line of the rotatory arbor or winding-stem, through which the winding mechanism shown in the previous figures and the hand-setting mechanism, also illustrated therein, are operated. Figs. 4 and 5 are enlarged sections, lines 4 4 and 5 5, respectively, of Figs. 1 and 2. Figs. 6 and 7 are plan views. Fig. 8 is a vertical section, and Fig. 9 is a side view, of other forms of arrangement of the mainspring-winding mechanism of this invention, all as will hereinafter fully appear.

In the drawings, A is the pillar-plate, B is the mainspring-arbor, and C is the hand-arbor, of a watch-movement.

D is a rotatory arbor or winding-stem turning in suitable bearings on the inner or under side of the pillar-plate; and E, Fig. 3, is a bevel gear-wheel on the winding-stem D and engaging a bevel-crown gear-wheel F, turning in common with a gear-wheel G, carried by a yoke H, arranged to swing around and engage with a circular stud J, secured to the pillar-plate A. The gear-wheel G on opposite sides meshes a gear-wheel K and a smaller gear-wheel L.

In Figs. 1 and 2 the gear-wheel L is carried by the swinging yoke H.

The gear-wheel L, Figs. 1 and 2, in all positions of the yoke, is in engagement with a gear-wheel M, carried by the yoke, and which when the yoke is swung in the proper direction therefor meshes the cannon-pinion N of the hand-arbor, and thus hand-arbor C and winding-stem D are connected.

The gear-wheel K, placed in engagement with the winding mechanism, by properly swinging the yoke H therefor, drives the mainspring-arbor B, as will hereinafter appear.

O, Figs. 1 and 2, is a bent spring applied to the swinging yoke H and attached to the pillar-plate for holding the gear-wheel M out of engagement with the cannon-pinion N and the driving gear-wheel K in engagement with the mainspring-winding mechanism, and P is a cam-shaped lever fulcrumed on the pillar-plate for swinging the yoke H against the bent spring O to place the driving gear-wheel

K out of engagement with the mainspring-winding mechanism and the gear-wheel M into engagement with the cannon-pinion N, and for so holding them until through said cam-lever the yoke H is set free to the action of its bent spring O to again place driving gear-wheel K into engagement with the mainspring-winding mechanism and gear-wheel M out of engagement with the cannon-pinion N, all as ordinary and well known and forming no part of this invention.

The winding-stem D, preferably, is to be inclosed in the pendant-knob (not shown) of the movement-case, (not shown,) and is otherwise constructed and arranged of itself and in its connection (all not shown) with the pusher-button (not shown) of the pendant-knob to be always in proper connection for being rotated and otherwise to serve all purposes, and as well known, the whole forming no part of this invention, and therefore, being well known, needs no further particular explanation herein. The mainspring-winding mechanism illustrated, Figs. 1, 2, and 4 to 9, both inclusive, in various forms of construction and arrangement of its several parts and in the special form of construction and arrangement of its several parts, Figs. 1, 2, 4, and 5, will now be described.

R S are two gear-wheels on mainspring-arbor B. The gear R is smaller than and is placed below the gear S, and it rests on a shoulder *a* of the arbor B. The gear S rests on the pillar-plate, and both gears R S are loose and free to turn on arbor B.

T U are two ratchet-wheels of similar size and both fitting and engaging the mainspring-arbor B and turning in common with it. This arbor B, as shown, is made square-sided, and each ratchet-wheel fits and engages the arbor.

T U are ratchet-wheels, one for each loose gear-wheel R S, and each ratchet-wheel is received in a countersink or recess *b* of the upper face of the loose gear-wheels, and the teeth of both ratchet-wheels are presented in the same direction as to the axis of the arbor B, Figs. 1 and 2.

V W are two pawls, each fulcrumed on a loose gear-wheel R S, and each at its free end engages the teeth of a ratchet-wheel T U of its gear-wheel R S.

f is a bent spring, at one end fastened to the gear-wheels R S and at its opposite and free end pressing against a pawl V W.

The driving gear-wheel K, carried by the swinging yoke H, with said yoke in its normal position, meshes the smaller loose gear-wheel R, and also a pinion gear-wheel X, which turns on a fixed stud X^2 of the pillar-plate and meshes the larger loose gear-wheel S. The rotation of the driving gear-wheel K directly rotates the loose gear-wheel R and the pinion gear-wheel X, turning both in the same direction, and indirectly through the pinion gear-wheel X it also rotates the loose gear-wheel S, but in a direction opposite to that of the loose gear-wheel R. If the direction of rotation of the loose gear-wheel R from the rotation of the driving gear-wheel K is such that its spring-pawl V engages the teeth of its ratchet-wheel T, then said ratchet-wheel will be thereby rotated in common with said loose gear-wheel R, and through it, as it is engaged with the mainspring-arbor, as before explained, such arbor will be correspondingly and similarly rotated, while as the loose gear-wheel S rotates in a direction opposite to that of the loose gear-wheel R, the teeth of both ratchet-wheels being, as stated, presented in the same direction, obviously the loose gear-wheel S will then simply turn on the mainspring-arbor, its spring-pawl W freely passing and slipping over the teeth of its ratchet-wheel U. Again, if the direction of rotation of the loose gear-wheel R from the rotation of the driving gear-wheel K is such that its spring-pawl V passes and slips freely over the teeth of its ratchet-wheel T, then said ratchet-wheel will remain stationary, and from the then rotation of the loose gear-wheel S, which is in an opposite direction to that of the loose gear-wheel R and in a direction for its spring-pawl W to engage the teeth of its ratchet-wheel U, said ratchet-wheel and the mainspring-arbor are consequently rotated therefrom, and, as is obvious, in a direction which is the same as that of its previous rotation from the rotation of the loose gear-wheel R when its spring-pawl V did engage with the teeth of its ratchet-wheel U. It thus appears that in either direction of rotation of the driving gear-wheel K the mainspring-arbor is rotated always in one and the same direction, and as the driving gear-wheel K receives its rotation from the rotation of the rotatory or pendant arbor D, plainly, in whatever direction that is rotated, the mainspring-arbor is always rotated in one direction only, whereby, it being of course understood that the so secured direction of rotation of the mainspring-arbor is one suitable to secure a winding of the mainspring therefrom, the winding of the mainspring is secured by a rotation in either direction of the winding-stem D.

The other forms of construction and arrangement of the several parts of the mechanisms of this invention are now to be described.

In Fig. 6 each of the loose gear-wheels R S, with its pawl V W and ratchet-wheels T U, turns on separate studs 10 and 11 of the pillar-plate, and both loose gear-wheels R S engage the common driving gear-wheel K. The teeth of the ratchet-wheels T U are opposed relatively to the direction of rotation of the mainspring-arbor B. Each ratchet-wheel has a fixed gear-wheel 12 13, in dotted lines, and the fixed gear-wheel 12 meshes gear-wheel 14, and fixed gear-wheel 13 meshes a gear-wheel 15, turning on a fixed stud of the pillar-plate and meshing said gear-wheel 14, which is fixed on the mainspring-arbor B.

In Fig. 7 the loose gear-wheel R, with its pawl and its ratchet-wheel T, is on, and the ratchet-wheel fixed to, the mainspring-arbor B, and the loose gear-wheel S, with its pawl W and its ratchet-wheel U, is loose on a fixed stud 16 of the pillar-plate. Loose gear-wheel R meshes driving gear-wheel K and loose gear-wheel S meshes a gear-wheel 17, turning on a fixed stud of the pillar-plate and meshing the driving gear-wheel K and a gear-wheel 24, fixed to the ratchet-wheel U of loose gear-wheel S, which meshes a gear-wheel 18, turning on a fixed stud of the pillar-plate and meshing a fixed gear-wheel 19 of the mainspring-arbor B. The teeth of both ratchet-wheels T U are presented in the same direction relatively to mainspring-arbor.

In both arrangements, Figs. 6 and 7, the turning of the driving gear-wheel K in either direction rotates the loose gear-wheels R S in opposite directions, and rotates the mainspring-arbor B in one direction only.

In Fig. 8 both loose gear-wheels R S, with their spring-pawls V W and ratchet-wheels T U, are on a common arbor 20, having a fixed gear-wheel 21, meshing a gear-wheel 22 of the yoke H, in turn arranged to mesh a fixed gear-wheel 23 of mainspring-arbor B. The loose gear-wheels R S are crown gear-wheels, and both mesh a common bevel gear-wheel 26 of the rotatory or pendant arbor D, and which gear 26 is located between them. The teeth of the ratchet-wheels are presented in the same direction relatively to the direction of rotation of mainspring-arbor, and the loose gear-wheels R S rotate in opposite directions and the mainspring-arbor in one direction only.

In Fig. 9 loose gear-wheels R S (shown as bevel gear-wheels) have toothed clutching-rims 27 28, respectively, and all on a common arbor 29 of the pillar and top plates, having a fixed gear-wheel 30 to be connected to mainspring-arbor. Arbor 29 has two separate clutching-collars 31 32 to turn with, but to be free to slide lengthwise on it. These clutching-collars 31 32 have a spring 33 between them and coiled about the arbor 29, all so as to engage both clutching-collars with their respective clutching rims of the loose gear-wheels, and to allow them to pass from and return to such engagement in the rotation of the loose gear-wheels. The loose gear-wheels are in mesh with a common bevel gear-wheel 34 at opposite sides thereof and which rotates with the winding-stem D. Turning the rotatory arbor D in either direction turns the fixed gear-wheel 30 of arbor 29 in one direction only, and through its connection (not shown) with mainspring-arbor that also is turned in one direction only.

In turning the winding-stem D in one direction, one of the clutching-rims 27 or 28 of the loose gear-wheels R S takes hold of its clutching-collar 31 or 32 of the arbor 29, which is common to all, and the other clutching-rim 27 or 28 of the loose gear-wheels R S slips and passes freely over its clutching-collar 31 32. The loose gear-wheels R S turn in opposite directions.

All the constructions and arrangements of mainspring-winding mechanism shown and described embrace substantially the same elements and are substantially the same, varying only in forms of details and their arrangement. In each there are two loose gear-wheels and two ratchet or clutch wheels, and two pawls or clutches to engage said ratchet or clutch wheels, combined with said loose gear-wheels and the mainspring-arbor and otherwise, as described, to secure a rotation of the two loose gear-wheels in opposite directions, and from them a rotation of the mainspring-arbor in one direction only.

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

1. In combination with a watch-movement actuated from the unwinding of a wound spring, mechanism for winding said spring, composed of two loose-turning gear-wheels, two ratchet or clutch wheels, one for each of said loose gear-wheels, two pawls or clutches to engage and to pass freely over said ratchet or clutch wheels, and means, consisting of a driving gear-wheel having connection with both of said loose gear-wheels, whereby from its rotation in either direction the loose gear-wheels will be simultaneously rotated, but in opposite directions, all combined, arranged, and operating substantially as and for the purpose described.

2. In combination with a watch-movement actuated from the unwinding of a wound spring, mechanism for winding said spring, composed of two loose-turning gear-wheels, an arbor or stud common to both of said gear-wheels, two ratchet or clutch wheels, one for each of said gear-wheels, two pawls or clutches to engage and to pass freely over said ratchet or clutch wheels, and means consisting of a driving gear-wheel having connection with both of said loose gear-wheels, whereby from its rotation in either direction the loose gear-wheels will be simultaneously rotated, but in opposite directions, all combined, arranged, and operating substantially as and for the purpose described.

3. In combination with a watch-movement actuated from the unwinding of a wound spring, mechanism for winding said spring, composed of two loose-turning gear-wheels, an arbor or stud common to both of said gear-wheels, two ratchet or clutch wheels, one for each of said gear-wheels, two pawls or clutches to engage and to pass freely over said ratchet or clutch wheels, and a gear-wheel to directly mesh with one and to connect with the other of said loose gear-wheels through an intermediate gear-wheel, and to rotate them in opposite directions, all combined, arranged, and operating substantially as and for the purpose described.

4. In combination with a watch-movement

actuated from the unwinding of a wound spring, mechanism for winding said spring, composed of two loose-turning gear-wheels, an arbor or stud common to both of said gear-wheels, two ratchet or clutch wheels, one for each of said gear-wheels, two pawls or clutches to engage and to pass freely over said ratchet- or clutch wheels, a gear-wheel to directly mesh with one and to connect with the other of said loose gear-wheels through an intermediate gear-wheel and to rotate them in opposite directions, and a support for said driving gear-wheel adapted to be adjusted to place its said gear-wheel in and out of said mesh, all combined, arranged, and operating substantially as and for the purpose described.

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

W. N. CLIFFORD.

Witnesses:
ALBERT W. BROWN,
FRANCES M. BROWN.