(No Model.) 2 Sheets—Sheet 1.

J. W. NUNAMAKER.

ALARM FOR WATCHES.

No. 492,611. Patented Feb. 28, 1893.

Fig. 1.

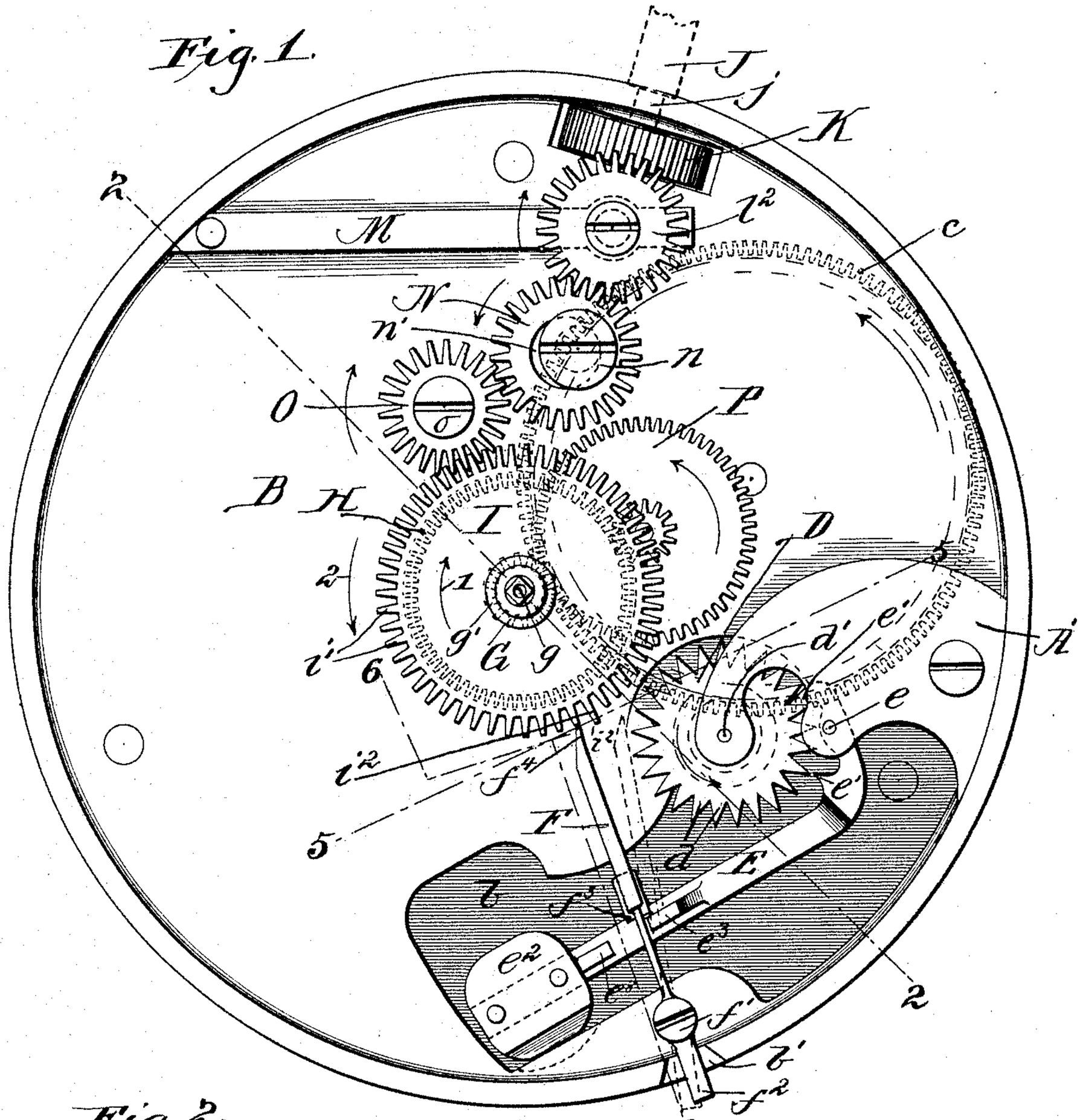
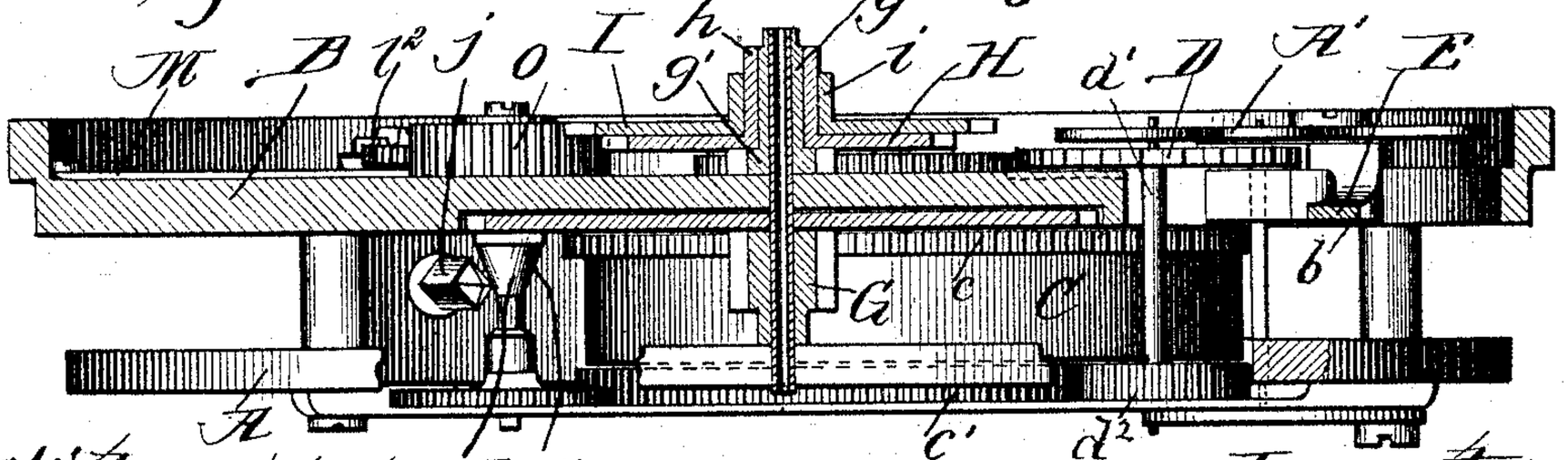


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

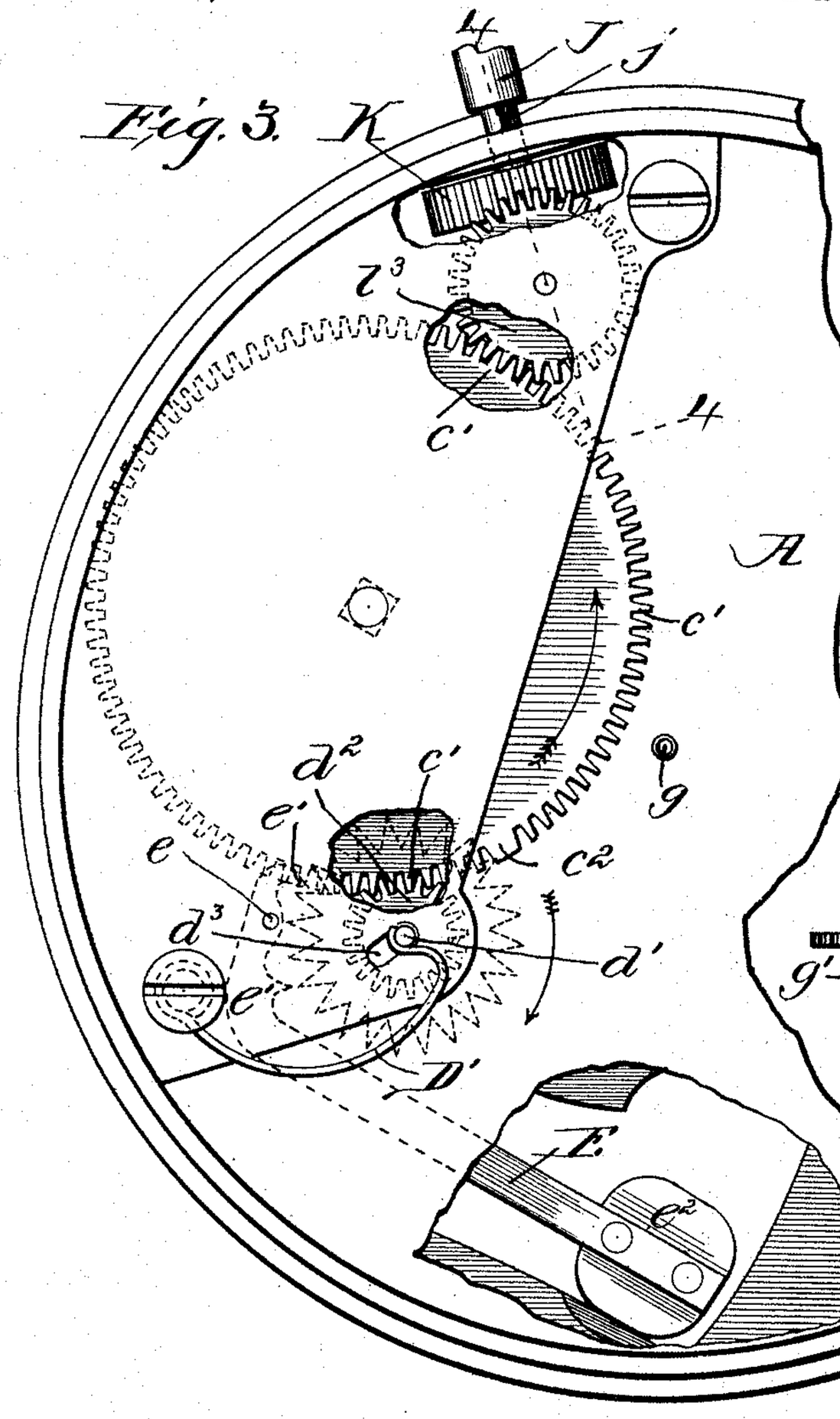


Fig. 4.

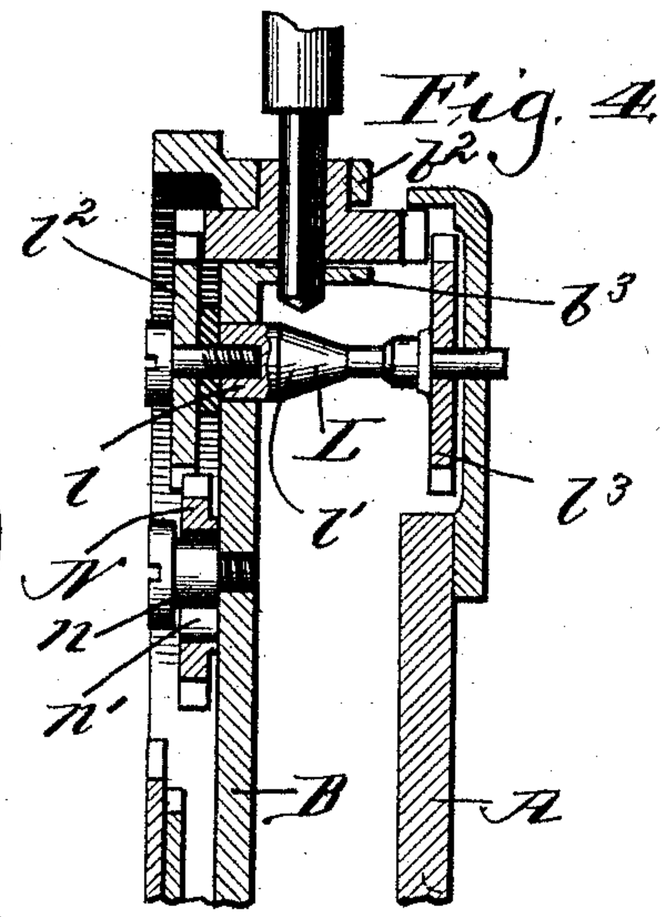


Fig. 5.

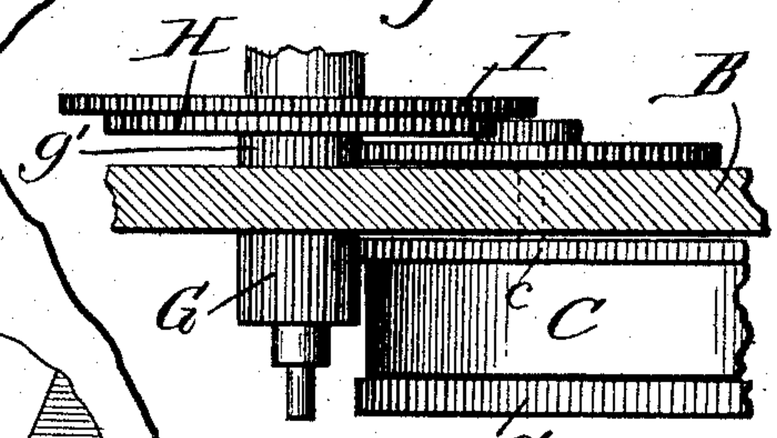


Fig. 6.

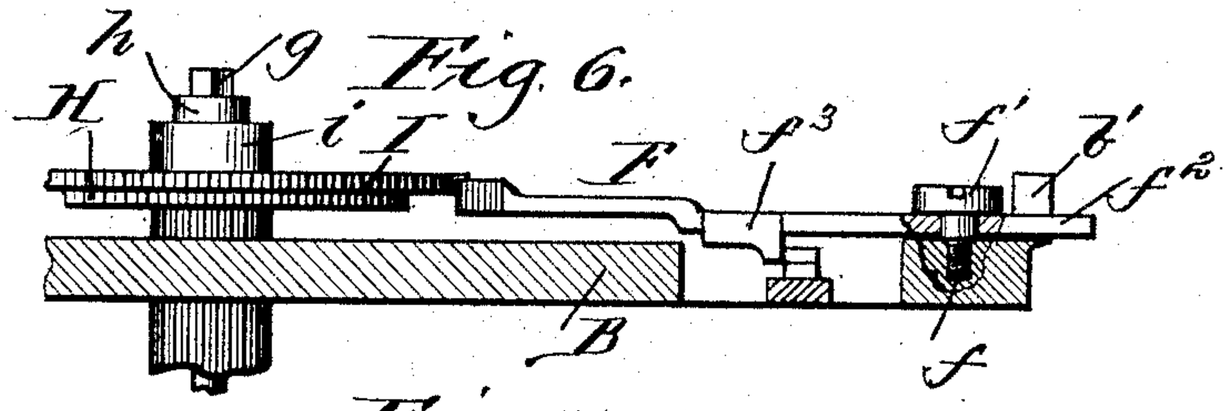
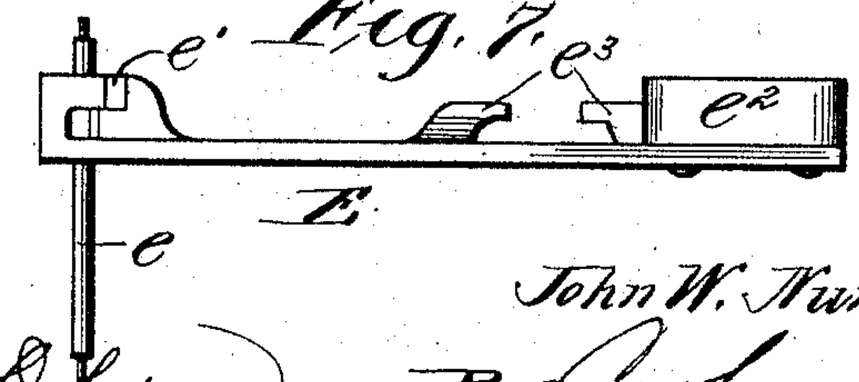


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN W. NUNAMAKER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO HARVEY L. HOPKINS, OF SAME PLACE.

ALARM FOR WATCHES.

SPECIFICATION forming part of Letters Patent No. 492,611, dated February 28, 1893.

Application filed January 26, 1892. Serial No. 419,282. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. NUNAMAKER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Alarms for Watches, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of the works of a watch embodying my invention looking down upon the front plate; Fig. 2, a cross-section of the same, taken on the line 2—2, of Fig. 1; Fig. 3, a detail bottom plan of the same, partly broken away; Fig. 4, a detail section, taken on the line 4—4, of Fig. 3; Fig. 5, a detail section, taken on the broken line 5—5, of Fig. 1; Fig. 6, a detail section, taken on the broken line 6—6, of Fig. 1; and Fig. 7, a side elevation of the alarm hammer lever, detached.

My invention relates to alarm mechanism for application to watches and consists in certain devices, for actuating the alarm by the main-spring, and setting, starting and throwing off the same as may be required.

I will now describe in detail the construction and operation of the mechanism of a watch in which I have practically embodied my invention in one way and will then point out more definitely in claims the particular improvements which I believe to be new and wish to secure by Letters Patent.

It is not necessary for the comprehension of my invention to show and describe all the parts and mechanism of a complete watch; hence I have shown in the drawings and shall describe only so much of a watch as will enable others to understand this invention.

In the drawings, A represents the ordinary back plate and, B, the like front plate of a watch movement. The drum or barrel, C, of the main-spring is also of any ordinary construction and is provided with the usual driving-gear, *c*, and the ratchet or winding-gear, *c'*. Just above the front plate and about midway between the center and outer edge of the latter, there is arranged on one side of the movement a toothed or escapement-wheel, D, which is provided with regular radial escapement-teeth, *d*, and is fixed upon the arbor, *d'*, mounted in the back plate, and a bracket, A', fastened to the upper side of the front plate. This arbor *d'* also carries at its lower end, a gear-pinion, d^2, and the arrangement of the arbor is such that the ratchet-gear, *c'* engages with this pinion. An alarm or hammer-lever, E, is fixed on an arbor, *e*, also mounted in the back plate and bracket A'. This lever E is substantially right angled, or of bell-crank form and the attachment to its arbor is made in the short arm thereof. This short arm of the lever is provided with pallets, *e'*, and the arbor of the lever is mounted in position, so that the teeth of the escapement-wheel C will engage with one or the other of the said pallets according to the position of the lever. The pallets are raised somewhat above the plane of the lever and are arranged one at the outer extremity of the short arm thereof, and the other at the inner end of the same, or angle between the two arms.

The lever E is fixed on its arbor, so that its main body or long arm will be in the plane of the front plate and the latter is cut out at one side to provide an opening, *b*, within which the lever is arranged and which is sufficiently wide to permit its required vibrations. At the outer end of the long arm of the lever there is fixed a small hammer, e^2. Obviously when left free to the action of the main-spring the arbor of the escapement-wheel D will be constantly rotated, thereby rotating the escapement-wheel which will operate to vibrate the alarm lever and, the hammer on the outer end of the latter striking against the edges of the top plate in the opening in which it vibrates, will sound an alarm. This operation is obtained by the re-action of the main-spring upon the ratchet or winding-wheel *c'* and for this purpose the latter is left without the usual dog or pawl by which it is held from back movement when the main-spring is wound up. But, of course, there must be a stop of some kind to hold this wheel from such backward movement and this device I provide in the trip stop of the alarm itself, which I will now describe. A short stop-lever, F, is pivoted to the front plate near the outer edge thereof and extends thence inward over the alarm lever. The pivot-pin,

f, of this lever may be a small screw, f', so that this device can be removed at pleasure. The outer end, f^2, of the stop lever projects out beyond the pivot through a notch or slot, b', in the edge flange of the front plate beyond which it projects slightly, as seen in Fig. 1, so as to provide for moving the lever by hand from the outside of the plate. The alarm lever E is provided with two stop lugs, e^3, on the upper face of the long arm thereof. These stop lugs are set a little distance apart. The stop lever F passes over the open space between these two lugs on the alarm lever and at a point just inside of the latter is provided with a lug or shoulder, f^3, projecting downward and outward on each side of the lever, as seen in Fig. 1 of the drawings, and extending down far enough to engage with one or the other of the stop lugs, as seen in Figs. 1 and 6. The stop lever extends inward beyond this point to a wheel on the main arbor, which is provided with a tooth for tripping this lever at the required point, as will be presently described, this end, f^4, of the lever being, preferably, beveled, and this stop lever is, therefore, the trip lever for the alarm. Now when the stop lever is brought into engagement with one of the stop lugs on the alarm lever, as seen in Fig. 1, obviously the alarm lever cannot vibrate and, being thus held in a state of rest, it will act as a stop to the escapement-wheel and through the latter, also as a stop to the winding-gear c', thus taking the place and performing the office to this extent of the ratchet usually supplied for this latter gear.

In order to provide for the ordinary winding up of the main-spring without operating the alarm lever, the lower end of the arbor d' of the escapement-wheel is set in a slot, d^3, as seen in Fig. 3, and a spring, D', is provided which normally holds the said arbor up to the inner end of said slot in position for the engagement of the pinion thereon with the winding-gear. The slot is inclined backward somewhat in the direction of the movement of the said gear in winding, so that when it is rotated for this purpose the lower end of the arbor will be moved outward in the slot, the spring yielding for this purpose, and so throw the pinion out of engagement with the gear. The spring D' is fastened at one end to the back plate, while the other is left free, but is bent so as to engage with the end of the arbor, as seen in Fig. 3. The driving-gear c engages, as usual, with the main pinion, G, on the main arbor, g, and above the front plate is the pinion, g', sleeved on the upper end of this arbor and fixed thereto, which, through an ordinary train, drives the hour-hand wheel, H, which is loosely sleeved on the sleeve of the pinion g' by means of a tubular or sleeve-hub, h, as seen in Fig. 2.

Just above the hour-wheel is the alarm trip-gear, I, which is sleeved on the hub of the hour-wheel by means of a tubular hub or sleeve, i, the friction between the two being sufficient to move the trip wheel with the hour-wheel, the same as the latter is moved through its sleeve mounting. This trip wheel is provided with gear teeth, i', at its outer edge, one of which, i^2, is extended outward, so as to be somewhat longer than the others. The inner end of the trip lever F is in the plane of this trip-gear I and extends inward almost to the line of travel of the short teeth, so that, obviously it will stand in the path of the long tooth i^2. This is the normal position of these devices when the trip lever is just engaged with the inner stop lug on the alarm lever, as seen in Fig. 1. Now as in the ordinary operation of the movement the trip gear I is rotated in the direction of the arrow marked 1 in Fig. 1, it is evident that when the long tooth i^2 is brought into contact with the inner end of the trip lever it will vibrate the latter, so as to release it from engagement with the stop lug on the alarm lever, which, obviously, also releases the winding-gear and the movement of the latter, under the action of the main-spring, revolves the escapement-wheel and sets the alarm lever into vibration, as already explained.

Unless stopped by some device the alarm would run after being set in motion until the main-spring is run down. Of course this would not be desirable and hence I provide an automatic stop, as follows: The winding-gear c' is provided at a certain point with a dead space or blind tooth, c^2, which is formed by joining two or more of the regular gear-teeth, or in other words, omitting to cut two or more adjoining gear teeth. The winding-gear is mounted upon its shaft and the main spring is constructed in such relation thereto that when the main-spring is wound up this blind tooth stands just beyond the engagement of the gear-wheel with the escapement pinion in the direction in which the former is to move, as seen in Fig. 3. Now when the alarm is tripped and the winding-gear released, it is obvious that the latter can make only about a single revolution before it is stopped, for when the blind tooth c^2 is brought around to the point of engagement with the escapement pinion, it is evident that such engagement cannot take place, and so the further revolution of the winding-gear is prevented, which, of course, stops the alarm; the regular stop devices may be subsequently adjusted by the holder at pleasure; but the stop lever is elastic, so that on winding, as the first impulse will be to throw back the alarm lever, the stop arm will spring into place and engage with the stop lever without opening the case.

It is, of course, desirable not only to stop the alarm mechanism by the trip device, but also to provide for the adjustment of the latter, so that, in this position, it will be out of the path of the trip tooth and the alarm cannot, therefore, be set in motion, so long as the devices remain in this adjustment. This result is effected, as follows: The ordinary op-

erative position of the lever F, to work both as a stop and a trip lever, is shown in full lines in Fig. 1, but this lever may be vibrated to the right still farther, as seen in dotted lines in said figure, in which position it is out of the path of the trip-tooth i^2, but still in engagement with the hammer lever, so as to lock the latter out of operation; obviously in this position the watch will run indefinitely without operating the alarm. So too the stop lever may be swung over in the other direction to engage with the outer stop lug, as also seen in dotted lines in Fig. 1, in which position it locks the alarm mechanism, as already described, and at the same time is out of the path of the trip-tooth; either one of these adjustments may be the ordinary position of the stop lever, and whenever it is desired to set the alarm it will be necessary only to move the stop lever into its central position, as indicated by the full lines in Fig. 1.

I will now describe the means for setting the alarm which is effected through devices that are also employed in stem winding. The watch is provided with a usual pendant arbor, J, but the inner end of this arbor is cut down to form a kind of stem, *j*, which extends inward underneath the front plate. This stem is of angular form, preferably rectangular, as seen in Fig. 2, and has mounted loosely upon it, a pinion, K, which is provided with an extension hub, *k*, projecting outward and fitted in a pendant bearing, b^2, on the front plate, as seen in Fig. 4. This also makes the bearing for the pendant arbor, but the stem of the latter is free to move back and forth in its pinion and is sufficiently long to permit this sliding movement. A short depending lug, b^3, drops from the front plate just inside of the pinion and serves to keep the latter in place, being perforated with an opening sufficiently large to accommodate the angular stem and permit it to revolve freely therein. The inner end of the pendant arbor stem is beveled on all sides, as seen in Fig. 2; and just within the path of this sliding stem, there is mounted an upright arbor, L, the upper end, *l*, of which is somewhat enlarged and passes up through a bearing in the front plate in which it it is free to slide vertically. The lower end of the arbor is mounted in the back plate and is of sufficient length to permit this sliding movement. Immediately opposite the beveled end of the stem, the arbor is beveled downward, so as to present a conical section, *l'*. A gear-pinion, l^2, is mounted loosely on the upper end of the arbor L above the front plate and just below this pinion the inner end of a spring, M, is also secured to the same, the outer end of which is fastened to the edge of the front plate, as seen in Fig. 1, this spring acting normally to hold the arbor down in the position seen in Fig. 4. The arbor L is also provided with a second gear pinion, l^3, fastened to its lower end just above the back plate. When the arbor is in the position shown in Fig. 4, the teeth of the upper pinion l^2 are engaged by the teeth of the pinion K on the pendant arbor stem, but the distance between the gear pinions l^2, l^3 is such that the teeth of the latter are then down out of engagement with the said pinion K. Just within the upper pinion l^2 there is an idle pinion, N, which is mounted on the front plate by means of a stud journal-pin, *n*. The bearing aperture of this pinion is cut out, so as to form a central opening, *n'*, considerably larger than the journal-pin, thus providing for lateral movement of the former upon the latter. A gear-pinion, O, is also mounted by a stud pin, *o*, on the upper side of the top plate and is arranged to engage with the alarm trip wheel I. The idler N is between the pinions l^2 and O, but its journal is not in line with the journals of these two, but stands somewhat inside thereof, as seen in Fig. 1. Now in its lower adjustment, as seen in Fig. 4, the pinion l^2 is always in engagement with the idler N and the latter being free to move laterally on its journal will be thrown to one side or the other by the action of the pinion l^2 according to the direction in which it is turned. When the pendant arbor is turned, so as to rotate the pinion l^2 in the direction indicated by the arrow in Fig. 1, the first effect will be to throw the idler N outward on its journal, which movement will bring it into engagement with the pinion O, if such engagement does not already exist. The further rotation of the pinion l^2 in this direction will obviously rotate the pinion O and through it the trip gear in the direction indicated by the arrow marked 2 in Fig. 1, whereby the latter may be adjusted to set the trip tooth i^2 in the required position to make contact with the trip lever at any desired point of time. If the pendant arbor is turned, so as to rotate the pinion l^2 in a direction opposite to that indicated by the arrow on Fig. 1, the effect will be to move the idler N out of engagement with the pinion O, so that its rotation in this direction will not disturb the alarm mechanism. This movement will, however, bring the idler N into engagement with one of the train-gear, P, by means of which the hands are set; but this hand-setting mechanism constitutes no part of my present invention, except in connection with the alarm mechanism. The lower pinion l^3 on the arbor L engages with the winding gear *c'*, but as the pinion l^2 is loose on the arbor the rotation of the latter for setting purposes, as described above, does not affect the lower pinion which remains at rest.

When it is desired to wind the watch the pendant arbor is pushed in, thus bringing the beveled inner end against the cone section of the arbor, by which the latter will be lifted and thus raise the pinion l^2 out of engagement with the pinion K, when, obviously, the operation of winding may be performed. This feature of the mechanism, however, is not a part of my present invention, except in connection with the alarm setting devices.

It will be noticed that the device for chang-

ing the setting devices is within the movement plates and that the spring M will operate to return the vertically sliding arbor L to the position shown in Fig. 4 whenever released from the inward thrust of the pendant arbor.

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

1. The escapement wheel D, in combination with the winding-gear c', connected to one end of the main spring, the hammer lever E provided with pallets e', and the stop lever F arranged to engage with the hammer lever and thereby act as a stop to both the alarm and the winding-gear, substantially as described.

2. The escapement wheel D, in combination with the winding-gear c' engaging with the pinion on the arbor of the former, the vibrating alarm lever E provided with pallets e' adapted to engage with the teeth of the escapement, the stop lever F adapted to engage with the alarm lever, and the trip gear I mounted on the journal of the hour-wheel and provided with a long tooth i^2 adapted to engage with the said stop lever to trip the same, substantially as described.

3. The winding-gear c', in combination with the escapement wheel D arranged to be driven by said winding-gear, the pivoted alarm lever E, provided with pallets engaging with the said escapement wheel and with stop lugs e^3, the stop lever F provided with shoulder f^3 adapted to engage with one or the other of said stop lugs to hold the alarm and winding-gear in a state of rest, substantially as described.

4. The winding gear c', in combination with the escapement wheel D, the arbor d' of said escapement mounted at its lower end in a slot d^3 and provided with a pinion d^2 engaging with the winding-gear, and a spring D′ adapted to hold the arbor up to cause said engagement, but yielding to permit disengagement when the winding-gear is rotated to wind up the main-spring, substantially as described.

5. The vibrating alarm lever E, in combination with the stop lever F arranged to engage the former and hold it at rest, the trip wheel I provided with gear-teeth i' and a long tooth i^2 adapted to engage the inner end of said stop lever, the pinion O arranged to engage with said trip wheel, the idle pinion N mounted on its journal by an enlarged opening to permit lateral movement thereon, the driving pinion l^2 engaging with said idler N, and the stem gear K engaging with said driving pinion, whereby, when turned in one direction, the idler is moved into engagement with the pinion O to set the trip gear and turned in the other direction the idler is moved away from and out of engagement with said gear, substantially as described.

6. The escapement-wheel D, in combination with the alarm lever E provided with pallets engaging therewith, the winding-gear c' provided with a dead space or blind tooth c^2, and the pinion d^2 fixed on the arbor of the escapement-wheel and engaging with the said winding-gear, substantially as described.

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