(No Model.)

J. M. W. LONG.

PAWL AND RATCHET MECHANISM.

No. 454,440. Patented June 16, 1891.

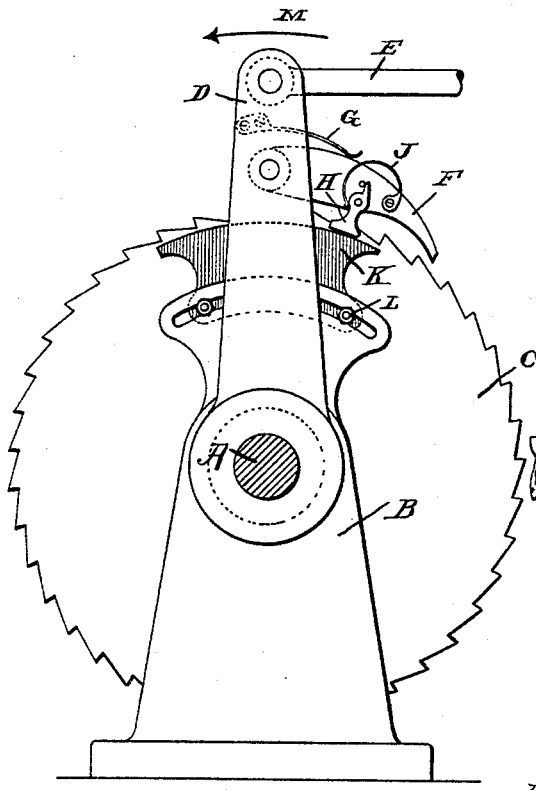

Fig. 1.

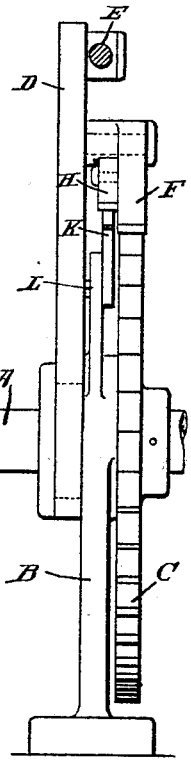

Fig. 2.

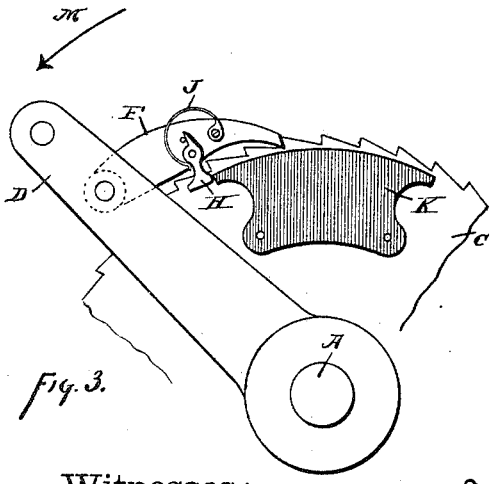

Fig. 3.

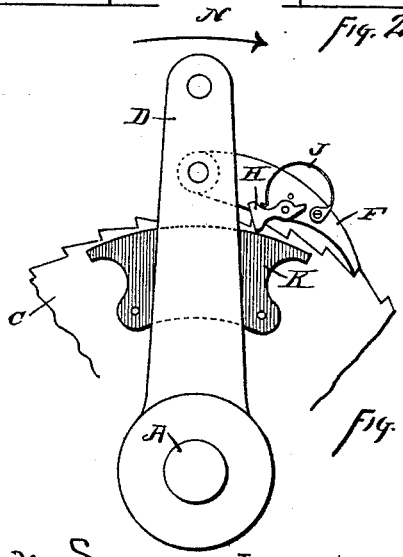

Fig. 4.

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PAWL-AND-RATCHET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 454,440, dated June 16, 1891.

Application filed March 26, 1891. Serial No. 386,424. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. W. LONG, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Pawl-and-Ratchet Mechanism, of which the following is a specification.

As a pawl makes its backward or idle stroke it rides over the teeth of the ratchet. If the ratchet-teeth be large and the pawl movement rapid, this idle riding of the pawl upon the teeth is productive of damaging wear upon the teeth and the pawl, and it is productive in many cases of an annoying racket. The backward drag of the pawl upon the ratchet also tends to drag the ratchet back improperly.

My present invention belongs to that class of devices designed to automatically lift the pawl from the ratchet during the back-stroke of the pawl, and my improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a pawl-and-ratchet mechanism exemplifying my improvements, the pawl in this figure being assumed as making its backward or idle stroke, as indicated by the arrow; Fig. 2, a side elevation of the same, the springs being omitted from this figure for the sake of clearness of view of other parts; Fig. 3, a front elevation, portional only, similar to Fig. 1, but showing the pawl as at the completion of its backward or idle stroke; and Fig. 4, a similar view showing the pawl as upon its forward or working stroke.

In the drawings, A indicates a shaft exemplifying a part to which intermittent rotary motion is to be transmitted by means of pawl and ratchet; B, a bearing for the shaft; C, an ordinary ratchet-wheel fast upon the shaft; D, an ordinary vibrating arm to carry the pawl; E, a reciprocating rod exemplifying ordinary means for vibrating the pawl-arm; F, an ordinary pawl pivoted to the pawl-arm and adapted to engage the teeth of the ratchet-wheel, as usual; G, an ordinary pawl-spring to press the pawl into engagement with the ratchet-wheel; H, a shoe pivoted to the pawl; J, a very light spring connected with the pawl and shoe and tending to turn the shoe into such position that the sole of the shoe will occupy its farthest position below the pawl, as indicated in Fig. 1; K, a fixed smooth segment concentric with the ratchet-wheel and lying near the ratchet-wheel, the radius of this segment being such that when the sole of the shoe bears upon the periphery of the segment, as shown in Fig. 1, the pawl will be supported thereby with its point free of engagement with the ratchet-teeth, the length of arc of this segment being at least equal to the sweep of the shoe as the pawl-arm vibrates, and the initial end of the segment, the end corresponding with the beginning of the active stroke of the pawl being so disposed that the shoe will travel just beyond it at the end of its back-stroke, as indicated in Fig. 3; L, a slot and bolt arrangement uniting the segment to the bearing B and serving merely to exemplify means by which the segment can be adjusted to bring its initial end to the position just above referred to; M, arrows indicating the backward or idle direction of arm-and-pawl motion, and N an arrow indicating the forward or active direction of arm-and-pawl motion.

It will be obvious from an inspection of Fig. 1 that as the arm and pawl move to the left the shoe will ride upon the segment, and the pawl be thereby held entirely free of the ratchet. By inspecting Fig. 3, which represents the pawl at the end of its idle or backward stroke, it will be obvious that when the shoe travels off the segment the pawl will be permitted to drop into engagement with the ratchet. When the pawl begins its forward or active stroke, it will remain in engagement with the ratchet, and the shoe will engage the initial end of the segment, and as pawl and shoe move forward the shoe will be turned up and will ride forward idly on the segment, as indicated in Fig. 4, the shoe during the active stroke thus being idle. The segment is to be so long that the shoe will not travel off its terminal end. At the completion of the active stroke of the pawl the pawl starts back and rides up the first ratchet-tooth, thus being lifted the height of the tooth, whereupon spring J restores the shoe to the position shown in Fig. 1, thus permitting the pawl to complete its back-stroke while supported by the shoe and segment

clear of the ratchet. Spring J should be very light, its only office being to turn the shoe into working position if the friction of the shoe on the segment should fail to properly turn the shoe. Under no circumstances should this spring be so strong as to elevate the pawl when the shoe starts to the right from the position shown in Fig. 3. Looking at Fig. 3, it will be seen that when the pawl starts to the right either of two things might happen. The shoe might turn up, as intended, or, spring J being too stiff, the pawl might be lifted from the ratchet, as is not intended. The downward pressure on the pawl, whether produced by the gravity of the pawl or by a spring, as at G, must in all cases be in excess of the lifting tendency produced upon the pawl by the action of spring J during the forward motion of the pawl. During the backward motion of the pawl, as in Fig. 1, the tendency of the motions is to insure the proper lifting, and no excessive downward pressure upon the pawl will press it into engagement with the ratchet-teeth. The length of arc of the segment K is immaterial if it be sufficient, an excess of length doing no harm; but the initial end of the segment must correspond substantially with the beginning of the forward stroke of the shoe. If arm D has a constant stroke of vibration, then of course the segment may have an invariable position; but in many pawl-and-ratchet motions the degree of effect is altered by altering the stroke of the pawl-arm. In such case the position of the initial end of the segment would require corresponding adjustment. Hence the bolt-and-slot arrangement L, or some equivalent, for permitting the segment to be adjusted so that its initial end will correspond substantially with the beginning of the forward travel of the shoe.

In the exemplification I have shown the ratchet as circular or in wheel form, the pawl arm and pawl having appropriately an oscillating motion; but my improvements are equally applicable to rectilinear ratchets actuated by reciprocating pawls, as will be obvious to any machine-constructer, the segment in such case of course becoming a straight guide or shoe-track, instead of a curved one, the office of the segment being merely to furnish a shoe-track parallel with the series of ratchet-teeth.

It seems only proper to explain that in numerous pawl-and-ratchet devices a segment or track has been employed in connection with the ratchet in order to vary the degree of rotation imparted to the ratchet by the pawl, the track thus furnishing the means for adjusting the degree of transmitted effect. There is no relationship between such devices and my present improvements, for the devices referred to would not accomplish the object of my improvements; nor does my arrangement provide for altering the degree of transmitted effect from pawl to ratchet during active stroke of pawl.

I claim as my invention—

1. In a pawl-and-ratchet mechanism, the combination, substantially as set forth, of a ratchet provided with a series of teeth, a pawl-carrier, a pawl pivoted thereto, a shoe pivoted to the pawl, and a fixed shoe-track parallel with the ratchet-teeth and adapted to be engaged by the shoe to support the pawl out of engagement with the ratchet-teeth during its backward or idle stroke, the initial end of the shoe-track corresponding substantially with the terminal of the backward stroke of the shoe.

2. In a pawl-and-ratchet mechanism, the combination, substantially as set forth, of a ratchet provide with a series of teeth, a pawl-carrier, a pawl pivoted thereto, a shoe pivoted to the pawl, a fixed shoe-track parallel with the series of ratchet-teeth and adapted to be engaged by said shoe to support the pawl out of engagement with the ratchet-teeth during the backward or idle stroke of the pawl, and means for adjusting the initial end of said shoe-track to correspond substantially with the terminal of the back-stroke of the shoe.

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