

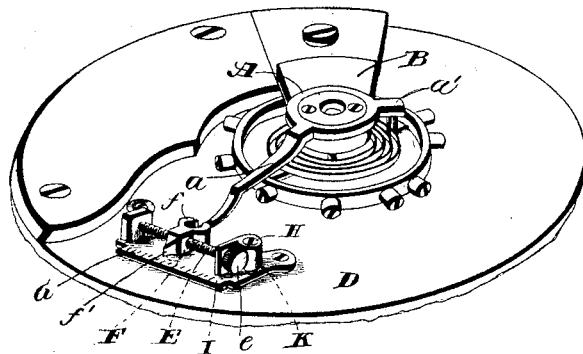
(No Model.)

S. L. GAARDER.  
WATCH REGULATOR.

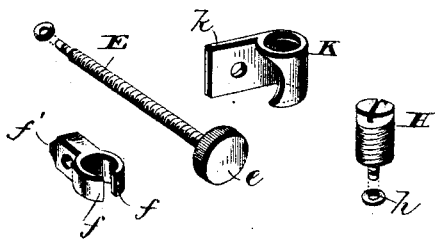
No. 459,279.

Patented Sept. 8, 1891.

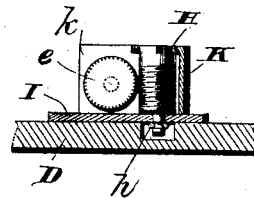
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses  
Chas. Williamson  
Henry C. Hazard

Inventor  
S. L. Gaarder, by  
Cindler & Russell, his attys

# UNITED STATES PATENT OFFICE.

SIMON L. GAARDER, OF STARBUCK, MINNESOTA, ASSIGNOR OF ONE-THIRD  
TO KNUT L. BREVIG, OF SAME PLACE.

## WATCH-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 459,279, dated September 8, 1891.

Application filed February 26, 1891. Serial No. 382,854. (No model.)

*To all whom it may concern:*

Be it known that I, SIMON L. GAARDER, a citizen of the United States, residing at Starbuck, in the county of Pope, and in the State of Minnesota, have invented certain new and useful Improvements in Watch-Regulators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows a perspective view of a watch-movement provided with my improved regulating means; Fig. 2, a similar view of the parts of my device separated from each other, and Fig. 3 a view partly in elevation and partly in section.

Letters of like name and kind refer to like parts throughout the several figures.

The object of my invention is to provide means to enable the regulation of a watch to be effected by a micrometrical or exceedingly-fine adjustment of its regulating mechanism; and to this end said invention consists in the device and the parts thereof constructed and combined as hereinafter specified and claimed.

My invention has nothing to do with the construction of the device which acts directly upon the hair-spring of a time-piece, but has reference to mechanism to be used in conjunction with any suitable device of this character, and hence while I show one form of such device to illustrate the practical embodiment of my invention it is to be understood that I do not limit myself to the use of such or any particular kind. The one with which I have shown my invention as adapted for use is of ordinary construction, consisting of a journaling-ring A, mounted on a cock B and provided with two radially-extending arms *a* and *a'*, the former of which constitutes a moving arm, while the latter constitutes the means for carrying the curb-pins, which engage with the hair-spring.

Mounted at its ends in bearings of suitable construction arranged upon the movement-plate D in proximity to the outer free end of the moving arm *a* is a shaft or arbor E, screw-threaded throughout its length, which is sub-

stantially equal to the range of movement the arm *a* is designed to have. Upon this shaft or arbor, and adapted to be moved thereby when the same is rotated, is a block F, having for the purpose of effecting such movement a screw-threaded opening which engages with the said arbor. The side of the block adjacent to the free end of the arm *a* of the regulator is provided with means to engage said arm, which preferably consists of two semi-circular arms *f* and *f'*, between whose ends is a small space into which projects said arm *a*. The opposite side of the block F is shaped so as to form an indicator *f'*, which, in conjunction with a graduated scale G, affords means to show the degree of adjustment or movement given the block.

The means I have devised to rotate the arbor and so move the block and through it the device which operates directly upon the hair-spring consists of a worm-wheel *e*, secured to one end of the arbor E, and a worm H, meshing with and adapted to rotate it. Said worm is journaled so as to be held in position relative to the arbor by having one of its ends reduced and contained in an opening provided for its reception in a plate I, while its upper end is contained within an opening provided in a shell or housing K, placed upon and attached to the plate I, so as to inclose or surround the worm H, except, of course, at a point adjacent to the worm-wheel *e*, where a space is left to permit engagement of the latter with the worm. Preferably formed with and as a part of said housing is a straight piece *k*, that constitutes one of the bearings or supports for the shaft or arbor E. The reduced end of the worm extends a short distance beyond the under face of the plate I and has an annular groove into which is sprung a ring or perforated disk *h*, which operates to hold said worm against longitudinal or endwise movement in one direction by engaging the under side of the plate I, while endwise movement in an opposite direction is prevented by the engagement with the upper side of said plate of the shoulder formed by reducing the diameter of the worm. This expedient, in conjunction with the housing K, forms a sim-

ple and effective means for journaling and protecting the worm. At its exposed end the latter is grooved or slitted for the reception of a suitable device, as a screw-driver, to effect its rotation.

The screw-threaded arbor E is restrained from longitudinal or endwise movement in a way precisely similar to that employed with the worm H—that is, its end opposite the one having the worm-wheel *e* is reduced where it passes through its bearing at such end, and an annular groove provided in a portion that projects beyond said bearing, into which is sprung a ring or perforated disk. The ring or disk on one side and the shoulder formed by reducing the diameter of the arbor on the other side engage the arbor-bearing, so that the arbor is securely held against longitudinal movement.

It will be understood that the engagement or contact of the face of the block F with the adjacent face of the plate I will prevent rotation of the former and compel it to move along the arbor E.

Preferably all of the parts of my device are mounted upon the plate I, and the index-scale formed thereon, and said plate suitably secured, as by screws, to the movement-plate D. I prefer, too, that the worm-wheel *e* and the shaft or arbor E be integral or in one piece; but of course changes may be made in this respect and in others of the same nature without departure from the scope of my invention.

It will be readily seen from the foregoing description that by the employment of my worm-gearing to revolve the screw-threaded arbor exceedingly delicate micrometric adjustment or regulation of the operative length of a hair-spring may be obtained, and that my

mechanism is both simple and inexpensive in its construction.

Having thus described my invention, what I claim is—

1. In combination with a regulator-arm, a screw-threaded shaft or arbor adapted to move the same, a worm-wheel on such arbor, a worm meshing with it, having one end reduced and passed through a supporting-plate, and the locking-ring seated in an annular groove in said reduced end beneath the supporting-plate, substantially as and for the purpose described.

2. In a regulating device for time-pieces, in combination with a movable part of such device, a worm-wheel, connections to transmit movement from the latter to said part, the worm meshing with said wheel, having a reduced end with an annular groove journaled in a suitable part, a ring seated in said groove to prevent endwise movement of said worm, and suitable journaling means for the other end of said worm, substantially as and for the purpose shown.

3. In combination with a worm or screw-threaded arbor having a portion of its length reduced to form a shoulder and having an annular groove, a bearing engaging such reduced portion, and a ring or perforated disk seated in said groove to prevent endwise movement of said arbor, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 23d day of January, A. D. 1891.

SIMON L. GAARDER.

Witnesses:

AND. G. ANDERSON,  
G. O. GUNDERSON.