

(No Model.)

J. W. NUNAMAKER.
ESCAPEMENT FOR TIMEPIECES.

No. 512,054.

Patented Jan. 2, 1894.

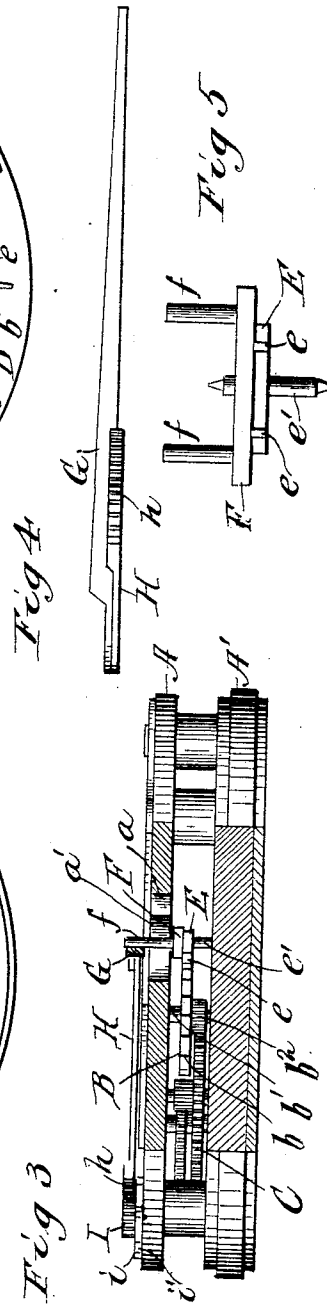
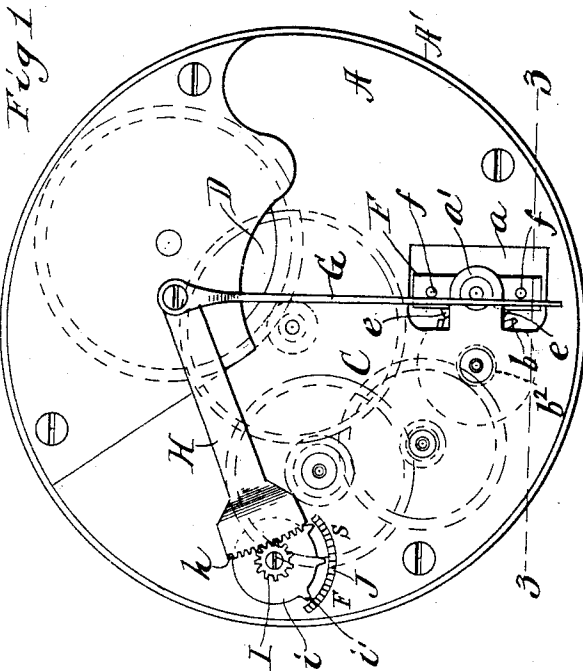
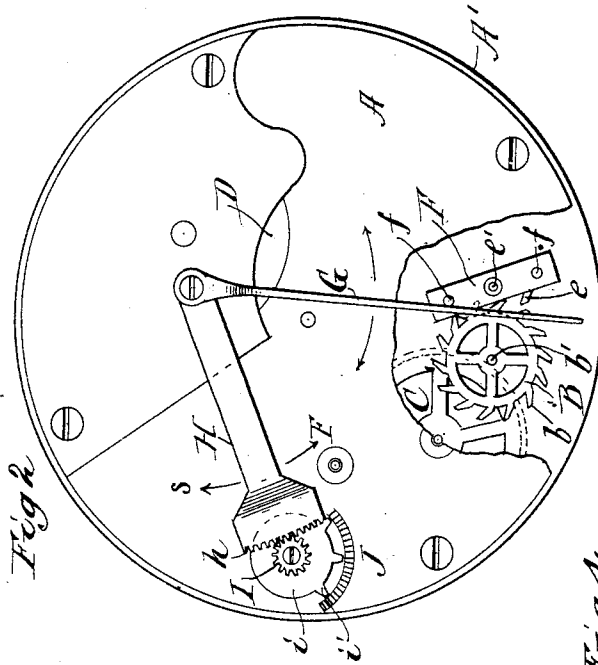


Fig 4

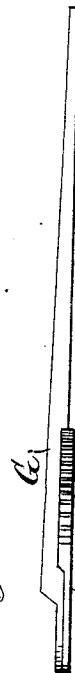
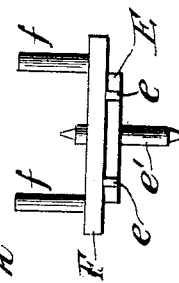


Fig 5



Witnesses
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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.

ESCAPEMENT FOR TIMEPIECES.

SPECIFICATION forming part of Letters Patent No. 512,054, dated January 2, 1894.

Application filed February 9, 1893. Serial No. 461,639. (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 a certain new and useful Improvement in Watches, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1, represents a plan view of a watch movement, embodying my invention, looking upon the top plate of the movement; Fig. 2, a similar view with a portion of the top plate broken away; Fig. 3, a vertical section of the same taken on the line 3. 3. of Fig. 1; Fig. 4, a side elevation of the banking spring and regulating arm detached; and Fig. 5, a side elevation of the pallet balance detached.

In the drawings, Figs. 1, 2 and 3 are upon one scale, and Figs. 4 and 5 upon another and enlarged scale.

My invention relates to the escapement mechanism in watches, and the object is to dispense entirely with the balance wheel and hair-spring generally employed in connection with this device. To accomplish this, I increase the weight of the pallet fork so that it will act something like a balance, and provide a spring, which I call a banking spring and which is arranged to act upon banking pins on the pallet balance or pallet fork on opposite sides of the arbor thereof; and the invention consists in substantially this mechanism, whereby I have found that the escapement may be successfully operated without the usual balance wheel and hair spring.

I will now describe in detail the construction and operation of a mechanism in which I have embodied my invention in one particular way, in connection with so much of the works of a watch as may be necessary to an understanding thereof; and the particular improvements which I believe to be new and wish to secure by Letters Patent will then be pointed out more definitely in claims.

All the main parts of the watch may be of any ordinary construction and will require no description herein; I shall only refer, therefore, to the few parts to which my improve-

ment is immediately related and which are necessary to an understanding of its action.

In the drawings, A, represents what is usually called the top plate of a watch movement, and A' the bottom plate thereof. Between these plates is mounted an escapement wheel, B, of any known construction, being provided with teeth, *b*, as usual. The balance wheel is fixed on an arbor, *b'*, on which there is also fixed a pinion, *b²*, which is connected up by a suitable train, C, with the drum or barrel, D, of the main frame. The pallet fork, E, is provided as usual with pallets, *e*, adapted to engage with the teeth of the escapement wheel; the fork is fixed on an arbor, *e'*, mounted between the top and bottom plates in suitable position to permit the pallets to engage with the escapement teeth, as usual. This pallet fork I increase in weight, in some suitable way, as compared with the device as heretofore used. As shown in the drawings, this is effected by providing the fork with a long straight bar, F, which is somewhat longer than the ordinary fork, and is rigidly secured to the latter, or it may be made in one piece therewith; or if a separate piece, it may be secured to the arbor independently of the fork; but in any event it should be heavy enough and long enough to make the vibrations of the entire device something like a balance. As shown in the drawings, the top plate, A, is cut out to make an opening, *a*, above the pallet fork, as seen in Fig. 1, a projecting tongue, *a'*, being left at one edge of the plate to provide a bearing for the fork arbor. Two pins, *f*, are set on the weighted pallet fork, being located at the respective ends thereof. These pins I call banking pins, and, as seen in the drawings, they are fixed on the respective ends of the bar, F, which may be called the balance bar. The pins are extended upward to a point above the plane of the top plate, being projected up through the opening, *a*, in the latter, on each side of the bearing, *a'*, of the pallet fork arbor, as seen in Fig. 1. A spring, G, is secured at one end to the top plate at some suitable point. In the drawings it is shown pivoted to the plate just over the main spring barrel. This spring

is extended from its point of attachment across the top plate nearly to the opposite edge thereof, and is entirely free except at its point of attachment, already mentioned.

5 Near its outer end it passes in front of, or inside of the banking pins on the pallet fork, as seen in Fig. 1. In this figure the parts are shown at rest, and in this condition both banking pins rest against the spring. I also

10 provide a device whereby the position of this spring may be adjusted. In the drawings this device is shown as an arm, H, which is either made in one piece with the spring, or is secured thereto, so that the swinging of

15 the arm will effect a corresponding movement of the spring. This arm extends outward above the top plate nearly at right angles to the spring, and at its outer end is provided with a short toothed sector, h, with

20 which a small pinion, i, engages. This pinion is on a small disk, z, pivoted to the top plate, and provided with index points or teeth z', which work over a graduated sector, J. Obviously the turning of the pinion by means

25 of the disk will slightly swing the arm in one direction or the other, and thereby move the spring slightly with reference to the banking pins on the balanced pallet fork. In operation, the main spring will, of course, act

30 through the train upon the escapement wheel the same as usual, and the movement of the pallet fork caused thereby, will bring the banking pin at one end thereof to act against the banking spring, thereby tending to move

35 the latter to one side and so giving it tension. This tension of the spring will return the pallet fork as soon as the pallet is released at the opposite end, and then the same operation is effected through the opposite banking pin,

40 the spring returning it also upon the release of the opposite pallet. From this description it will be seen that the office of the banking spring is to return the balanced pallet fork from the extremity of each of its movements,

45 the spring acting upon each of the banking pins; the extremes of the vibrations of the pallet balance will be given by the tension of the main spring, the greater the tension the greater the movement, and vice versa. With

50 this pallet balance and banking spring acting upon the balance upon each side of the pallet arbor, I secure the regular oscillation of the pallet fork, which is requisite to the required operation of the watch, and the action of the

55 spring equalizes the running of the watch so as to secure the same time with the varying tensions of the main spring. This equalization will be effectively accomplished as the movement of the pallet balance is increased

60 in speed, either by increasing the length of its sweep or its number of movements. By actual test I have obtained the running of "rates" in a watch provided with this improvement.

65 By means of the regulating device, de-

scribed above, the spring may be adjusted nearer to, or farther away from the banking pins. This adjustment serves to regulate the movement, as, if the spring is moved nearer to the pins, the vibration of the pallet balance will be increased in speed; and, if moved away from the pins, this motion will be decreased in speed, so that this device for adjusting the spring serves as the regulating device for the watch.

75 With this improvement the construction of a watch is greatly simplified, and several expensive and delicate parts are entirely dispensed with, so that not only is the cost of the watch decreased, but it is rendered more reliable and durable.

80 Modifications may be made without departing from the principle of operation; and I have intended to describe and show herein only an illustration of the invention as applied in a practical way. The shape of the spring may be modified, and it may be made fast either with or without a slight coil at its fixed end, instead of pivoted as herein described; and the adjusting or regulating device may be something very different from that herein shown.

The distinguishing features of my invention are the weighting and balancing of the pallet fork, and a spring against which the respective ends of said fork act on each vibration thereof; and so long as these features are retained, my invention is embodied. Furthermore there may be a reversal of the relations between the pins and spring; the pallet balance may be provided with springs which are arranged to bank against ordinary banking pins; the same result may be effected under this reversal of parts. A single banking spring provided with forked arms arranged astride the pallet balance may also be employed with like result. These are some of the modifications which may be made, but I do not wish to be understood as enumerating herein all possible modifications.

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

1. In a watch, an escapement wheel, in combination with a balanced pallet fork provided with pins on each side of its arbor, and a banking spring arranged to act on each of said pins to return the fork at the end of each vibration thereof, substantially as described.

120 2. In a watch, an escapement wheel, in combination with a balanced pallet fork, and a spring arranged to act upon each end of said fork to effect its return movement, and a regulator whereby said spring may be adjusted with reference to said fork, substantially as described.

3. The escapement wheel, B, in combination with the pallet fork, E, balance bar, F, provided with pins, f, a spring, G, secured at

one end and with its free end passing by said pins, substantially as described.

4. The escapement wheel, B, in combination with the balanced pallet fork provided
5 with pins, *f f*, spring, G, adjusting arm, H, connected to said spring and provided with toothed sector, *h*, and setting pinion, I, en-

gaging with said sector, substantially as described.

JOHN W. NUNAMAKER.

Witnesses:

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