

F. TERSTEGEN.
REPEATING MECHANISM FOR TIMEPIECES.

No. 502,917.

Patented Aug. 8, 1893.

Fig. 1.

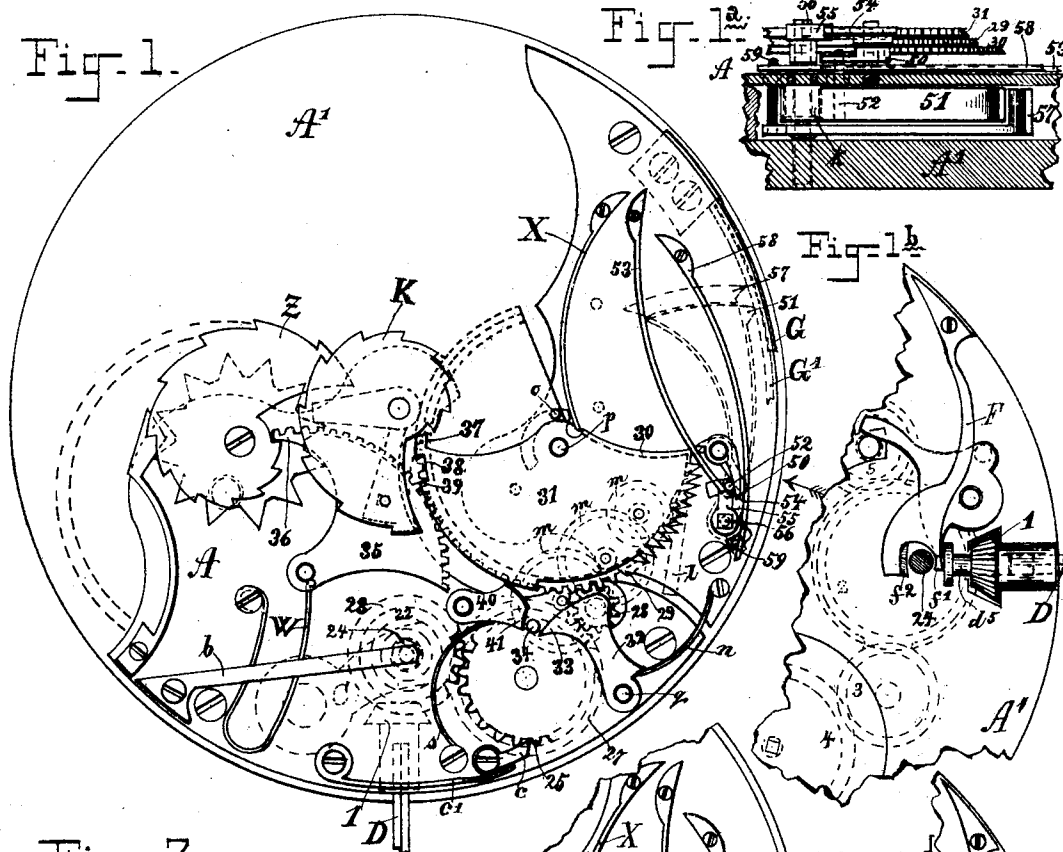


Fig. 1a.

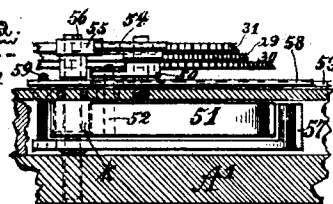


Fig. 1b.

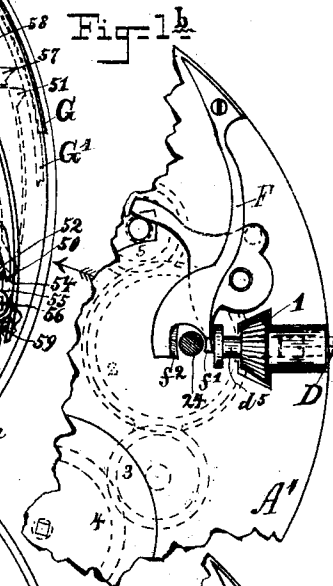


Fig. 2.

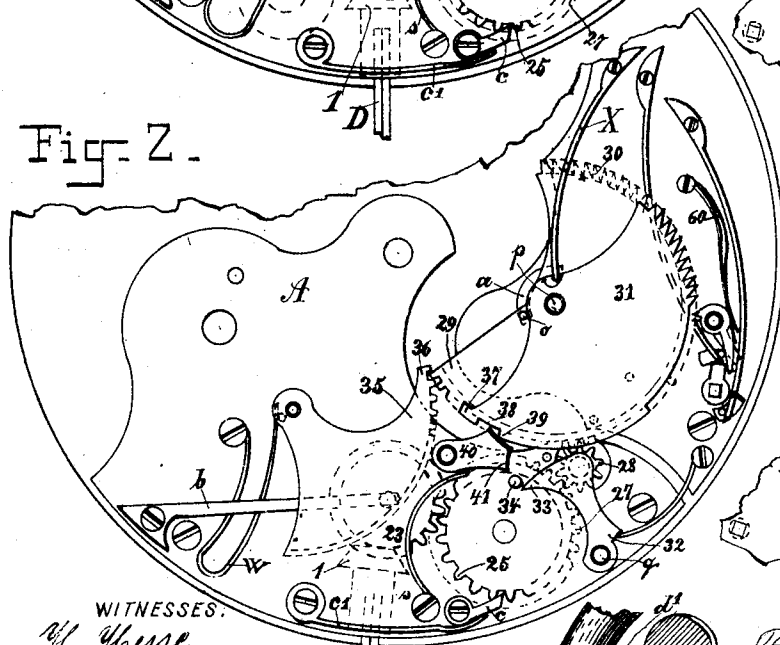
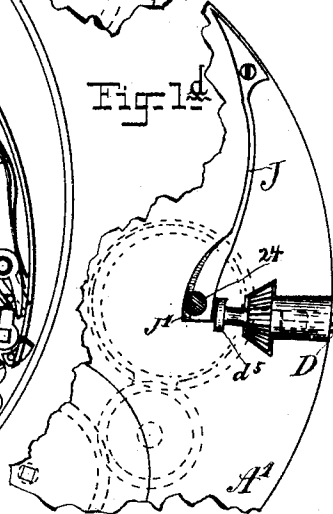
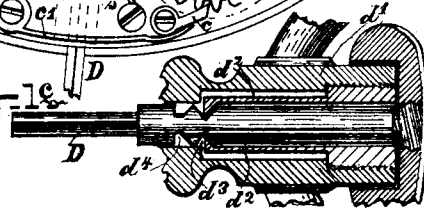


Fig. 1c.



WITNESSES:
H. H. Hesse.
Anton J. Habermehl

Fig. 1d.



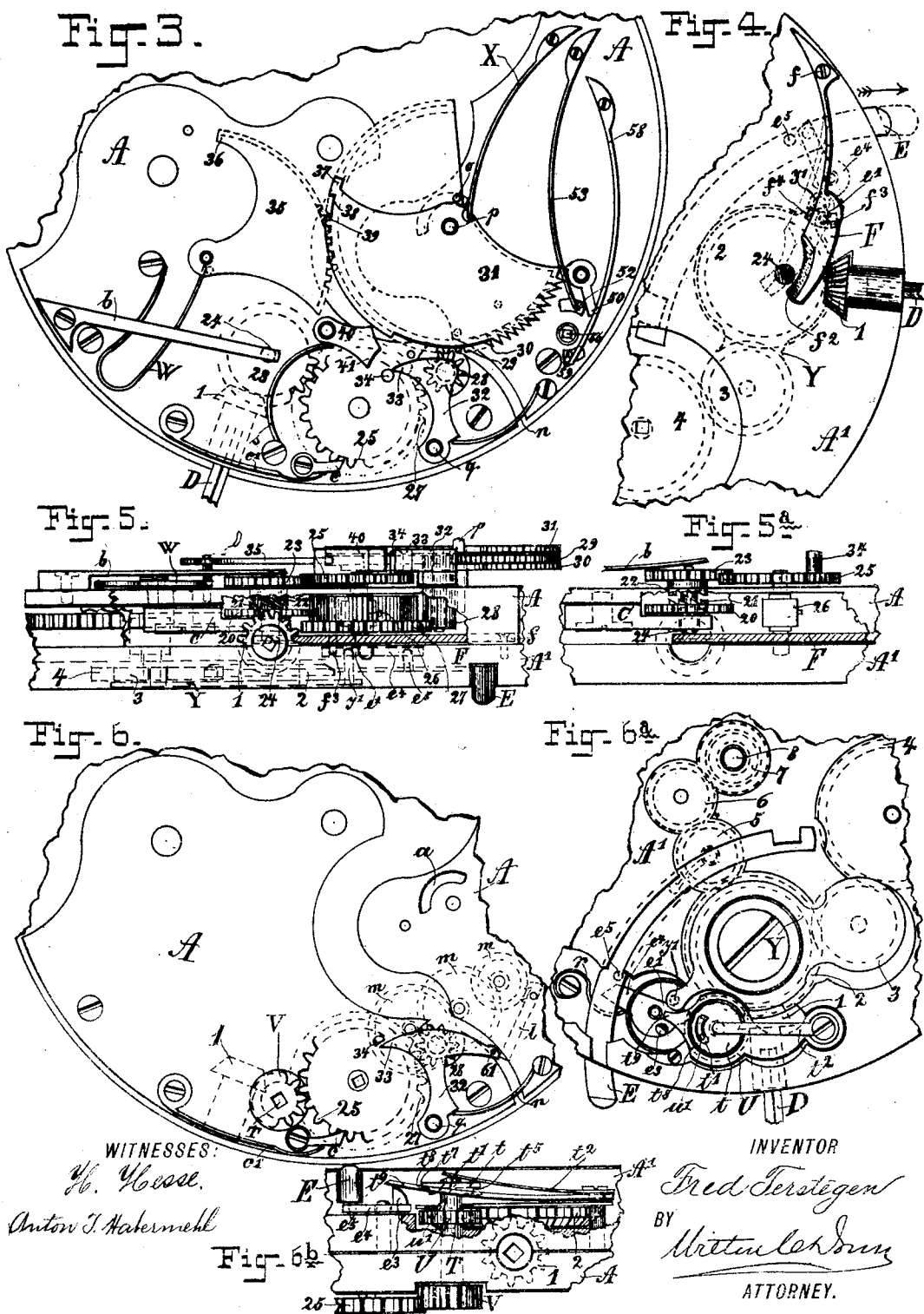
INVENTOR

Fred Terstegen
BY
Wittich & Son
ATTORNEY.

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UNITED STATES PATENT OFFICE.

FRED TERSTEGEN, OF ELIZABETH, NEW JERSEY.

REPEATING MECHANISM FOR TIMEPIECES.

SPECIFICATION forming part of Letters Patent No. 502,917, dated August 8, 1893.

Application filed May 21, 1890. Serial No. 352,654. (No model.)

To all whom it may concern:

Be it known that I, FRED TERSTEGEN, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Repeating Mechanism for Watches and other Timepieces, of which the following is a specification.

This invention relates to an improved repeating mechanism for watches and other time-pieces and to the manner of starting the repeating mechanism to strike the time by means of a winding-pinion and a train of gearing operated by said pinion.

The invention consists in setting the repeater motor-spring in action by a winding stem and pinion and a device operated by intermediate gearing forming part of the winding mechanism of the repeater motor for releasing the striking rack automatically, when the said motor-spring has been sufficiently retracted to return the striking mechanism to its normal position.

The invention further consists in preventing the over-winding of the repeater-motor and also the rewinding of the same until the time is fully struck, by providing a stop device which through suitable mechanism when the rack or racks are set, arrests the further retraction of the repeater-spring and holds the same until the time is fully struck, the said device being adapted to sustain any strain that may be put on the winding-pinion, as the result of attempting to over-wind.

The invention further consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings Figure 1 is a face view of my improved repeating mechanism for watches, the striking-racks being released and the parts in position for action. Fig. 1^a is a sectional elevation of the hammer-actuating mechanism of Fig. 1 taken from the direction of the arrow when the striking-racks are in their normal or initial position. Fig. 1^b is a face view of a part of the front watch-plate which carries the stem-driven train of the watch and the pendant-set connection with the wedge, used to prevent the striking mechanism from operating, while the hands

are being set, by lifting the arbor 24, (shown in section,) and also used to break the connection of the gearing for transmitting motion from the winding-pinion to the repeater-motor, when the stem-driven train is brought to its hand-setting position. Fig. 1^c is a section of the pendant of a watch, drawn on a larger scale, provided with the stem-springs by which the longitudinally-movable stem-arbor is held in the required position. Fig. 1^d represents a face view of a part of the front watch-plate, which carries the stem-driven train, and the wedge as modified to adapt it to operate in connection with the pendant-set devices and repeating mechanism, to break the connection of the gearing used for transmitting motion from the winding pinion to the repeating mechanism and also used to connect the same with the winding-pinion, when the stem-arbor is drawn or pulled out a short distance. Fig. 2 is a face view of a part of the watch-plates and showing the repeating mechanism in its normal position of rest. Fig. 3 is a similar view, showing the repeating mechanism brought to a striking position and the striking-racks disconnected from the driving gear of the motor-spring and a stop mechanism brought in action to prevent further winding of the motor-spring. Fig. 4 is a face view of a part of the front-plate of a watch, which carries the stem-driven train and the yoke lever setting mechanism for the same, connected with the wedge, modified to adapt the same to be operated by the yoke-lever setting mechanism when the stem-driven train is brought to its hand-setting position. Fig. 5 is a sectional edge elevation of a portion of a watch, showing the location and arrangement of the set of gearing, by which the motor-spring of the repeating mechanism is retracted, also showing the going spring-barrel in connection with the striking-racks. Fig. 5^a is a similar view, showing the connection of the gearing broken between the barrel-arbor wheel of the repeater-motor and the winding pinion by the action of the wedge. Fig. 6 is a face view of a part of the watch, showing a stop mechanism for the moderating-gear arranged on the rack-releasing lever to hold the motor-spring in condition to act, also showing another gearing connection with the arbor-wheel of the repeater-motor. Fig.

6^a is a face view of a part of the exterior of the front plate of the watch, showing the gearing in connection with the stem-driven train. Fig. 6^b is a sectional edge elevation of a portion of a watch, showing the winding-pinion and crown-wheel and the set of gearing for actuating the repeater-motor arranged through the watch-plates and acted upon by the yoke-lever setting mechanism to break the connection of the gearing that transmits the motion of the crown-wheel to the repeater motor.

Referring to the drawings, Sheet II, a winding-stem D is suitably connected with a wheel or winding-pinion 1 of a watch; the said pinion engages a crown-wheel 2 as shown in Figs. 4, 5 and 6^a, which is placed under a yoke Y pivoted to the watch-plate A' and held in place by a cap and screw as usual. At one end of the yoke is pivoted an intermediate winding-wheel 3 engaging the barrel-arbor wheel 4, when the yoke is in its winding position. 5 is the intermediate setting-wheel for transmitting the motion of the crown-wheel to the dial-wheels, when the yoke is in its setting position. 7 is the cannon-pinion, placed on the center-post or minute-hand arbor 8, and 6 is a suitable wheel that connects the setting wheel 5 with the cannon-pinion. These wheels are usually called dial-wheels.

The above described mechanism of a stem winding and setting watch is of well known construction. I will now describe in detail my novel devices for operating a repeating mechanism by means of a stem-winding pinion.

On the under side of the watch-plate or bridge A is placed a wheel 20, which is held in place by a bridge C, as shown in Figs. 5 and 5^a, or is attached in any other suitable manner in such a position that the said wheel 20 is engaged by the winding-pinion 1 and turned thereby. The wheel 20 is provided with ratchet-teeth 21, projecting from its upper side near its center-hole and engaging similar teeth 22 on the under side of a wheel 23, attached to a round arbor 24, which is passed through the center-hole of wheel 20 and bridge C, and projecting below the same, so that the said arbor can be engaged by a wedge on a spring arm F, adapted to push or shift the same in the bridge C, whereby its ratchet-teeth 22 can disconnect the ratchet-teeth 21 of wheel 20 in order that the connection for transmitting motion from the winding-pinion to the repeater motor can be broken, when the dial-wheels for setting the hands are operated by the winding-pinion 1, as will be hereinafter described. A suitable spring b presses by its free end upon the top or center-head of the wheel 23 to keep its ratchet-teeth in engagement with the ratchet-teeth of wheel 20. The said wheel 20 is turned by the winding-pinion 1 in either direction, but the arrangement of the parts is such, that when the winding-pinion is turned to the right, the wheel 23 is unlocked or disengaged by the ratchet-teeth 21 of wheel 20 and the motion of

the winding-pinion is transmitted to the barrel-arbor wheel 4, which winds the motor-spring of the time mechanism. But by turning the winding-pinion to the left or reverse direction, the motion of the same is transmitted by the wheel 20 to the wheel 23 by its clutch-device 21 engaging and locking the clutch-device 22 of the wheel 23. The wheel 23 engages the wheel 25 suitably fastened to the arbor 26 of the spring-barrel 27 for retracting the motor-spring of the repeating mechanism and the wheel 25 is held by a pawl or click c controlled by its spring c' when it is rotated. The said click and spring are pivoted to the watch-plate and shown in Figs. 1, 2, 3 and 6.

28 is a shifting wheel or pinion for transmitting motion from the spring-barrel 27 to the striking-racks 30 and 31 and shown in Figs. 3 and 5, and is also used for releasing the said racks so that they can move to a striking position in the following manner: The hour rack 30 is attached to a gear-wheel 29 preferably shown as a segment in Figs. 1, 2 and 3, pivoted to a stud p projecting above the watch-plate or bridge A and which is engaged by the wheel or pinion 28; the said pinion is pivoted to a movable bridge or lever 32 suitably pivoted at q to the watch plate or bridge A and is controlled by its spring n which presses the said lever 32 with its pinion 28 toward the toothed spring-barrel 27 and the said pinion in gear therewith as shown in Figs. 1 and 2. The lever 32 is also provided with a projection or finger 33 by which the same is turned aside by a stud or guide-device 34 attached to the wheel 25, when the same is turned around by the winding-pinion 1 and stem D as shown in Fig. 3, whereby the pinion 28 is shifted out of gear with the spring-barrel wheel 27 and thereby disconnects the segmental gear-wheel 29 with its rack 30 from the motive power or spring-barrel 27. A toothed lever or sector 35 is provided with an hour or snail-piece 36 arranged approximately in line with the circle of its teeth and is engaged and pressed by its spring W toward the hour-snail Z. The said sector 35 gears into the segmental-wheel 29, and turns the said wheel with its hour-rack 30 to a striking position, as soon as the pinion 28 is shifted out of gear with the spring-barrel wheel 27, as shown in Figs. 1 and 3. Above or upon the gear-wheel 29 is placed a five-minute rack 31, which is moved by its rack-spring X toward the snail K. The said minute-rack is provided near its snail-piece 37 with an incut 38 having a shoulder 39 acting on a stop-lever 40 which is set thereby with its projection 41 in the path before the stud or guide-device 34 attached to the arbor-wheel 25, as soon as the pinion 28 is shifted out of gear with the spring-barrel wheel 27, thereby releasing the racks as shown in Fig. 3. The said stop-lever is pivoted to the watch-plate A and is controlled by its spring s. By turning the arbor-wheel 25 a little more than is neces-

sary to move the releasing lever 32, the latter with its finger 33, is pressed by its spring n behind the said stud or guide-device 34, which is prevented now from further turning and stopped by the projection 41 of the stop-lever 40 as shown in Fig. 1. The spring-barrel wheel 27 drives the moderating-gear m , provided with an escapement l , and is also engaged by the pinion 28 which is in gear with the segmental-wheel 29 that moves the hour-rack 30 and its sector 35 back, whereby the rack-teeth engage the hour-hammer-tooth 50 pivoted below the other hammer tooth 54 and shown separately in Fig. 3, which comes in contact with the pin 52 attached to the hour-hammer 51, and actuates the same, and the hammer is forced by its spring 53 against the gong-spring G shown in Figs. 1 and 1^a. After the hours are struck a pin o attached to the segmental-wheel 29 comes in contact with the edge of the striking-rack 31 and turns the same back whereby the rack-teeth engage the upper hammer-tooth 54 that operates the minute hammer 57 in the following manner: The hammer 57 is provided with a staff 56 which is pivoted between the watch plates A and A' and which has one end (which is preferably squared), projecting through the plate A upon which is pivoted a finger or crank 55 which is engaged by the said hammer tooth 54 and communicates its motion to the said hammer 57 as shown in Figs. 1, 1^a, and swings said hammer which is engaged by its spring 58 bearing against a pin 59 provided for it and forced against the gong-spring G' as shown in Fig. 1. After the striking has taken place the incut 38 of the minute-rack 31 comes in contact with the stop-lever 40, which is caused by its spring s to turn into the same and its projection 41 is set thereby out of the way of the stud or guide-device 34 of wheel 25, which can now be moved again by turning the winding-pinion 1 as before described.

Fig. 2 shows the position of the mechanism after the striking has been finished and the pin o attached to the segmental-wheel 29, projecting from its under side bears against the end of a slot a , provided for it in the watch-plate or bridge A , thereby stopping the motion of the racks and the moderating-gear. The springs 60 for returning the hammer-teeth operate as usual.

If desired, quarter and minute-striking devices may be arranged in connection with the hour-rack 30 in which case differently divided striking-racks are employed. The hour rack 30 and segmental-wheel 29 can also be formed as one wheel, instead of being separate wheels.

From the foregoing description it will be understood that the arbor-wheel 25 has to be turned once around, whereby the motor-spring is retracted, the repeating mechanism released and the further winding is stopped, until the repeating mechanism has finished striking the time and is then ready for another operation.

In Fig. 6 is shown the releasing-lever 32 modified and provided with a stop attachment

61 for the escapement l of the moderating-gear, and consisting of a short piece of spring-wire or a pin fastened to the lever 32 and projecting downwardly through the opening of the watch-bridge A , so that the same comes in contact with the escapement and checks the moderating-gear when the racks are to be released by disconnecting the pinion 28 from the spring-barrel wheel 27 in case the arbor-wheel 25 should not be turned fast enough and thereby the lever 32 should be delayed in dropping off the stud or guide-device 34. The said stud 34 is also shown half round, so that the said lever can be released more quickly. Instead of one stud or guide-device 34, two or more can be placed on the gearing, if desired, to start the striking mechanism as it depends entirely on the revolution of the spring-barrel or part thereof and the distance it has to travel, to return the striking-racks to their normal position.

The arbor-wheel is also shown without the use of the stop-lever 40 for the purpose as before described to stop the wheel from further turning, when the racks are being released. The main object of the said stop-lever is to prevent an over-winding of the motor-spring, while the repeating mechanism is in the position for action.

In order that the hands of the watch may be set either forward or backward by the winding-pinion 1 without interfering with the turning of the same, the connections for transmitting motion through the special gearing to the repeater-motor can be broken or disconnected in the following manner: In Figs. 5 and 5^a a round arbor 24 is attached to the wheel 23, which passes loosely through the wheel 20 and bridge C and projects through the same, so that the said arbor can be engaged by the free end of a wedge F which acts upon the rounded or beveled end of the arbor 24, so that its wheel 23 with the ratchet-teeth 22 can be disconnected from the ratchet-teeth 21 of wheel 20. A suitable spring b presses by its free end on the top or center-head of the wheel 23 to keep its ratchet-teeth in engagement with the ratchet-teeth of wheel 20, when the wedge F is not brought in contact with the arbor 24 as shown in Fig. 5.

In pendant-set watches the operation is illustrated in Figs. 1^b, 1^c and 5^a. In the pendant of a watch-case is placed a case-sleeve carrying the stem-springs d^2 which catch the stem in the annular grooves d^3 and d^4 formed in the stem-arbor D . In Fig. 1^c the stem-arbor is pressed inwardly or the stem-springs catch in the groove d^3 , which is known as the winding-position and when the said stem-arbor is drawn out a short distance until the stem-springs catch the groove d^4 , it is known to be in the hand-setting position. When the stem D is applied to the winding-pinion 1 as shown in Fig. 1^b, and pressed inwardly, the sliding or push-pin d^5 , the end whereof within the winding-pinion bears against the end of the stem, is forced against the end f' of the wedge

F and presses the same out of connection with the arbor 24, which is pressed down by its spring b , whereby the wheel 23 with its ratchet-teeth 22 will be connected with the ratchet-teeth 21 of wheel 20 and the gearing for transmitting motion to the repeater-motor is connected with the winding-pinion 1 as shown in Fig. 5. But when the stem is drawn out, the wedge F follows the motion of the same and being released, its beveled edge or incline f^2 engages and swings under the rounded end of the arbor 24, which is thereby raised upon the top or face of the said wedge F, whereby the wheel 23 with its ratchet-teeth 22 will be disconnected from the ratchet-teeth 21 of wheel 20 as shown in Fig. 5^a. The connection between the winding-pinion 1 and the repeater-motor now being broken, the turning of the winding-pinion in connection with the hand-setting gearing can be done in either direction, as the repeater cannot be operated, while the hands are set. The wedge may be provided with a slot or fork and connected thereby with a push-pin or stem-arbor or the push-pin or stem-arbor may be provided with an annular groove having shoulders which act upon the lever to give it a swinging movement from and to the arbor 24.

In lever-set watches the operation is illustrated in Figs. 4 and 5 in connection with the wedge F that is movable laterally to press the arbor up to disconnect the winding-pinion from the repeater motor. The said wedge being modified carries a pin f^3 projecting downwardly and through an opening or slot f^4 provided for it in the watch-plate A', the said pin bears against the edge e' of the setting-piece e^4 which is placed on the under or opposite side of the said watch-plate where it is in connection with the yoke-lever E, provided with a pin e^5 which turns the said setting piece e^4 , whereby its edge e' bearing against a pin or projection y' of the yoke Y turns the same, so that its wheel 3 will be disconnected from the barrel-arbor wheel 4 of the time mechanism when the yoke-lever E is being drawn out in the direction of the arrow to its hand-setting position, in the usual manner.

The above described yoke-setting mechanism is of well known construction and is fully described and shown in my application Serial No. 346,781 now pending, and is also shown in Fig. 1 of the present application in dotted lines, (the watch being reversed) in connection with my novel wedge F for operating the arbor 24 of wheel 23. The wedge F by its pin f^3 being in connection with the said setting-piece e^4 will be moved or swung to the position shown by dotted lines, when the yoke-lever E is drawn out, whereby the inclined or beveled edge f^2 of the said wedge F engages and moves under the rounded end of the arbor 24 which is raised and shifted thereby until the same rests upon the top or face side of the said wedge F, whereby as before stated the wheel 23 on the said arbor with its ratchet-teeth 22 is disconnected from the ratchet-teeth 21 of

wheel 20 and the connection between the winding-pinion 1 and the repeater-motor is broken, so that the said winding-pinion and stem-driven train are only in gear with the dial-wheels as usual for setting the hands.

Instead of a wedge F as before described, used for disconnecting the special gearing between the winding-pinion and the repeater-motor, when the stem-driven train is brought to the hand-setting position, a similar wedge J, shown in Fig. 1^a may be used in connection with a longitudinally-movable stem D and arranged in the pendant d' of a watch-case as described and shown in Fig. 1^c. The wedge J is set by the push-pin d^5 through the inwardly pressed stem D in contact with the beveled end of the arbor 24 so that its beveled edge j' is fully swung under the said arbor, whereby the wheel 23 attached thereto with its ratchet-teeth 22 is disconnected from the ratchet-teeth 21 of wheel 20 and the stem by this arrangement can be turned to the left or reverse from that of winding the watch as usual, as the special gearing is placed entirely out of action, and also by this arrangement the wedge J does not require a connection with the setting mechanism of the yoke-lever as before described. The gearing of the repeater-motor is brought in action only when the said stem-arbor is so drawn out that the stem-springs catch the groove d^4 , whereby the said wedge J follows the motion of the stem and releases the arbor 24 of wheel 23, which by its spring b (shown in Fig. 5) is pressed down and its ratchet-teeth 22 are brought in engagement with the ratchet-teeth 21 of wheel 20 and the gearing for transmitting the motion to the repeater-motor is connected with the winding-pinion.

In place of the ratchet-teeth arranged on wheel 20, the hole of the same may be made square and the wheel 23 provided with a square arbor, which is shifted into the wheel 20, and its beveled end can be engaged by the said wedge J and act thereon so that when the said wedge is set by the push-pin and inwardly-pressed stem under the said beveled arbor, the same is shifted upward and the wheel 23 brought out of gear with the arbor-wheel 25.

Fig. 6^a shows the front or exterior side of the plate A' whereon the dial-wheels for setting the minute-hand are placed and is of well known construction. In this figure and in connection with Figs. 6^b and 6 is illustrated the manner of connecting the special gearing for retracting the repeater-motor with the crown-wheel 2, which receives motion from the winding-pinion 1, instead of being connected directly with the said pinion. The said wheel 2 engages a wheel U, provided with a center-hole through which an arbor T is placed, which projects through the watch-plates A' and A. On the arbor T is arranged on one end a flat head t provided with an oblong hole t' , of which one edge on its under side is rounded off or beveled down and the

other under edge of the hole is sharpened and the said head t on the arbor T rests upon the wheel U in such a manner, that the ratchet-tooth u' provided for or attached to the wheel U on its face side is placed into the said hole t' of the head t so that the ratchet-tooth u' engages and bears against the sharp edge and forms a clutch or coupling device, whereby the wheel U can turn the head t on arbor T and thereby the wheel V, placed on a square arranged on the other end of the said arbor and which is in gear with the arbor-wheel 25 retracting the motor-spring of the repeating mechanism. The wheel U can be turned by the wheel 2 in either direction by the winding-pinion 1. The arrangement of the parts is such, that when the winding-pinion is turned to the right, the head t on the arbor T is unlocked or disengaged by the wheel U and the motion of the winding-pinion is transmitted by the wheels 2 and 3 to the wheel 4 which winds the motor-spring of the time mechanism. But by turning the winding-pinion to the left or reverse direction, the motion of the same is transmitted by the wheels 2, and U to the wheel V by its clutch-device u' engaging and locking the clutch-device t' arranged on the arbor T. The free end of a spring t^2 presses upon the said head on the arbor, thereby keeping the locking-device of the same in engagement with the wheel U.

The locking device t' of the arbor T can be disconnected from the ratchet-tooth u' of the wheel U through the mechanism connected with the yoke-lever E. The said yoke-lever is provided with a pin e^3 which comes in contact with the setting-piece e^4 provided with an arm e' which engages the projection y' of the yoke Y and turns the same in the usual manner, when the yoke-lever E is drawn out to its setting position.

The setting-piece e^4 is provided with a beveled stud e^5 , which operates a spring-bar t^3 for shifting the clutch or locking device t' of the arbor T from the ratchet-tooth u' of the wheel U in the following manner: The spring-bar t^3 is provided with a hole t' and a groove t^5 and through the said hole the arbor T is placed so that its head t , provided with a collar t^5 rests in the groove t^5 of the spring-bar t^3 , and the arbor T is shifted when the beveled stud e^5 of the setting-piece e^4 is turned under the free end of the said spring-bar, whereby the same is pressed or bent upward, and its groove t^5 lifts thereby the head t on the arbor T away from the ratchet-tooth u' of wheel U. The said beveled stud e^5 on the setting-piece e^4 is turned under the said spring-bar, when the yoke-lever E is drawn out to its setting position, as shown in Fig. 6^b. By pushing the yoke-lever back to its initial position, the setting-piece e^4 is turned by its spring τ , so that its beveled stud e^5 is pressed away from under the spring-bar t^3 , which being released therefrom snaps down and the spring t^2 pressing on the head on arbor T with its clutch-

device t' is brought in connection again with the ratchet-tooth u' of wheel U as shown in Fig. 6^a whereby the motion of the winding-pinion is transmitted to the gearing of the repeater-motor.

The wheel U and arbor T with spring bar t^3 operated by the setting piece e^4 in connection with the yoke lever E and the yoke-shifting mechanism for setting the hands are not claimed in this application.

The hammers for striking the time are arranged between the watch-plates A' and A, and shown in Fig. 1^a. The shorter hammer 51 is pivoted to the watch-plate A by a hollow screw-stud k provided with a head and held thereby in place. Through the said hollow screw-stud extends the arbor or staff 56 of the hammer 57, firmly attached thereto and provided on its outer end with a square, upon which the finger or crank 55 is placed, which communicates the motion of hammer-tooth 54 to the hammer. The arm of the said hammer 57 is reduced in thickness so as to form a recess for the shorter hammer 51, so as to allow both hammers to be pivoted on the same center one above the other, and to occupy the same space between the plates.

I do not claim broadly the winding pinion in gear with the crown-wheel and the winding parts for retracting the repeater motor, as these parts are not connected directly with the winding pinion as in my application Serial No. 346,780—my present invention being limited to connecting those parts with a wheel for retracting the repeater motor as shown and described herein without giving a backward motion to the wheel V and arbor T.

I claim—

1. In a repeating watch, a device for releasing one or more racks or ratchets so that they can be set to a striking position, a gear-wheel forming part of the winding mechanism provided with a projection or guide-device for actuating the said device to release one or more racks, a winding-pinion and suitable gearing for operating the said gear-wheel, substantially as specified.

2. The combination of a winding-pinion, suitable gearing connected therewith for operating a gear-wheel, a gear-wheel forming part of the winding mechanism provided with a stud or guide-device, a spring-controlled releasing-lever for releasing the ratchets that operate the striking devices and the said lever engaged by the said stud of the gear-wheel for releasing the said ratchets, substantially as specified.

3. The combination of a winding-pinion, suitable gearing for transmitting the motion of the said pinion to a repeater motor-spring for retracting the same, a gear-wheel forming part of the transmitting gearing for retracting the motor spring provided with one or more projections or guide-devices for operating a releasing device for releasing the racks to a striking position, substantially as specified.

4. The combination of a device for releasing the racks or ratchets to a striking position, a gear-wheel provided with a device or devices for disengaging the said releasing lever, a winding-pinion and suitable gearing for operating the said gear-wheel and a spring-actuated click engaging the said wheel for holding it in place, substantially as specified.

5. The combination of a device for releasing the racks to a striking position, a gear-wheel provided with a projection or guide-device for operating the said releasing-device, the said gear-wheel suitably connected with a motor-spring to retract the same, a winding-pinion and suitable gearing for operating the said gear-wheel and a spring-actuated click for holding the said gear-wheel, substantially as specified.

6. The combination of a gear-wheel provided with a projection or guide-device, a releasing-device for releasing the racks to a striking position and operated by the said projection of the gear-wheel, and a device for stopping the motion of the said gear-wheel when the same has operated the releasing-device for the racks, substantially as specified.

7. The combination of a winding-pinion, suitable gearing connected therewith for operating a gear-wheel to retract a motor-spring of a repeating mechanism, the said gear-wheel provided with a projection or guide-device, a releasing-device for releasing the racks to a striking position and operated by the said projection of the gear-wheel, a device for stopping the motion of the said gear-wheel, when the same has operated the releasing-device for the racks, a motor-spring for returning the racks to their normal position and a device for setting the stop-mechanism away from the projection of the said gear-wheel, substantially as specified.

8. The combination of a winding-pinion, a gear-wheel provided with a projection or suitable guide-device, suitable gearing that connects the winding-pinion with the said gear-wheel for operating the same, a device for releasing one or more racks to a striking position, the said releasing-device operated by the projection of the said gear-wheel, a stop-lever for stopping the motion of the said gear-wheel and operated by one rack, when the same is being released, a motor-spring for returning the rack to the normal position, and the said stop-lever automatically moved out of the way and from the projection of the said gear-wheel, substantially as specified.

9. The combination of a pivoted rack provided with gearing, a shifting pinion that is engaged thereby and operated by a releasing-lever, the said lever adapted to move the pinion in and out of gear with a toothed spring-barrel, a gear-wheel provided with a projection or guide-device for operating the said releasing-lever to disconnect the pinion from the spring-barrel, thereby releasing the rack to a striking position and connecting the said

pinion with the spring-barrel when the releasing-lever has been operated by the said gear-wheel, and the said spring-barrel actuated by a motor-spring for turning the pinion and returning the rack to the normal position, substantially as specified.

10. The combination of a device for releasing the racks to a striking position, a stop-piece arranged on the releasing-device for checking the escapement of the moderating-gear, a gear-wheel provided with a suitable projection for operating the said releasing-device, the said gear-wheel suitably connected with a motor-spring to retract the same, a winding-pinion and suitable gearing for operating the said gear-wheel, that comes in contact with the said releasing-device and which checks the moderating-gear during the time it is engaged by the projection of the said gear-wheel, substantially as specified.

11. The combination of a spring-barrel 27, pinion 28 on a releasing-lever 32 provided with a stop-attachment 61 for the escapement 7, moderating-gear *m*, gear-wheel 25 with stud 34 and the gearing between the said wheel and winding-pinion 1, substantially as specified.

12. A repeating-watch, provided with pivoted striking-racks operating the striking devices for the hour and its divisions, a motor-spring for the same, suitable gearing connected therewith and with the winding-pinion for retracting the said motor-spring, a spring-controlled device and a pinion mounted on the same for releasing the racks, the said device operated by the winding-gear that retracts the motor-spring when the same has been sufficiently retracted thereby, to return the striking-racks to their normal position, substantially as specified.

13. The combination in a repeating watch having separately-operated racks for operating the striking devices for the hour and its divisions, a toothed sector provided with an hour or snail-piece approximately in line with the circle of its gearing, an hour-rack provided with suitable gearing, said gearing arranged thereto approximately in line with the circle of its rack-teeth and the said sector engaged thereby, substantially as specified.

14. The combination of a pivoted hour-striking rack and suitable gearing connected therewith, said gearing arranged approximately in line with the circle of the rack-teeth and engaged by a toothed sector, provided with a snail-piece projecting on the said sector approximately in line with the circle of its teeth and a spring for setting the said sector against the hour-snail, substantially as specified.

15. In a watch or other time-piece, the combination of a single winding-pinion operated by a stem without intermediate gearing, separate motor-springs for operating a repeating mechanism and a time mechanism, the said motor-springs retracted by the said pinion, gearing for transmitting the motion of the said pinion to a time-motor and gearing for

transmitting the motion of the said pinion to a repeater-motor, and in direct communication with said winding pinion substantially as specified.

16. In a watch or other time-piece, the combination of two motor-springs, one for operating a time mechanism and the other one for operating a repeating mechanism, gearing for retracting the said time motor-spring connected with a single winding-pinion and gearing for retracting the said repeater motor-spring connected with the same pinion, the said winding-pinion operated by a stem without intermediate gearing, substantially as specified.

17. In a watch or other time-piece, the combination of a single winding-pinion connected with and operated by a stem without intermediate gearing, a motor-spring of a repeating mechanism and gearing interposed between the said pinion and the repeater-motor for retracting the same, a motor-spring of the time mechanism and gearing interposed between the said pinion and the time-motor for retracting the same, substantially as specified.

18. The combination of a stem connected with a single winding-pinion without intermediate gearing and operating the same for retracting separate motor-springs, suitable gearing for transmitting the motion of the said pinion to a time-motor, and suitable gearing for transmitting the motion of the said pinion to a repeater-motor, substantially as specified.

19. The combination of a single winding-pinion in gear with two gear-wheels, one wheel for transmitting the motion of the said pinion to a time-motor and the other wheel for transmitting the motion of the said pinion to a repeater-motor, substantially as specified.

20. In a repeating watch the combination of a winding pinion in engagement with a gear wheel 2 forming part of the time-motor-winding-mechanism with a gear wheel 20 forming part of the repeater winding mechanism, substantially as specified.

21. The combination with a winding-pinion, a gear-wheel engaged thereby, an arbor adapted to be engaged by the said gear-wheel and provided with a gear-wheel for transmitting the motion of the said pinion to a repeater-motor, substantially as specified.

22. The combination with a winding-pinion, of an arbor and two wheels applied thereto, one of the said wheels in gear with the winding pinion and the other wheel arranged to be connected with and disconnected from the said gear-wheel by the said arbor, moving longitudinally through the center-hole of the one wheel, substantially as specified.

23. In a repeating watch the combination of a winding-pinion, a gear-wheel forming part of a repeater winding mechanism engaged by the said pinion, an arbor and a wheel attached thereto, the said parts provided with a coupling-device and a spring for keeping the

said wheels coupled together, substantially as specified.

24. The combination of a winding-pinion, a gear-wheel engaged by the said pinion, an arbor and wheel attached thereto, a motor-winding wheel engaged by the said wheel, and means for breaking the connection between the said motor-actuating wheel and the said gear-wheel that is engaged by the winding-pinion, substantially as specified.

25. The combination of a winding-pinion, a gear-wheel engaged thereby, an arbor and a wheel attached thereto, the said parts provided with a coupling-device, a spring for keeping the said gear-wheels coupled together and a spring-actuated wedge for breaking the connection between the said wheels by engaging the said arbor, substantially as specified.

26. The combination of a winding-pinion and suitable gearing connected therewith for retracting a motor-spring of a repeating mechanism, a wedge for breaking the connection between the said pinion and the repeater-motor, a stem for operating the said wedge, when the said stem is moved longitudinally, substantially as specified.

27. The combination of a longitudinally-movable stem for operating a winding and setting mechanism of a watch, of suitable gearing for operating a repeating mechanism by turning the said stem, a wedge for disengaging the said gearing from the winding mechanism and operated by the said stem, when the same is moved longitudinally, substantially as specified.

28. The combination of a longitudinally-movable stem for operating a winding and setting mechanism of a watch, of suitable gearing for operating a repeating mechanism by means of the said stem, a spring-actuated wedge for disengaging the said gearing from the winding mechanism and the said spring-actuated wedge having no connection with the winding stem but adapted to automatically follow the longitudinal motion of the said stem, when the same is drawn out, substantially as specified.

29. The combination of a longitudinally-movable stem, a winding-pinion, a push-piece in engagement with a wedge for breaking the connection between the winding pinion and a repeater-motor, substantially as specified.

30. The combination of a yoke-lever setting mechanism of a watch, a wedge F, having a pin f^3 , whereby it is engaged with the said mechanism and operated thereby to disengage the actuating gearing of a repeater-motor from the stem-winding mechanism, when the said yoke-lever is being adjusted to its hand-setting position, substantially as specified.

31. The combination of two hammers, pivoted on the same center one above the other, of hammer-teeth for actuating the hammers, and pivoted ratchets or racks engaging and

operating the said striking devices, substantially as specified.

32. The combination of a winding-pinion, gear-wheel 2, gear-wheel U, arbor T and wheel
5 V engaging a wheel 25 to transmit the motion of the winding-pinion to a repeater motor-spring, the said arbor T arranged through the watch-plates A' and A for connecting the wheels U and V, substantially as specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 20th day of March, 1890.

FRED TERSTEGEN.

Witnesses:

FREDK. HAYNES,
WILTON C. DONN.