F. ECAUBERT.

COLLET FOR HAIR SPRINGS.

APPLICATION FILED MAY 4, 1917.

1,283,705. Patented Nov. 5, 1918.

Fig. 1.

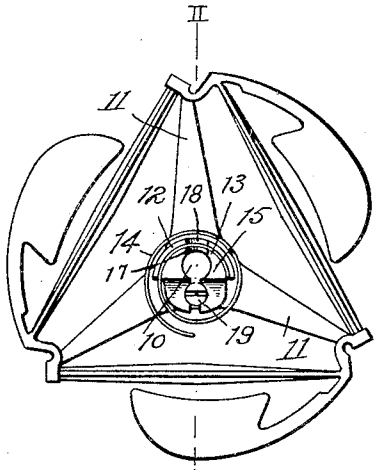


Fig. 2.

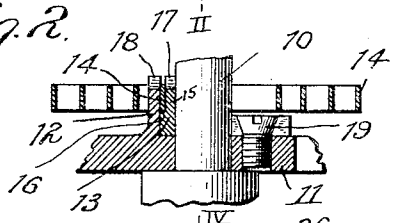


Fig. 3

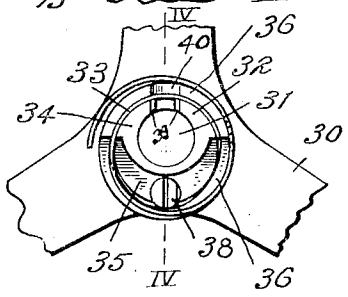
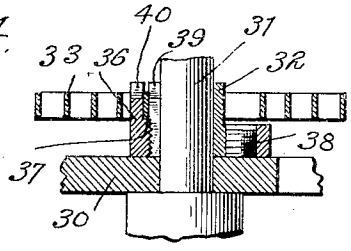


Fig. 4.



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UNITED STATES PATENT OFFICE.

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COLLET FOR HAIR-SPRINGS.

1,283,705. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed May 4, 1917. Serial No. 166,372.

To all whom it may concern:

Be it known that I, FREDERIC ECAUBERT, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Collets for Hair-Springs, of which the following is a specification.

My invention relates to devices for fastening the hair springs of timepieces to the balance wheels or staffs on which the latter are mounted.

The construction usually employed for this purpose consists of a split collar or ring adapted to be forced over the balance wheel staff and provided with a more or less tangential bore or recess in which the end of the hair spring is secured by means of a wedge. The objects of my invention are mainly to provide a construction of collet in which the hair spring can be readily and conveniently secured, and in which the effective length of the hair spring will remain constant in all positions of the timepiece, after it has once been mounted in place. According to my invention, the collet is free from parts projecting into the operating space of the hair spring, and furthermore, it is of such construction that the entire unit of the balance wheel hair spring and collet can be readily maintained in perfect counter-balance. Another important object of the invention is to provide a convenient and effective arrangement for the mounting and demounting of the hair spring in the timepiece movement.

Within the broad scope of the invention, the collet may represent a portion of the balance wheel, or it may be constructed entirely independently thereof and adapted to be assembled on the staff in proper relation thereto. Both of these suggested embodiments of the invention are shown in the accompanying drawing to illustrate the principles employed.

In said drawing,

Figure 1 is a face view of a compensating balance wheel employing a construction in which part of the collet is integral with the balance wheel proper. Fig. 2 is a transverse section through the collet and balance wheel on the line II—II of Fig. 1;

Fig. 3 is a face view of a construction of collet formed independently of the balance wheel, but adapted to be properly associated therewith on the staff; and Fig. 4 is a transverse section of the same taken on the line IV—IV of Fig. 3.

Referring to the embodiment of the invention illustrated in Figs. 1 and 2, 10 indicates the staff on which is mounted a balance wheel 11, constructed under the principles clearly shown in my prior U. S. Patent No. 1,176,527, granted March 21, 1916 for a compensating balance wheel. The wheel center in the present instance is formed with a generally semi-circular flange 12 projecting integrally therefrom in approximately concentric but preferably somewhat eccentric relation with the staff 10. This flange 12 constitutes a stationary clamp jaw or anvil, and mounted within it is the moving clamp jaw 13, which is in the form of a split ring or collar sprung over the staff 10 and adapted when seated flat against the face of the balance wheel center, to cooperate with the flange 12, in firmly gripping and securing the hair spring 14 in place. For this purpose, the moving clamp member has a generally semi-circular rear portion 15 extending to about the same height as flange 12, such rear portion being shouldered at 16 to constitute a positive stop or seat by which the hair spring 14 is engaged and arrested when inserted in axial direction. Such rear portion 15 and the flange 12, may, if desired, be recessed at 17, 18 to accommodate the introduction of a suitable implement for pressing the hair spring 14 down against shoulder 16, whereby the plane of the hair spring is established. The forward portion of the split ring 13 is somewhat lower than the shoulder 16 to provide clearance for the hair spring, and is separated into two halves which tend to spring toward each other. To spread these two halves and thereby close the inner and outer clamp members 13 and 12 upon the hair spring which rests between them. I provide a wedge screw 19, which is threaded into the wheel center of the balance wheel 11. By screwing down the wedge screw 19, the inner clamp member is distorted so as to grip the hair spring as above described, whereas by unscrewing the cam screw 19, the pressure of the inner clamp member 13 upon hair spring 14 is relieved. Screw 19 also serves to secure collar 13 to the balance wheel.

At the point where the hair spring enters the collet, the faces of what I may term

the inner and outer clamp members are substantially in the same plane, so that no portion of either clamp member projects into the natural range of movement of the hair spring. In this way, the effective length of the hair spring will remain constant for all positions of the timepiece, regardless of gravity. The contour or curvature of the gripping surfaces of the inner and outer clamp members, preferably conforms with the natural curvature of the hair spring, so that the hair spring is not under strain. This curvature may be, for example, spiral or circular and it may be concentric with the axis, or only approximately so. The entire unit including the balance wheel, staff, collet and hair spring, is in the preferred form intended to be counter-balanced, and in the embodiment of the invention already described, compensation for changes in temperature is provided for as fully described in my said prior U. S. patent.

Instead of having a portion of the collet formed integral with the balance wheel center, the invention also embraces within its broad principles, a form of collet which may be applied to any approved form of balance wheel, as illustrated for example, in Figs. 3 and 4. In these figures, 30 indicates the balance wheel center which is suitably mounted on the staff 31. A split ring or collar 32 is formed over the staff 31 and pressed firmly against the face of balance wheel 30. This collar 32 constitutes an inner clamp member, which in the present instance, is stationary and acts as the anvil against which the hair spring 33 is pressed, as will appear. The collar 32 is substantially circular in outline, but as before it has a raised portion 34 and a lower portion 35, the split being in the present instance, in the raised portion. The outer periphery of the split ring or collar 32 is threaded and has threaded upon it the outer clamp member 36 which has raised and lower portions corresponding with those of the inner clamp member. The hair spring 33 rests upon a stop shoulder 37 formed upon the inner periphery of the outer clamp member 36 at a level somewhat above the lower portions of the inner and outer clamp members. The outer clamp member in this instance constitutes the movable clamp and to accommodate its movement, the threaded connection between the two clamp members is such as to permit a certain amount of play or freedom radially. To accomplish this motion by which the clamping action is carried out, a cam screw 38 is threaded into the inner clamp member so as to project from its periphery and engage the inner periphery of the outer clamp member 36. The outer clamp member is in effect a ring of such thickness as to permit of its being distorted by the cam screw 38 so as to draw the raised portion of the outer clamp member firmly against hair spring 33, and thus grip it between the two clamp members. The cam screw 38 has a flat face which permits the ring or outer clamp member 36 to return to normal shape when this flat face is presented to the inner periphery of the ring 36. In the present case, as before, the two raised portions are provided with recesses 39 and 40 to permit the introduction of a suitable implement for pressing the hair spring firmly down against the shoulder 37, whereby the plane of the hair spring is established.

In both embodiments of the invention above described, the collet comprises two clamp members of which at least one is distortable in the clamping operation, and it will be seen that the distortable member may be either the inner or the outer one. The distortion may occur in a member which is a complete annulus or a split ring. Both clamp members engage the hair spring on a curved surface of at least approximately the same curvature as the engaged portion of the hair spring has, and at the point where the hair spring enters the collet, the end face of each clamping portion is approximately at a right angle to the hair spring, so that in all positions of the timepiece, the operating portion of the hair spring is free from contact with the collet, thus insuring a constant effective length, once it has been adjusted. I prefer to so dispose the parts that in any case the entire unit comprising the balance wheel, hair spring and collet, will be in a state of counter-balance.

With reference to the embodiment illustrated in Figs. 3 and 4, it will be seen that the cam screw 38 is not a complete circle in cross section and therefore one side is heavier than the other. The locking action, however, remains effective throughout considerably more than one-half of the circumference of the screw. In view of these facts, the exact position of screw 38 can be varied so as to throw more or less weight toward or away from the axis of the balance wheel, which would have a slight influence on the balancing of the entire unit.

I claim:—

1. In combination with a balance-wheel staff, a collet comprising two clamping members embracing said staff, one member rigidly supported as to the other member, the other member distortable in shape with relation to the first member, the two members having surfaces for engaging the hair-spring of approximately the same curvature as the hair-spring near the latter's inner end, the engaging surfaces terminating at the end adjacent the effective part of the hair-spring substantially in a line transverse the hair-spring, and adjustable means for

both distorting one member of the clamp and allowing it to reutrn to undistorted shape, so that in one position of said means the hair-spring will be clamped and in the other released.

2. In a combination such as set forth in claim 1, the clamping members comprising a rigid collar fixed to the balance-wheel and a distortable split ring encircling the staff and having a two-position distorting member for forcing the split ring into locking engagement with the hair-spring or releasing it therefrom.

3. A collet for hair springs, comprising in combination inner and outer clamp members having hair spring engaging surfaces conforming approximately with the curvature of the hair spring, one of said members being distortable to effect relative motion of one surface toward the other, a shoulder on one of said members to establish the plane of the hair spring, and means for controlling the distortion of the distortable member to govern the clamping operation.

4. A collet for hair springs, comprising in combination inner and outer clamp members having hair spring engaging surfaces conforming approximately with the curvature of the hair spring, one of said members being distortable to effect relative motion of one surface toward the other, a shoulder on one of said members to establish the plane of the hair spring, and means disposed below the plane of said shoulder for controlling the distortion of the distortable member to govern the clamping operation.

FREDERIC ECAUBERT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."