

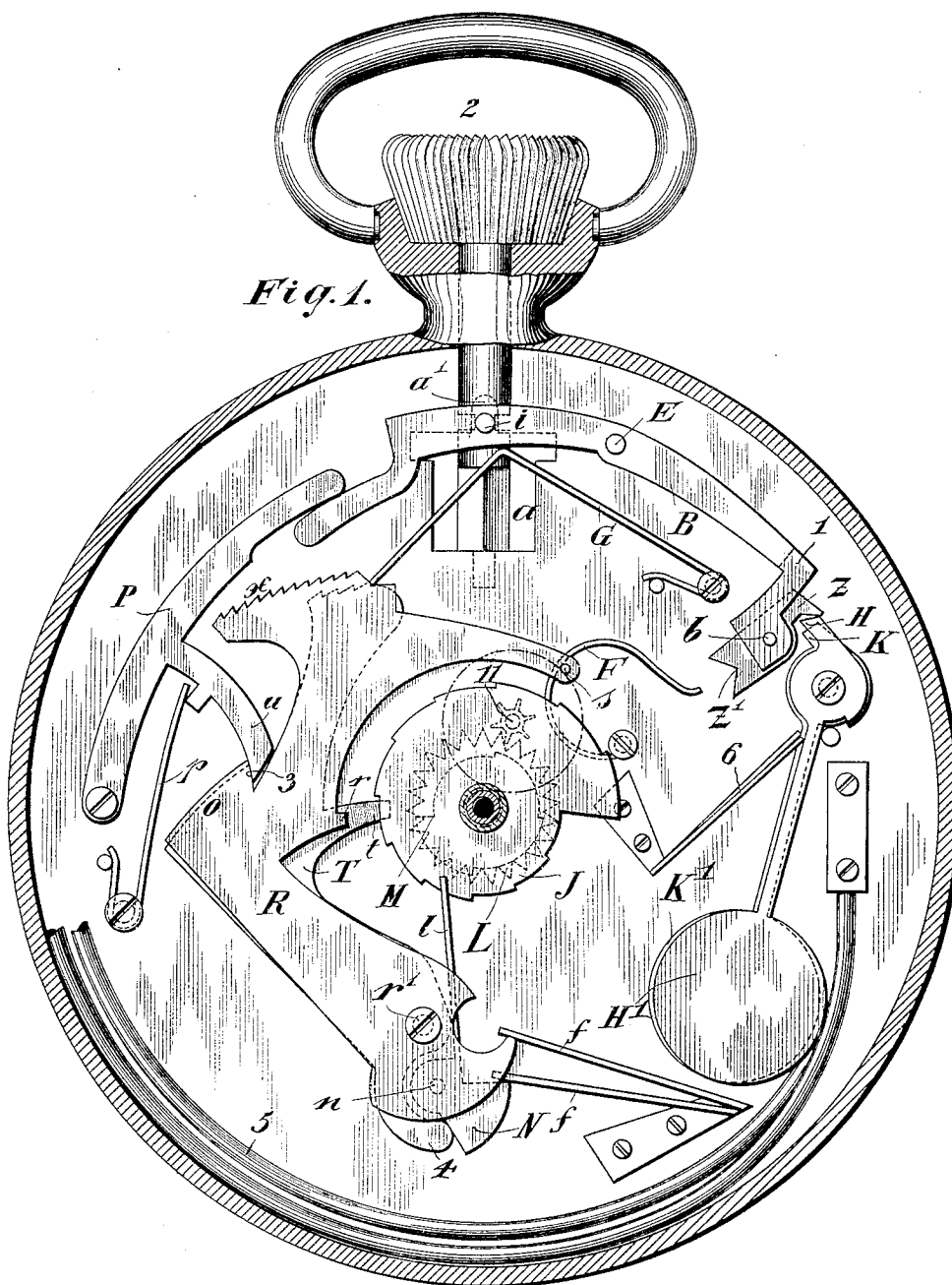
(No Model.)

3 Sheets—Sheet 1.

M. FISCHER.
REPEATING WATCH.

No. 584,681.

Patented June 15, 1897.



Witnesses:

B. S. Oler
M. J. L. Higgins

Inventor.

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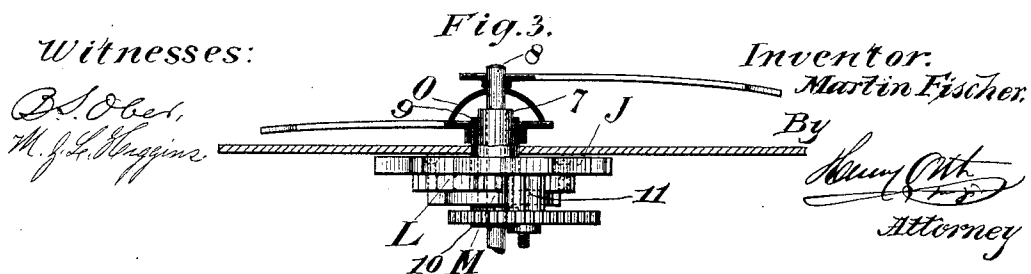
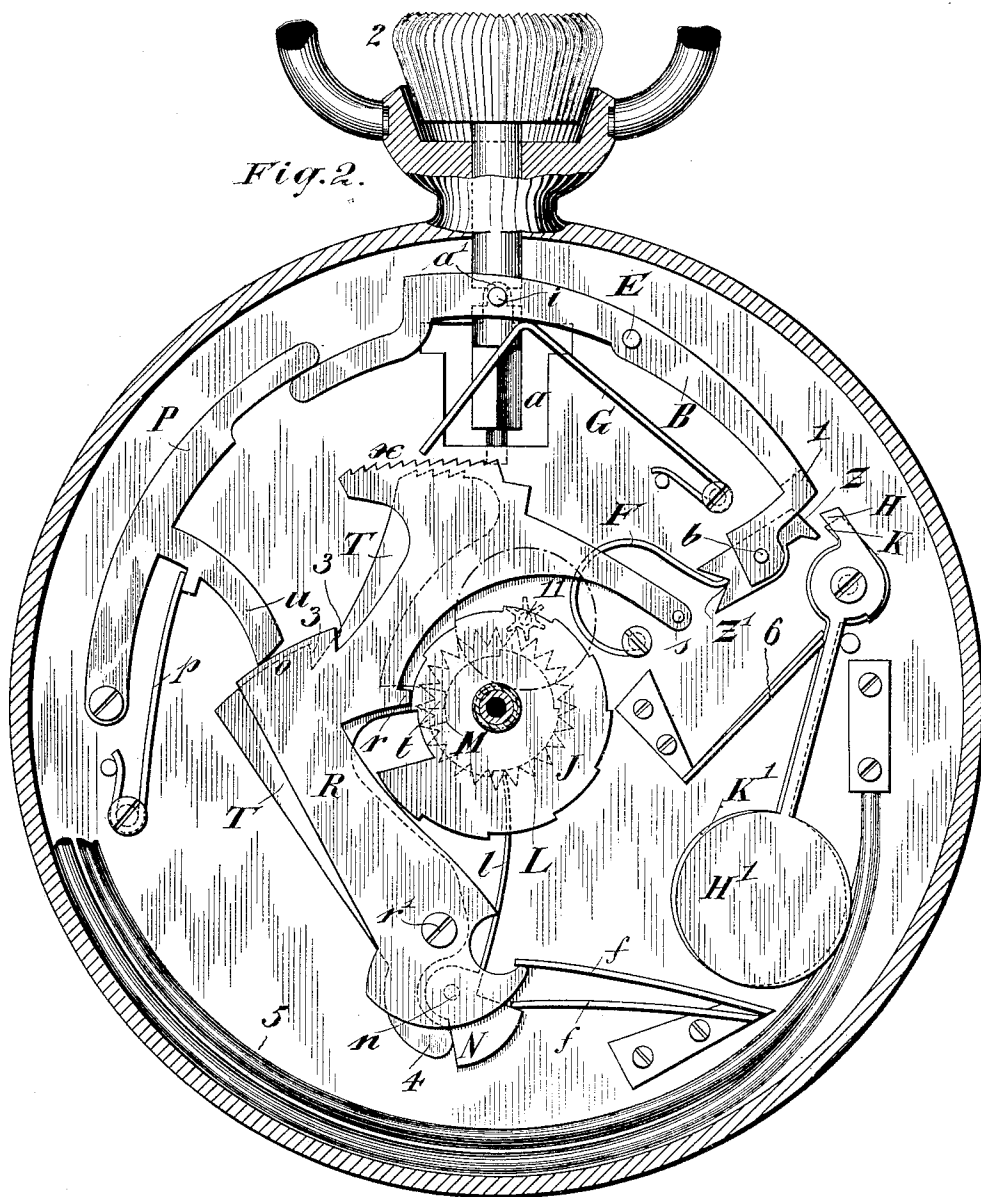
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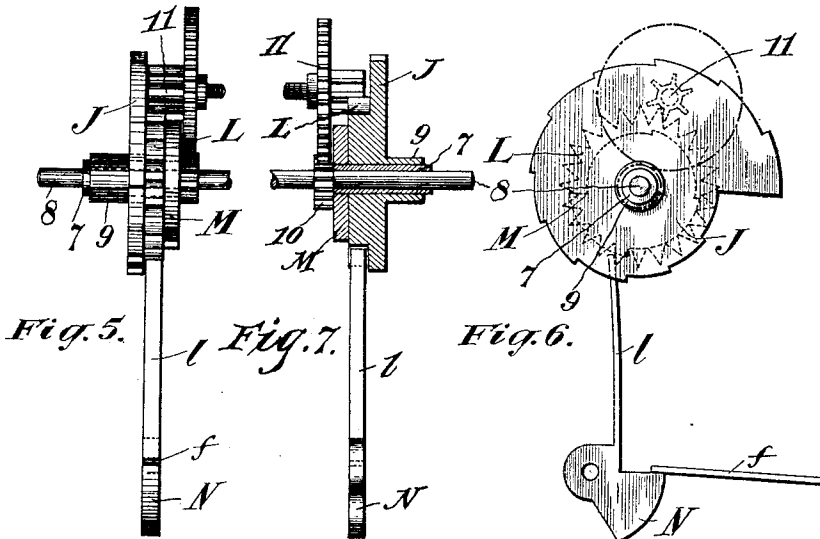
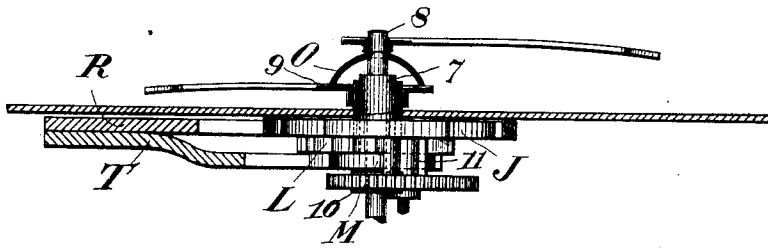
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Fig. 4.



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UNITED STATES PATENT OFFICE.

MARTIN FISCHER, OF ZURICH, SWITZERLAND.

REPEATING WATCH.

SPECIFICATION forming part of Letters Patent No. 584,681, dated June 15, 1897.

Application filed September 4, 1896. Serial No. 604,840. (No model.) Patented in Switzerland March 5, 1895, No. 10,062; in France March 29, 1895, No. 246,216, and in Germany April 7, 1895, No. 84,848.

To all whom it may concern:

Be it known that I, MARTIN FISCHER, a citizen of the Republic of Switzerland, residing at Zurich, in the Republic of Switzerland, have invented certain new and useful Improvements in Repeating Watches, (this invention being already partly patented in Switzerland, No. 10,062, dated March 5, 1895; in Germany, No. 84,848, dated April 7, 1895, and in France, No. 246,216, dated March 29, 1895,) of which the following is a specification.

My invention relates to repeating watches, and has for its object the simplification of the striking mechanism by which all sliding pieces, levers, and other attachments to the case are done away with, the number of the parts greatly reduced, and the necessity of a regulating-train for the racks dispensed with, also to simplify the construction of the surprise, all of which mechanisms I am enabled to operate by the depression of the stem and crown of a stem-winding watch without in the least impairing the operation of these pieces, or, if attached to a key-winding watch, by placing a suitable push-button in a perforation in the case.

My mechanism is compact, requiring no coil-springs in its operation, no so-called "governing mechanism," is easily placed on any movement, while the simplicity of its construction does not require the parts to be so accurately made as those manufactured at present, and it is applicable alike to Swiss or American watches, hand or machine made, requires no special construction of the time mechanism, and, above all, when placed on the rack-plate can be seen and examined, or, if required, removed from the watch without taking the time-movement apart or even taking the movement from the case.

Referring to the drawings illustrating my invention, in which similar reference-symbols refer to like parts, Figure 1 shows the repeating mechanism in normal position, locked—*i. e.*, before set in motion for striking. Fig. 2 shows the same unlocked, the crown pulled out and ready to strike. Figs. 3 and 4 are sections showing snails and star-wheels in elevation. Figs. 5 and 6 show the surprise-operating spring *l*, the star-wheel, and snails in end and side elevation. Fig. 7 shows the snails and star-wheels in section.

The main or hammer lever is in the form

of a yoke and a lever of the first class, having a slot *l* in its right arm, in which is pivoted by means of the pin *b* a trip or pawl *z*, having a triangular notch *z'* in its tail. The left arm of the yoke is simply a bearing for the detent or locking-lever *P*, which is a lever of the second class.

The main lever *B* is fulcrumed at *E* on the end of a screw screwed into the plate from below, and between the fulcrum and its left end carries a pin *i*, that projects through a slot *a'* in the plate (thereby limiting the movement of the lever in one direction) into a groove in the stem, prevents the stem from being withdrawn, and likewise limits the outward movement thereof, at the same time leaving the stem free to turn on its axis. A shoulder on the bottom of the stem, abutting against the lower edge of the hole *a* cut in the plate, limits the inward movement of the crown and stem, and consequently of the lever *B*.

A right-angle motor-spring *G* serves the double function of exerting an outward pressure on the lever *B* with its knee and, when said lever is depressed by pressure on the crown *2* by means of its short leg, of operating the hour and fractional-hour racks directly beneath it.

The racks *R* and *T*, here shown as hour and quarter-hour racks whose serrated faces *a* directly beneath the free end of the operating-spring *G* have a common pivot-screw *v'* below the center of the watch and between the ends, on one side are provided with the usual fingers *r* and *t* for contacting with the snails and on the other side have segmental friction or brake surfaces *o*, whose centers are at *v'* and are of a slightly-different radius. These braking-surfaces *o*, the one on the hour-rack *R* having the greater radius, as this rack is the first to be operated, terminate at the edge of a notch *3 3* for the reception of a detent or locking pawl *u*.

The hour-rack *R* has twelve teeth at *x*, one for each hour, which can be made quite coarse, and is provided with an arm that projects over the center of the watch, that carries a pin *s*, that engages a guiding-spring *F* for guiding the trip *z*, and at its pivoted end has a shoulder against which bears an engaging spring *f* for snapping the racks against the hour-snail.

The quarter-hour rack *T* has four teeth at

x , lies behind the hour-rack, and at its pivoted end is provided with a short circular arm 4, that acts as a cam against a spring-carrier N, pivoted within the arm 4 at n , having a spring extension l for operating the surprise and a shoulder for the reception of a spring f , which spring, through the action of the piece n on the arm 4, serves to snap the quarter-rack against its snail.

The detent or locking lever P is pivoted at one end, and at the other bears on the left arm of the main lever B, and integral therewith is the detent or locking pawl u , whose end acts as a brake upon the surfaces o , as soon as the racks are unlocked, by lifting the pawl u from the notch 3. A spring p , the strongest one in the repeating mechanism, serves to press the pawl u with sufficient force to brake the racks against the surfaces o and snap the same in its notch 3.

The hammers II' and K' have at their ends noses H and K, of unequal length, that are tripped by the nose of the pawl or trip z at each depression of the crown 2 and are made to strike the bells 5, by means of suitable springs 6, after being released from the nose of the pawl z .

The attachment to the snails, so called a "surprise," is compact and strong, and depends for its action on the radial distance between the first and last step on the quarter-hour snail, and causes no loss of power to the time-movement.

The sleeve 7 on the quarter-snail M, which has four steps, fits the minute-shaft 8, and the hour-snail J, having connected to it or not, as desired, the star-wheel L, is provided with a sleeve 9, on which the hour-hand is placed in the usual manner.

The hour-snail, and consequently the hour-hand, are geared to the minute-pinion 10 by the usual reducing-gear. The pinion of wheel 11 meshes with the star-wheel L, the teeth of both of these engaging wheels being very coarse with much free play between them, and instead of driving the hour-wheel L by means of the reducing-pinion I drive it by means of friction between it and the sleeve 7, and, as shown in the drawings, also by the stirrup-spring O, frictionally placed on the shaft 8 between the two hands and attached to the hour-hand, which is attached to the hour-sleeve in the usual way.

The spring l engages the teeth of the star-wheel L, its free end passing close to the quarter-snail, so as not to interfere with the rotation of the latter. It is evident that in place of the stirrup-spring O other simple means for driving the hour-snail may be employed—as, for instance, a spring acting on the star-wheel and thereby moving the hour-snail.

The operation of the mechanism is as follows: The parts being locked or in their normal position, as shown in Fig. 1, and we wish to repeat the time shown by the hands, say 6.45, the crown 2 with its attached stem is

pulled out, (the parts assuming the position shown in Fig. 2,) being limited in its outward movement by the pin i in the notch a' of the plate, which pin connects the stem with the main or hammer lever B, the left end of said lever being lifted while the right end is depressed, the nose of the pawl z swinging back and riding over the nose II of the hammer II', while simultaneously the lever P is lifted against the stress of its spring p , the detent-pawl u withdrawn from the notches 3 of the racks, said racks snapped against their snails under the stress of their springs ff , the spring l brought into engagement with the star-wheel L, and the guide-spring F, being also released, is sprung to the right. The mechanism is now ready to sound the first stroke of the hour, to do which the crown is depressed, and with it the hammer-lever B and its right-angle spring G, the nose of the pawl or trip z strikes the longer nose II of the hour-hammer, trips it, and causes it to strike, while the free end of the spring G engages the teeth x of the hour-rack and moves it back the distance of one tooth. The hour-rack is held in its new position by the friction of the pawl u on its braking-surface o and the crown-stem and hammer-lever B are lifted by the spring G. The said spring G being under tension lifts the crown and its stem to its outer position ready for another depression, when the crown is again depressed for the second hour-stroke, and so on until the hour has been struck, when the hour-rack will have been returned to its normal position, the pawl u falling from the brake-surface of the hour-rack and into its notch 3 and resting on the brake-surface of the quarter-rack, which up to this time has not been moved. The pin s in the arm of the hour-rack has now engaged the guide-spring F and drawn it back somewhat, thus elevating its end. This elevation of the spring F, the end of which engages the triangular notch z' of the trip or pawl z , tends to lower the nose of said pawl, so that it can engage both hammer-noses II and K. The next depression of the crown causes the nose of the pawl z to trip both hammers II' and K' and strike a double-toned quarter-stroke, one of the hammers, K', falling first, on account of its shorter nose K. The quarter-rack T is shoved back the distance of one tooth and held in its new position by the friction of the pawl u on the surface o . Its tail, by engaging the piece N, gradually disengages the surprise mechanism, and the lever B, crown, and stem are again pushed out by the spring G. At the end of the last quarter-stroke the pawl u falls completely into the notches 3, the spring l is disengaged from the star-wheel, and the parts are again in the position shown in Fig. 1—normal.

The surprise, consisting of the star-wheel L and spring l , operates as follows: The quarter-rack T being the first to be disengaged from the pawl u throws the spring-lever l into engagement with the star-wheel L by means of its tail 4 and turns it backward.

If the time is fifty-nine minutes of seven, for instance, then the hour-snail has been for several minutes in a position to cause seven o'clock to be struck, but the spring *l*, turning the star-wheel *L*, which is carried to its position by the friction of the stirrup-spring *O* in the minute-axis, is turned backward, carrying with it the hour-snail *J*, so that the finger *r* of the hour-rack falls on the sixth step of the hour-snail. When the hour is completed, if it is desired to strike the hour, the racks are released, as above described, as the quarter-rack falls on the zero-step of the quarter-snail, (that is held out of range of the end of the spring *G*,) so that as soon as the hour is struck the pawl *u* falls completely into the notches *3*, the spring *l* cannot be made to engage the star-wheel, and the hour-rack falls securely on the step of the new hour—seven o'clock.

Instead of striking only hours and quarter-hours other fractions of an hour may be substituted or added, as desired, the principle of operation remaining the same.

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

1. In a watch repeating mechanism, a stem having a limited back-and-forth motion, in combination with a lever of the first class, a trip or pawl on one arm thereof, hammers capable of being tripped thereby, and a spring-actuated detent-lever engaging the other arm, hour and fractional-hour racks normally held by the detent-lever, a snail for each of said racks a surprise mechanism operated by one of the racks and a spring in contact with one of the arms of said lever of the first class, its free end capable of engaging the serrated face of said racks to return them to their normal position, substantially as described.

2. In a stem-winding watch, a repeating mechanism comprising a crown and stem, a groove in said stem, and a shoulder on the end thereof engaging the edge of a recess in the plate to limit its inward movement, in combination with a lever of the first class, a pin in one arm of said lever projecting into the groove in the stem and limiting the outward movement of both stem and lever by engaging a notch in the upper part of the aforementioned recess, a spring-actuated detent-lever bearing on one end of the lever of the first class, a brake-pawl integral with the detent-lever, hour and fractional-hour racks, snails therefor, and a striking mechanism operated by a pawl on the other end of the lever of the first class, substantially as described.

3. In a repeating watch, a striking mechanism comprising a spring-actuated lever of the first class, a trip or pawl in one arm thereof, a triangular notch in said pawl, in combination with means for causing the depression of one arm of said lever, means for regulating the position of the pawl or trip on its axis, and pivoted hammers having ends of unequal length tripped by said pawl to cause them to strike the bells, substantially as described.

4. In a repeating mechanism for watches, in combination with snails having concentric bearings, racks having a common pivot and of different radii adapted to engage said snails, a brake-surface on said racks terminating in a notch, and a detent-pawl adapted to engage the brake-surfaces and notches successively and hold the racks in normal position after repeating, substantially as described.

5. In a repeating mechanism for watches, a fractional-hour snail carried on the minute-arbor together with the hour-snail and star-wheel; in combination with a pinion on the minute-arbor, a reducing-wheel carrying a small star-pinion in gear with said minute-pinion, said star-pinion limiting the forward-and-backward movement of the star-wheel and hour-snail, substantially as set forth.

6. In a surprise for repeating watches, a star-wheel in combination with a spring thrown into engagement therewith by one of the racks and capable of moving the same backward, means for holding it in engagement with the star-wheel and returning it and the star-wheel to correct position, substantially as described.

7. In a repeating mechanism for watches, a minute-axis, a fractional-hour snail thereon, a star-wheel and sleeve loosely mounted on said snail, an hour-hand mounted on said sleeve, a spring frictionally connecting the hour-hand with the minute-axis whereby the hour mechanism is driven, and a reducing-pinion in engagement with said star-wheel for limiting the velocity of revolution of the hour mechanism, substantially as described.

8. The combination with a repeating mechanism for watches and a locking device for locking such mechanism out of operation; of a crown connected with the locking device and adapted when pulled out to move such device to release the repeating mechanism.

9. In a surprise mechanism, hour and fractional-hour snails frictionally mounted on the minute-arbor, a star-wheel on the hour-snail, means for limiting the movement of the hour-snail and star-wheel, and means operated by the fractional-hour rack to turn the hour-snail in a reverse direction when time is repeated near the end of an hour, substantially as set forth.

In testimony whereof I hereunto sign my name, in the presence of two subscribing witnesses, this 25th day of July, 1896.

MARTIN FISCHER.

Witnesses:

AUGUST FISCHER,
C. FIEDLER.