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W. KOHLHAGEN

2,567,567

HAIRSPRING FOR TIMEPIECES

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Fig. 1.

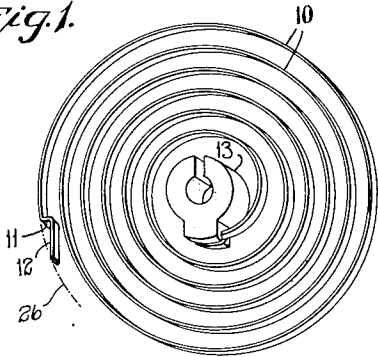


Fig. 4.

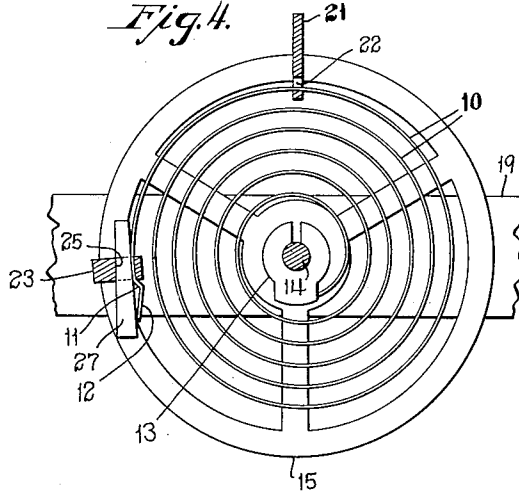


Fig. 6.

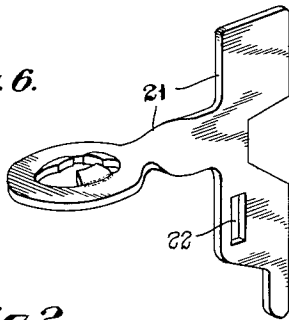


Fig. 5.

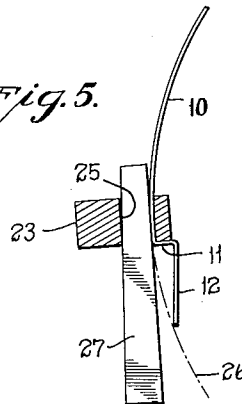


Fig. 2.

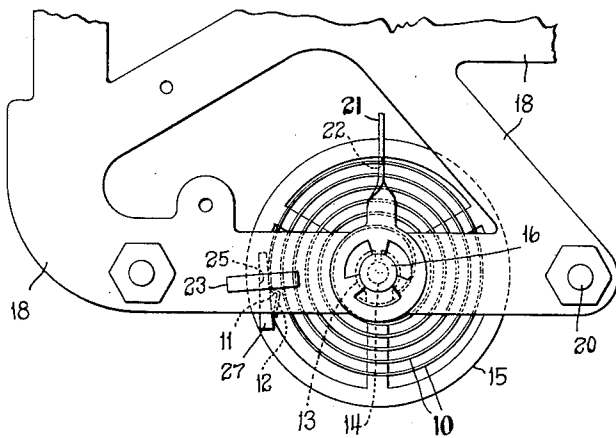
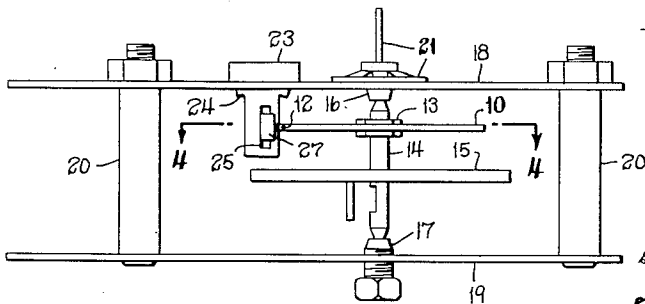


Fig. 3.



Inventor
Walter Kohlhausen
By *Seymour, Carl & Nichols*
Attorneys

UNITED STATES PATENT OFFICE

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HAIRSPRING FOR TIMEPIECES

Walter Kohlhausen, Elgin, Ill., assignor to The
E. Ingraham Company, Bristol, Conn., a cor-
poration of Connecticut

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3 Claims. (Cl. 58—115)

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The present invention relates to improvements in hairsprings and relates more particularly to improvements in hairsprings for clocks, watches and other timepieces.

It is the general practice to secure the inner end of a spiral hairspring to a unit comprising a balance-staff and a balance-wheel on the latter and then prior to the assembly of the unit into a timepiece, vibrating the assembly until the same oscillates at approximately the predetermined desired rate, whereupon the outer convolution of the hairspring is provided with a kink located adjacent its end and designed to be seated against an anchoring-abutment which usually takes the form of an apertured anchoring-stud.

In assembling hairsprings of the type above referred to in a clock movement for instance, the outer end of the hairspring is manually maneuvered through an aperture in a regulating-lever and then through an aperture in an anchoring-stud. This procedure requires careful hand-work and hence is expensive.

Furthermore, since it is the general practice to anchor the outer end of such hairsprings in an aperture in an anchoring-stud by means of a wedge, the indiscriminate kinks commonly applied in such hairsprings are apt to be unduly straightened out in the process of driving the wedge in place. This latter effect results in distortion of the hairspring and erratic behaviour of the timepiece in which it is installed.

One of the main objects of the present invention is to provide a superior hairspring having a terminal-end which will not materially interfere with its threading through an aperture in a regulating-lever or in an anchoring-stud.

Another object of the present invention is to provide a hairspring having a superior terminal-end so shaped as to substantially thread itself through apertures in a regulating-lever or an anchoring-stud when the balance-unit of which it may form a part is rotated in the direction required to move its said outer end toward such apertures.

A further object of the present invention is to provide a superior hairspring of the character referred to having an outer terminal-end which not only will not materially interfere with its entry into apertures of the character referred to but which will also minimize the distortion of the hairspring when its said terminal-end is anchored in an anchoring-stud or the like.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all

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features in the said disclosure which are novel over the prior art.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a perspective view of a hairspring embodying the present invention and shown as attached at its inner end to a hairspring-collet;

Fig. 2 is a broken face view of a movement-frame of a clock showing the hairspring constructed in accordance with the present invention as mounted therein, together with a balance-staff, balance-wheel, bearings and regulator;

Fig. 3 is an edge view thereof;

Fig. 4 is a broken detail sectional view taken on line 4—4 of Fig. 3 but on a larger scale;

Fig. 5 is a broken view on a still larger scale of the outer portion of the hairspring shown in conjunction with the anchoring-stud and wedge-like retaining-pin, the anchoring-stud being shown in section and the retaining-pin being shown as partly inserted into the aperture in the said anchoring-stud; and

Fig. 6 is a perspective view of the regulating-lever, detached.

The hairspring illustrated in the accompanying drawings is of spiral form and is generally designated by the reference character 10. The outer portion of the said hairspring adjacent its extreme end, is bent substantially radially inwardly to form a stop-reach 11 and then is bent again in the general direction of the curvature of the hairspring to form a terminal-reach 12. The respective reaches 11 and 12 are integral with the hairspring proper 10 and the terminal-reach 12 is inclined outwardly from the inner end of the stop-reach 11 so that its extreme end occupies the position which is substantially the same radial distance from the center of the hairspring as is the point of juncture of the stop-reach 11 with the hairspring proper of which it forms a part.

The inner end of the hairspring 10 is clamped in a collet 13 which, in turn, is tightly fitted upon a balance-staff 14 which, like the collet 13, may be of any approved construction. The balance-staff 14 has mounted thereon a balance-wheel 15, in a manner usual in so-called "marine type" escapement mechanisms.

The respective opposite ends of the balance-staff 14 are of conical form and the end adjacent the hairspring 10 is adapted to oscillate in a bearing-stud 16, while the end of the balance-staff nearest the balance-wheel 15 is adapted to

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oscillate in a bearing-stud 17, as is indicated in Fig. 3.

The bearing-stud 16 is mounted in a movement-plate 18 and in a similar manner the bearing-stud 17 is mounted in a companion movement-plate 19 between which the unit comprising the parts 10 to 15 inclusive, is adapted to oscillate. The said movement-plates 18 and 19 are held in spaced relationship with respect to each other by a suitable number of pillars such as 20.

Mounted for turning movement against the outer face of the movement-plate 18 and about the bearing-stud 16 as a center, is a regulating-lever generally designated by the reference character 21. The said regulating-lever is formed with an aperture 22 through which the outer convolution of the hairspring is adapted to pass. The width of the aperture 22 is in excess of the length in a radial direction of the stop-reach 11 of the said hairspring so as to freely permit the kinked end of the latter to be passed therethrough.

Mounted in the movement-plate 18 is a substantially-T-shaped anchoring-stud or -member 23 having its leg or stem extending through the said movement-plate inwardly toward the balance-wheel 15. The said anchoring-stud is rigidly attached to the movement-plate 18 in a suitable manner such, for instance, as by staking the same at 24, as is indicated in Fig. 3.

The anchoring-stud 23 above referred to is formed with an aperture 25 which, like the aperture 22 before referred to, is in circumferential alignment with the free end of the hairspring 10. The width of the said aperture 25, in a direction radially of the balance-wheel 15 and associated parts, is slightly in excess of the length of the stop-reach 11 of the hairspring so as to freely permit the kinked end of the latter to be passed therethrough.

By reference to Figs. 1 and 5 in particular, it will be noted that the extreme end or tip of the inclined terminal-reach 12 of the hairspring 10 is substantially the same radial distance from the center of the balance-staff 14 as is the portion of the outer convolution of the hairspring immediately adjacent the radially-outer end of the stop-reach 11. The dotted lines 26 in Figs. 1 and 5 are concentric with respect to the central axis of the collet 13 and the said line 26 serves to indicate the circumferential coincidence of the parts just referred to prior to being stressed, in the manner as will presently appear.

For the purpose of holding the free end of the outer convolution of the hairspring 10 anchored in the anchoring-stud 23, a wedge-like retaining-pin may be employed.

After the hairspring 10 and its collet 13 have been assembled onto a balance-staff such as 14, such unit will be installed between the movement-plates 18 and 19 so that the opposite ends of the balance-staff 14 respectively freely bear in the bearing-studs 16 and 17. The unit may now be turned in a counterclockwise direction (as viewed in the drawings), whereupon the sloping terminal-reach 12 will pass through the aperture 22 in the regulating-lever 21 with little, if any, direct manual deflection in a radial direction, which deflection may be provided by a pair of tweezers held by the assembler.

After passing the outer terminal end of the hairspring 10 through the aperture 22 in the regulating-lever 21, the continued turning movement of the balance-staff 14 will cause the inclined terminal-reach 12 of the hairspring 10 to

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enter and pass through the aperture 25 in the anchoring-stud 23. The wedge-like retaining-pin 27 may now be inserted into the aperture 25 from a direction toward the said terminal-end, preparatory to clamping (Fig. 5) the portion of the outer reach of the said hairspring lying immediately adjacent the stop-reach 11, against the inner wall of the said aperture 25. The driving in of the retaining-pin 27 will seat the stop-reach 11 against the adjacent face of the anchoring-stud 23, as is indicated in Fig. 5, and a further penetration of the said retaining-pin will tend to cause the said anchoring-reach to slightly straighten out, as is indicated in Fig. 4, until the extreme end of the inclined terminal-reach 12 engages with the inner face of the said retaining-pin.

The engagement of the extreme end of the terminal-reach 12 with the inner face of the retaining-pin 27, as above described, serves to restrain the stop-reach 11 from further straightening out under force exerted by the driving in of the said retaining-pin, and thus very accurate location of the outer end of the hairspring such as 10 may be achieved uniformly from clock-to-clock.

It will be seen from the foregoing that by so shaping the end of the outer convolution of the hairspring 10 as to provide the stop-reach 11 and the inclined terminal-reach 12 in such relationship that the extreme end of the said terminal-reach substantially circumferentially coincides with the portion of the said outer convolution immediately adjacent the outer end of the stop-reach 11, the passage of the hairspring through apertures such as 22 and 25 is not materially interfered with. Furthermore, the stop-reach 11 is prevented from unduly straightening out when the retaining-pin 27 or its equivalent is driven home, by the engagement of the extreme end of the terminal-reach 12 with the said retaining-pin or its equivalent.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A spiral hairspring for timepieces having its outer convolution kinked to provide a relatively short integral inwardly-extending stop-reach and a terminal-reach integral with the inner end of the said stop-reach; the said stop-reach extending inwardly generally in a substantially-radial direction and the said terminal-reach being inclined from the inner end of said stop-reach outwardly to a point substantially coinciding with an imaginary circumferential line touching the junction of the said stop-reach and the said outer convolution.

2. A hairspring-unit for timepieces comprising a collet; and a spiral hairspring having its inner convolution secured to the said collet and having its outer convolution kinked to provide a relatively short integral inwardly-extending stop-reach and a terminal-reach integral with the inner end of the said stop-reach; the said stop-reach extending inwardly generally in a substantially-radial direction and the said terminal-reach being inclined from the inner end of said stop-reach outwardly to a point substantially

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coinciding with an imaginary circumferential line touching the junction of the said stop-reach and the said outer convolution.

3. An anchorage for a hairspring in a time-piece, comprising a kink in an end-convolution of said spring to form therein a laterally-extending stop-reach and a continuing terminal-reach extending in the general direction of said end-convolution; an anchor-member having an aperture through which said end-convolution extends with said stop-reach bearing against said anchor-member and said terminal-reach extending in toto beyond the latter; and a wedge forced in said aperture in the anchor-member to clamp said end-convolution in place therein, the taper

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of the forced wedge extending in a direction to hold the clamped portion of said spring convolution in said aperture under sufficient longitudinal tension to deflect said reaches toward said wedge and force the end of said terminal reach into permanent engagement with said wedge.

WALTER KOHLHAGEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,209,172	Putnam	July 23, 1940