March 2, 1937. F. BETTER 2,072,704

ESCAPEMENT CONSTRUCTION

Filed Oct. 30, 1934

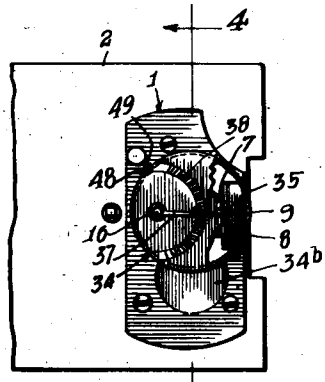


Fig. 1

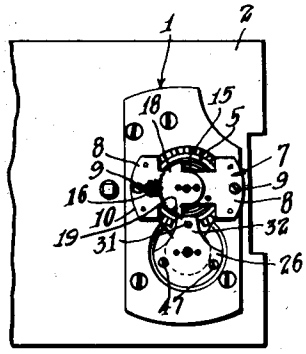


Fig. 2

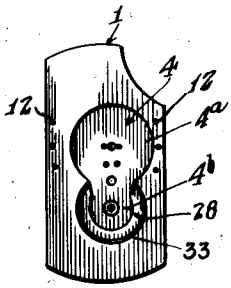


Fig. 3

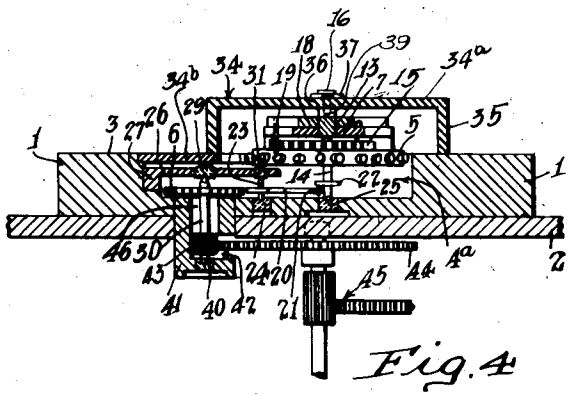


Fig. 4

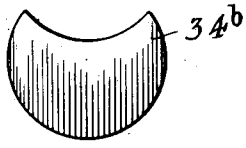


Fig. 5

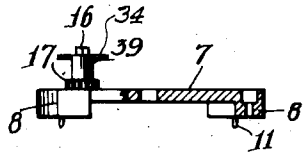


Fig. 6

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ESCAPEMENT CONSTRUCTION

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9 Claims. (Cl. 58—104)

This invention relates to the construction of escapements, and while the invention may be used in the construction of watches, clocks, or chronometers, it is expected to have its greatest usefulness when employed in connection with clocks for driving recording webs or dials.

It has been found in practice, that the accuracy of instruments employing an escapement, is greatly affected by the condition of the escapement mechanism; for example, it has been found that the presence of oil on the hair spring may increase the speed of movement of the balance-wheel of the escapement to such an extent as to render the instrument inaccurate. It is also desirable to provide a substantially dust-proof housing or casement for an escapement mechanism.

One of the objects of this invention is to provide an escapement construction, which is simple and which will provide a casing or casement for the moving parts, which will protect them and insure their efficient operation.

A further object of the invention is to provide an escapement construction, which will insure that accurate alignment of the bearings for the arbors of the escapement mechanism will be maintained.

A further object of the invention is to provide improved means for supporting the outer or upper bearings of the arbors or staffs of the escape-wheel and the balance-wheel, and also to provide means for effecting the regulation of the hair spring of the escapement from the exterior of the cover of the escapement.

A further object of the invention is to produce an escapement construction, which will provide a casement for the mechanism, which will be substantially dust-proof.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient escapement construction.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Figure 1 is a plan illustrating my escapement secured in place on a frame plate of a horological instrument, and showing a portion of a cover broken away to indicate a part of the cover in cross section. This view shows a portion of the frame plate broken away.

Figure 2 is a view similar to Fig. 1, but representing the cover removed from the escapement.

Figure 3 is a plan of the body of the escapement housing with the cover and the working parts of the escapement removed.

Figure 4 is a vertical section taken on the line 4—4 of Fig. 1 upon an enlarged scale, illustrating the general arrangement of the parts, and particularly illustrating the supports for the bearings of the escape-wheel and the balance-wheel, and showing how the cover of the escapement cooperates with the body to encase the escapement. This view also shows a frame plate of the instrument broken away, and shows a portion of the escapement train that connects to the driving mechanism of the instrument.

Figure 5 is a plan illustrating a portion of the cover.

Figure 6 is a side elevation in partial section of a bridge which I prefer to employ as a bearing for the balance-wheel staff or arbor.

In accordance with this invention, I prefer to mount the escapement mechanism in a housing distinct from the framing of the instrument with which the escapement mechanism cooperates, and this housing preferably has a body in the form of a stout block which is attached against the outer side of one of the frame plates of the instrument. The outer face of this block is recessed so as to form a chamber for the escapement mechanism, and over this chamber a cover is provided which seats on the block, thereby forming a substantially dust-proof casement for this mechanism. The advantage of forming the body of the housing in the form of a block, is that this gives great rigidity to the housing, preventing any possible warping, and assuring that perfect alignment of the bearings formed in the housing and bearing brackets mounted in the housing, will be always maintained. One of the features of the invention is that the bearing for the arbor of the escape-wheel is provided with a relatively wide seat in this block, insuring a good support for the bearing of the escape-wheel arbor. A bearing for the arbor of the balance-wheel is carried in a bridge extending across the chamber in the block, and this bridge is preferably constructed so that it will center the cover of the casement when it is put down in place. This cover is preferably constructed in the form of a shallow inverted cup, the flange of which seats on the outer face of the block, and the cover preferably includes an extension in the form of a plate that extends over the escape-wheel and encases that part of the escapement

mechanism. In the present embodiment of the invention the extension over the escape-wheel is in the form of a plate, which, for convenience, is made as a separate piece from the bonnet that constitutes the remainder of the cover. The staff or arbor of the escape-wheel is preferably mounted in a sleeve that extends through the frame plate that carries the escapement housing, and beyond this frame plate the staff of the escape-wheel is provided with a pinion to mesh with one of the gears of the escapement train. This construction is described more in detail hereinafter.

Referring more particularly to the parts, and especially to Figs. 1 and 2, the escapement housing comprises a body 1, which is preferably in the form of a thick metal block which is secured on the outer face of a frame plate 2 of the instrument with which the escapement cooperates. This block is recessed on its outer or upper face 3 so as to form a chamber 4, which includes a relatively large substantially circular chamber 4a in which the balance-wheel 5 is mounted, and includes a relatively smaller chamber 4b communicating with the chamber 4a and which carries the escape-wheel 6, (see Fig. 4).

Extending laterally across the block or body 1, I provide a bridge 7 (see Fig. 2), which is preferably provided with enlarged heads 8 at its ends, and this bridge is secured by suitable screws 9 to the outer face 3 of the block. The heads 8 are preferably formed with arcuate end faces 10, which are struck on a radius from the center of the chamber 4a. This bridge or bridge plate 7 is preferably provided with dowel pins 11 on its under side, which are received in dowel sockets 12 (see Figs. 3 and 6). At the middle of the bridge 7 an opening is provided to receive the upper or outer bearing 13 for the balance-wheel arbor 14. This bearing would, of course, be a jeweled bearing (not illustrated). The balance-wheel is provided with a hair spring 15 of usual construction, and the action of this hair spring can be regulated through the agency of a regulator shaft 16 that extends down through the bridge 7, and this regulator shaft carries a pinion 17 to mesh with the segment or sector 18. This sector 18 carries a small wire 19 of suitable form for engaging with the hair spring to regulate it. This regulator shaft 16 can be operated from the exterior of the housing, as will be described hereinafter. The escape-wheel cooperates with a pallet fork 20, the fork end of which cooperates with a pin 21 extending down from a collar 22 rigid on the arbor 14 of the balance-wheel. The arbor 23 for this pallet fork has a bearing 24 in the bottom of the chamber 4a, and a similar bearing 25 is provided for the arbor 14 (see Fig. 4).

Mounted within the chamber 4b I provide a bearing bracket 26, which is of general fan-shape as illustrated in Fig. 2. This bearing bracket is in the form of a plate having a relatively thick flange 27 formed on a circumferential edge. It fits down onto a shoulder 28 of arcuate form, which is formed in the recess or chamber 4b by counterboring this chamber (see Fig. 3). This bearing bracket carries a bearing 29 at its center for the arbor or staff 30 of the escape-wheel, and also carries a small bearing 31 for the pallet fork arbor 23. This bearing 31 is formed near the extremity of a tapering tongue portion 32 of the bearing bracket that projects toward the arbor 14 of the balance-wheel.

In order to encase the parts of the escapement, the chamber 4b is preferably provided with a small counterbore forming a rabbet groove or arcuate shoulder 33 to support a part of the cover 34 for the escapement mechanism. This cover preferably includes a bonnet 34a which is in the form of an inverted shallow cup having a cylindrical flange 35 that fits down neatly on the arcuate faces 10 of the bridge 7 (see Fig. 1). This centers the bonnet 34a in position. The cover also includes an extension 34b which, in the present instance, is made as a separate piece from the bonnet 34a. This extension or plate 34b is illustrated in Fig. 5, and has the form of a large crescent. The crescent is so large that this cover plate has a convex periphery extending over more than 180°. This insures that when this plate is dropped into place, it will center itself and be retained by the edge of the chamber 4b. The outer or upper face of this plate 34b is flush with the face 3 of the block. This plate should be put into place before the bonnet 34a, and when the bonnet is in place, the edge of its flange 35 thrusts against the upper face 3 of the block 1 and extends over and abuts against the upper face of the plate 34b. In this way, a substantially tight connection is made between the bonnet and the block, and if desired, a gasket can be used between the meeting faces of these parts.

The bonnet 34a is provided with an opening 36 to permit the regulating shaft 16 to pass up through the bonnet when the bonnet is put in place. Above the bonnet the regulator shaft 16 is provided with a pointer 37, which may cooperate with a scale 38 formed on the upper face of the bonnet. This scale may have symbols upon it to indicate the direction the pointer should be moved to accelerate or retard the action of the hair spring 15 of the escapement. Of course, when the pointer 37 is swung through an arc, its movement will be imparted to the pinion 17, which, in turn, will impart its movement to the segment or sector 18 that carries the regulator wire 19.

If desired, the bonnet 34a may be provided with a bushing 39 to carry the regulator shaft 16. (See Fig. 6.) This bushing 39 should make a neat fit in the opening 36 in the bonnet to insure a substantially dust-tight connection.

The inner end of the arbor 30 of the escape-wheel is carried in a bearing 40 in a sleeve that extends in through the frame plate 2 (see Fig. 4), and this sleeve is preferably rigid with the block 1. The side of this sleeve is cut away as indicated at 42, to enable a pinion 43 on the arbor 30 to mesh with the gear 44 of the escapement train 45. The sleeve 41 is of tubular form, and if it is desired to make the casing for the escapement mechanism very positively dust-proof, this can be accomplished by placing a dust-washer in the tubular bore of this sleeve at the point 46, (see Fig. 4).

The bearing bracket 26 is secured on its annular seat 28 by suitable screws 47.

The cap or bonnet 34a can be secured in place by two diametrically opposite screws such as the screw 48 illustrated in Fig. 1. These screws 48 would be located diametrically opposite to each other and placed quite close to the flange 35 of the bonnet. The head of each screw is cut away as indicated at 49. These screws would have very fine thread. By turning these screws so that the cut edges 49 are located inwardly, clearance will be afforded for the bonnet to be set down into position, after which, by tightening up these

screws, their heads will engage the upper face of the bonnet and hold it in position.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claims, to the particular embodiment set forth.

What I claim is:

1. In an escapement construction, the combination of an escapement housing having a body in the form of a block with a chamber therein to receive the escapement mechanism, a complete escapement mechanism carried by said block, and a cover seating on said body over said chamber and having a chamber receiving parts of the escapement mechanism and cooperating with said block to form a casement for the said escapement mechanism.

2. In an escapement construction, the combination of an escapement housing having a body in the form of a solid block with a chamber therein to receive the escapement mechanism, a bridge secured to the outer face of said block and extending across said chamber, and a cover seating on said body over said chamber and cooperating with said body to form a casement for the escapement mechanism, said cover and the ends of said bridge having curved faces engaging each other to center the cover on the block.

3. In an escapement construction, the combination of an escapement housing having a body with a chamber therein to receive the escapement mechanism, and a cover seating on said body over said chamber and cooperating with said body to form a casement for the escapement mechanism, said cover comprising a plate section and a bonnet, said bonnet having a chamber on its under side communicating with the first-named chamber.

4. In an escapement construction, the combination of an escapement housing having a body with a chamber therein to receive the escapement mechanism, and a cover for said chamber, said cover comprising a plate section, the outer face of said body having a shoulder for supporting said plate section with its outer face substantially flush with the outer face of said body, said cover also including a bonnet having a chamber on its under side and secured to the outer side of the body and with its inner edge extending over the outer face of said plate section.

5. In an escapement construction, the combination of an escapement housing having a body with a chamber therein, said chamber including an escape-wheel chamber, and a balance-wheel chamber communicating therewith, said chambers being recessed into the outer face of said body, said escape-wheel chamber having a shoulder extending along the same adjacent the outer face of the body, a cover for said body including a plate section received on said shoulder with the outer face of said plate section substantially flush with the outer face of said body, and a bonnet with a chamber on its under side and secured over said first-named chamber with the inner edge of said bonnet abutting against the outer face of the body and extending over, and abutting against, the outer face of said plate section.

6. In an escapement construction, the combination of an escapement housing having a body with a chamber therein, said chamber including an escape-wheel chamber, and a balance-wheel chamber communicating therewith, said chambers being recessed into the outer face of said body, said escape-wheel chamber having a shoulder extending along the same adjacent the outer face of the body, a cover for said body including a plate section received on said shoulder with the outer face of said plate section substantially flush with the outer face of said body, and a bonnet with a chamber on its under side and secured over said first-named chamber with the inner edge of said bonnet abutting against the outer face of the body and extending over, and abutting against, the outer face of said plate section, said escape-wheel chamber being of substantially circular form and having a counterbore forming said shoulder.

7. In an escapement construction, the combination of an escapement housing having a body with a chamber in the form of a recess extending into the same from its outer face, a bridge extending across said chamber and secured on the outer face of the body, a bearing carried in the said bridge for the balance-wheel of the escapement, a bearing bracket for the arbor of the escape-wheel of the escapement, said body having a seat for the said bearing bracket within said chamber, means for securing the bearing bracket on said seat, said bridge having arcuate centering faces, and a cover having a bonnet with an arcuate flange fitting down over the said arcuate faces of said bridge and centered thereby, said cover having a part extending over the bearing bracket and cooperating with the outer face of said body to encase the escapement mechanism.

8. In an escapement construction, the combination of an escapement housing having a body with a chamber therein to receive the escapement mechanism, said chamber being in the form of a recess extending into the body from its outer face, a bridge secured to the outer face of said body extending across said chamber, a bearing for the balance-wheel of the escapement carried in said bridge, said bridge having arcuate centering faces, and a cover in the form of a bonnet with an annular flange extending downwardly on its under side seating down over the bridge with the flange engaging said arcuate faces to center the cover thereon.

9. In an escapement construction, the combination of an escapement housing having a body with a chamber therein to receive the escapement mechanism, said chamber being in the form of a recess extending into the body from its outer face, a bridge secured to the outer face of said body extending across said chamber, a bearing for the balance-wheel of the escapement carried in said bridge, said bridge having arcuate centering faces, and a cover in the form of a bonnet with an annular flange extending downwardly on its under side seating down over the bridge with the flange engaging said arcuate faces to center the cover thereon, a regulator shaft for the escapement extending up through said bonnet to the upper face thereof, and a pointer carried by said regulator shaft above the outer face of the bonnet.

FREDERICK BETTER.