(Model.)

F. M. WILLS.

HAIR SPRING COLLET REMOVER.

No. 262,875. Patented Aug. 15, 1882.

Fig. 1

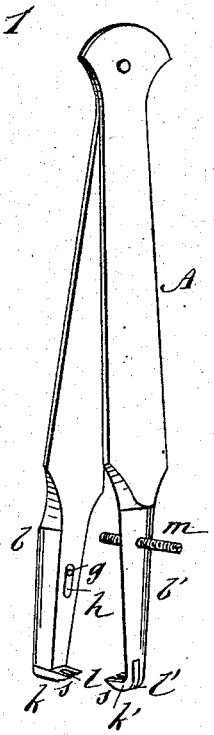


Fig. 4

Fig. 2

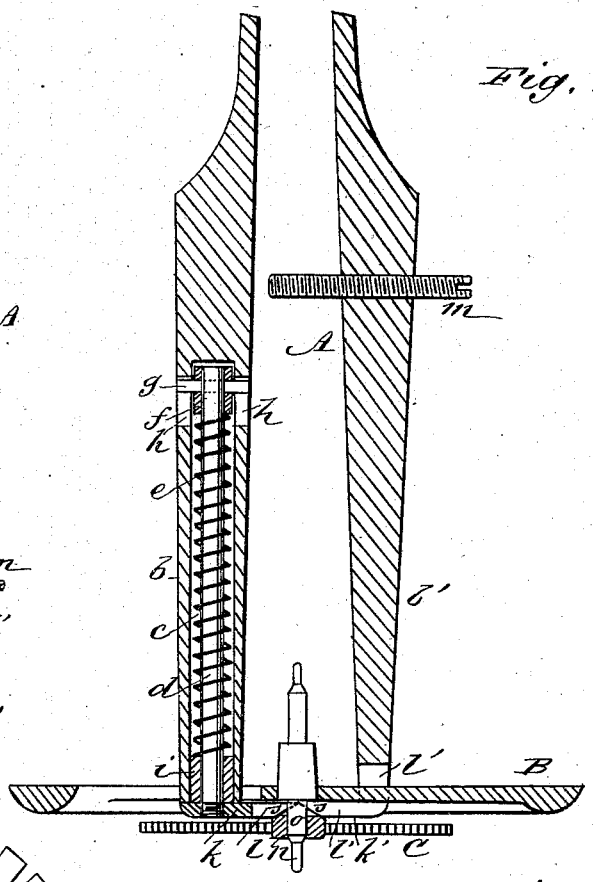
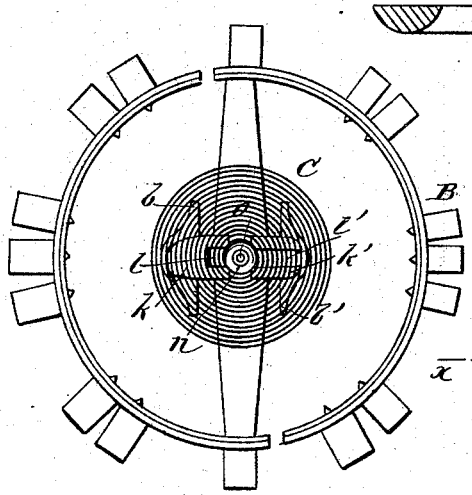
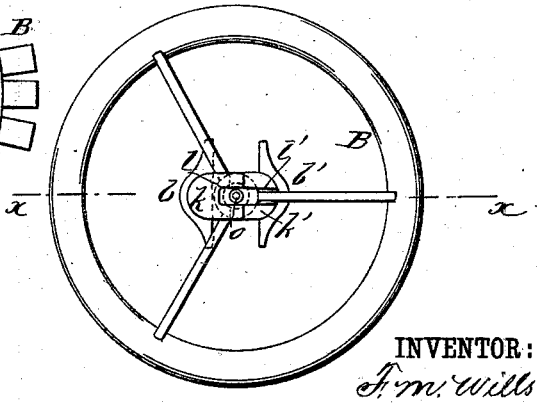


Fig. 3





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FRANK M. WILLS, OF SPRINGFIELD, ILLINOIS.

HAIR-SPRING-COLLET REMOVER.

SPECIFICATION forming part of Letters Patent No. 262,875, dated August 15, 1882.

Application filed June 14, 1882. (Model.)

To all whom it may concern:

Be it known that I, FRANK MARION WILLS, of Springfield, in the county of Sangamon and State of Illinois, have invented a new and useful Improvement in Hair-Spring-Collet Removers, of which the following is a full, clear, and exact description.

This invention relates to the tool used by watch-makers for removing the hair-spring collet, with its attached spring, from the staff of the balance-wheel of a watch whenever adjustment, repair, or replacement by another spring or other part is necessary.

The invention consists in a pair of tweezers of peculiar construction and comprising various special details and combinations, including slotted jaws on the ends of the prongs of the tweezers, one of which is extensible and controlled by a spring, whereby the removal of the hair-spring collet is effected in every instance without fail, the tool is prevented from throwing the hair-spring out of truth, the balance-staff is not marred or defaced, the tool may be used to remove the hair-spring from different sizes or styles of balances, including both two and three armed ones, the hair-spring collet is restrained from being spread or sprung, and other advantages are obtained over or as compared with the tools heretofore in use for the purpose.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a view in perspective of my improved tool; Fig. 2, a longitudinal section of the same, in part upon an enlarged scale, on the line *x x* in Fig. 3, showing the device as applied to the removal of the hair-spring from the staff of the balance-wheel of a watch. Fig. 3 is an inverted plan or face view, upon a still different scale, of the balance-wheel shown in Fig. 2, and which has three arms, with the tweezers as closed about the balance-staff, but omitting the hair-spring; and Fig. 4 is a further inverted plan or face view, upon another different scale, of an adjustable weighted balance-wheel having the hair-spring applied to its staff and showing the tweezers in their open condition relatively with the collet of the spring.

In the accompanying drawings, A indicates a pair of steel or spring tweezers constructed in accordance with my invention, and B balance-wheels, and C a hair-spring for the balances, to illustrate the use and operation of the tool, which is here shown as applied in a downward direction, but which may be used in an upward one. One of the prongs, *b*, of said tweezers has a longitudinal hole, *c*, drilled in its outer or working end portion. Within this hole *c* are arranged a round piece of stubs, steel wire, or other suitable metal, forming a jaw-stem, *d*, a hard brass wire spiral or other spring, *e*, arranged around said stem, a steel or other collet, *f*, fitted to work up and down within the hole *c*, subject to the guidance of a cross-pin, *g*, which passes through longitudinal slots *h h* in the prong and through the stem *d* to connect said stem and collet *f* together, and to keep the stem, with its attached jaw *k*, from turning, and a fixed bushing, *i*, at the working end of the prong, through which the stem *d* is guided and free to slide, and between which and the collet *f* the spring *e* is arranged, and serves, by its pressure on said collet, to draw the stem *d* inward.

The jaw *k*, which is screwed onto the outer end of the stem *d*, has a slot, *l*, in its forward end. The opposite jaw, *k'*, is a fixed part of the other prong, *b'*, of the tweezers, which prong is bent to form said jaw. This jaw *k'* is also formed with a slot, *l'*; but said slot is not restricted to the forward end only of this jaw, but is extended backward through the jaw and prong and some little distance up or along the latter, as shown in Figs. 1 and 2. Both forward working ends of the jaws *k k'* are made beveling, as at *s*, on the outer faces of their forward ends, and the movable or sliding jaw *k* is made to project slightly beyond the opposite jaw, *k'*, so that on closing the jaws together the forward end of the sliding jaw *k* will move up over the bevel *s* of the fixed jaw *k'* and be drawn or forced out against the tension of the spring *e*. The object of this will be hereinafter explained. One of the prongs has an adjustable screw-stop, *m*, which, when the tweezers are closed, comes in contact with the other prong to limit the tool to any given or required range of closing action.

To remove the hair-spring collet *n*, with its attached spring C, from the balance-staff *o*, the tweezers are manipulated so as to bring the

jaws *k k'* between said collet and the balance-wheel B. Upon closing said jaws the beveled surfaces *s s* bear on the collet on opposite sides of its axis to force it from the balance-staff, and as the jaws meet and their closing action is continued the extensible jaw *k* is drawn outward by its riding over the incline *s* of the opposite jaw, *k'*, whereby the collet *n* is removed from the balance-staff without fail and without throwing the hair-spring out of truth. In this action the sharp or knife edges of the jaws *k k'* are prevented from coming in contact with the balance-staff and from marring or defacing it by the slots *l l'* of the jaws receiving said staff within them, and by extending the slot *l'* through the back and for a short distance up or along the prong *b'* provision is made for removing the hair-spring collet from the balances in which the wheel has more than two arms by receiving the arm which otherwise would be in the way within the slot *l'*, as shown for the three-armed balance-wheel in Fig. 3. Thus, and by the general construction of the device, the hair-spring collet may be removed by my improved tool from different sizes and styles of balances, and this without any tendency to spread or spring said collet. The adjustable screw-stop *m* limits the tweezers to their proper closing action, free from risk of breakage or derangement, and after the hair-spring collet has been removed and pressure is relieved from the tweezers to admit of them opening the spring *e* quickly draws the jaw *k* inward to its normal position for a repetition of the removing action of the device when required.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A pair of tweezers having jaws at the outer ends of their prongs, the one of which is made extensible against the tension of a spring for its riding over the opposite jaw when closing the tweezers, substantially as and for the purpose herein set forth.

2. The combination of the extensible slotted jaw *k* with the fixed slotted jaw *k'*, for removing the collet of the hair-spring from the balance-staff without coming in contact with said staff to mar it, essentially as described.

3. In a pair of tweezers having two slotted jaws, the extension of the slot *l'* of one of said jaws through the back of the prong which carries said jaw, substantially as and for the purposes herein set forth.

4. The combination, with the fixed jaw *k'* of the tweezers, having a bevel, *s*, on its outer face, of the extensible jaw *k*, arranged to project beyond the fixed jaw, the stem *d*, restricted to a sliding action in direction of its length, and the spring *e*, substantially as specified.

5. The sliding collet *f* and fixed bushing *i*, in combination with the stem *d* of the extensible jaw *k*, the prong *b*, having a longitudinal hole, *c*, and slots *h* in it, the cross-pin *g*, and the spring *e*, essentially as shown and described.

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