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WATCH MOVEMENT WITH SIMPLIFIED ASSEMBLY ARRANGEMENT

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2 Sheets-Sheet 1

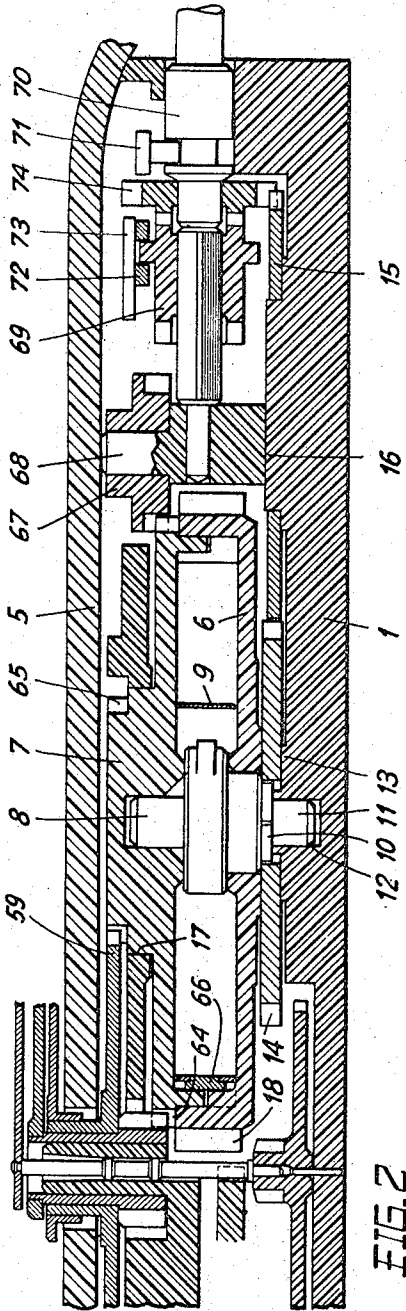


FIG. 2

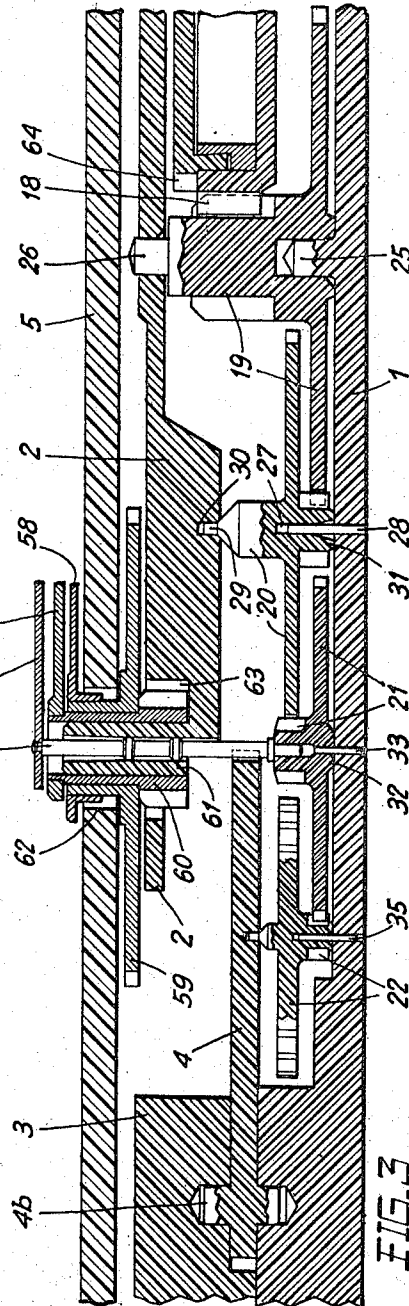


FIG. 3

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WATCH MOVEMENT WITH SIMPLIFIED ASSEMBLY ARRANGEMENT

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4 Claims. (Cl. 58—59)

ABSTRACT OF THE DISCLOSURE

The disclosure teaches a simplified method of mechanically assembling a watch movement wherein all of the elements, except the winding stem, may be assembled by vertical downward movement of the same. All of the elements of the gear train are received on stationary pivots projecting from the inner face of the main frame element whereby these elements may be lowered onto their respective pivots in a predetermined manner during the assembly operation. Additionally, a dial is disclosed which covers the outer face of the secondary frame elements.

The present invention relates to a watch movement comprising a frame formed of a main element and of at least two secondary elements secured to the main element at the same side thereof, one of said secondary elements constituting the balance cock of the movement and affording for the pivoting of an end of a regulating member arranged in the frame, and a dial covering one of the outer faces of the frame.

In the heretofore known watch movements the main element of the frame is formed by the bottom plate. This piece carries on its inner face bearings for receiving the lower ends of the different wheels of the movement and on its outer face a circular cavity or housing in which are engaged the cannon-pinion and the hour wheel. The bottom plate further in general is provided in its outer face with housings or openings for receiving the dial feet of the dial placed onto the bottom plate after the assembling of the movement and retaining in place the cannon-pinion and the hour wheel as well as in certain cases the setting wheel.

In order to effect the assembling of such a movement the wheels are first placed on the bottom plate in a correct position. After the positioning of all wheels the upper ends of which pivot in one of the bridges, this bridge is secured to the bottom plate. It is proceeded in the same manner successively for all different bridges, the last to be positioned being the balance cock. The assembling of the balance cock presents particular difficulties due to the fact that it is accompanied by the operation of fixing the balance spring stud to its support and by the positioning of the regulator. Furthermore the operation of putting into beat the movement may in certain cases necessitate corrections of the regulation and the checking of the function of the balance may render necessary a disassembling of this frame element.

Once all bridges have been positioned it is necessary to turn the movement in order to permit mounting of the cannon-pinion, of the hour wheel and of certain pieces of the winding mechanism as well as the dial.

It is a prime object of the present invention to create a watch movement the assembling of which is highly simplified.

To this end the watch movement according to the invention is characterized by the fact that the dial covers the outer face of the secondary frame elements.

Other features and advantages of the present invention

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will become apparent from the description now to follow, of a preferred embodiment thereof, given by way of example only, and in which reference will be made to the accompanying drawings, in which:

FIG. 1 is a top view with the dial removed.

FIG. 2 is a section taken along the line II—II of FIG. 1.

FIG. 3 is a section taken along the line III—III of FIG. 1, and

FIG. 4 is a section taken along the line VI—VI of FIG. 1.

The watch movement represented in the drawings comprises a frame formed of four elements: a bottom plate 1 (FIG. 1), a train wheel bridge 2, a balance cock 3 and a pallet cock 4. The train wheel bridge 2, the balance cock 3 and the pallet cock 4 are placed at the same side of the bottom plate 1. The train wheel bridge 2 and the balance cock 3 are placed side by side and cover the elements of the watch movement, whereas the pallet cock 4 is placed within the frame. A dial 5 (FIG. 2) covers the upper face of the bridges 2 and 3.

The watch movement comprises a barrel formed of a drum 6 and of a cover 7 between which is maintained in place a shaft 8. A motor spring 9 affords for the driving of the barrel. Protruding from the lower face of drum 6 the shaft 8 presents a square 10 and a shaft end 11 of cylindrical shape. The latter is engaged in an opening 12 of the bottom plate 1 and is enclosed by a circular collar 13 of small height and the out diameter of which is slightly inferior to one side of the square 10. Between the drum 6 and the upper face of the bottom plate 1 extends a ratchet wheel 14 the square opening of which is engaged in its upper portion on the square 10 and in its lower portion of the collar 13. The ratchet wheel 14 meshes with a crown wheel 15 pivoted on a boss 16 formed in the inner face of the bottom plate 1.

The cover 7 presents a cylindrical shoulder 17 adapted to the dimension of any opening in the bridge 2 this opening forming the upper bearing of the barrel.

The drum 6 presents a toothed crown 18 meshing with the pinion of a large driving wheel 19 (FIG. 3) the wheel of which drives the third wheel 20, the latter meshing with a seconds wheels 21 placed in the center of the movement. The seconds wheels 21 meshes with the pinion of an escape wheel 22 actuating a pallet 23 (FIG. 4) transmitting its impulses to a balance 24.

The large driving wheel 19 the pinion of which extends at the level of the toothed crown 18 is pivoted on a stud 25 protruding from the bottom plate 1. It presents at its upper portion a pivot 26 engaged in an opening of bridge 2. It is placed eccentrically in the movement and its wheel extends immediately above the inner face of the bottom plate 1 passing underneath the drum 6 and at the side of the seconds wheel 21 (FIG. 1).

The third wheel 20 has a pinion toothing meshing with the large driving wheel and a wheel toothing meshing with the pinion of the seconds wheel. Its shaft has an axial boring 27 with conical entry. It is pivoted on a stud 28 formed of a thin cylindrical metallic rod partially immersed in the bottom plate 1 and secured to the latter. In its upper portion the shaft of the third wheel 20 has a pivot 29 engaged in a corresponding opening 30 of bridge 2. However owing to the fact that the stud 28 extends upwardly to the level of the upper face of the third wheel 20 the latter is sufficiently engaged on stud 28 to be maintained by the latter in a position with its axis substantially perpendicular to the plane of the bottom plate 1. The opening 30 thus essentially serves as a guide and avoids excessive discentering of the third wheel 20.

The stud 28 does not extend to the bottom of the boring 27 and the shaft of third wheel 20 presents at its

lower end an annular abutment element 31 resting on the inner face of the bottom plate 1.

The seconds wheel 21 is similar to the third wheel 20. However its pinion toothing is situated above the wheel and the annular abutment surface 32 limits a boss of small height formed in the center of the wheel disk. The seconds wheel 21 also is pivoted on a stud 33 secured to the bottom plate 1. It is to be noted however, that it comprises a shaft 34, frictionally engaged in a central opening of the wheel 21. This shaft traverses the watch movement and carries at its upper end a seconds hand 56.

The escape wheel 22 is pivoted on a stud 35 sticking in the bottom plate 1 in the same manner as the wheel 21 whereas the pallet 23 is guided by a stud 36 immersed in a housing of the bottom plate 1. As visible from FIGURES 3 and 4 the axial play of the pallet 23, of the wheel 22 and of the seconds wheel 21 are limited on the one hand by the bottom plate 1 and on the other hand by the pallet cock 4, which is clamped between the bottom plate 1 and the bridges 2 and 3 and the guiding studs 4a, 4b, 4c of which protruding upwardly and downwardly being engaged in corresponding openings of the frame elements 1, 2 and 3.

The balance 24 is carried by a shaft 37 pivoting in two bearings 38 and 39 secured to the bottom plate 1 and to the balance cock 3, respectively. To the shaft 37 is secured a collet 40 holding the inner end of a spiral spring 41 the outer end of which is secured to a balance spring stud (not shown) which is secured to a balance stud support plate 42 adapted to rotate about a boss 43 of the balance cock 3. On the same boss is engaged a regulator 44, the key 45 and the stud 45a of which enclose the outer winding of the spring 41. The balance spring stud carrier 42, the regulator 44 and a washer 46 placed between these two elements are maintained in place on the boss 43 of cock 3 by a thin elongated resilient plate 47. The latter has an opening in the shape of a key entry engaged on the profiled end of a rod 48. This rod 48 traverses the cock 3 and the bottom plate 1. It presents at its lower end a head 49 provided with a slot 50. A packing ring 51 is placed between the head 49 and the bottom plate 1. The rod 48 forms a lock pressing a resilient plate 47 against the regulator and thus maintaining the latter in place. It further constitutes a control member for the regulator 44. To this end it is coupled by a shoulder 52 to a pinion 53 arranged in a recess 54 in the upper face of cock 3. This pinion meshing with a toothed sector 55 of the regulator 44 affords for displacement of this regulating member by means of a screw driver engaged in the slot 50.

The indicators of the described watch movement comprise besides the seconds hand 56 a minute hand 57 and an hours hand 58. The latter is secured to the sleeve of the hours wheel 59 pivoted on the sleeve of the cannon pinion 60 to which is secured a minutes wheel 57. The cannon pinion 60 in turn is pivoted on a sleeve 61 securely mounted to bridge 2 and extending upwardly to a central opening 62 of the dial 5. The toothing of the cannon pinion 60 is engaged in an angular recess 63 enclosing the base of sleeve 61 traversing the bridge 2 on a portion of its periphery. The toothing of the cannon pinion thus meshes with a toothed crown 64 (FIG. 2) of the cover 7 of the dial. This cover is provided with a second toothing 65 situated above of the bridge 2 and meshing with the wheel 59. Thus the cover 7 serves simultaneously as a driving member for the cannon pinion and for the dial train. To this end the cover 7 is coupled by a friction coupling 66 to the drum 6 of the barrel.

The described watch movement is provided with a winding mechanism and with a setting mechanism (FIG. 2) comprising a setting wheel 67 pivoted on a stud 68 projecting from the upper face of bridge 2. The setting wheel 67 meshed with a toothed crown 64 of the barrel

cover. A sliding pinion 69 sliding on a square portion of the winding stem 70 may be engaged with the setting wheel 67 by displacement of the stem 70 in outward direction under the action of a setting lever 71 actuating a lever 72 which displaces the sliding pinion 69 to the left in FIG. 2. A lever spring 73 maintains the lever 72 engaged on the pinion 69. Normally the latter is coupled to a winding pinion meshing with the crown wheel 15.

In order to afford for the mounting of the bridges 2 and 3 to the bottom plate 1 the latter has along its periphery five studs 75 made of one piece with the bottom plate. The bridges 2 and 3 have corresponding openings engaged each on one of said studs 75. As visible from FIG. 4 the cock has in a zone adjacent to the periphery of the movement an angular flat shoulder 76, a surface of which extends flush with the upper face of the studs 75. A corresponding shoulder extends at the periphery of bridge 2.

The bottom plate 1 and the bridges 2, 3 and 4 are elements made of plastic material such as for example of nylon, of a nylon derivate or of Delrin and are made of one piece with all openings and recesses required by injection moulding so that these elements need no further machining. The securing of the bridges on the bottom plate is effected by welding. To this end use may be made of a ring adapted to the dimensions of the shoulder 76 and provided with heatable collars, that may be lowered onto the watch movement subsequent to the positioning of a bridge and which weld the heads of the studs 75 to the bridge in one operation.

In the described embodiment the dial 5 is also made of one piece of plastic material. This dial extends above of the watch movement and an angular zone of this dial near its periphery bears onto the bridges 2 and 3. The dial itself is directly secured by its periphery to the watch case. However, in another embodiment, the dial could also be secured to the bottom plate 1, for example by means of feet which would be forced into openings provided in the studs 75. Also the dial 5 could be secured to the bridges 2 and 3.

The frame elements of the described watch movement being made by injection moulding of plastic material it is obvious that the studs 28, 33, 35 may be immersed in the plastic material during the moulding. To this end it is sufficient to provide the mould with receiving elements into which the studs may be placed before the moulding operation. Of course, the studs could be secured in a different manner.

In the described movement not only the frame elements are made of plastic material but also and to a major part the elements of the gear train. Thus, for example, the cover 7 and the drum 6 of the barrel, the center wheel 19, the third wheel 20 and the seconds wheel 21 exception made of the shaft 34, of the escape wheel 22 and of the pallet 23 are of plastic material. The balance 24 comprises a body of plastic material moulded on a ring 77 and on a shaft 37, both latter mentioned elements being of metal. The regulator 44 and the balance spring stud carrier 42 are also made of metal as well as the rod 48, the cannon pinion 60, the hour wheel 59 and the ratchet wheel 14.

Owing to the described arrangement the assembling of the watch movement may be effected in a very simple manner and very rapidly. It is to be noted in this respect, that the bottom plate 1 does not bear on its outer face any element that has to be placed there during the assembling. Thus after having engaged the rod 48 with the packing 51 in the corresponding opening in the bottom plate 1, the latter may be placed on the support where it remains until the assembling of the movement is completed. The different elements of the movement may be positioned in the following order:

(1) The seconds wheel 21 without the shaft 35. This wheel is engaged on stud 33 and is centered thereby and

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maintained with its axis substantially perpendicular to the bottom plate 1.

(2) The center wheel 19 the wheel of which will be at the same height as that of the wheel 21.

(3) The crown wheel 15 is placed freely on the boss 16.

(4) The ratchet wheel 14 the toothing of which is engaged with that of the crown wheel 15.

(5) The third wheel 20.

(6) The escape wheel 22.

(7) The pallet 23.

(8) The pallet cock 4 the lower studs 4b of which are engaged in openings provided in the bottom plate 1.

(9) The barrel (6, 7) provided with its shaft 8 the square 10 of which is engaged in the central opening of ratchet wheel 14, the lower face of the drum 6 resting on this ratchet wheel.

(10) All elements of the gear train and the barrel are then in their position and the gear wheel bridge 2 may be secured to the bottom plate and ensure in its definitive position the pallet cock 4 and the barrel 6, 7 the center wheel 19 and the third wheel 20.

Hereafter the regulator may be positioned by engaging the balance with its pin in the entry of the pallet and in the bearing 38. Then the balance cock 3 may be mounted before it is proceeded to the pinning up, to the checking and to the regulation. As the balance cock is assembled, its opening for the passage of rod 48 is engaged on the latter so that the pinion 53 may be engaged on the projecting end of the rod 48 and into toothing 55 and the plate 47 may be locked on the head of shaft 48.

Without necessitating any returning of the movement, the cannon-pinion 60, the hours wheel 59 and the setting wheel 67 as well as the elements of the winding mechanism may then be assembled.

All elements of the watch movement, exception made of the winding stem may thus be placed by a very simple operation, namely the lowering of the elements to be assembled presented in a correct position in a vertical downward movement. This means that all these operations may easily be effected mechanically. Moreover, since the wheels once placed on the bottom plate are maintained owing to their pivoting device on this bottom plate in a position with their axis substantially vertical, the positioning of the train wheel bridge is free from the difficulties which are encountered usually during the positioning of the train wheel bridge of a conventional movement and this in spite of the fact that this bridge carries the upper bearings of four elements.

As the pallet cock 4 is positioned a portion of the latter is placed above the wheel 21 so as to axially retain the latter in place.

This portion of the pallet cock has a recess of circular section extending around the shaft of wheel 21 so that when the bridge 2 has been secured to bottom plate 1 the central housing of wheel 21 is accessible directly through the central opening of sleeve 21. It is through this central opening that is engaged the shaft 34 the lower end of which is forcibly engaged into that opening. Thereby the shaft 34 is itself guided within the central opening of sleeve 61.

Of course the mounting of the hands 56, 57, 58 is effected subsequent to the mounting of the dial. In the case where the latter is secured to the watch case, the movement must be mounted in the case before the hands can be mounted, but this is not so, when the dial is secured directly to the movement. In any case the seconds hand 56 may be secured to shaft 34 before this shaft is inserted in sleeve 61.

In the described watch movement the fact that the main frame element extends opposite the dial and that in turn the secondary frame elements formed by the train wheel bridge and the balance cock extend immediately

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underneath the dial, whereby the wheels carrying the hands are mounted on the train wheel bridge, enables the assembling operations to be highly facilitated since all these operations may be effected from the same side of the main frame element.

I claim:

1. A watch movement comprising a frame formed of a main element and at least two secondary elements secured to the main element at the same side thereof, one of said secondary elements constituting the balance cock of the movement and providing for the pivoting of an end of a regulating member arranged in the frame, a dial covering one of the outer faces of the frame and the outer face of the secondary frame elements, said regulating member being formed by an oscillating balance co-operating with a spiral spring the active length of which is determined by a regulator, and characterized in that the regulator is adjustable by an actuating member traversing the watch movement and accessible from the outer face of the main frame element.

2. A watch movement comprising a frame formed of a main element and at least two secondary elements secured to the main element at the same side thereof, one of said secondary elements constituting the balance cock of the movement and providing for the pivoting of an end of a regulating member arranged in the frame, a dial covering one of the outer faces of the frame and the outer face of the secondary frame elements, a barrel comprising a shaft and a drum, the end of said shaft being engaged in a bearing in the inner face of the main frame element, said bearing being surrounded by a circular collar and adapted to the dimensions of a square opening in a ratchet wheel positioned between the barrel drum and the main frame element, said square opening being engaged partially on said collar and partially on a square of the dial shaft.

3. A watch movement comprising a frame formed of a main element and at least two secondary elements secured to the main element at the same side thereof, one of said secondary elements constituting the balance cock of the movement and providing for the pivoting of an end of a regulating member arranged in the frame, a dial covering one of the outer faces of the frame and the outer face of the secondary frame elements, and a gear train in which all the elements thereof are pivoted on stationary studs projecting from the inner face of the main frame element.

4. In a watch movement comprising a frame formed of a main element and at least two secondary elements secured to the main element at the same side thereof, one of said secondary elements constituting the balance cock of the movement and providing a pivot for an end of a regulating member arranged in the frame, a dial covering the outer face of the secondary frame elements, a gear train in which all the elements thereof are pivoted on stationary studs projecting from the inner face of the main frame element and abutting said inner face, and the length of said studs being such that they maintain each element of the gear train in a position in which its axis extends vertically when the main frame is placed horizontally with its inner face directed upwardly.

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