Aug. 25, 1942. H. COLOMB 2,294,023

BALANCE BRIDGE WITH REGULATOR FOR CLOCKWORK MECHANISM

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Fig.1

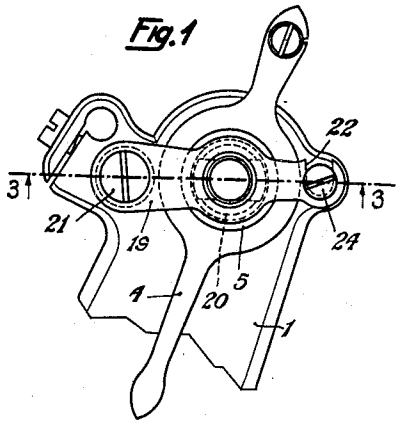


Fig.2

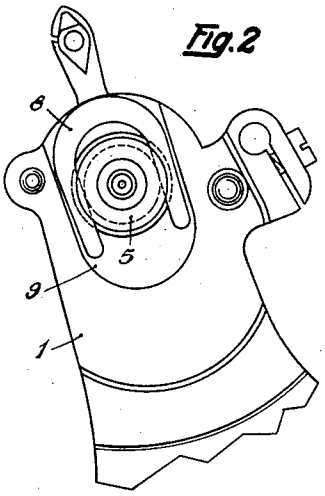


Fig.3

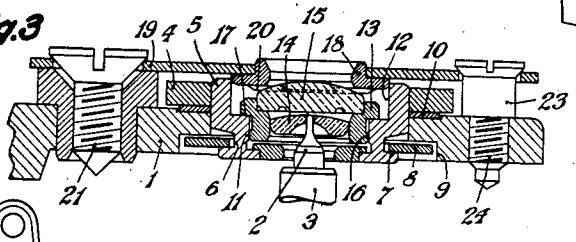
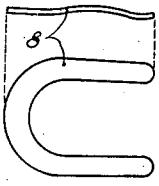


Fig.4



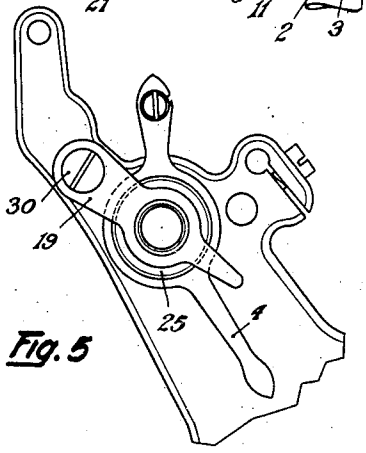


Fig.5

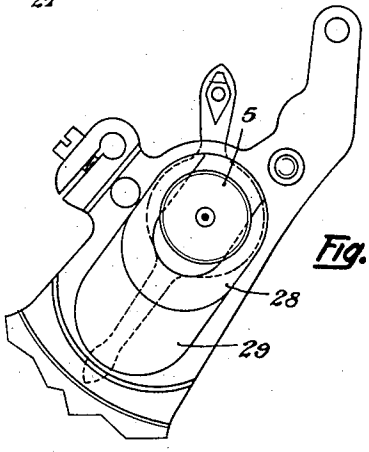


Fig.6

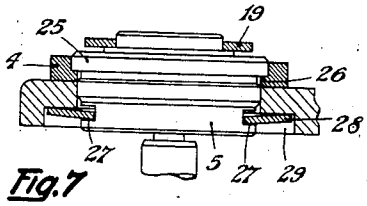


Fig.7

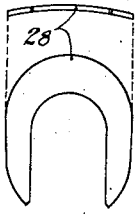


Fig.8

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BALANCE BRIDGE WITH REGULATOR FOR CLOCKWORK MECHANISM

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Fig. 9

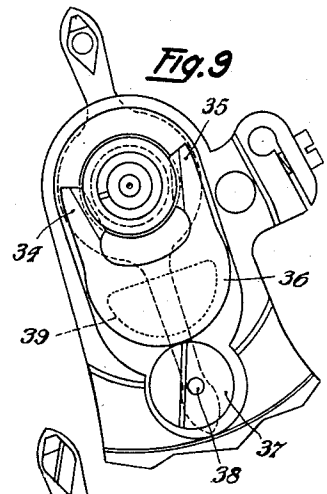
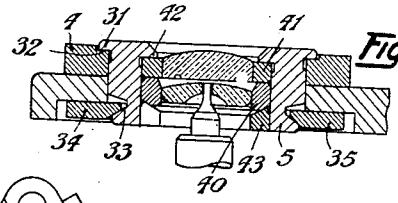


Fig. 10



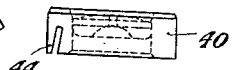


Fig. 11

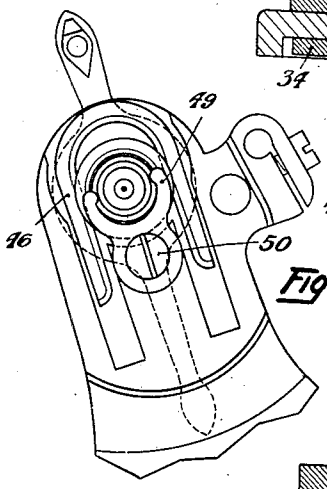


Fig. 12

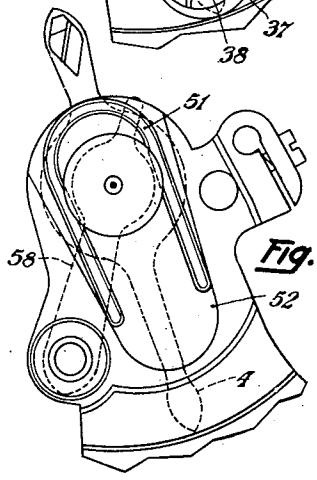


Fig. 13

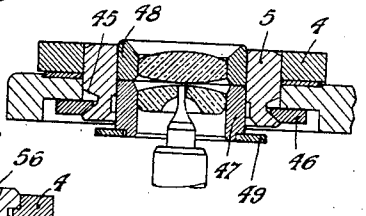


Fig. 14

Fig. 15

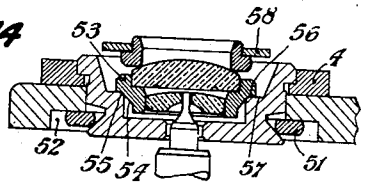


Fig. 16

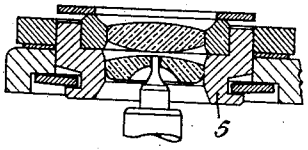


Fig. 17

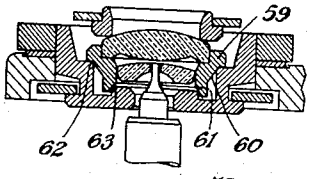


Fig. 18

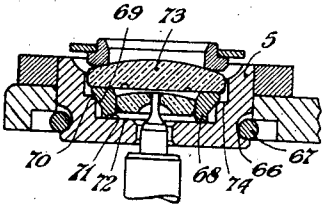


Fig. 19

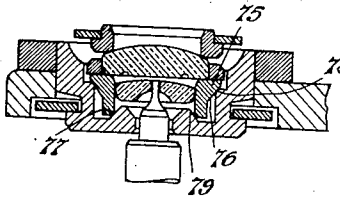
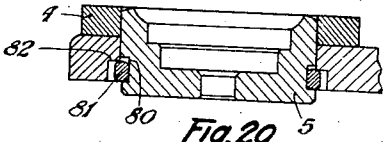


Fig. 20



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Patented Aug. 25, 1942 2,294,023

UNITED STATES PATENT OFFICE

2,294,023

BALANCE BRIDGE WITH REGULATOR FOR CLOCKWORK MECHANISM

Henri Colomb, Lausanne, Switzerland

Application May 1, 1939, Serial No. 271,145
In Switzerland May 12, 1938

1 Claim. (Cl. 58—139)

The present invention relates to an arrangement comprising a bearing bridge provided with a regulator for clockwork mechanism, and including particularly the pivot bearing for the spindle of the balance wheel.

The primary object of the invention is the provision of a bridge which the regulator is assembled with by the intermediary of a socket snugly fitted in the bridge and by assembling means applied to said socket and to said bridge. It is another object to provide said assembling means at the same time for subjecting the rotary movement of the regulator to heavy friction so as to preclude the probability of accidental displacement of the regulator.

A further object of the invention is the provision of the two parts of the bearing, namely, the perforated member which is traversed by the pivot and the member serving as abutment for the end of this pivot, in coaxial arrangement with the socket in a manner that at least one of said members is kept in place by fixing means so as to be detachable even if the regulator remains assembled with the bridge.

The invention consists in the construction and arrangement of certain parts as will be apparent from the following description and claim, reference being had to the accompanying drawings which show various forms of embodiment of the present invention.

In the drawings,

Figures 1 and 2 are plan views of a first embodiment shown from the top and from below, respectively. Figure 3 is a sectional view along line 3—3 of Fig. 1 and Figure 4 shows a detail.

Figures 5 and 6 are plan views of a second embodiment shown from the top and from below, respectively. Figure 7 is a partial section along the bearing axis of this embodiment and Figure 8 shows a detail.

Figure 9 is a plan view from below of a third embodiment and Figure 10 is an axial section thereof. Figure 11 shows a modification of a detail thereof.

Figure 12 is a plan view from below of a fourth embodiment and Figure 13 is an axial section thereof.

Figures 14 and 15 are according views of a fifth embodiment.

Figures 16 to 20, inclusive, illustrate each one an axial section of a modification.

The embodiment of Figures 1 to 4 comprises the balance bridge 1, the upper pivot 2 of the axle 3 of the balance wheel, the regulator 4 rigidly mounted by pressure on the socket 5 which in turn is freely but without play fitted in the bridge 1. This socket has in its lower portion a circular groove 6, the lower plane face 7 of which is situated in a perpendicular plane respective to the axis of the balance wheel. A spring 8 cut out in U-shape and having the two branches longitudinally cambered (see Fig. 4) is located in a slot 9 provided in the lower face of the bridge, said two branches penetrating into the groove 6 of the socket 5 for exerting upon the regulator-socket aggregate a traction parallel to the axis of the balance wheel, so as to keep the aggregate in place and subjecting the rotary movement of the regulator relative to the bridge to heavy friction. A washer 10 is inserted between the regulator and the bridge to protect the latter from any deterioration, when the regulator is moved. The socket 5 shows two cylindrical recesses 11 and 12 wherein the bearing of the pivot 2 is seated. This bearing comprises the perforated part 13, that is to say a bezel wherein the perforated jewel 14 is fixed, and the cap jewel 15 which is freely mounted in a concentrical recess of the bezel 13 above the perforated jewel. This bezel 13 is exactly fitted in the socket recess 11 by means of an outer cylindrical surface 16 and it rests with a transversal abutting surface 17 upon the bottom of the socket recess 12. The bearing is kept in place by means of a ring 18 carried by a leaf spring 19 and bearing with two diametrically opposite projections 20 against the cap jewel 15. The leaf spring 19 previously arched so that its concavity being faced when mounted, is with its both ends fixed to the bridge, at one end by means of the screw 21 engaged in a barrel driven into the bridge, and at the other slotted end 22 by means of the screw 24 having a collar 23 which is partially surrounded by the hook shaped end of said spring 19. For releasing the cap jewel it will be sufficient to slightly unscrew the two screws 21 and 24, and then to disengage the spring 19 from the screw 24 by rotating it round the screw 21.

It is a particular feature of the above described fixed bearing that the two parts 13 and 15 of the bearing are located in the socket 5 so as being assembled independently thereof and in a manner to be only axially separable from each other. Regulator and socket of this embodiment could form a single piece.

In ordinary Swiss watches the perforated jewel is fixed in the movement plate covering the balance and the cap jewel is mounted in a part called "coqueret" which is secured on the covering plate by screws. The outer surface of this coqueret is

generally truncated conical and the regulator, being split, is snugly mounted on this surface. In comparison with the arrangement, the above described structure presents the following advantages:

The elimination of the coqueret allows the regulator hub to be reduced and the bearing jewels to be increased in diameter thus permitting to provide the bearing with a larger quantity of oil. Furthermore by making the regulator hub smaller the eye-screw carrying the regulator pins is positioned nearer the axis of the balance wheel, in consequence of which the Breguet overcoil of the hairspring operating between the regulator pins is provided with a normal, small radius of curvature whereby a turn of the hair-spring will be less likely to catch or snag on the regulator pins when the watch is subjected to a shock.

For cleaning the jewels or lubricating the bearing it will no more be necessary to separate the regulator from the bridge and to remove the latter from the pillar plate; it is sufficient to lift the bearing out of the regulator-socket aggregate. The lubricating of the bearing is performed while the two bearing parts remain assembled, the cap jewel resting on the work bench, by introducing the oil through the jewel perforation and letting it run over the cap jewel.

With the regulator-socket aggregate, wherein the regulator is no longer split and depends upon the socket for its centering with respect to the axis of the balance wheel, the position of the abutment for the spiral on the one hand is firm and on the other hand it does not vary its radial distance from said axis when the regulator is turned. Furthermore, the assembling of this aggregate in the bridge is easy and rapid and allows to perform the rotary movement of the regulator under very regular, tolerable friction.

In the embodiment of Figures 5 to 8 the regulator 4 is snugly fitted on the socket 5 which is fitted in the same manner into the bridge. This socket provides at its upper portion a circular shoulder 25 resting in a seat 26 of the regulator, and at its lower portion two rectilinear and parallel grooves 27 wherein are engaged the two branches of a U-shaped spring 28 (see Fig. 8) located in a slot 29 of the bridge and being slightly cambered according a cylinder the sides of which would be parallel to these two branches. The width of the spring and the space between its two branches are established according to the dimensions measured between the sides of the slot 29 and the bottom of the two grooves of the socket in a manner to render the latter immovable. This spring exerts upon the socket a traction parallel to the axis of the balance wheel, which is sufficient for maintaining the regulator between the shoulder 25 of the socket and the bridge, so that this regulator can be turned under heavy friction between these two parts. The socket contains likewise a bearing similar to that one of the first described embodiment. The leaf spring 19 previously and suitably cambered for maintaining the bearing in place is secured by means of a screw 30 screwed into a barrel which is rigid with the bridge and serves as support for the spring.

In the embodiment of Figures 9 and 10 the regulator is snugly mounted on the socket 5 fitted in the same manner into the bridge. The socket provides at its upper portion a shoulder 31 resting on a seat 32 of the regulator, and at its lower portion a circular groove the lower side 33 of which is conical. In this groove are engaged the two parallel and canted branches 34 and 35 of an assembling organ 36 located in a slot of the bridge and submitted to the action of an eccentric 37 adapted to turn round a tenon 38 of the bridge. Thanks to this eccentric the insertion of the concerned branches into the groove can be adjusted and, consequently, the traction exerted upon the socket 5 and, furthermore, the friction of the regulator, since this traction clamps the regulator between the shoulder 31 of the socket and the bridge, so that the regulator can be rotated under tolerable friction between these two parts. The organ 36 could be rendered elastic, for instance by cutting out a hole shaped according the dotted line 39. The perforated jewel and the cap jewel of the bearing of this embodiment are fixed in the rings 40 and 41, respectively. These two rings, especially the ring 40, are snugly fitted into a cylindrical bore of the socket and are kept in place against the seat 42 thereof by means of a split ring 43 elastically disposed in said bore. This ring 43 could be dispensed with and the part backing against the seat in the socket bore could be maintained in position by means of the perforated part which would be furnished with an elastic tongue 44 (see Fig. 11) permitting, when previously widened a little, to be easily fitted in the bore by frictional engagement.

In the embodiment of Figures 12 and 13, the socket 5 whereupon the regulator is forcedly driven, provides at its lower part a circular groove 45 with a tapered lower side and wherein the branches of a U-shaped spring 46 are engaged. The branches are canted and their spacing is such that by immerging the spring more or less into the groove the traction exerted upon the socket can be adjusted. The cap jewel ring 48 is driven into a central bore of the socket wherein the perforated part or bezel 47 is snugly located and maintained by means of a spring 49 with two branches fixed by a screw 50 to the lower face of the bridge and acting upon the extremity of the bezel which projects beyond the socket.

In the embodiment of Figures 14 and 15, the regulator 4 is snugly mounted on the socket which is likewise snugly fitted into the bridge, and the former is clamped between a shoulder of this socket and the bridge. The regulator-socket aggregate is assembled to the bridge by means of a wire spring 51 of U-shaped and of rectangular cross section with rounded edges, disposed in a chamber 52 made in the lower face of the bridge and having its lateral wall more spaced from each other at its entrance than at its end. In this way, by immerging the spring further into said chamber, the branches of the spring bearing with their ends against said lateral walls approach each other, increasing thus the traction exerted upon the socket and, consequently, the frictional engagement of the regulator. The bearing disposed in this socket is no more a fixed bearing but a shock absorbing bearing similar to that one constituting the object of the United States Patent No. 2,146,329. It comprises the perforated part or bezel 53 wherein the perforated jewel is fixed and the cap jewel being freely fitted in a recess of said bezel. The centering of this perforated part in the socket is obtained by a conical, circular surface 54 provided thereon and co-operating with a rounded circular edge 55 of the socket. The latter provides furthermore a circular shoulder 57 co-operating with a transversal abutting surface 56 of the bezel. The bearing is kept in place by means of a spring 58.

In the embodiment of Figure 16 the regulator-socket aggregate is assembled with the bridge by means of a spring similar to that one in Fig. 8; the perforated jewel is directly driven into a central bore of the socket **5**, and the cap jewel is freely fitted in a concentric bore wherein it is maintained by means of a spring. The modification in Fig. 17 does not differ from this embodiment but by a spring which assembles the regulator-socket aggregate with the bridge and by the bearing located in the socket. This shock absorbing bearing of the type constituting the object of the United States Patent No. 2,219,068 granted October 22, 1940, application No. 215,024, comprises a perforated part or bezel **59** wherein the perforated jewel is fixed, and the cap jewel resting freely in a coaxial bore of said bezel. The centering of said bezel in the socket is obtained by means of two conical, circular surfaces **60** and **61** provided on the bezel and co-operating with two rounded circular edges **62** and **63** of the socket.

In the modification of the Figure 18 the groove **66** made in the lower end of the socket shows a semi-circular cross section and the spring **67** engaged therein is constituted by a wire of circular cross section, bent in U-shape. The bearing is of the type described in the United States application for patent Serial No. 231,053. The perforated jewel is fixed in a bezel **68** providing a conical circular surface **69** which co-operates for centering with a rounded circular edge **70** of the socket. The bezel abuts, on the other hand, with its lower end **71** against the bottom **72** of the bearing recess in the socket. The cap jewel **73**, quite loosely placed in a bore of the socket, rests on the bezel at a sufficient distance from the bottom **74** of said bore so as not to contact therewith even in case of a shock. In the modification of Figure 19 the bezel **75** of the perforated jewel provides for its centering in the socket a conical circular surface **76** and a rounded, circular edge **77** co-operating respectively with a rounded circular edge **78** and a conical, circular surface **79** of the socket. The part of the bearing serving as abutment for the end of the pivot, in this case a cap jewel set in a bezel, is disposed in a bore of the socket in the same way as explained under Fig. 18.

In the modification of Figure 20 the socket **5** driven into the regulator **4** has a circular groove **80** of rectangular sectional shape. A spring with two branches in U-shape, made of wire of rectangular cross section, is interposed between the bottom **82** of a slot in the lower side of the bridge and the lower wall of the socket groove **80** and this spring exerts a tangential friction upon the socket while effectively maintaining the regulator-socket aggregate in the bridge without clearance in axial direction. For adjusting this tangential friction which governs the frictional rotary movement of the regulator, this spring could also be applied against the lateral sides of the slot in the bridge wherein it is located, said sides running along as shown in the embodiment in Fig. 14.

The branches of this spring could be bent a little, of course, so as to produce a tension upon the regulator-socket aggregate for assuring its axial position in the bridge.

I claim:

In a time piece regulator construction, the combination with a balance pivot bearing structure comprising a bearing bridge, provided with an axially disposed cylindrical opening, a recess and a horizontal top face, and a bearing body, or a slide ring seated on the top face of said bridge, a socket rotatably fitted and centered in the opening of said bridge and adapted to accommodate the bearing body, said socket having an outer circular groove, a regulator lever placed with a press-fit upon said socket so as to rotate therewith on the bearing bridge while being rockingly applied by means of said socket against the slide ring on said horizontal top face, and a U-shaped spring lodged in the recess of said bridge and having its two branches longitudinally cambered and engaged in said groove of the socket for exerting axial traction upon said socket so as to hold the regulator lever in frictional engagement with said slide ring on the top face of the bearing bridge.

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