

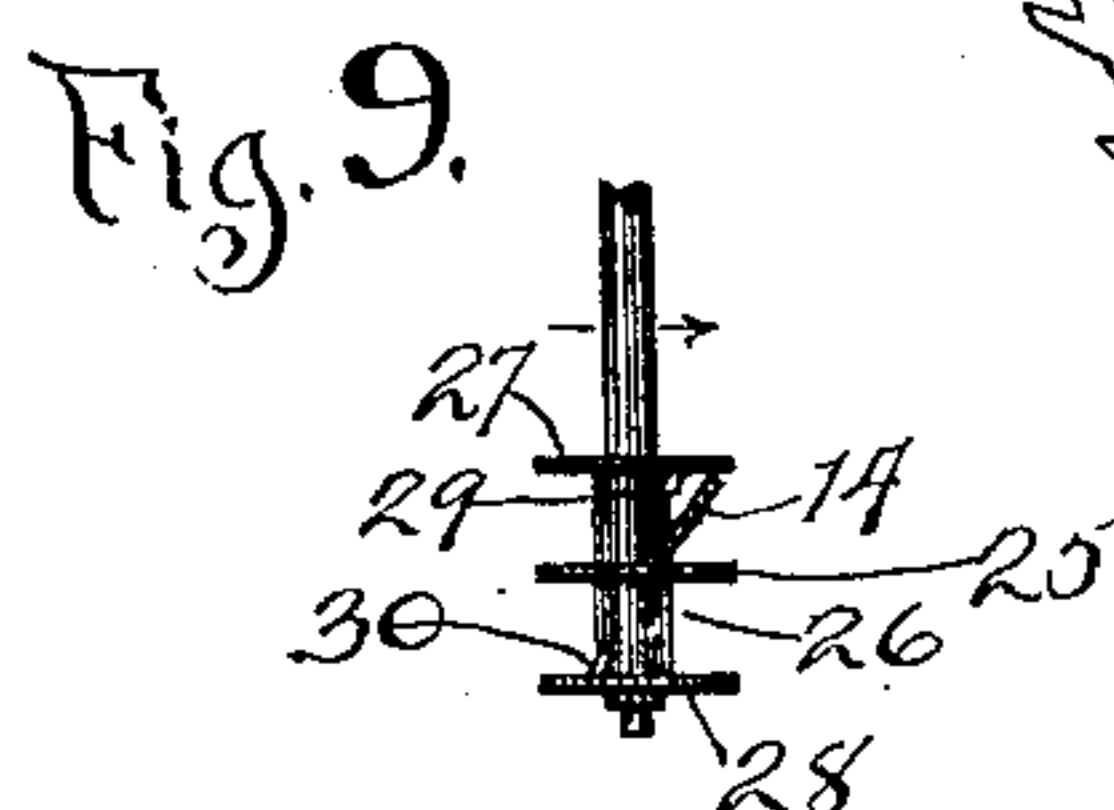
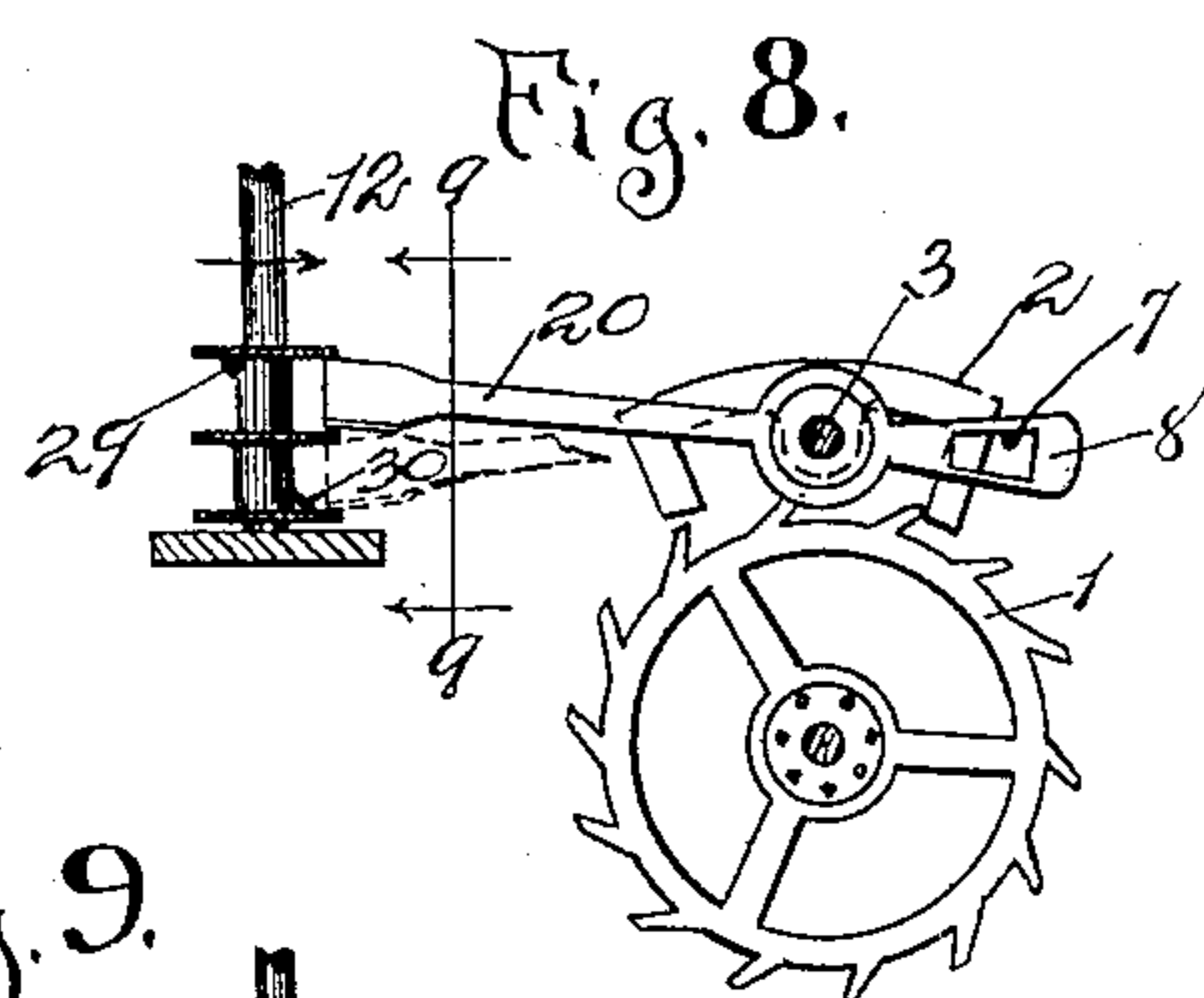
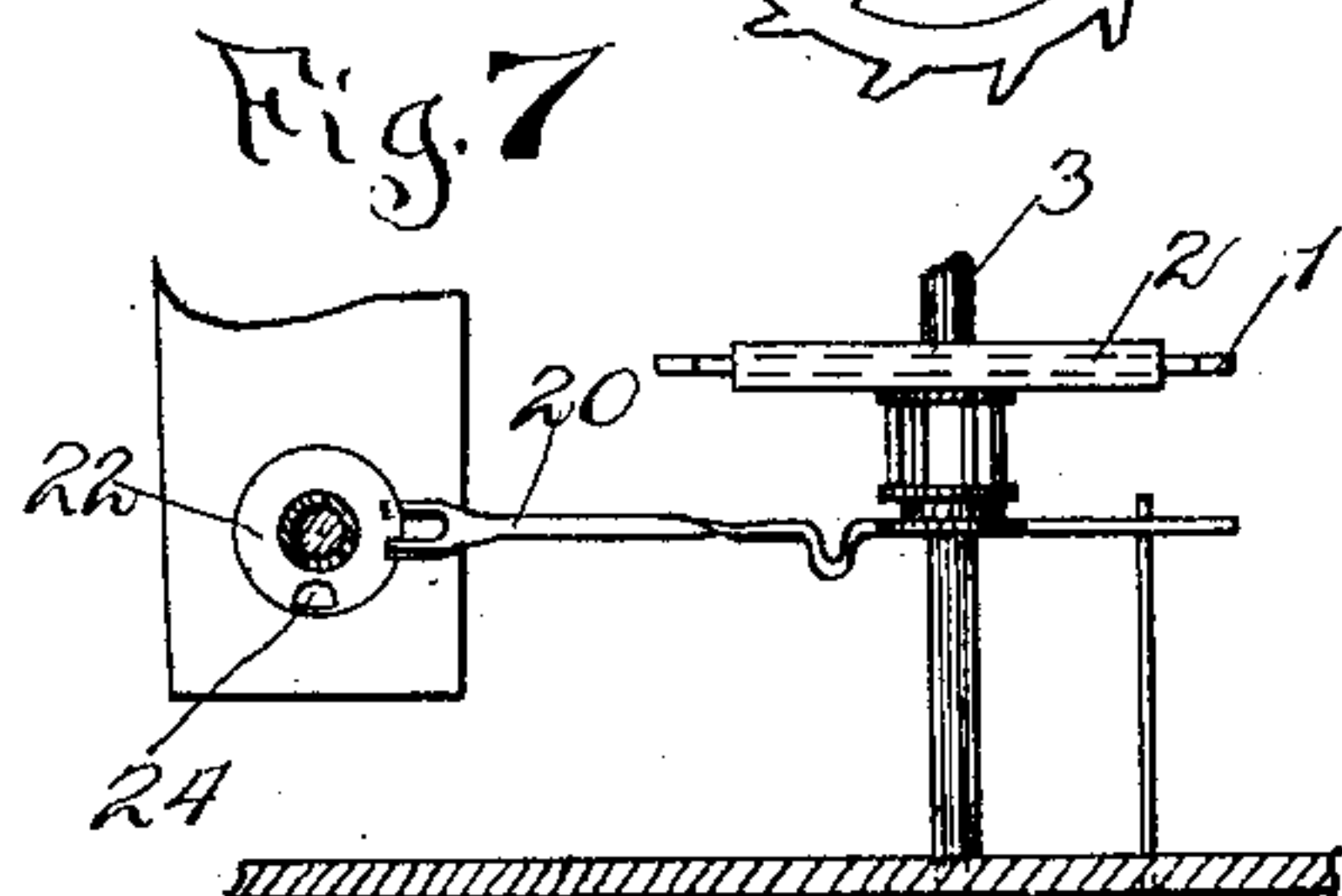
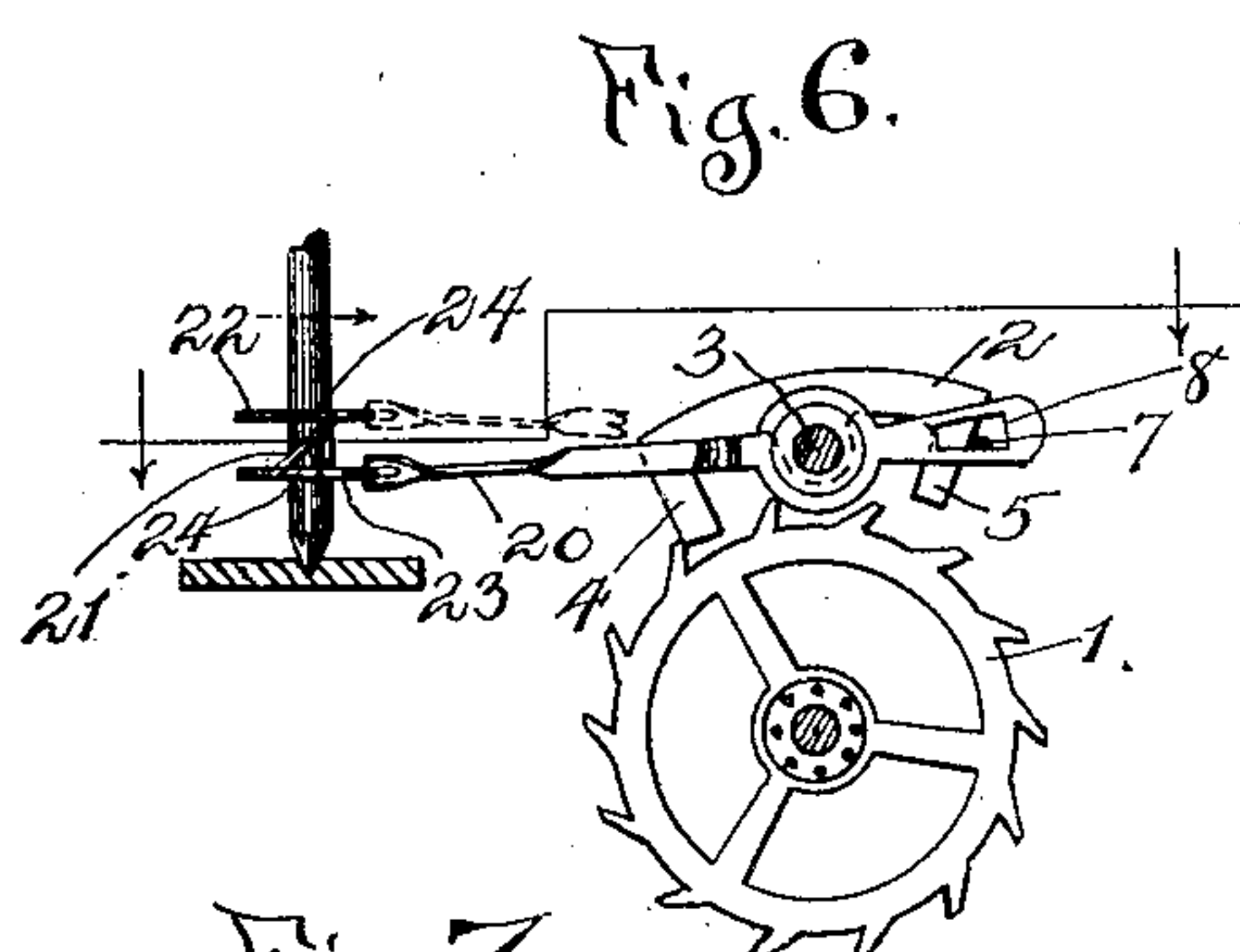
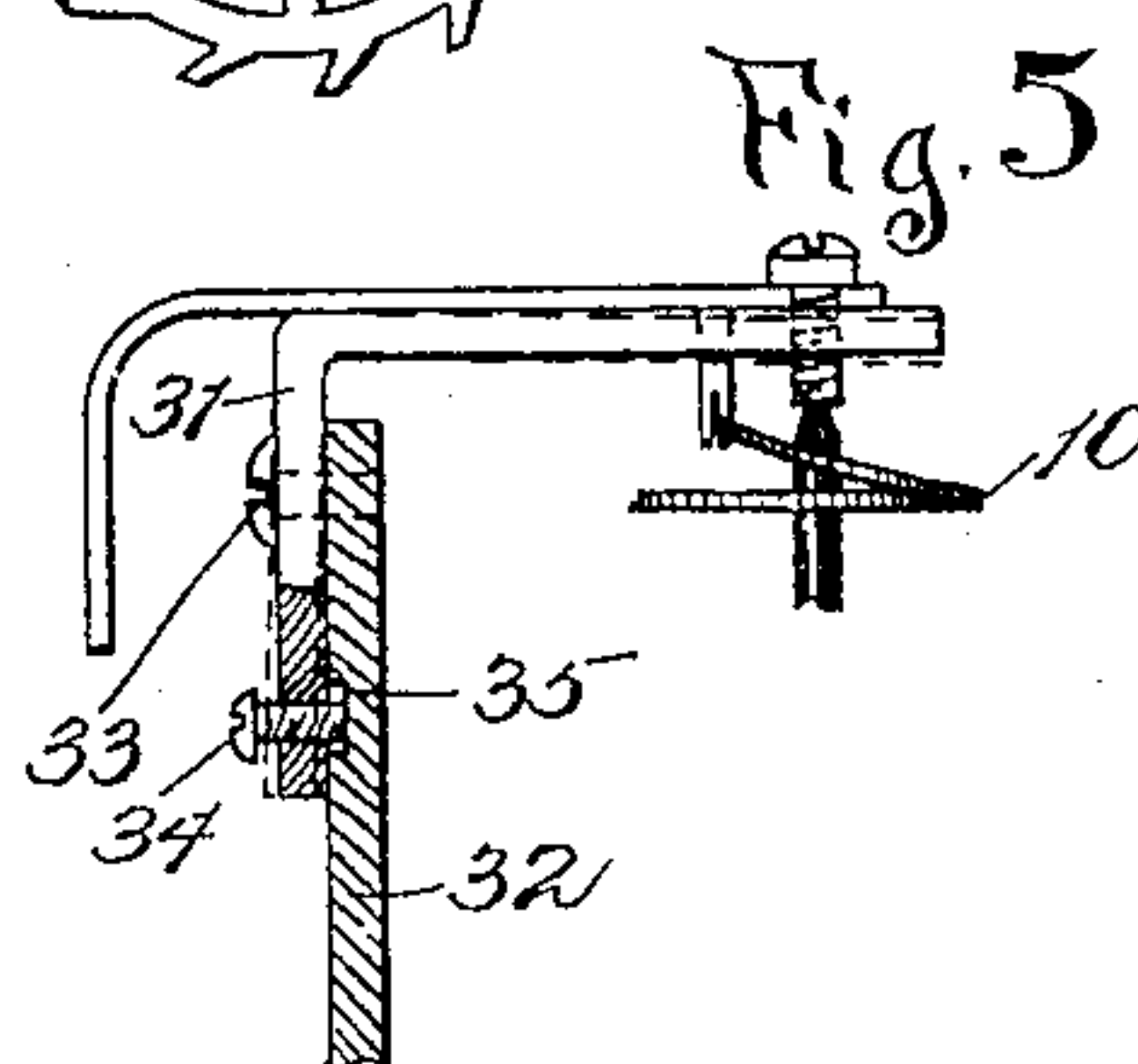
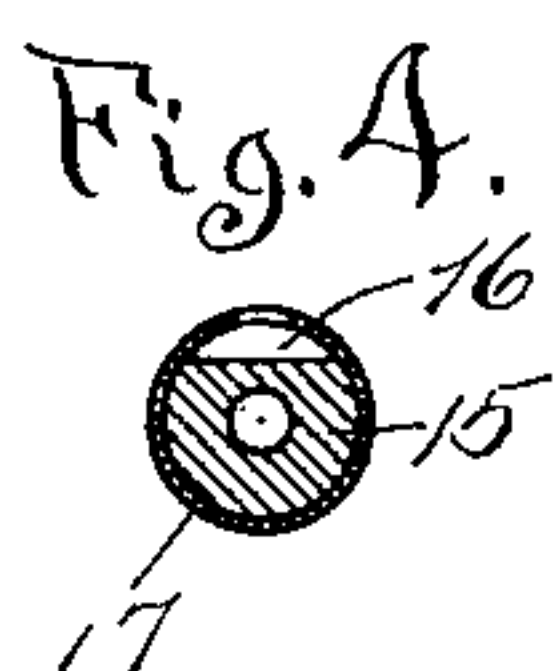
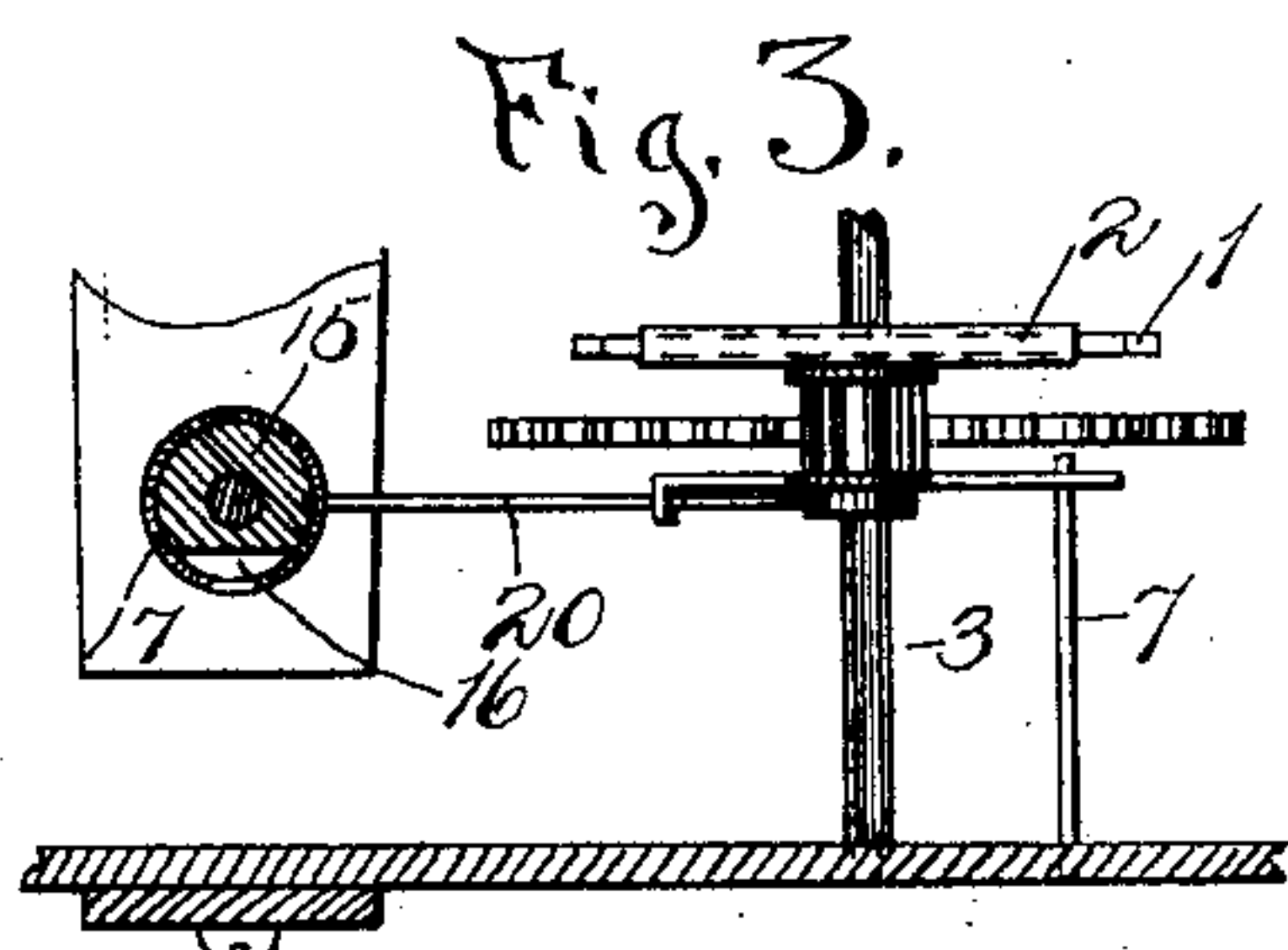
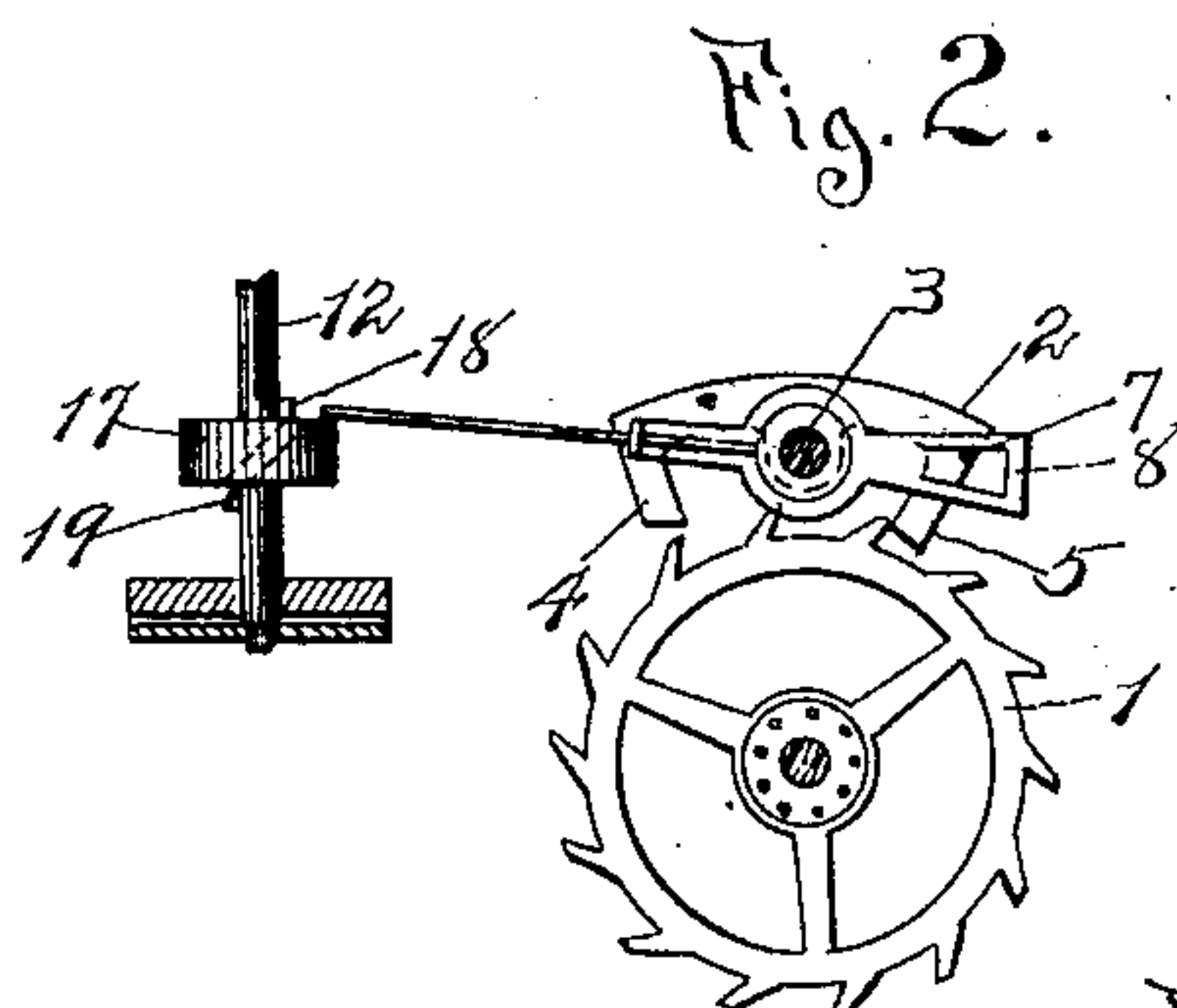
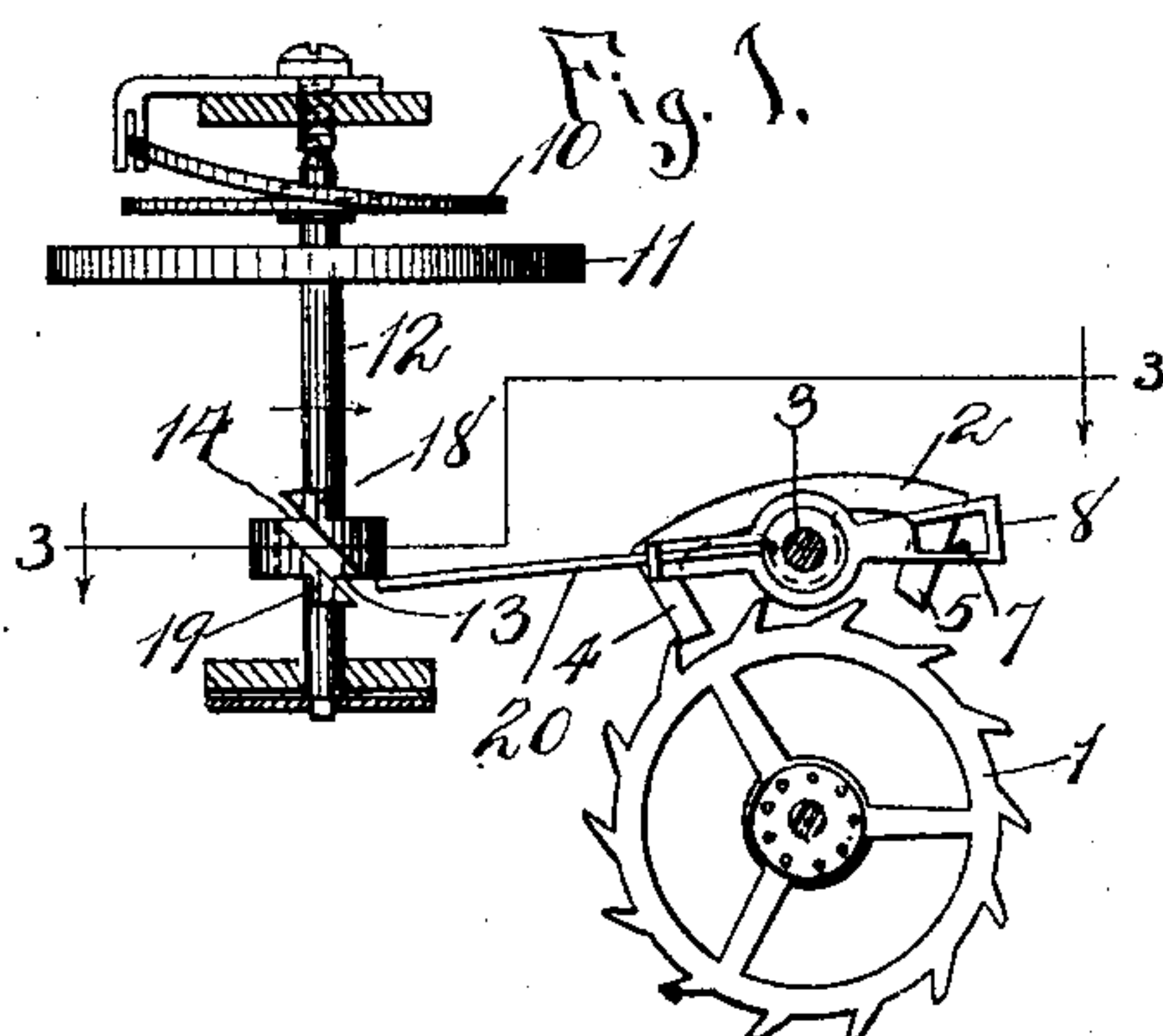
No. 664,734.

Patented Dec. 25, 1900.

L. ERIKSON.
BALANCE ESCAPEMENT.

(Application filed May 25, 1899.)

(No Model.)



UNITED STATES PATENT OFFICE.

LAURENCE ERIKSON, OF EVANSTON, ILLINOIS.

BALANCE-ESCAPEMENT.

SPECIFICATION forming part of Letters Patent No. 664,734, dated December 25, 1900.

Application filed May 25, 1899. Serial No. 718,223. (No model.)

To all whom it may concern:

Be it known that I, LAURENCE ERIKSON, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Detached-Lever Escapements, of which the following is a specification.

The present invention relates to what is known as a "detached-lever escapement," being an escapement having a balance-wheel, a hair-spring for resisting the movement of the balance-wheel in both directions, an escapement-wheel, pallets engaging it, an oscillating lever carrying the pallets, a lever-arm carried by said lever, and means for transmitting impulses from the lever-arm to the balance-wheel shaft and from the balance-wheel shaft to the lever-arm.

The invention consists in the features of novelty that are hereinafter fully described, with reference to the accompanying drawings, which are made a part hereof, and in which—

Figure 1 is an elevation of an escapement embodying the invention in its preferred form, showing the parts in the positions that they occupy when the oscillating lever carrying the pallets is at one extremity of its permitted movement. Fig. 2 is an elevation of a portion thereof, showing the parts in the positions that they occupy when the said oscillating lever is at the other extremity of its permitted movement. Fig. 3 is a section thereof on the line 3 3, Fig. 1. Fig. 4 is a section of one of the parts on the same line 3 3, Fig. 1, but with the part in the position shown in Fig. 2. Fig. 5 is a sectional elevation of some of the parts thereof, showing the means for adjusting the bridge of the balance-wheel shaft. Fig. 6 is an elevation of an escapement embodying some features of the invention under a slight modification. Fig. 7 is a plan view thereof. Fig. 8 is an elevation of a portion of an escapement embodying some features of the invention under another modification. Fig. 9 is a view showing some of the parts thereof in elevation and in changed position and one of the parts in section on the line 9 9, Fig. 8.

The escapement-wheel is shown at 1.

2 is an oscillating lever supported by a shaft 3, and 4 and 5 are the pallets, carried by the

oscillating lever and each provided with a driving-plane and a locking-plane, all of said parts being constructed and arranged to operate in customary manner. The movement of the oscillating lever 2 is limited by a pin 7, occupying an opening 8 in an arm 9, projecting from the shaft 3.

The hair-spring is shown at 10, the balance-wheel at 11, and its shaft at 12, these parts being of customary construction. The shafts of the lever 2 and balance-wheel are at right angles to each other, and one of them carries two parallel cam-surfaces that occupy an oblique position with respect to the balance-wheel shaft, while the other has means for imparting impulses to and receiving impulses from said cam-surfaces. In the preferred form of the invention (shown in Figs. 1 to 4, inclusive) the two cam-surfaces 13 and 14 are carried by the balance-wheel shaft and are formed by providing a disk 15 with a cut-away portion 16 and a band 17, which partly encircles the disk, the ends of the band being oblique and arranged opposite the cut-away portion 16. The cam-surfaces 13 and 14 are on the oblique ends of the band and on extensions 18 and 19, one of which projects beyond one face of the disk 15 and forms a continuation of the cam-surface 13, while the other projects beyond the other face of the disk and forms a continuation of the cam-surface 14, so that while said cam-surfaces are of equal length each projects at one end beyond the corresponding end of the other. In the preferred form of the invention the means carried by the shaft 3 for receiving impulses from and imparting impulses to the cam-surfaces 13 and 14 consists of a lever-arm 20, which is adapted to project into the space between the cam-surfaces 13 and 14.

The operation of this device is as follows: As the parts are shown in Fig. 1 a tooth of the escapement-wheel is bearing against the locking-plane of the pallet 4, but without any tendency to move it. The lever-arm 20 is below the disk 15, and the balance-wheel under the influence of the hair-spring is rotating in the direction of the arrow. As soon as the extension 19 of the cam-surface 14 comes in contact with the lever-arm 20 it will elevate it slightly, thereby moving the locking-plane of the pallet 4 out of engagement

with the tooth of the escapement-wheel and allowing said tooth to impinge against the driving-plane of said pallet 4. Under this impulse the lever-arm 20 will be moved upward and in doing so will come in contact with the cam-surface 13, and thereby impart thereto an impulse tending to carry the balance-wheel in the direction of the arrow. This movement of the pallet 4 brings the locking-plane of the pallet 5 in the path of a tooth of the escapement-wheel and brings the lever-arm 20 to a position slightly above the disk 15, as shown in Fig. 2. Thereafter the balance-wheel will continue its movement—say to the position indicated in Fig. 2—until arrested by the hair-spring and again returned thereby. Upon its return movement the extension 18 of the cam-surface 13 will engage the lever-arm 20 and move it downward slightly, thus freeing the tooth of the escapement-wheel from the locking-plane of the pallet 5 and permitting the tooth to impinge against the driving-plane of said pallet, whereby the pallet is moved toward the position shown in Fig. 1, and in doing so the lever-arm 20 will impinge against the cam-surface 14 and impart an impulse thereto tending to throw the balance-wheel in the direction opposite that indicated by the arrow.

As before stated, the pallets and escapement-wheel are so constructed that under normal conditions the pallets will be locked when a tooth of the escapement-wheel is in engagement with the locking-plane of one or the other of them, and when so locked the lever-arm 20 exerts no pressure whatever upon the band 17, thus completely detaching the balance-wheel from the remainder of the works, excepting when the balance-wheel is either giving an impulse to or receiving an impulse from the lever-arm 20. Ordinarily the teeth of the escapement-wheel will have no tendency to escape from the locking-planes of the pallets by reason of the pressure of the teeth against said planes; but in order to avoid the possibility of such a disengagement of the teeth and locking-planes under accidental circumstances I provide guards or stops for preventing the movement of the pallets excepting when the lever-arm 20 comes under the control of one or the other of the cam-surfaces 13 or 14. In the preferred form of the invention these guards or stops consist of the opposite edges of the band 17, which lie close to the lever-arm while at either extremity of its permitted movement and prevent it from being moved under the influence of the escapement-wheel should a tooth accidentally escape from a locking-plane.

Normally the balance-wheel shaft will have a movement of less than three hundred and sixty degrees; but in order to guard against the possibility of a greater movement the extensions 18 and 19 are provided with abrupt faces adapted to be engaged by the lever-arm 20, and thereby arrest the movement of the balance-wheel shaft and prevent it from

moving through the full three hundred and sixty degrees.

In the form of the invention shown in Figs. 6 and 7 the two cam-surfaces 13 and 14 are formed upon opposite faces of a plate or bar 21, which occupies an oblique position with respect to the balance-wheel shaft 12, and the lever-arm 20 is bifurcated at its ends, so as to straddle said plate or bar and straddle also a pair of disks 22 and 23, which are carried by the shaft and which are notched, as shown at 24, the plate or bar 21 being so disposed that it connects the disk 22 at one margin of its notch with the disk 23 at the opposite margin of its notch. In other words, the upper and lower faces of the disks 22 and 23 form continuations of the cam-surfaces 14 and 13, respectively. It will be observed that the arrangement shown in Figs. 6 and 7 is a mere reversal or transposition of the arrangement shown in Figs. 1 to 4, inclusive. In the form of the invention shown in Figs. 6 and 7 the cam-surface 13 and one branch of the bifurcated end of the lever-arm 20 cooperate and the cam-surface 14 and the other branch cooperate. The disks 22 and 23 form guards or stops for preventing the lever-arm 20 from being moved under the influence of the escapement-wheel should a tooth accidentally escape from a locking-plane.

In the arrangements shown in Figs. 8 and 9 the cam-surfaces 13 and 14 are carried by the lever-arm 20. In fact, they are the opposite faces of an enlargement at the end of the arm, said enlargement being disposed in a plane that is oblique with respect to the balance-wheel shaft 12, as shown more clearly in Fig. 9. In this form of the invention the balance-wheel shaft carries a disk 25, having a notch 26 and a pair of disks 27 and 28, carrying pins 29 and 30, respectively. The opposite faces of the disk 25 form the guards or stops for preventing the lever-arm 20 from moving either upward or downward, excepting when its enlarged end comes opposite the notch 26. Assuming the parts to be in the positions shown in Fig. 8, as the balance-wheel shaft rotates in the direction of the arrow the pin 29 will impinge against the cam-surface 13, carried by the lever-arm 20, and move it downward. In so doing the locking-plane of the pallet 5 is moved out of engagement with the tooth of the escapement-wheel, and the latter is allowed to impinge against the driving-plane at the extremity of said pallet and move the lever-arm 20 downward, thus causing the cam-surface 14 to impinge against the disk 25 and impart to the balance-wheel shaft an impulse in the direction of the arrow, the continued downward movement of the lever-arm 20 bringing the locking-plane of the pallet 4 into engagement with the escapement-wheel. When the parts arrive at this position, the enlarged end of the lever-arm will be between the disks 25 and 28 and the pin 30 will have passed it, as shown by dotted lines in Fig. 8. The bal-

ance-wheel shaft will then continue to move in the direction of the arrow until returned by the hair-spring, whereupon the pin 29 will impinge against the cam-surface 14 and operations the reverse of those above described will take place.

In all of the several forms of the invention the hair-spring is so adjusted that it exerts no pressure upon the balance-wheel shaft when the parts occupy central positions within the ranges of their permitted movements, but will be put under tension by a movement of said parts in either direction away from said central positions. In other words, when the lever-arm 20 is at the center of its permitted movement it will be at the center of the cam-surfaces 13 and 14, and the hair-spring will be under no tension whatever; but in moving either upward or downward from this central position the lever-arm will impinge against one or the other of the cam-surfaces 13 and 14, (or an equivalent action will take place,) and thereby partially rotate the balance-wheel shaft and in turn put the hair-spring under a tension, which tension after the impulse received from the impingement of the lever-arm with the cam-surface has spent itself in thus putting the hair-spring under tension will again return the balance-wheel to and past central position, with the results already stated.

In order to adjust the bearing of the balance-wheel shaft, the bridge which carries the bearing has a part 31, which is secured to some fixed part 32 in such manner that within the range of the necessities their opposing faces may be adjusted to any desired angle with respect to each other. To this end the two parts are secured together by a screw passing through one and having threaded engagement with the other and an adjusting-screw 34, which has threaded engagement with one and bears against the other. By turning the adjusting-screw 34 the parts 31 and 32 may be brought to the angular position necessary to bring the bearing of the shaft to proper position. Then by tightening the screw 33 the parts are securely held in place.

In order to prevent the movement of the part 31 about the screw 33 as an axis, the part 32 is provided with a depression 35 for engaging the end of the screw 34.

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

1. An escapement mechanism comprising a hair-spring, a balance-wheel, a shaft at right angles to the balance-wheel shaft carrying pallets having locking-planes, oscillating cam-surfaces carried by one of said shafts, oscillating transmitting means carried by the other shaft for imparting impulses to and receiving impulses from said cam-surfaces, said cam-surfaces being such as to allow an oscillating motion to the balance-wheel independent of the transmitting means, but to coact

with the locking-planes of the pallets to allow said means to remain stationary during such independent motion.

2. In a detached-lever escapement, the combination of an escapement-wheel, an oscillating lever, pallets carried by said lever, a balance-wheel, a shaft therefor disposed at right angles to the axis of oscillation of said lever, a hair-spring adapted to give impulses to the balance-wheel in both directions, two cam-surfaces carried by the balance-wheel shaft and occupying an oblique position with respect to the axis thereof, a lever-arm adapted to partake of the movement of said oscillating lever and having a part arranged in the paths of said cam-surfaces and adapted to give impulses to and receive impulses from them, and guards or stops for preventing the movement of the lever-arm under the influence of the pallets after each movement of said lever-arm under the influence of the pallet and before it receives the next impulse from the balance-wheel, each of the pallets having a locking-plane adapted to engage the teeth of the escapement-wheel and lock the pallets and lever-arm at rest after each impulse from the escapement-wheel and until it receives the next impulse from the balance-wheel, substantially as set forth.

3. In a detached-lever escapement, the combination of a balance-wheel, a shaft therefor, a hair-spring adapted to give impulses to the balance-wheel in both directions, a disk carried by the balance-wheel shaft and having a cut-away portion, a band surrounding the disk and having oblique ends disposed opposite said cut-away portion and providing parallel cam-surfaces occupying an oblique position with respect to the axis of the balance-wheel shaft, a pallet, a lever-arm carried thereby and adapted to enter the space between the cam-surfaces, and means for holding the lever-arm out of engagement with the accessories of the balance-wheel shaft, excepting while giving or receiving an impulse, substantially as set forth.

4. In a detached-lever escapement, the combination of a balance-wheel, a shaft therefor, a hair-spring adapted to give impulses to the balance-wheel in both directions, two parallel cam-surfaces carried by the balance-wheel shaft and occupying an oblique position with respect to the axis thereof, said cam-surfaces being so disposed that each of them, at one end, projects beyond the corresponding end of the other, a lever-arm projecting into the paths of the projecting portions of the cam-surfaces, and means for holding the lever-arm out of engagement with the accessories of the balance-wheel shaft, excepting while giving or receiving an impulse, and means for moving the lever-arm, substantially as set forth.

LAURENCE ERIKSON.

Witnesses:

L. M. HOPKINS,
B. C. SIMS.