No. 607,144. Patented July 12, 1898.

C. L. TESKE.

WINDING MECHANISM FOR TIMEPIECES.

(Application filed Mar. 8, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

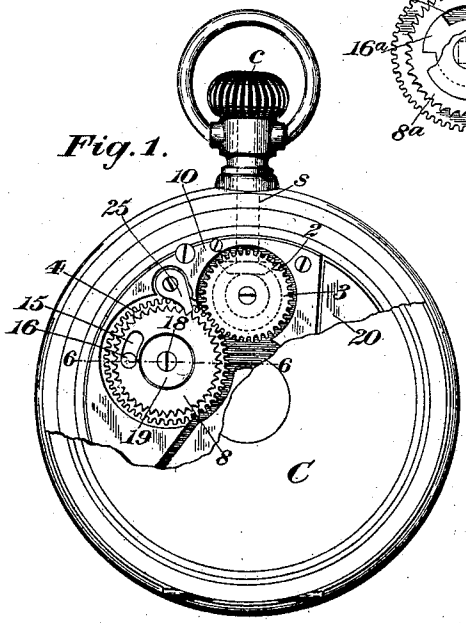

Fig. 7.

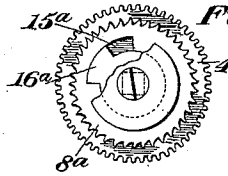

Fig. 6.

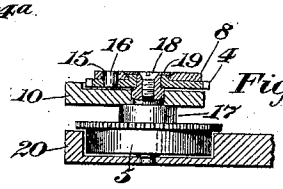

Fig. 2.

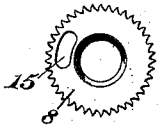

Fig. 4.

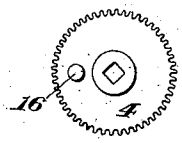

Fig. 3.

Fig. 5.

Fig. 8.

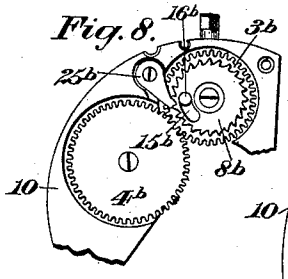

Fig. 9.

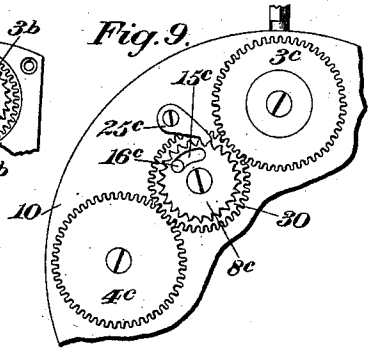

Fig. 10.

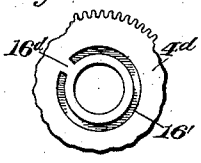

Fig. 11.

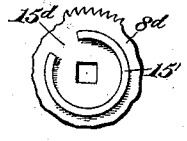

Fig. 12.

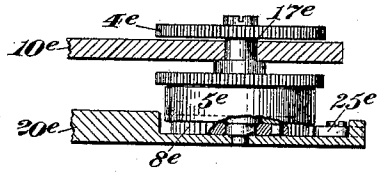

Fig. 13.

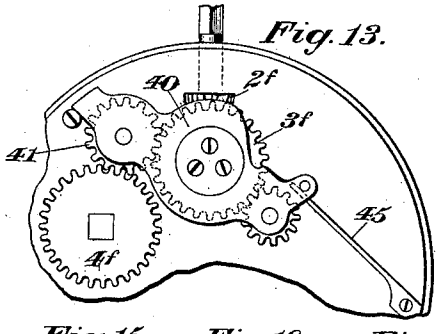

Fig. 14.

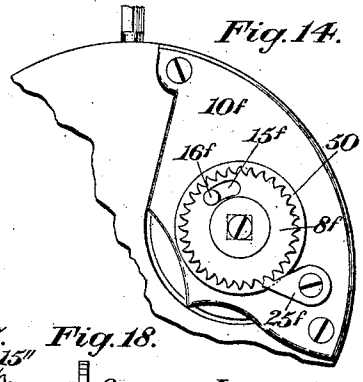

Fig. 15.

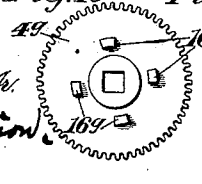

Fig. 16.

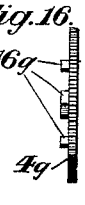

Fig. 17.

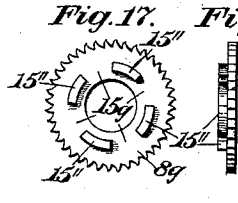

Fig. 18.

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No. 607,144. Patented July 12, 1898.

C. L. TESKE.

WINDING MECHANISM FOR TIMEPIECES.

(Application filed Mar. 8, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 19.

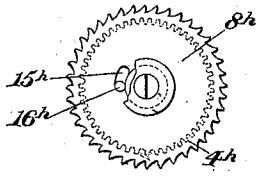


Fig. 22.

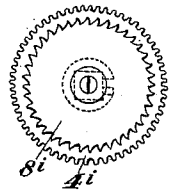


Fig. 24.

Fig. 26.

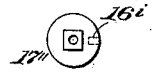


Fig. 25.

Fig. 27.

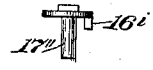


Fig. 20.

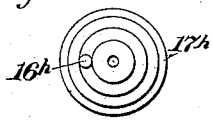


Fig. 23.

Fig. 21.

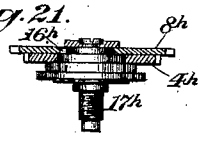


Fig. 28.

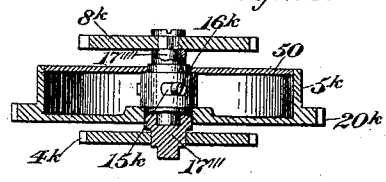


Fig. 29.

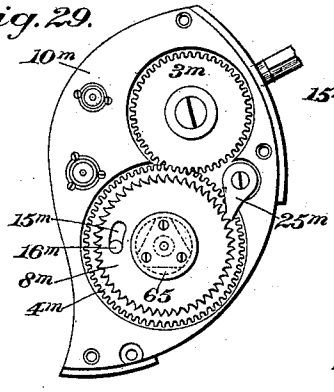


Fig. 31.

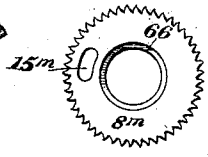


Fig. 34.

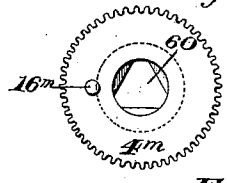


Fig. 32.

Fig. 35.

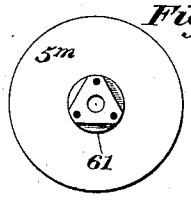


Fig. 33.

Fig. 36.

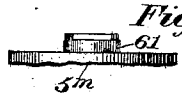


Fig. 30.

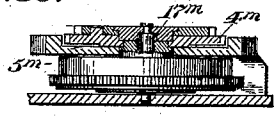
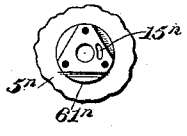


Fig. 37.



Witnesses:
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E. C. Champion

Inventor:
Charles L. Teske.
By his Attorney,
F. W. Richards.

UNITED STATES PATENT OFFICE.

CHARLES L. TESKE, OF HARTFORD, CONNECTICUT.

WINDING MECHANISM FOR TIMEPIECES.

SPECIFICATION forming part of Letters Patent No. 607,144, dated July 12, 1898.

Application filed March 3, 1898. Serial No. 673,111. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. TESKE, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Winding Driving Mechanism, of which the following is a specification.

This invention relates to winding driving mechanism, and especially to a winding mechanism for time-movements or watch-movements of clocks, watches and other power-driven mechanism in which the movements of the driven member are imparted by force stored up in a previously-wound spring, cord, or other winding device.

The principal feature of this invention is the provision of an improved winding mechanism for clocks, watches, &c., in which the spring, cord, or other winding member can be wound up without straining the same unduly.

As is well known, in clocks and watches as heretofore constructed it has been possible, and, indeed, customary unless great care has been exercised, to wind up the mainspring to its full extent and until the winding-wheel could be turned no further. It is obvious that in timepieces of delicate workmanship constructed to keep accurate time within a few seconds per week or month such straining of the mainspring would result in storing up considerable surplus power, which of course when released would drive the time-train at an accelerated rate of speed and thereby impair the accuracy and usefulness of the movement as a time-keeping mechanism. In addition to these extra forces stored up in the mainspring by the overwinding thereof there is usually another force present to increase the speed of movement of the train, and this second surplus force is obtained in watch and clock movements when the pawl or click forcibly locks the last tooth of the winding-wheel and thereby obtains and maintains a considerable leverage, which of course will be exerted upon the wheels of the time-train to increase the speed movement of the latter.

The principal object of this invention is to prevent the overwinding of the mainspring or other winding member of a time-movement, and hence prevent the transmission to the driven members of the time-train of a force or forces in excess of that which the spring is designed to impart. I attain this result by introducing between the winding device and the spring or other power-accumulating device to be wound a let-off connection which will permit the spring or other member to unwind partially after it is wound up, and thus prevent straining of the parts by overwinding, and also prevent locking up of the click with the teeth of the wheel engaged thereby. Ordinarily I will employ some form of pin-and-slot connection in the gear-train; but I do not limit myself to these particular devices, nor to any particular species of pin-and-slot connection, as many different varieties or modifications of the latter may be made. In all cases, however, the parts will be so organized that after the spring or other member is wound up it will unwind slightly, the extent of this unwinding being determined usually by the relative sizes of the pin and the slot.

In the drawings accompanying and forming part of this specification, Figure 1 is an enlarged rear elevation of a watch containing a movement illustrating one embodiment of my present invention, parts being broken away to illustrate the construction clearly. Figs. 2, 3, 4, and 5 are details of the let-off device. Fig. 6 is a transverse section of a portion of the watch-movement, the section being taken in the line 6 6, Fig. 1. Fig. 7 is a detail of a modification of the let-off device. Fig. 8 is a detail of a portion of a watch-movement embodying my improved let-off device in direct connection with the crown and intermediate wheel of the movement. Fig. 9 is a similar view of another watch-movement embodying my let-off device, in connection with an idle-gear between the winding-wheel and the crown and intermediate wheel. Figs. 10 and 11 are details illustrating the complementary parts of another form of my improved let-off device. Fig. 12 is a sectional detail illustrating my invention applied to a watch having the winding-gears under the dial, the barrel having no cogs on the outside thereof. Figs. 13 and 14 are front and rear elevations of a portion of a watch-movement somewhat similar to that shown in Fig. 12. Figs. 15 to 18, inclusive, are details of another modification of the let-off device. Figs. 19 to 21, inclu-

sive, are details illustrating the application of my let-off device directly to the winding-arbor of the watch-movement. Figs. 22 to 27, inclusive, are details of another modification, illustrating my improved let-off device applied to another form of winding-arbor. Fig. 28 is a sectional view illustrating a portion of an old-style watch-movement with my let-off device attached thereto. Figs. 29 to 36, inclusive, are details illustrating the application of my improvements to another form of Waltham movement, and Fig. 37 is a detail of a modification of the construction for adapting my improved let-off device to this type of movement.

Similar characters designate like parts in all the figures of the drawings.

My present invention may be applied, as before stated, to many different forms of driving mechanisms, whether these be the time-movements of clocks, watches, &c., or any of the various modifications illustrated in the drawings of this application.

The essential feature of my improvements is the provision between the winding device and the part to be wound of a let-off device by means of which such part may be let down or permitted to unwind to a predetermined extent when wound.

Referring first to the construction illustrated in Figs. 1 to 6, inclusive, I have shown my invention in connection with a stem-winding watch of the "Waltham" type. Here the case of the watch, which is designated by C, contains the well-known Waltham movement somewhat modified to admit of the application of my improvements thereto. In this case the usual crown *c* is connected to a stem *s*, carrying a pinion 2, meshing with one wheel of a gear-train between the winding-stem and the mainspring of the watch, the pinion in the present case engaging the crown-teeth of the usual crown and intermediate wheel 3, by which the movements of the winding pinion and stem may be transmitted to the usual winding-wheel 4, secured to the barrel containing the mainspring. (Not shown.) This barrel is indicated at 5, Fig. 6, and is of the well-known type. Ordinarily in a watch-movement of this type a ratchet-wheel is carried by the winding-wheel and moves in unison therewith, such ratchet-wheel coacting with a pawl or click supported usually on a bridge 10, secured to the main plate of the watch in the usual manner, as by screws.

The main plate is indicated at 20. In the present case, however, instead of employing a fixed ratchet-wheel moving in unison with the winding-wheel I make use of a let-off device which will admit of a slight unwinding motion of the spring after the winding up of the latter is effected. This let-off device will usually be in the form of a pin-and-slot connection between two members of the connections between the winding-stem and the mainspring, and in the construction illustrated in these views I employ a ratchet-wheel somewhat similar to that in common use; but instead of mounting it so that it moves in unison with the winding-wheel I support it on said winding-wheel in such a manner that it has a movement relatively to the winding-wheel at certain times. This will be obvious by referring to Fig. 1, in which I have shown a barbed ratchet-wheel 8 concentric with the winding-wheel and supported on the latter in such a manner as to be capable of moving slightly relatively thereto. This relative movement in this type of watch-movement may be obtained advantageously by providing a pin-and-slot connection between the winding-wheel 4 and the ratchet-wheel 8. Either wheel may carry the pin or the slot; but in the construction shown the ratchet-wheel is slotted at 15, while the winding-wheel has a pin or stud 16 rising therefrom and preferably integral therewith. (See Figs. 2 and 4.)

The winding-wheel is supported on the winding-arbor 17 in the usual manner, and this winding-arbor may be tapped at its upper end for the reception of a screw 18, having a countersunk head for holding in place a washer 19, engaging the ratchet-wheel 8.

In connection with the ratchet-wheel just described I make use of the usual pawl or click 25, supported on the bridge and in position to coact with the teeth of said wheel.

It will be noticed, now, that if the watch is wound up by turning the crown *c* in the usual manner motion will be transmitted to the winding-wheel 4 before the ratchet-wheel begins to turn, and the pin 16 will move from the position shown in Fig. 1 to the other end of the slot before said ratchet-wheel moves. Hence when the crown is let go the tension upon the mainspring will cause the winding-wheel, with its pin, and therefore the mainspring, to fly back to the position shown in Fig. 1 before the click will become effective to prevent further unwinding of the mainspring and movement of the winding-wheel and barrel. The extent of the unwinding movement will of course be determined by the relative dimensions of the pin and slot, and particularly by the length of the slot.

In a modification of the let-off device illustrated in Fig. 7, 4^a designates a winding-wheel similar to that before described, and 8^a a barbed ratchet-wheel corresponding to that shown in Fig. 1. A let-off connection is provided between these two parts and has the same functions as that before described; but in this instance the ratchet-wheel has a substantially sector-shaped slot 15^a and the winding-wheel has a stop-segment 16^a, working in a slot 15^a, which is of greater length than the stop and has its end walls or stop-walls disposed at such an interval as to allow for the necessary movement of the winding-wheel and the mainspring relatively to the ratchet-wheel after the mainspring is wound and while the ratchet-wheel is held by its click.

In Fig. 8 I have illustrated another modification of the invention in which the let-off device is applied directly to the crown and intermediate wheel instead of to the winding-wheel. In this case the crown and intermediate wheel 3^b is supported on the bridge 10 in substantially the same manner as the ratchet-wheel is mounted on the winding-wheel in Figs. 1 and 6. The ratchet-wheel 8^b is somewhat smaller in this case; but between it and the crown and intermediate wheel will be the usual pin-and-slot connection, comprising a slot 15^b in the ratchet-wheel and a pin 16^b, projecting from the crown and intermediate wheel. The click or pawl 25^b coacts with the teeth of the ratchet-wheel, as before stated, and the crown and intermediate wheel meshes directly with a winding-wheel 4^b.

In Fig. 9 is shown a modification of my improvements in which the let-off device is applied to an idle-gear between the crown and intermediate wheel. In this construction a large crown and intermediate wheel 3^e meshes with an idler 30, on which is supported a ratchet-wheel 8^e, having a slot 15^e, in which works a pin 16^e, rising from the idler 30, which latter meshes with the teeth of a winding-wheel 4^e. In this modification, although the pin-and-slot connection or let-off device is between the ratchet-wheel and an idle-gear, the function of the mechanism is the same as in the preceding cases. A click 25^e coacts with this ratchet-wheel in the usual way.

In Figs. 10 and 11 I have illustrated another modification of the let-off device, in which the winding-wheel 4^d has thereon a parti-annular slot 16′, between the ends of which is a stop 16^d, while the ratchet-wheel 8^d has thereon a parti-annular ring 15′, projecting therefrom, the ends of this ring forming between them a space or recess 15^d of sufficient size to permit the stop 16^d to have considerable play between the end walls of the recess 15^d, and thereby enable the mainspring to unwind to the proper extent after being wound. In this construction the sides of the two gear-wheels shown in Figs. 10 and 11 are juxtaposed, with the ring 15 projecting through the annular opening 16′.

In Fig. 12 I have illustrated the application of my improvements to a watch-movement of a type in which the let-off device, including the ratchet-wheel, is located under the dial of the watch and between the bridge 10^e and the main plate 20^e. In this case the winding-arbor 17^e is journaled in the bridge and the main plate and carries thereon, adjacent to the main plate, a ratchet-wheel 8^e, secured to a squared portion of the arbor and coacting with a click 25^e, also supported on the main plate. In this construction the barrel 5^e is adjacent to the ratchet-wheel and has a smooth periphery, with no gear-teeth thereon, the winding-wheel 4^e being located above the barrel and the ratchet-wheel.

Figs. 13 and 14 illustrate another type of watch-movement, in which the winding-wheel train is under the dial, and there is not sufficient space for a winding-wheel adjacent to the ratchet-wheel and the click. In this case the movement of the winding-pinion 2^f is transmitted to a crown and intermediate gear 3^f, on the hub of which is loosely supported for oscillation a swinging bridge 40, carrying a pair of pinions meshing with the intermediate gear 3^f, and one of which, 41, meshes with the winding-wheel 4^f, a spring 45 holding the swinging bridge, and hence the pinion 41, in the working position. At the other side of the watch-movement the winding-arbor passes through a bridge 10^f, and its outer squared end receives a disk 50, having an externally-rounded hub, on which a ratchet-wheel 8^f is supported for movement relatively to the disk 50. Between the disk 50 and the ratchet-wheel is the usual let-off or pin-and-slot connection, consisting of a slot 15^f in the ratchet-wheel and a pin 16^f, rising from the disk. A pawl or click 25^f coacts with the teeth of the ratchet-wheel in the usual manner.

In Figs. 15 to 18 I have illustrated another modification of my invention, in which a winding-wheel 4^g and the ratchet-wheel 8^g have extending from adjacent side faces thereof coacting projections 16^g and 15″, the latter forming between them recesses 15^g, in which the projections 16^g work, so as to permit relative movement of the winding-wheel with respect to the ratchet-wheel. The manner in which these two parts coöperate will be obvious from the drawings.

Figs. 19 to 21, inclusive, illustrate a modification of my improved let-off device, in which the pin-and-slot connection is applied directly between the ratchet-wheel and the winding-arbor. In this case the ratchet-wheel, which is designated by 8^h, is disposed above and is somewhat larger than the winding-wheel 4^h, which winding-wheel is secured to a winding-arbor, (indicated herein by 17^h.) This arbor is stepped, as illustrated clearly in Fig. 21, one of the steps receiving the winding-wheel, while the next smaller step supports the ratchet-wheel for movement relatively to the winding-arbor. In this case the winding-arbor may have a pin 16^h projecting from one of the steps thereof and preferably integral therewith, this pin working in a corresponding slot 15^h in the ratchet-wheel. The ratchet-wheel will be held in place on the arbor, substantially in the usual manner, by means of a screw and washer.

In Figs. 22 to 27 I have shown the application of my improved let-off device to a modified form of winding-arbor, formed in this case in two parts. These two parts are clearly illustrated in detail in these views and embody a main tubular arbor 17′ and a secondary arbor 17″, working within the tubular bore of the main member 17′. Here the upper portion of the main member 17′ is squared to receive the winding-wheel 4^i, and just below the squared portion is a flange or

collar, in one edge of which is a recess 15^i, into which projects a lug 16^i, depending from the under side of a flange on the secondary member 17″ of the winding-arbor, this latter also having a squared portion to receive the ratchet-wheel 8^i. It will be obvious that as the ratchet-wheel is fixed to the secondary member of the arbor and the winding-wheel is fast to the primary member of the arbor the lug 16^i and the recess 15^i permit the winding-wheel and the primary member of the arbor to move relatively to the ratchet-wheel and the secondary member of said arbor after the mainspring is wound.

In Fig. 28 I have illustrated another modification of my invention, showing its adaptation to an old-style watch. Here the barrel 5^k forms part of the main plate 20^k and is covered by a disk 50, secured to the primary member 17‴ of a winding-arbor journaled in the main plate and having secured to it a winding-wheel 4^k. The secondary member of this winding-arbor is indicated by 17⁗ and has secured thereto on a squared part a ratchet-wheel 8^k. Between the two members of this winding-arbor I interpose a let-off connection substantially similar to that illustrated in Figs. 22 to 27, inclusive; but in this modification the primary member 17‴ has a circumferential slot 15^k, in which works a pin 16^k, projecting radially therethrough from the secondary member 17⁗ of the winding-arbor.

In Figs. 29 to 36, inclusive, I have illustrated my invention in connection with the well-known new Elgin watch-movement. Here the crown and intermediate wheel (indicated by 3^m) is connected with the winding-pinion in the usual manner and also with a winding-wheel 4^m, which has a substantially triangular opening 60, through which may be passed a corresponding triangular projection 61′, rising from the hub 61 of the barrel. Of course the winding-wheel 4^m rotates with the barrel and the winding-arbor 17^m, while the ratchet-wheel 8^m is supported on the winding-wheel and is capable of movement relatively thereto by reason of the pin-and-slot connection therewith. The pin is shown at 16^m on the winding-wheel and the slot at 15^m on the ratchet-wheel. A click 25^m, mounted on the bridge 10^m, coacts with the barbed teeth of the ratchet-wheel in the usual manner. The ratchet-wheel may be held in position, as may also the winding-wheel 4^m, by a cap, such as 65, having screws adapted to pass into corresponding screw-holes in the projection 61′ of the barrel 5^m, this cap having an undercut head adapted to fill a countersink 66 in the upper side of the ratchet-wheel 8^m.

In Fig. 37 I have illustrated a modification of the watch-movement last described, in which the hub 61 may have therein a slot, such as 15^n, which of course will coact with a pin depending from the under side of the ratchet-wheel. (Not shown.)

In all of the various constructions in which my invention may be embodied, as shown herein, it will be seen that provision is made for permitting the mainspring of the watch-movement to unwind to a predetermined extent after being wound, thereby preventing the straining of the mainspring and locking upon the click at the end of the winding operation. When this let-off device is used in connection with stem-winding watches of the usual type, the partial unwinding of the mainspring after it is wound causes the winding-stem and pinion to turn in the opposite direction from that in which they are moved when the watch is being wound, and hence it becomes unnecessary to turn the winding-stem in the reverse direction to that for winding the spring.

Having described my invention, I claim—

1. In a time-movement, the combination, with a winding device and with a motor, of power-transmitting connections for preventing overwinding of the motor, said connections embodying a pair of rotary members, one of which has a loose connection with, and is movable a predetermined distance relatively to, the other for permitting an immediate predetermined partial unwinding of the motor after the latter is wound.

2. In a time-movement, the combination, with a winding device and with a mainspring, of power-transmitting connections for preventing overwinding of said spring and embodying a pair of concentric gear-wheels, one of which has a loose connection with, and is movable a predetermined distance relatively to, the other for permitting an immediate predetermined partial unwinding of the spring after the latter is wound, and a stop-pawl for one of said gear-wheels.

3. In a time-movement, the combination, with a winding device and with a mainspring, of power-transmitting connections between said winding device and spring for preventing overwinding of the spring and embodying a pair of concentric gear-wheels having a pin-and-slot connection and movable relatively to each other for permitting an immediate partial unwinding of the spring after the latter is wound, and a stop-pawl for one of said gear-wheels.

4. In a time-movement, the combination, with a winding device and with a mainspring, of power-transmitting connections between said winding device and spring for preventing overwinding of the spring and embodying a pair of concentric gear-wheels one supported on the other, said gear-wheels having a pin-and-slot connection for permitting an immediate partial unwinding of the spring after the latter is wound, and a stop-pawl for one of said gear-wheels.

5. In a watch-movement, the combination, with a winding-stem and pinion, of a crown and intermediate wheel; a mainspring; a winding-wheel; a ratchet-wheel coacting with one of said first-mentioned wheels and having a pin-and-slot connection therewith for

permitting an immediate partial unwinding of the mainspring after the latter is wound; and a stop-pawl for said ratchet-wheel, the construction being such that overwinding of the mainspring is prevented.

6. In a watch-movement, the combination, with a winding-stem and pinion, of a crown and intermediate wheel; a mainspring; a winding-wheel in mesh with said crown and intermediate wheel; a ratchet-wheel supported on the winding-wheel and movable relatively thereto and having a pin-and-slot connection therewith for permitting an immediate partial unwinding of the mainspring after the latter is wound; and a stop-pawl for said ratchet-wheel, the construction being such that overwinding of the mainspring is prevented.

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