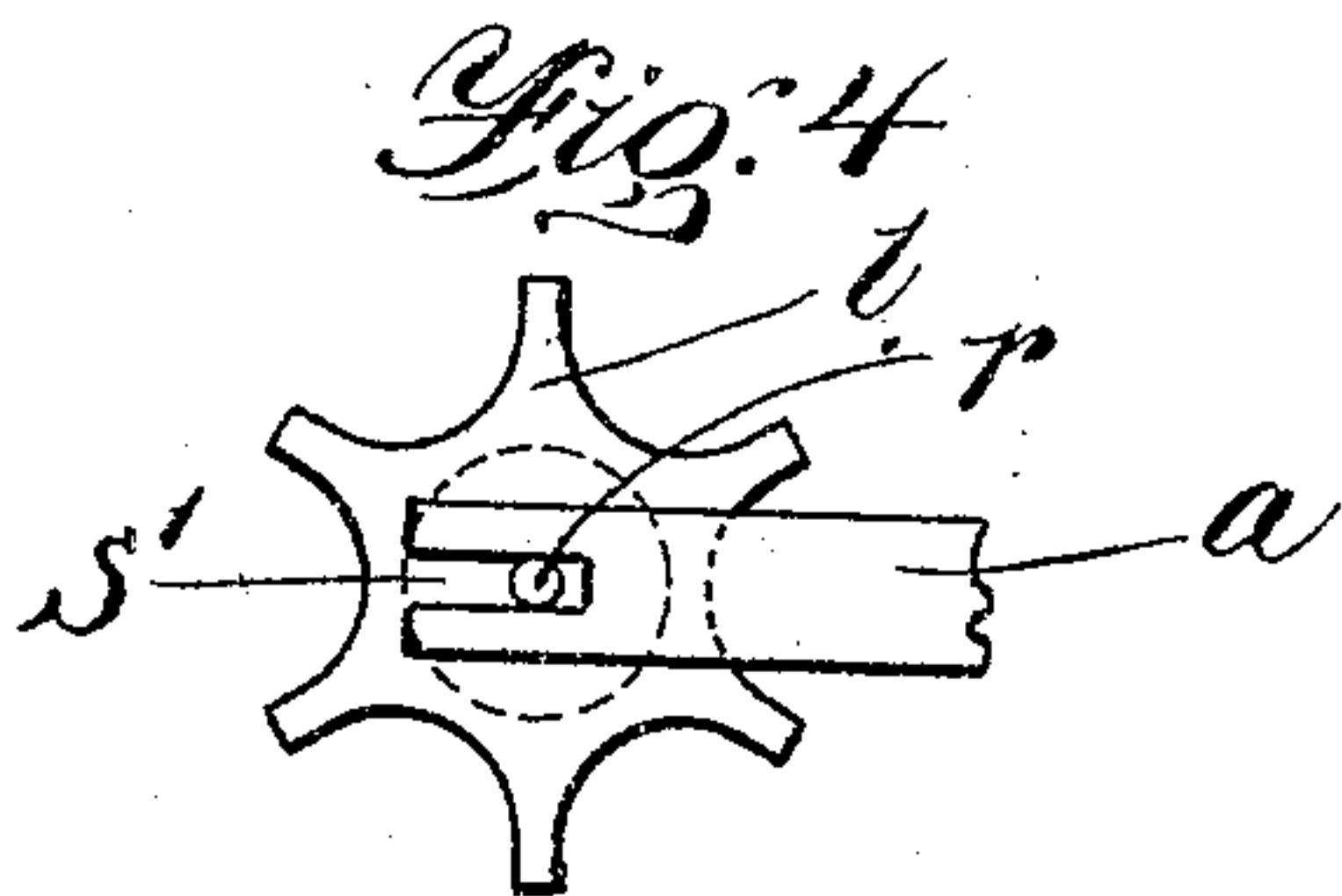
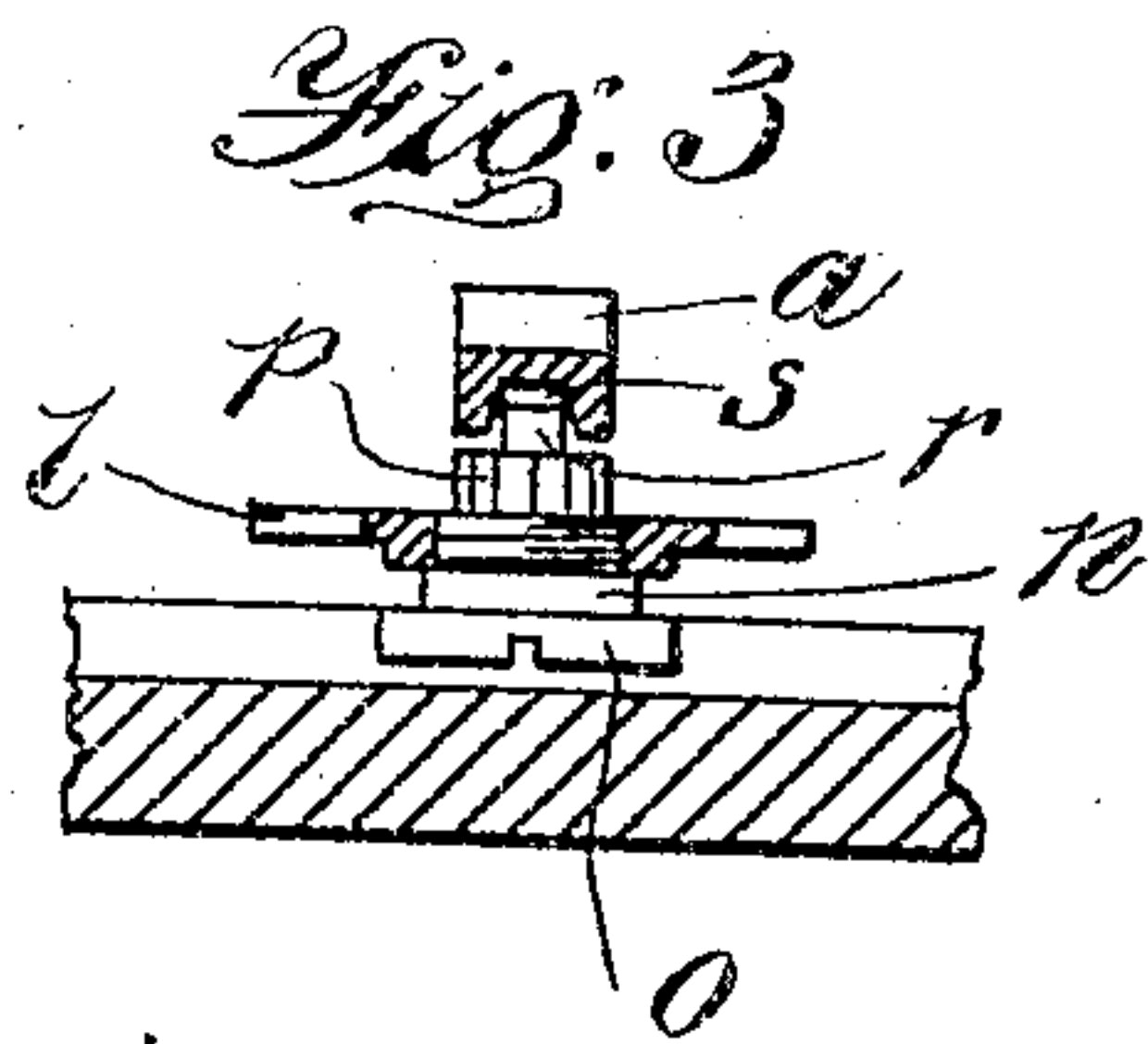
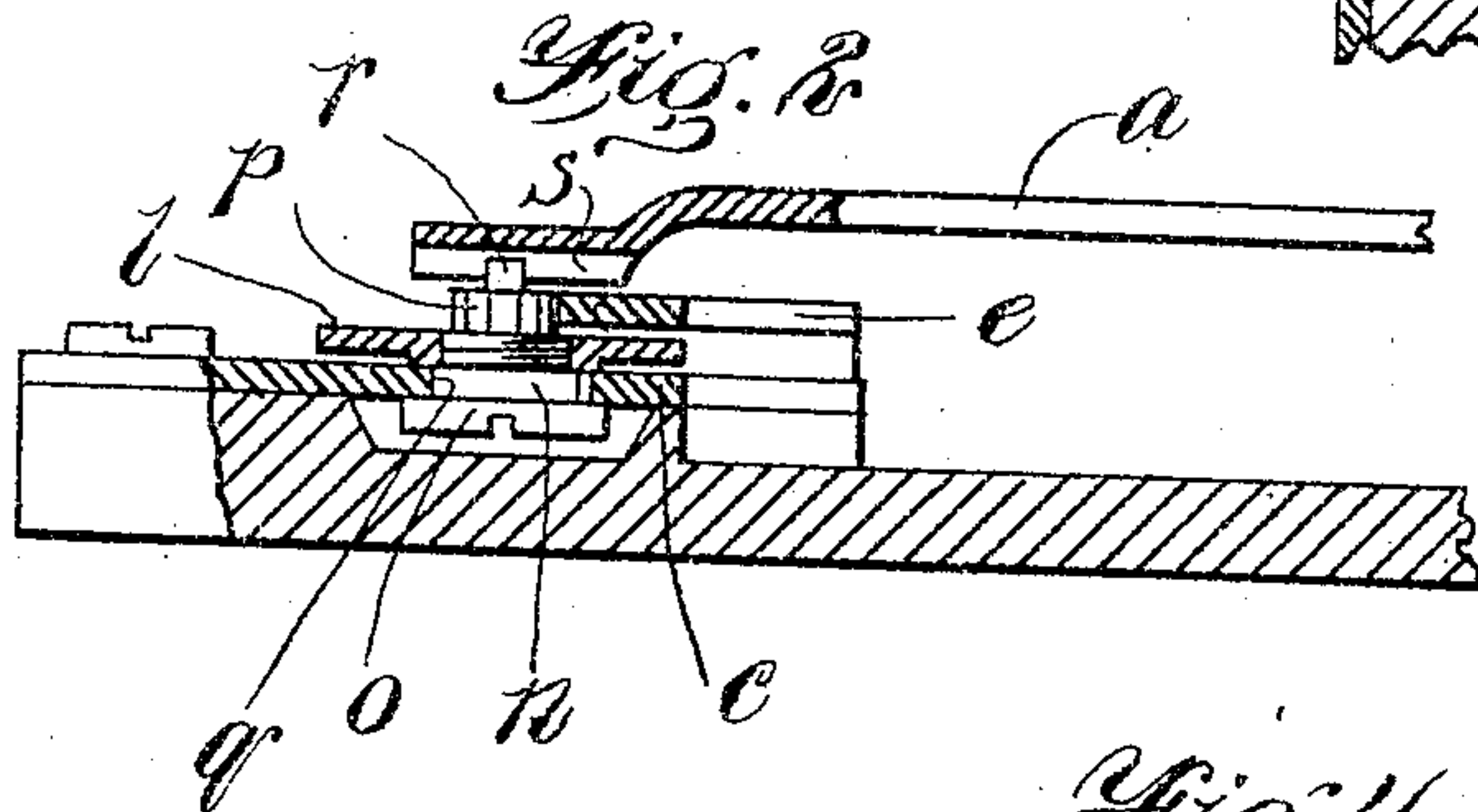
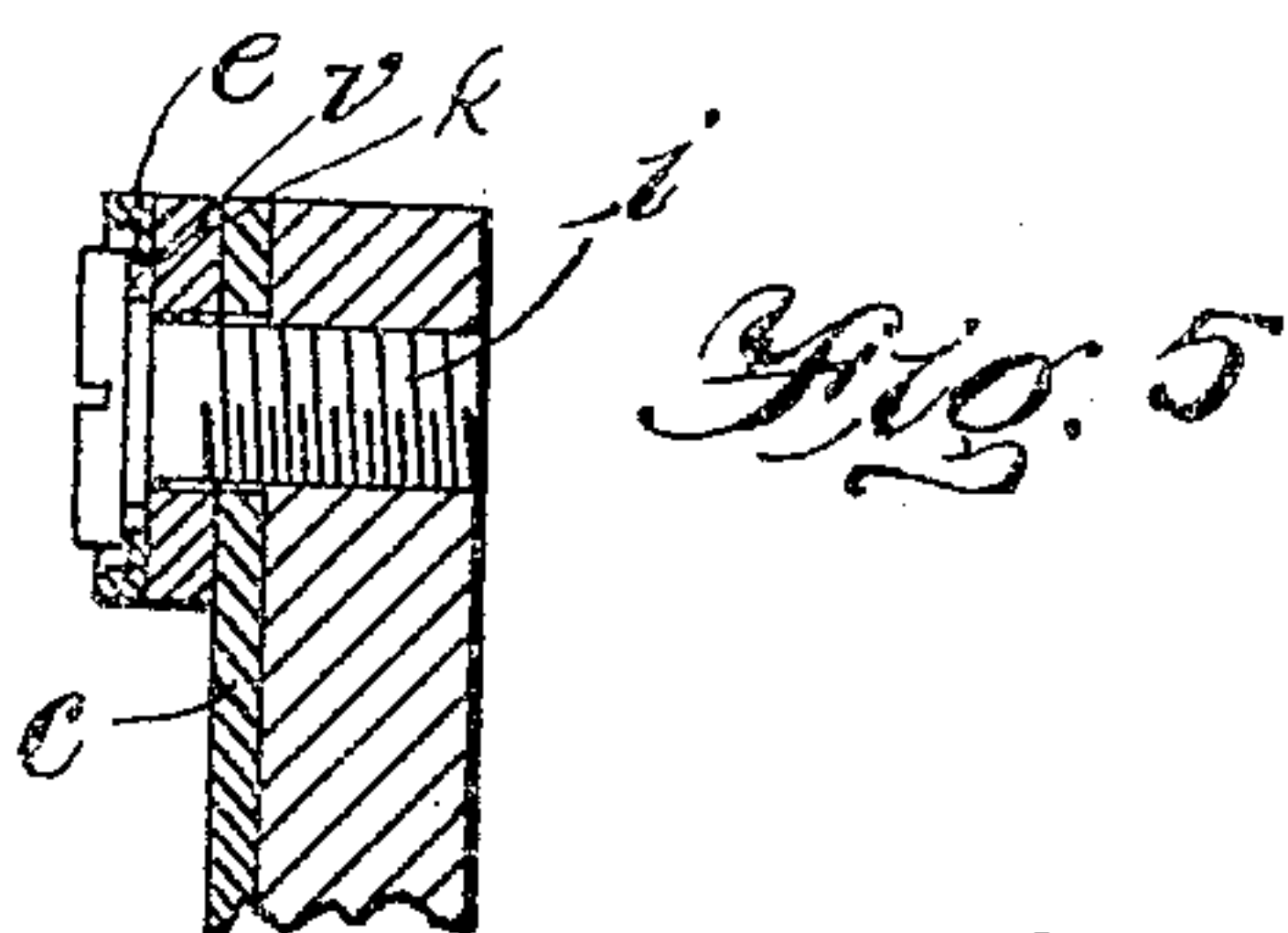
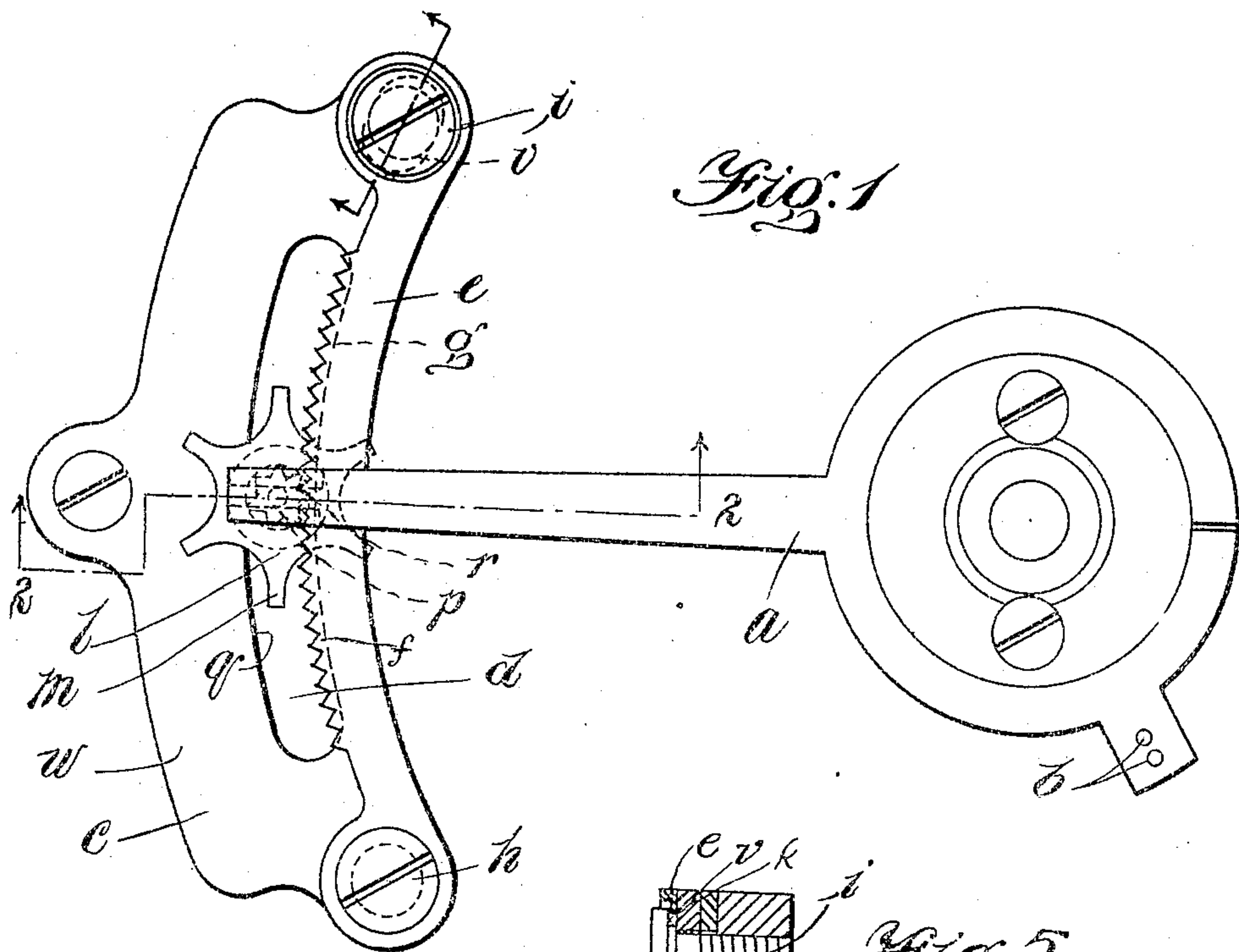


No. 818,043.

PATENTED APR. 17, 1906.

O. OHLSON.
WATCH REGULATOR.
APPLICATION FILED JULY 31, 1905.



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UNITED STATES PATENT OFFICE.

OLOF OHLSON, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO AMERICAN WALTHAM WATCH COMPANY, OF WALTHAM, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

WATCH-REGULATOR.

No. 818,043.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed July 31, 1905. Serial No. 271,880.

To all whom it may concern:

Be it known that I, OLOF OHLSON, of Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Watch-Regulators, of which the following is a specification.

The object of the present invention is to provide a watch-regulator which is capable of making a fine regulation of the length of the hair-spring and can be manufactured with greater accuracy and at less cost than is possible in the construction of other regulators now known and used.

To these ends the invention consists in the improved details of construction which I will now proceed to describe and claim, reference being had to the drawings, forming a part of the specification, in which—

Figure 1 represents a plan view of a regulator embodying the present invention. Fig. 2 represents a sectional view on line 2 2 of Fig. 1. Fig. 3 represents a cross-section taken through the regulator-wheel and the end of the regulator-arm. Fig. 4 represents a plan view showing a modified form of regulator-arm. Fig. 5 represents an elevation showing a stud used in holding certain of the parts.

The same reference characters indicate the same parts in all the figures.

a represents the usual regulator-arm, which is mounted in the ordinary manner upon the balance-cock of a watch and carries pins *b* for engaging and varying the length of the hair-spring.

c is a plate mounted upon the balance-cock or upper plate of the watch and formed with a slot *d*, curved and located to coincide substantially with the path of movement of the end of the arm *a*.

e is a plate or bar having one edge provided with teeth *f*, which are arranged on a curved line parallel with and near the edge *g* of slot *d*. This plate or bar constitutes a curved rack, of which the teeth are formed upon the concave side. It is secured in place by studs *h* *i*, which pass through its ends and also through the end of the plate *c* and secure both members to the plate of the watch, and it is separated by a small space from the plate *c* by spacing-washers *k*, surrounding the holding-studs and placed between *c* and *e*.

A regulating-wheel *l*, which has a number

of arms *m*, giving it the form of a star and from which it may therefore be called a "star-wheel" for convenience, is provided and to it is secured a stud *n*, the shank of which extends through slot *d* and the head *o* of which is of greater diameter than the width of the slot and clamps the plate between itself and the wheel with a frictional hold of such an amount as to permit the wheel to be moved and at the same time to retain the wheel in whatever position it may be left. Carried by the wheel *l* concentrically therewith is a pinion *p*, which meshes with the teeth *f* of the rack-bar. This pinion, as will be seen from Figs. 2 and 3, is integrally united with the stud *n*. This stud has five portions of different diameters, the head having the greatest diameter and being wider than the slot *d*, the shank being larger than the threaded portion of the stud which screws into the star-wheel, so that a shoulder is provided for giving a firm bearing and securing the stud tightly in the star-wheel, while the pinion is of less diameter than the threaded portion, so that it may be passed through the central orifice of the wheel when the stud is being connected to the wheel. Extending from the pinion is still another integral portion *r* of the stud, which is of less diameter than the pinion and is provided for a purpose hereinafter described. The rack-bar *e* projects over the wheel *l*, a portion of which extends into the space provided between the rack and plate *c*. The side *q* of the slot is parallel with the teeth of the rack and located at such a distance therefrom that when the shank of stud *n* is in contact with such edge the pinion is in position to mesh properly with the teeth of the rack, and thus this edge guides the wheel and pinion, so that as the wheel is turned the pinion continues in gear with the rack and both are caused to travel along the line of the slot. An engagement is effected between the wheel and regulator-arm *a*, so that the end of the latter is moved by the wheel, such engagement being made by the projecting portion or pin *r* extending upward from the wheel and entering a slot *s* in the end of the arm, such arm extending over the rack *e* and a portion of the wheel.

As shown in Figs. 2 and 3, the slot is made with sides *t*, which are inclined toward each other as they extend from the back toward

the face of the watch-movement, so that there will be an engagement of the stud with both sides of the slot at the same time, and no play or backlash will be permitted.

5 Another form of connection is shown in Fig. 4, wherein the slot s' extends entirely through from one surface to the other of the regulator-arm and is open at the end.

As before stated, the rack e is secured in
10 place at its ends, and it is so arranged that movement in substantially the direction of the length of the rack is permitted at one of its ends, so that it is possible for the toothed portion of the rack to spring toward and
15 away from the guiding edge q of the slot. The orifice v , through which the stud i extends, is of a length greater than the diameter of the stud, while its width is the same as that of the stud. Thus this end of the rack is en-
20 abled to move slightly in opposite directions in a line approximately the same as the direction in which the rack extends. Thus it is possible, the rack being constructed of re-
25 siliant material, to make the distance between the teeth of the rack and the guiding edge q a tight fit for the stud and pinion, and the rack being then permitted to yield allows
30 the wheel to be turned and the regulator shifted, while also holding the pinion in close mesh and retaining the wheel frictionally in whatever position it may be placed.

The plate c is provided with the usual graduations w , and those arms m of the star-wheel which project over the graduations are
35 engaged and moved when the regulator is to be shifted. It will be seen that the direction given the arm a by this movement is the same as that in which the arms m of the wheel move. Hitherto in order to provide in the
40 regulator a star-wheel which can be turned in the direction it is desired to move the regulator-arm it has been necessary to form teeth on the concave surface of a curved bar carried by the regulator-arm, as in the patent
45 to D. H. Church, No. 484,176, granted October 11, 1892. The operations of making teeth of this sort and of such small size is an exceedingly difficult and expensive one and
50 one in which there is great danger of error, so that in many cases the teeth are very imperfectly formed. As is well known, the operation of making teeth on a convex surface is a much simpler, less expensive, and more
55 accurate one, and also in this device the teeth are formed on a single bar which is independent of the regulator-arm and one which is much easier to make than is the annular toothed bar shown in the Church patent referred to. It will therefore be seen that my
60 invention marks an advance in the art of watchmaking in rendering more accurate and cheapening the cost of manufacture of a regulator.

I claim—

65 1. In a regulator, a slotted plate, a toothed

member adjacent and substantially parallel with one side of the slot in said plate, a star-wheel supported by said plate, a stud and a pinion carried by said wheel and engaged respectively in the slot and with the toothed
70 member, and a regulator-arm arranged for actuation by movement of the star-wheel.

2. In a regulator, a slotted plate, a toothed member adjacent and substantially parallel
75 with one side of the slot in said plate, a star-wheel supported by said plate, a stud and a pinion carried by said wheel and engaged respectively in the slot and with the toothed member, and a regulator-arm engaged with
80 said star-wheel.

3. In a regulator, a slotted plate, a toothed member adjacent and substantially parallel
85 with one side of the slot in said plate, a star-wheel supported by said plate, a stud attached to the star-wheel and having a shank adapted to bear against the side of the slot opposite the toothed member and a head
90 frictionally engaging the plate on the side opposite the wheel, a pinion attached to the star-wheel meshing with the toothed member, and a regulator-arm engaged with the star-wheel.

4. In a regulator, a regulator-arm, a toothed bar adjacent the end of said arm
95 curved substantially concentrically with the path of movement thereof and having its teeth on the convex side, a plate arranged parallel with the bar and separated therefrom by a space, said plate having a slot curved
100 concentric with the bar, a wheel supported by said plate extending partially into said space, a pinion connected with the wheel and meshing with the teeth of the bar, a projection extending from the wheel into the slot
105 and bearing against one side thereof for guiding the wheel and pinion, and a connection therewith and with the regulator-arm.

5. In a regulator, a graduated plate having a guiding edge or surface, a bar or plate hav-
110 ing a side parallel with said guiding-surface provided with teeth, said bar being mounted with capacity for yielding, an actuating-wheel engaged with said guiding-surface and supported by said plate, a pinion carried
115 by the actuating-wheel and held in mesh with the teeth of said bar by the guiding-surface, and a regulator-arm connected for actuation by the wheel.

6. In a regulator, a plate having a guide-
120 way, a wheel supported and guided thereby, a toothed bar supported adjacent thereto having at one end an elongated hole, studs for holding said bar, one of them extending through the elongated hole and being of less
125 diameter than the length thereof, whereby a limited movement of the bar is permitted, a pinion carried by the wheel in mesh with the teeth of the bar, and a regulator-arm.

7. In a regulator, a toothed bar, a wheel
130 having a pinion meshing therewith and guided

to travel in a path parallel with the bar, a stud projecting from the center of the wheel, and a regulator-arm having a slot near its end adapted to receive said stud.

5 8. In a regulator, a toothed bar, a wheel having a pinion meshing therewith and guided to travel in a path parallel with the bar, a stud projecting from the center of the wheel, and a regulator-arm having a slot near its end
10 formed with sides convergently inclined with

respect to the plane of the bar and parallel to the direction of the length of the arm, said stud being engaged with and bearing against said sides.

In testimony whereof I have affixed my 15 signature in presence of two witnesses.

OLOF OHLSON.

Witnesses:

A. C. RATIGAN,
ARTHUR H. BROWN.