United States Patent [19]

Tuetey

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[54] **DRIVE MECHANISM FOR A WATCH HAVING A BALANCE MOTOR**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **58/116 R**

[51] **Int. Cl.** **G04b 15/00**

[58] **Field of Search** ..... 58/116 R, 121 R; 74/1.5

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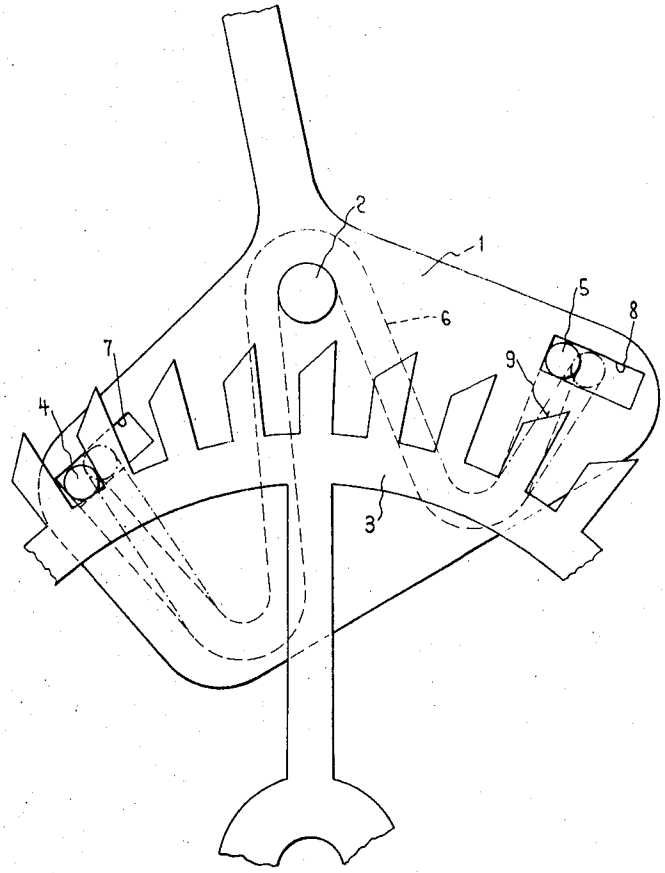
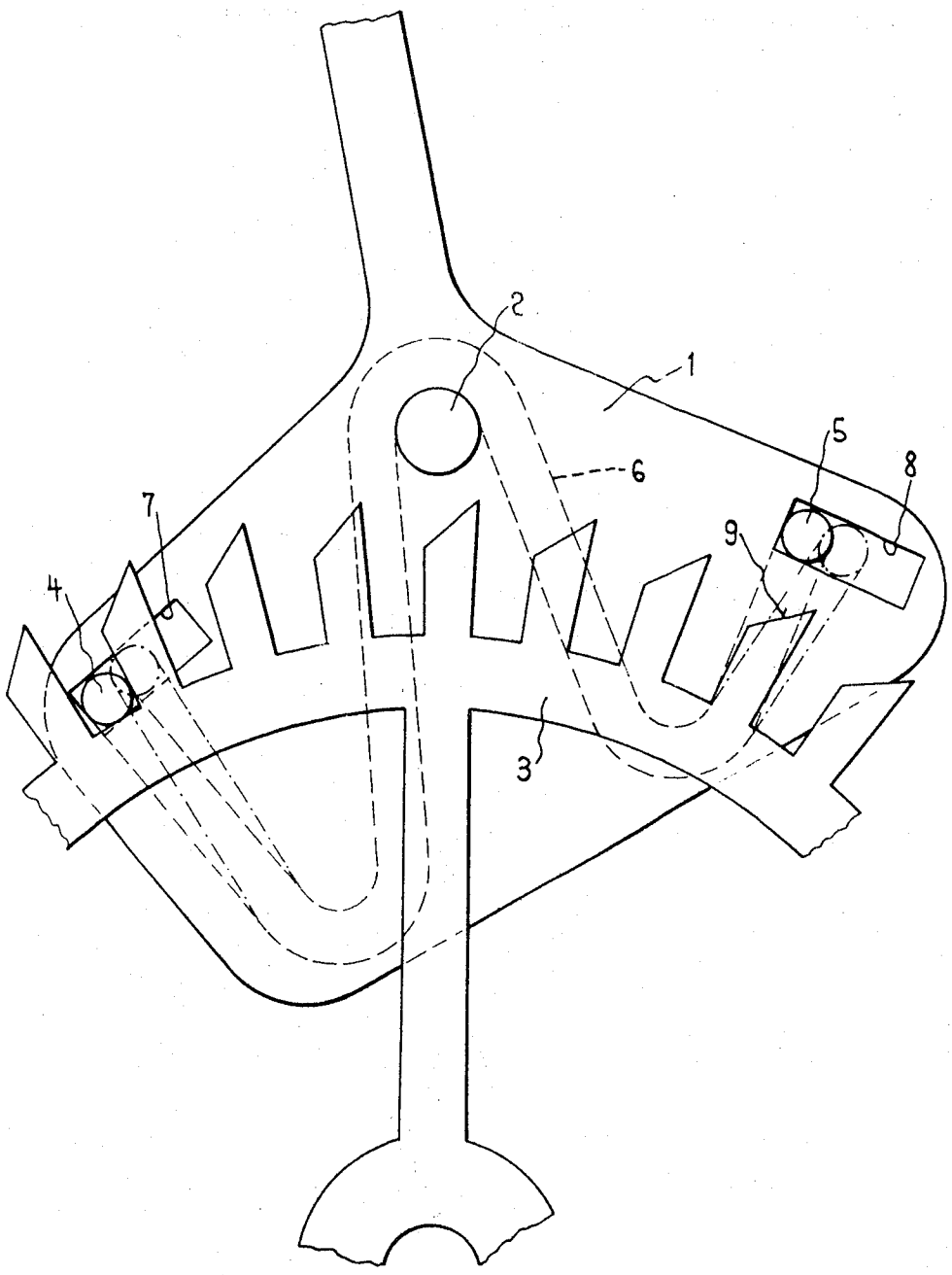
[57] **ABSTRACT**

Anomalous operation of a lever-driven escapement type wheel driving the hands of a watch is prevented by mounting the two pallets on springs or forming them from a spring, the pallets having free resilient but limited movement in slots formed in the lever, which itself is driven from a balance wheel motor. The dimensions of the parts are such that while one pallet is engaged with the drive face of one tooth of the escapement wheel, the other pallet, engaged with one end of its slot, lodges between two teeth, providing spring-loaded locking of the wheel against reciprocating movement while enabling it to be driven.

7 Claims, 1 Drawing Figure





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DRIVE MECHANISM FOR A WATCH HAVING A BALANCE MOTOR

BACKGROUND OF THE INVENTION

The maintenance of oscillation of a balance wheel entraining the hour indicating members, through the intermediary of an appropriate gear train may be effected by various mechanisms.

For obvious reasons, the oscillatory system should not be in permanent contact with the drive mechanism. The use of an escapement having an inverse lever as the drive mechanism has already been proposed. Two main problems arise in such a device.

a) As the drive (or escapement) wheel mechanism and the lever are no longer retained in place by the main driving force, as is the case in a spring driven watch, it is necessary to stabilise the lever in its end positions. This problem has already been solved by the use of a permanent magnet, integral with the movement, and another permanent magnet carried by the lever. If the magnets are of the same polarity with respect to each other, repulsion is produced, pressing the lever against one or other of the limit stops. The lever cannot pass from one stop to the other outside the impulse period, as it is prevented by the known pin and plate system. At the instant of drive of the lever by the pin on the plate, there is firstly a resistance to disengagement, due to the repulsion of the ends of the magnets of the same polarity, followed by an impulse as soon as the median point is passed. This impulse compensates the intitial braking effect and, as a result, the disturbance to the balance wheel is reduced to a minimum. As a variation, the magnets may be placed in such a manner that they are of opposite polarity with respect to each other, so that there would then be an attraction instead of a repulsion, but the effect obtained could be made the same by suitable design.

b) The second problem arises from the fact in a drive mechanism constituted by an escapement having an inverse lever, misses can occasionally be produced at the moment of impulse, the ratchet wheel effecting a reciprocating movement instead of always turning in the same direction.

SUMMARY OF THE INVENTION

The present invention aims to provide a solution to this second problem, by ensuring a locking of the drive or escapement wheel, even during the course of an impulse. It has for its subject a drive mechanism for a watch having a balance wheel motor, constituted by an escapement having an inverse lever, the lever of which includes two pallets mounted on flexible members integral with the lever and extending through slots in the lever for cooperation with the escapement wheel, the correct functioning of the escapement being ensured because said pallets are displaceable with respect to one other in a plane parallel to the plane of the lever and between the ends of the respective slots in the lever, and by the fact that the said escapement wheel is locked by the displacement of the said pallets during the functioning of the ratchet mechanism.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE is a fragmentary plan view of an embodiment of a drive mechanism according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

In the drawing, a lever 1 is supported by a lever pivot 2 for cooperation with a drive or escapement wheel 3. The drive mechanism consists of an escapement, having an inverse lever, i.e., the lever 1, oscillated by a balance wheel motor of known form (not shown) which lever is adapted to turn the drive wheel 3 always in the same direction the wheel 3 operating, the indicator members or hands of the watch by the intermediary of a gear train of known form (not shown).

The drive and locking of the ratchet wheel 3 is effected by means of pallets 4 and 5, each fixed to, forming part of supported by a spring 6 which, in turn is fixed to the lever pivot 2, the pallets being capable of sliding in respective rectangular slots 7, 8 in the lever 1. In the example shown, the pallets 4 and 5 are constituted by the turned-up ends of a thin wire spring 6.

When at rest, the spring 6 maintains each pallet 4, 5 in a predetermined position as shown in full lines in the drawing, at one end of its respective slot 7 and 8 respectively, of which is slightly inclined with respect to the periphery of the wheel near the slot. The wheel 3 has a plurality of radially extending teeth each of which has an end face 9 that is inclined to the radius of the respective tooth, the teeth being substantially uniformly shaped and spaced substantially equal to the width of a pallet.

In the position shown in the drawing the pallet 4 is engaged between the sides of two adjacent teeth of the wheel 3, and thus ensures locking of the wheel, as lateral displacement of the pallet 4 is limited by one end of the slot 7. The dimensions of the lever 1 are such that at the moment when the lever 1 starts to be driven by the balance wheel motor, the pallet 5, which is not engaged with the teeth of the wheel 3, starts to operate on the drive face 9 of a tooth of the wheel before the other pallet 4 is moved from between the teeth, and unlocks the wheel 3. The rotary movement of the wheel 3 produces a limited movement of the pallet 4, in a direction parallel to the plane of the lever to the position indicated by the dotted lines, the pallet 4 only returning to the position shown in full lines under the action of the spring 6 when the pallet moves outside the outer diameter of the teeth of wheel 3. At this moment, the other pallet 5 is fully engaged between the teeth of the wheel; it has finished its drive action on the tooth face 9 and lodges between the faces of two adjacent teeth, thus ensuring, in its turn, the locking of the wheel 3 and of the gear train. Upon reciprocation of the lever 1, the pallet 4 drivingly engages a toogh face 9 while the pallet 5 precludes reciprocation of the wheel 3.

Except during each drive impulse the lever 1 may be held in its end positions against one or other of its limit stops, by the use of permanent magnets, as hereinbefore described.

We claim:

1. A drive mechanism for a watch having a balance motor, comprising an inverse pallet lever and a toothed escapement wheel, said lever having a pair of spaced slots juxtaposed with the periphery of said wheel, resilient means fixed on said lever and carrying a pair of pallets respectively extending through said slots for engagement with the teeth of said wheel and movable longitudinally of the respective slots in a plane parallel with the plane of said lever, the teeth of said wheel extending radially thereof and having end faces substan-

tially uniformly inclined to the radius of the respective tooth for engagement by said pallets to initiate rotation of said wheel, and said teeth being spaced a distance substantially equal to the width of a pallet to preclude play therebetween, engagement of the end face of a tooth by one pallet driving said wheel and causing movement of the other pallet in its slot until said other pallet is freed from the teeth between which it is engaging.

2. A drive mechanism as recited in claim **1,** wherein said pallets are maintained at rest against the ends of said slots by said resilient means.

3. A ratchet mechanism as recited in claim **2,** wherein each of said pallets returns to its rest position under the effect of the resilient means only when said pallet arrives outside the outer diameter of the wheel teeth.

4. A ratchet mechanism as recited in claim **1,** wherein the path of the lever is such that an in-going pallet not engaged in the teeth of the ratchet wheel starts to operate on the impulse plane of a tooth of the wheel before the out-going pallet has ceased to lock the wheel.

5. A ratchet mechanism as recited in claim **4,** wherein during the moment of return to rest of one pallet, the other pallet is lockingly engaged between the teeth of the wheel.

6. A drive mechanism as recited in claim **1,** wherein said resilient means is constituted by a thin wire spring fixed to the lever pivot.

7. A drive mechanism as recited in claim **6,** wherein said pallets are constituted by bent-up ends of said spring.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,775,968 Dated December 4, 1973

Inventor(s) PAUL TUETEY

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Heading:

[73], the assignee should read as follows:

-- Les Fabriques d'assortiments Reunies, Le Locle, Neuchatel, Switzerland -- .

Signed and sealed this 13th day of August 1974.

(SEAL)
Attest:

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