M. WHEELER.

Main-Spring Attachment for Watches.

No. 167,372. Patented Aug. 31, 1875.

FIG. 1.

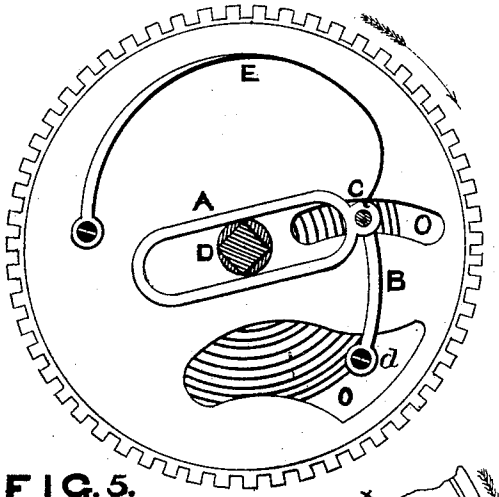


FIG. 2.

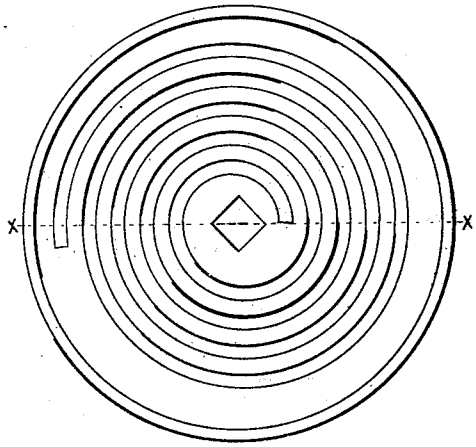


FIG. 5.

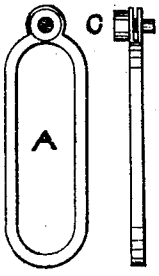


FIG. 4.

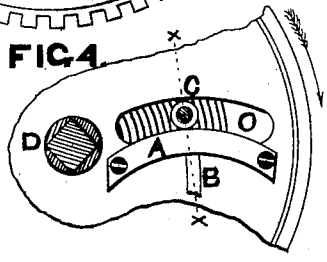


FIG. 3.

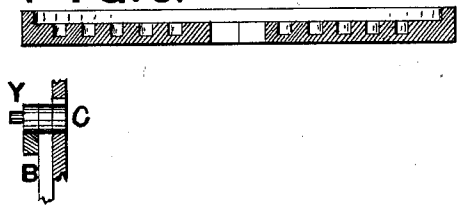


FIG. 6.

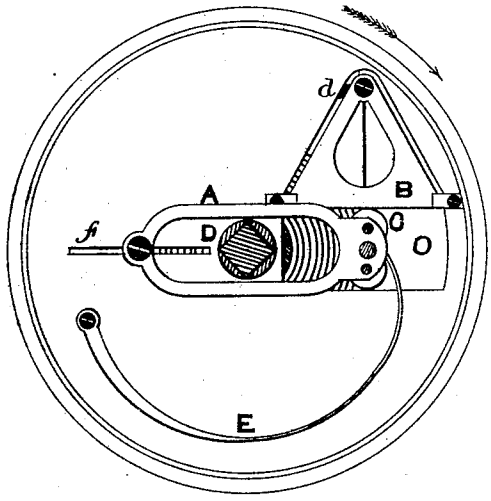
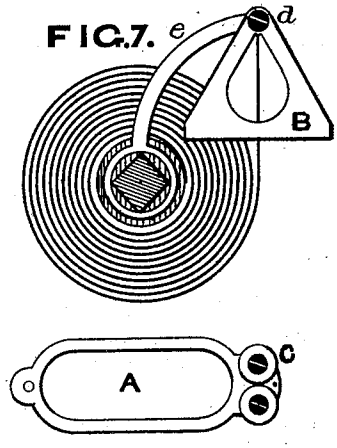


FIG. 7.



WITNESSES;

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UNITED STATES PATENT OFFICE.

MARSHAL WHEELER, OF BIG RAPIDS, MICHIGAN.

IMPROVEMENT IN MAINSPRING ATTACHMENTS FOR WATCHES.

Specification forming part of Letters Patent No. **167,372**, dated August 31, 1875; application filed July 8, 1875.

To all whom it may concern:

Be it known that I, MARSHAL WHEELER, of the city of Big Rapids, in the county of Mecosta and State of Michigan, have invented a new and useful Improvement in the Mode of Constructing Time-Pieces, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

The object of my invention is to so control the pressure of the mainspring to a train of wheels in a time-piece that the force imparted to the first or main wheel shall be no greater at its point of contact with said train when the mainspring is wound up to its greatest tension than at any other period of its running time, thereby producing the same result which is attained in the use of the fusee-wheel and chain in many time-pieces of English construction. Said object is attained by disconnecting the outer end of the mainspring from any fixed or direct connection with the mainspring barrel, as is usual in Swiss and American watches, or from the main wheel, as in many American lever clocks, and attaching the same to a connection-rod, which carries at its other extremity a pin or anti-friction roller, which rests upon an arm of the main wheel. As the time-piece is being wound up this roller, upon which the whole power of the mainspring is brought to bear, is drawn in toward the center of the main wheel, thereby moving the power of said mainspring from the point of contact with the train as its force increases; and as the time-piece is running down said roller is pushed out toward the circumference of the main wheel, thereby moving the power of said mainspring toward the point of contact with the train as its force decreases. The result is that of an unvarying and constant force being maintained at said point of contact, and whatever amount of motion a balance or pendulum may receive from the impulse of the mainspring, when wound to its greatest tension, will be maintained throughout its entire running time.

Figure 1 is a plan of the main wheel to a time-piece, and shows the means employed to attain the result named.

O O are orifices through the face of said wheel, disclosing a coiled mainspring lying beneath. The inner end of the mainspring is connected to the arbor of the winding-post D. The outer end of said mainspring is attached at *d* to the connection-rod B. The other end of said rod is connected to a sliding bar, A, beneath the end of which, and attached to it at C, is placed a roller, which runs on the lower edge of the upper orifice, and which is practically an arm of the main wheel. A and C, Fig. 5, give, respectively, a bottom and an edge view of said sliding bar, showing more plainly the position of the roller C and the slot within which the upper end of the connection-rod B, Fig. 1, works. The duty of said sliding bar is mainly that of a guide, the more perfectly to keep the roller in place.

The bridge A, Fig. 4, may serve as a track or bearing for an additional roller, as shown in the sectional view Y, to the right of Fig. 4, and thus act as a guide to keep the roller C in position.

Over all, and attached to the winding-post D, Fig. 1, is placed a scroll or spiral grooved disk, a bottom view of which is given in Fig. 2, and a sectional view in Fig. 3. When this disk is placed in position over the main wheel a pin or anti-friction roller, shown plainly opposite the roller C in the edge view, Fig. 5, enters a groove in said disk. Upon winding the time-piece said disk is turned around with the post, being attached to it, and said pin, working in the groove of the disk, is forced back toward the winding-post D, Fig. 1, drawing the sliding bar A and roller C back with it. As the time-piece is running down, the disk stands still, and the main wheel revolves beneath it, in the direction of the arrow, carrying around with it the sliding bar A, and all its attachments; consequently the pin, working in the grooves of said disk, is moved constantly out toward the circumference of the main wheel, taking with it the sliding bar and all its attachments.

The scroll in said disk should be constructed in such proportion as to give the roller C, Fig. 1, its proper position upon the arm of the wheel, corresponding to the parabolic line of force developed in a bending spring, to produce the best results.

In such time-pieces as have a barrel to contain and confine the mainspring when the

piece has run entirely down, the mainspring is compacted around the extreme inside limits. It is, therefore, necessary to construct the arm of the main wheel, upon which the roller C, Fig. 1, travels, in the form of a segment of a circle, the radius of which is the length, from center to center, of the connection-rod B, Fig. 1, and its center near the inner circumference of the barrel. When winding the inner coils of the spring are taken up first, and simultaneously therewith the roller C and upper end of the connection B, Fig. 1, are drawn over the segmentary arm toward the winding-post D; but when fully wound the outer coils are gathered in, and the lower end of the connection-rod then swings into the position necessary for a right direction of force. The auxiliary spring E, Fig. 1, is used for the purpose of overcoming the friction of the roller C in moving outward upon the arm of the main wheel, the same being at its greatest tension when the time-piece is fully wound up, and decreasing gradually in force as the same runs down, and friction caused by the decreasing pressure of the mainspring becomes less. One end is attached to the main wheel, and the other to the sliding bar or upper end of the connection-rod near C. The mainspring is thus left free to perform the exclusive work of moving the train of wheels.

A different arrangement, involving the use of the same principle above described, is shown in the view given under Fig. 6. In this plan the outer end of the mainspring is attached to the triangular supporting-piece or strut B, at the point *d*. The strut, in turn, rests upon the double anti-friction rollers C, which in turn rest upon the lower edge of the orifice O, which is practically an arm of the main wheel. The upper end of said strut B is kept in its proper position by an anchor-bar, *e*, Fig. 7, which surrounds at its lower extremity the winding-post D, Fig. 6.

In the arrangement given in Fig. 6 said anchor-bar is placed between the mainspring and the main wheel in a channel made in the under side of said wheel for its reception. A bottom or reverse view of the sliding bar A, showing the double anti-friction rollers C, is given at A, beneath Fig. 7. The rollers are designed to run one on the other, and are kept in a position at right angles with the arm of the main wheel by the sliding bar A, Fig. 6, and the said bar is kept in proper position independent of the winding-post D by means of a pin working in the slot *f*, cut beveling through the surface of the main wheel. Fig. 7 gives a view of the mainspring, anchor-bar, and supporting-piece or strut, as they would appear taken out of the main wheel, the whole constituting the propelling power with its attachments of a time-piece in accordance with plan, Fig. 6. If desired the parts A and B, Fig. 6, may be placed on the surface of the main wheel, together with the anchor-bar *e*, Fig. 7. In such case an arm fastened to the surface of the wheel will be needed for the rollers C to travel upon; but no orifice will be needed, save a small one at *d* to connect the strut B with the mainspring.

In comparing this invention with the old fusee and chain arrangement it will be found that the scrolled disk, Fig. 2, and main wheel, Fig. 1, take the place of the fusee-wheel; the connection-rod B, Fig. 1, that of the chain; and the movement of the roller C over the arm corresponds to that of the chain on the fusee, being drawn toward the center, as the time-piece is being wound up, and running out toward the circumference as the time-piece is running down.

I claim as my invention—

1. The combination of the sliding bar A and roller C with the scrolled disk, whereby the roller is drawn toward the center of the disk when the time-piece is being wound up, and forced outward in unwinding, as set forth.

2. The rod B, having the outer end of the spring attached thereto, in combination with the sliding bar A and roller C, substantially as set forth.

3. The slotted sliding bar A, fitting over the stem D, the stem serving as a guide to the bar, so as to keep it in position as it moves back and forth, substantially as specified.

4. The combination of the sliding slotted bar, stem D, and auxiliary spring E, substantially as shown.

MARSHAL WHEELER.

Witnesses:

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MELVIN HAIL JENNER.