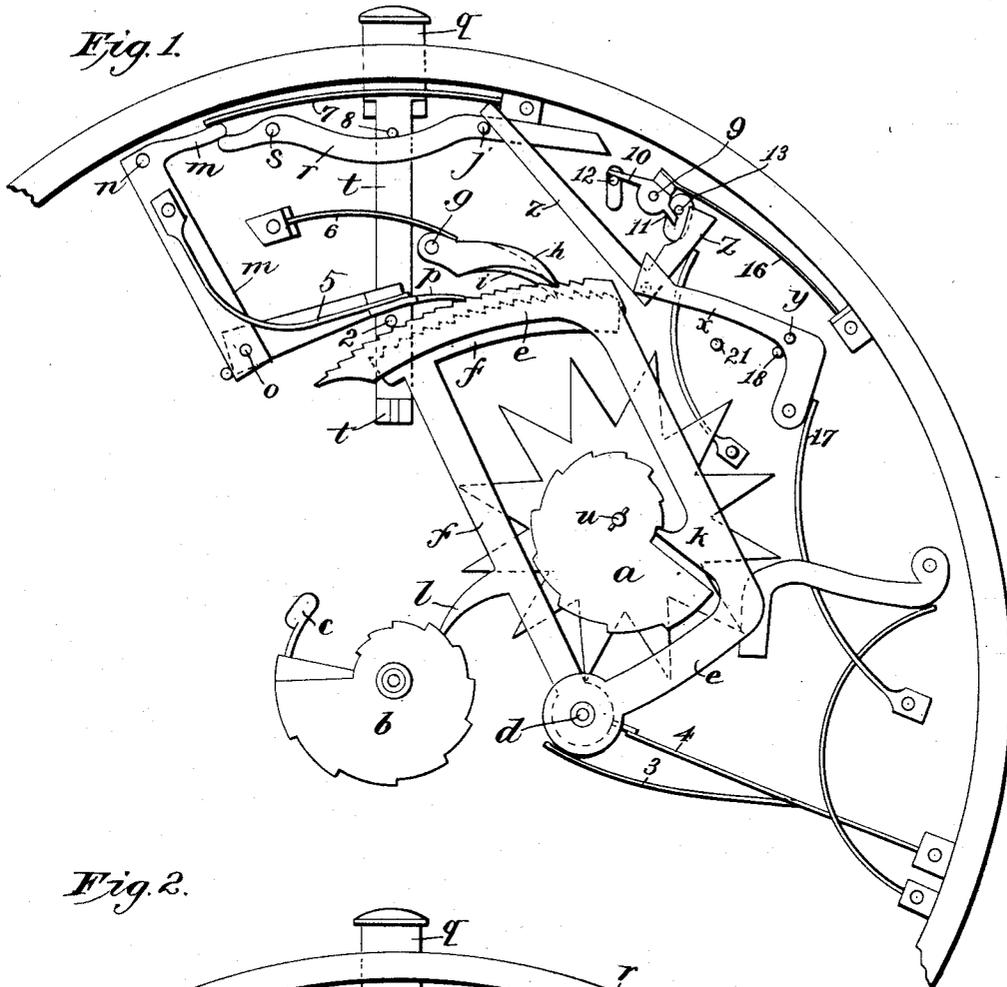


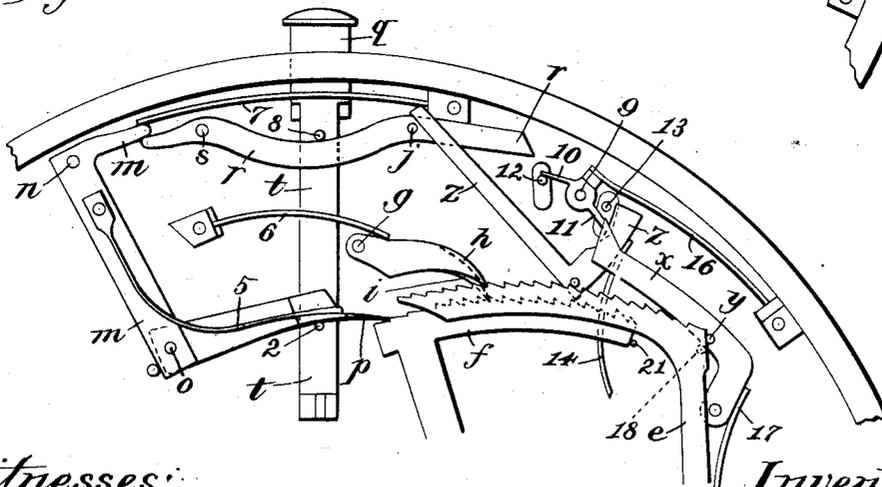
C. RUHNKE.  
REPEATING WATCH.

No. 430,692.

Patented June 24, 1890.



*Fig. 2.*



*Witnesses:*

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*Inventor:*

*Carl Ruhnke  
per Charles Radtzig  
his Atty.*

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Fig. 3.

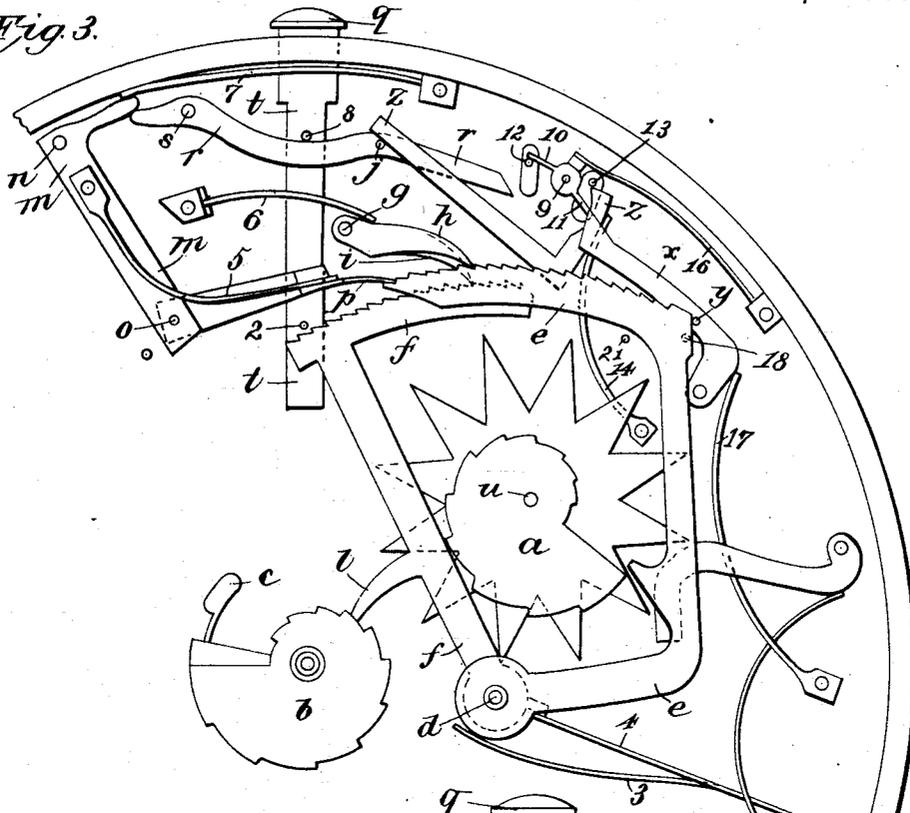


Fig. 4.

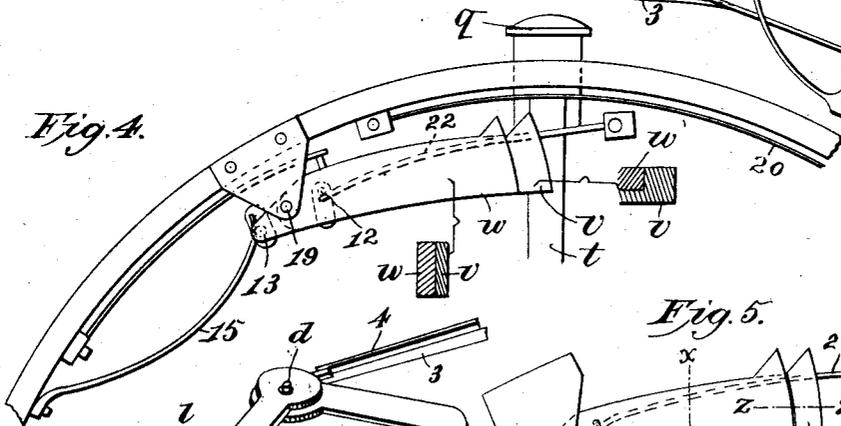


Fig. 5.

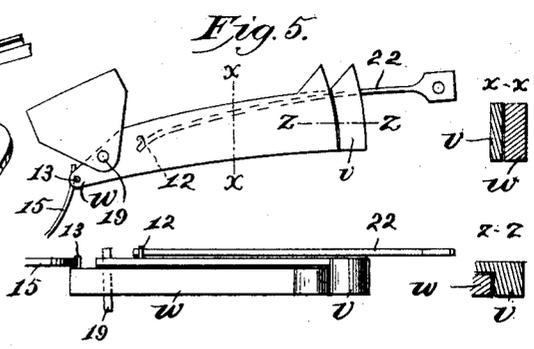
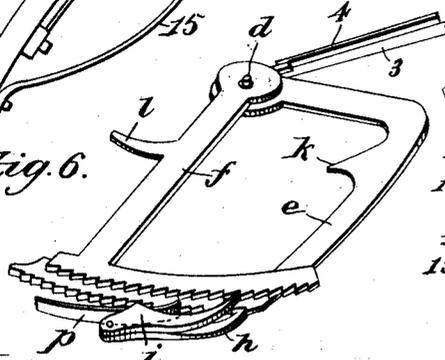


Fig. 6.



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# UNITED STATES PATENT OFFICE.

CARL RUHNKE, OF BERLIN, GERMANY.

## REPEATING-WATCH.

**SPECIFICATION** forming part of Letters Patent No. 430,692, dated June 24, 1890.

Application filed March 20, 1889. Serial No. 304,084. (No model.) Patented in Germany July 31, 1888, No. 46,503; in England January 9, 1889, No. 424; and in Switzerland January 21, 1889, No. 446.

### *To all whom it may concern:*

Be it known that I, CARL RUHNKE, a subject of the King of Prussia and German Emperor, and a resident of the city of Berlin, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Repeating Mechanism for Time-Keepers, (for which invention I obtained Letters Patent in the German Empire, No. 46,503, dated July 31, 1888; in the Kingdom of Great Britain, provisional protection No. 424, dated January 9, 1889, and in Switzerland, No. 446, dated January 21, 1889,) of which the following is a specification.

The main feature of this invention consists therein that the repeating mechanism of a time-keeper is not released by its movement, and when it is released by hand does not strike the time automatically by hours, half-hours, or quarter-hours, but that it requires a depression by hand of a knob or button protruding from the casing for each stroke of a bell-hammer, so that the strokes can follow each other at intervals, as desired, and may then be counted with greater certainty.

In the accompanying drawings, Figure 1 is a plan view of the repeating mechanism of a time-piece, shown at a position corresponding to the time of thirty-five minutes after twelve o'clock when set, ready to commence the counting operation. Fig. 2 is a plan view of the repeating mechanism after it has finished its strokes at thirty-five minutes past twelve o'clock. Fig. 3 is a plan view of the repeating mechanism after finishing the twelve-hour strokes and about ready to give a signal-stroke indicating that the one-twelfth of an hour or five-minute strokes will follow. Fig. 4 is a rear view showing the two signal-hammers. Fig. 5 is a detail view of the hammers. Fig. 6 is a perspective view of the levers *e* and *f* and some of the surrounding parts.

Upon a pin *u*, secured in the frame of the time-piece, is mounted the well-known twelve-pointed star, and also the snail-cam *a* for striking the hours.

Another snail-cam *b* is mounted upon the minute-arbor and serves to divide the hour into parts of five minutes each, and also to effect in the well-known manner the hourly movement of the cam *a* with the aid of a

projection *c*, which is loosely mounted upon cam *b*.

Upon another pin *d*, secured to the bed-plate, are rotatably mounted two levers *e* and *f*, the outer extremities of which have toothed segments carrying the teeth or racks for striking the hours and minutes. One of these levers is projecting above the other, as shown in the drawings. Both levers *e* and *f* are provided with arms *k* and *l*, respectively, in such a manner that these, when the mechanism is released by hand, engage with the snail-cams *a* and *b*, respectively, as soon as their upper arms, which form the striking-racks, are released by the raising of the pawls *h* and *i*, which hold them against the stationary pin *g*. In order to return these two racks tooth by tooth for each stroke, I provide a bell-crank lever *m*, oscillating upon the pin *n* and having a pawl *p* hinged to its lower arm at *o*, which will move one rack or the other for one tooth of a rack each time the knob *q* is pressed—first the upper rack for striking the hours and then the lower rack for striking the minutes. The upper arm of the lever *m* engages with the lever *r*, which is fulcrumed at *s* and carries a pin *j*, and is also connected with the sliding stem *t* in such a manner that in depressing the stem *t* the lever *r* will bring into action two striking-hammers at one side and at the other side will move the pawl *p* on the bell-crank lever *m* for a distance equal to the length of one tooth on either of the racks. The sliding stem *t* is guided laterally, and at its upper end is provided with a knob *q*, projecting beyond the case of the watch. This stem *t* may in keyless watches be replaced by the shaft with the winding-knob.

A lever *x*, carrying a pin *y*, is arranged in such a manner that the upper arm of the striking-rack lever *e* engages with the pin *y* after the hour has been struck, and thereby raises the signal-hammer *w*, in which raised position it is kept by one end of bell-crank lever *z*, sliding under the pin *l* in hammer *w* when the knob *q* is depressed—a position shown in Fig. 3 of the drawings.

On relieving the hand-pressure on knob *q* the different springs will cause the lever *z* to return to its normal position, thus releasing

the support of pin 13, when the spring 15 will cause the hammer *w* to sound the signal which indicates that the striking of the minutes is to begin. This signal-stroke is not counted with the striking of the time, and will occur at the same moment when the pawl *p* drops from the hour-rack upon the minute-rack, as can be seen by observing the position shown in Fig. 3, which illustrates the position of the principal parts at the moment preceding this sounding of the signal-stroke. This sounding will take place as soon as the pressure of the finger upon the knob is released, when the spring 7 will cause the dropping of the hammer *w* and that of the pawl *p* to take place simultaneously. The hammer *w* is resting in a recess of hammer *v* at the reverse side of the top plate of the movement, as shown in Fig. 4, to economize space.

In order to accomplish the required motions, I employ a number of levers, pins, and springs, of which springs 3 and 4 serve, on the release of the mechanism, to press the projections *k* and *l* of the levers *e* and *f* upon the respective steps of the cams *a* and *b*, while a spring 5, secured to the lever *m*, presses the pawl *p* into the teeth of the racks on levers *e* and *f*. Two springs 6 hold detent-pawls *h* and *i* into corresponding racks, while the action of the spring 7 upon the upper short arm of the bell-crank lever *m* causes the return of the pawl *p*. A pin 8, projecting from sliding stem *t*, engages with the longer arm of lever *r*. Mounted upon a rocking arbor 9, secured in the bed-plate, are the arms 10 and 11, in such a manner that the arm 10 engages with one end of lever *r*, and at the same time with a pin 12, projecting from the hammer *v* through a hole in the top plate of the watch-movement, and on its depression will place the spring 22 in tension and cause a powerful blow of the hammer as soon as the arm 10 is tripped. As soon as the hour has been struck the lever *e* will press against pin *y*, raise the lever *x*, and thereby hammer *w*, by acting upon pin 13, and place the spring 15 in tension, while the spring 14 will press the short arm of bell-crank lever *Z* under pin 13, holding the hammer *w* in a raised position till on the return of the sliding stem *t* the spring 7 will trip the signal-hammer *w* with the aid of pin *j* in lever *r*, and the signal will be sounded, indicating the beginning of the five-minute strokes. Spring 16 serves to return the arms 10 and 11 to their normal position, and spring 17 holds lever *x* against pin 18 on the release of the levers *e* and *f* by raising the pawls *p*, *h*, and *i*. The two hammers *v* and *w*, Fig. 4, are mounted upon a stationary pin 19 and strike upon the sounding-tongues 20. The stop-pin 21 terminates the movement of lever *f*, and thereby the

downward movement of sliding stem *t*, the latter being locked by means of the rack on lever *f*, pawl *p*, and the levers *m* and *r*.

The operation of the repeating mechanism is now as follows: To learn the time at a certain moment—for instance, at thirty-five minutes past twelve, Fig. 1—a person raises sliding stem *t* by pulling its head or knob *q* outward. By this operation the pin 2 will raise the pawl *p*, and thereby the pawls *h* and *i*, when the springs 3 and 4 will oscillate the levers *e* and *f* till their arms *k* and *l* respectively touch the steps on cams *a* and *b*, which correspond to the given time. The mechanism is now set to time, and each depression of the knob *q* will sound an hour. In this case twelve strokes will follow, whereupon the hammer *w* will sound the signal for the commencing of the five-minute strokes, of which seven more strokes will follow till the mechanism comes to a stop.

Although two hammers are used in this repeater, I at times find it convenient to employ one hammer only, and in this case designate the end of the hour-strokes by a silent stroke by using materially the same mechanism as herein shown and described.

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

1. In a repeating mechanism for time-keepers, the combination of the cams *a* and *b* with the rack-levers *e* and *f*, the springs 3 and 4, the pawls *i* and *h*, spring 6, bell-crank lever *m*, carrying the pawl *n* and spring 5, the spring 7, stop-pin 21, and the striking mechanism, as and for the purposes herein shown and described.

2. The signal-hammer *w*, having the pin 13, in combination with the sounding-hammer *v* and the sounding-tongues 20, the lever *x*, having the pin *y*, the lever *z*, the spring 14, the lever *e*, cam *a*, and arm 11, as and for the purposes herein shown and set forth.

3. In a repeating mechanism for time-keepers, the sliding stem *t*, having the knob *q* and pins 8 and 2, in combination with the lever *r*, having the pin *j*, lever *m*, having the spring 5 and pawl *p*, spring 7, lever *z*, spring 14, lever *x*, having the pin *y*, spring 17, stop-pin 18, rack-levers *e* and *f*, springs 3 and 4, stop-pin 21, cams *a* and *b*, arms 10 and 11, spring 16, hammer *v*, having the pin 12, hammer *w*, having the pin 13, springs 15 and 22, and the sounding-tongue 20, as and for the purposes herein shown and described.

Signed at Berlin, in the Kingdom of Prussia, this 25th day of February, A. D. 1889.

CARL RUIINKE.

Witnesses:

B. ROI,

GEO. H. MURPHY.