No. 775,557. PATENTED NOV. 22, 1904.

C. F. DIECKMANN.

RATCHET MECHANISM.

APPLICATION FILED FEB. 15, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

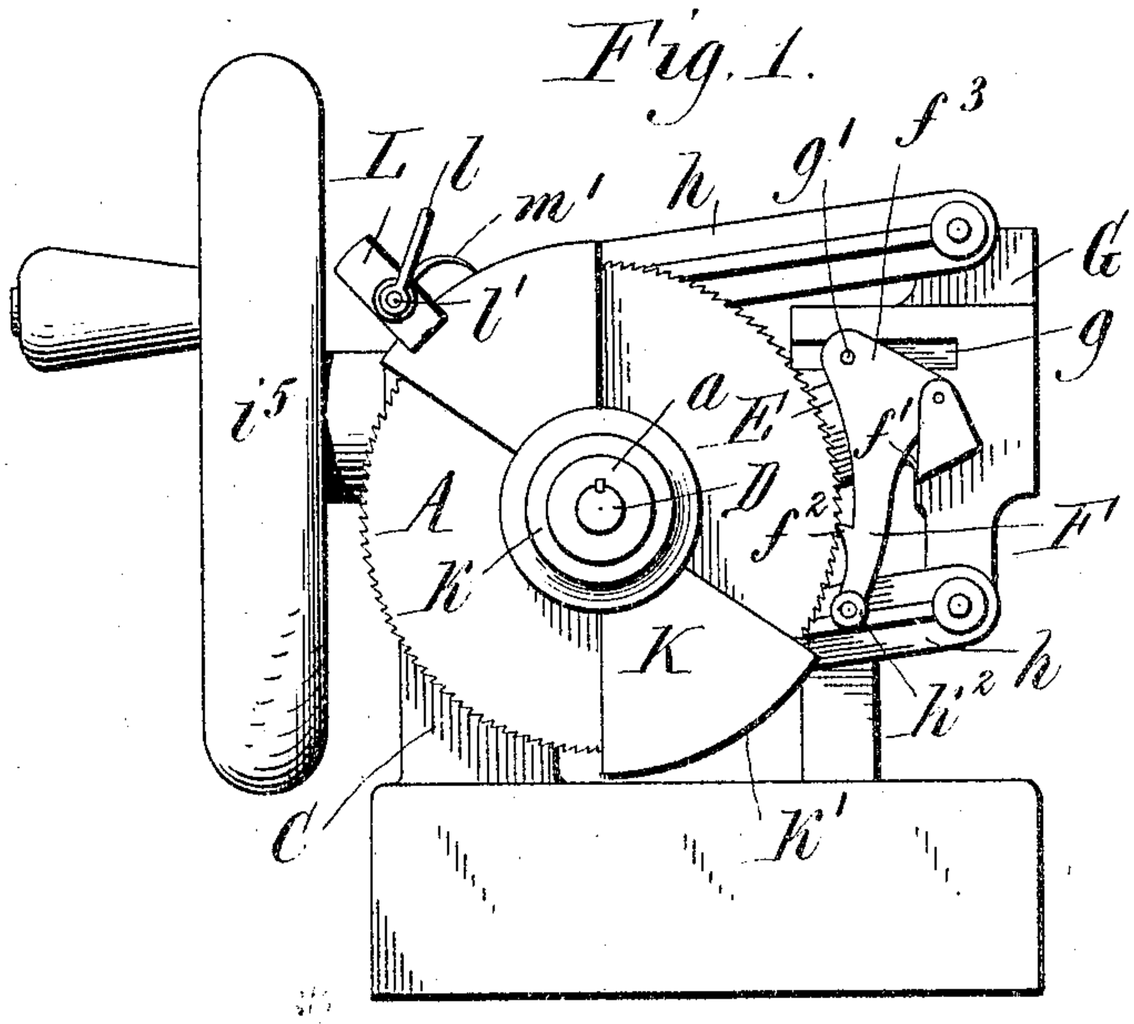
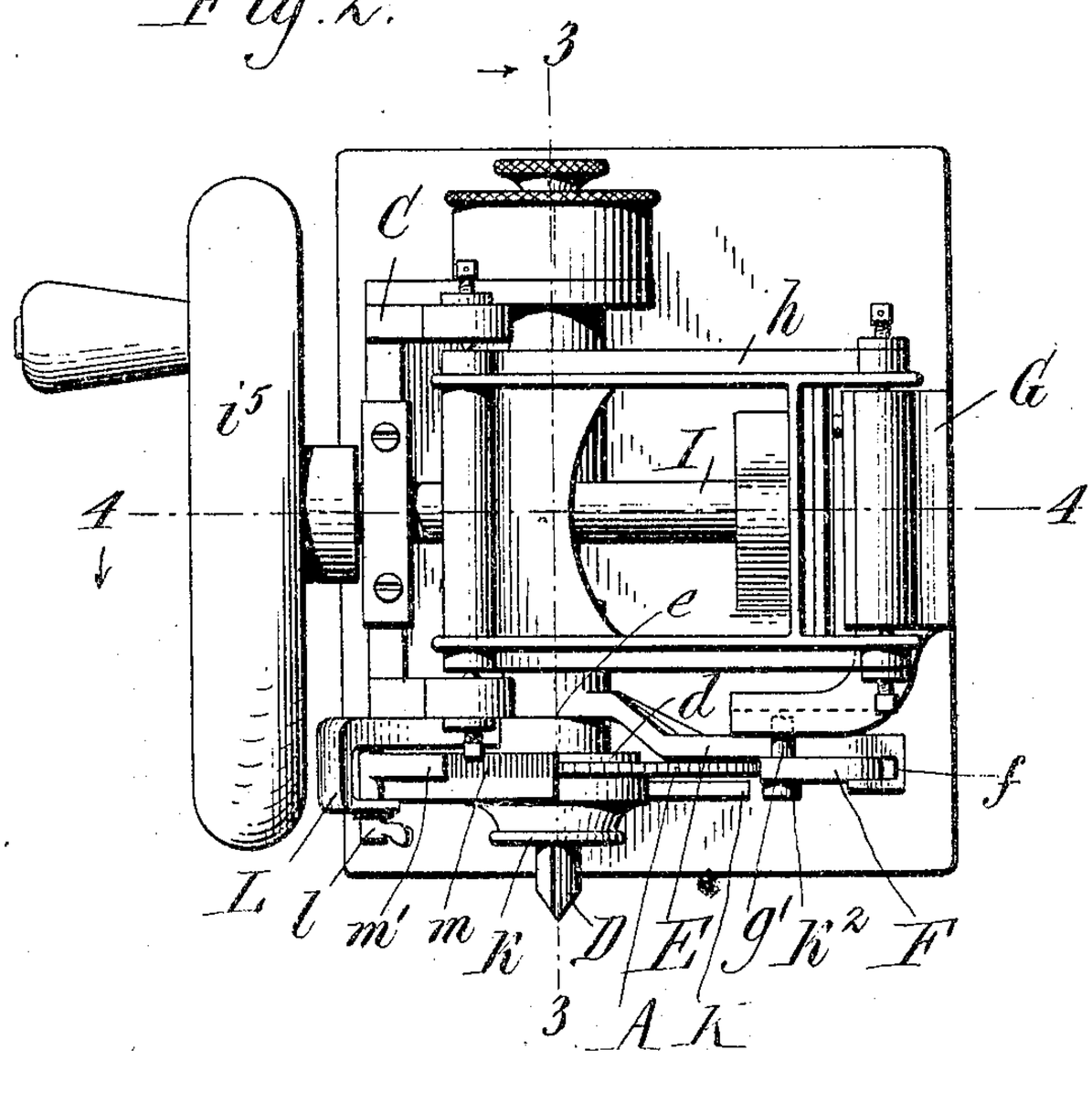


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

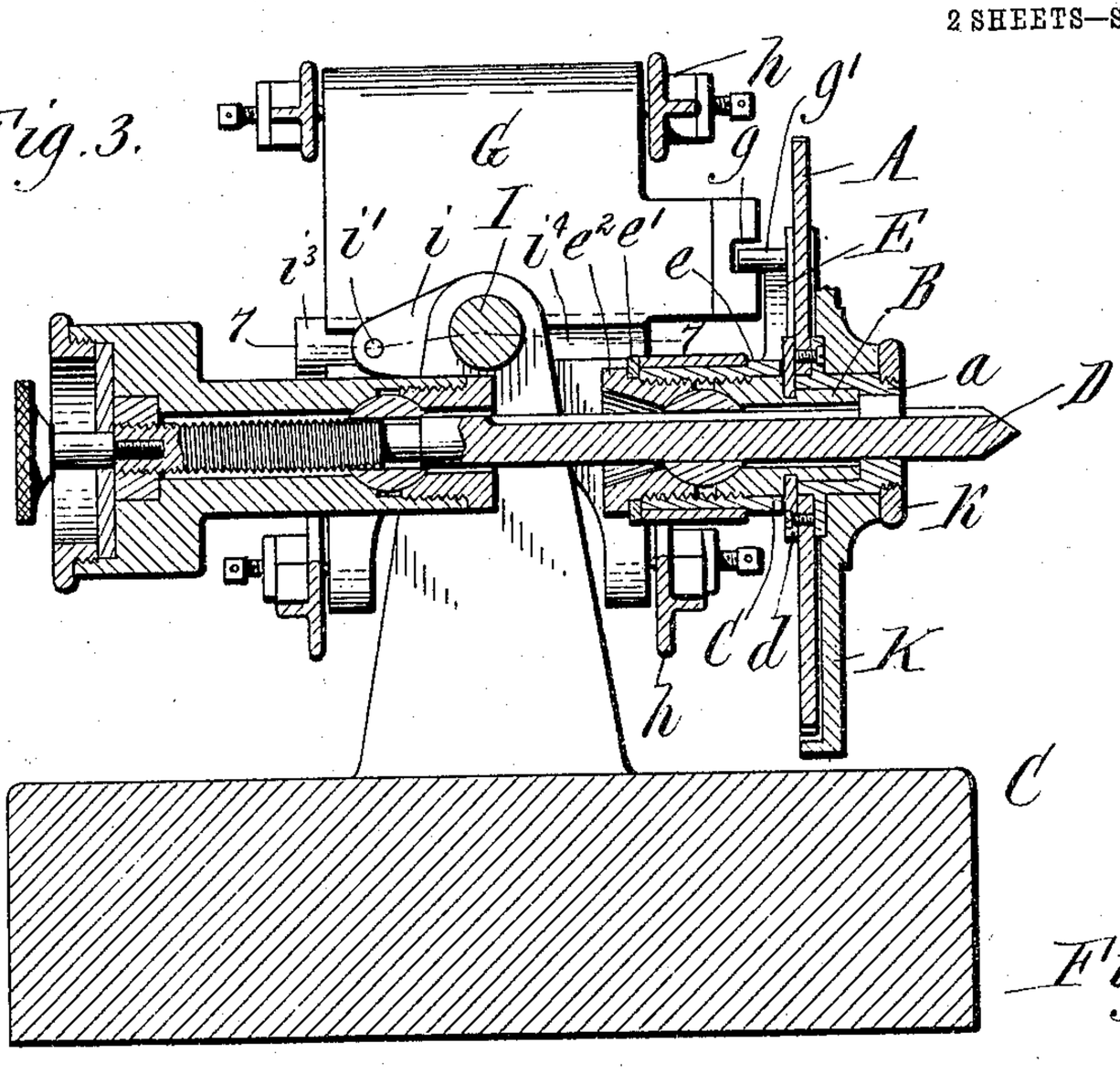


Fig. 5.

Fig. 4.

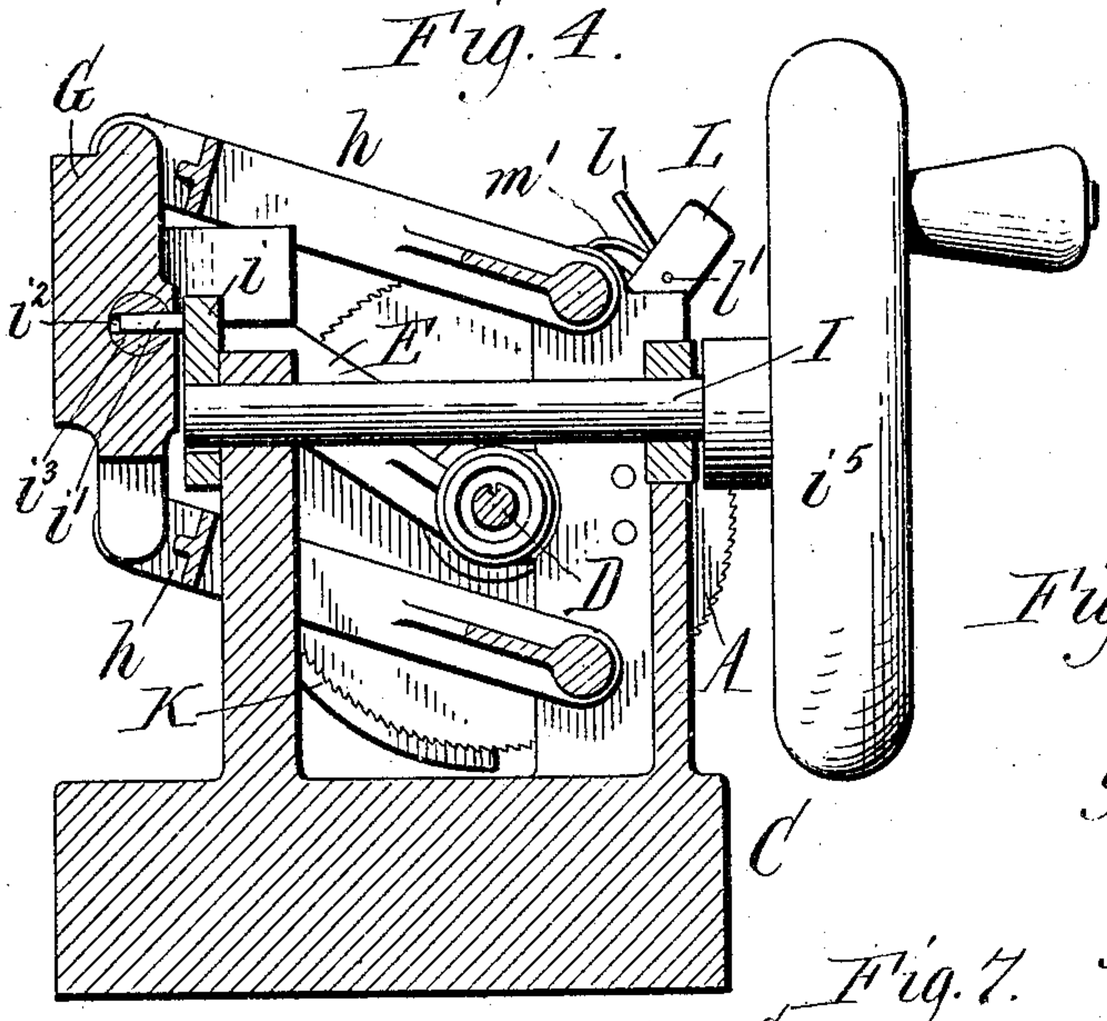


Fig. 6.

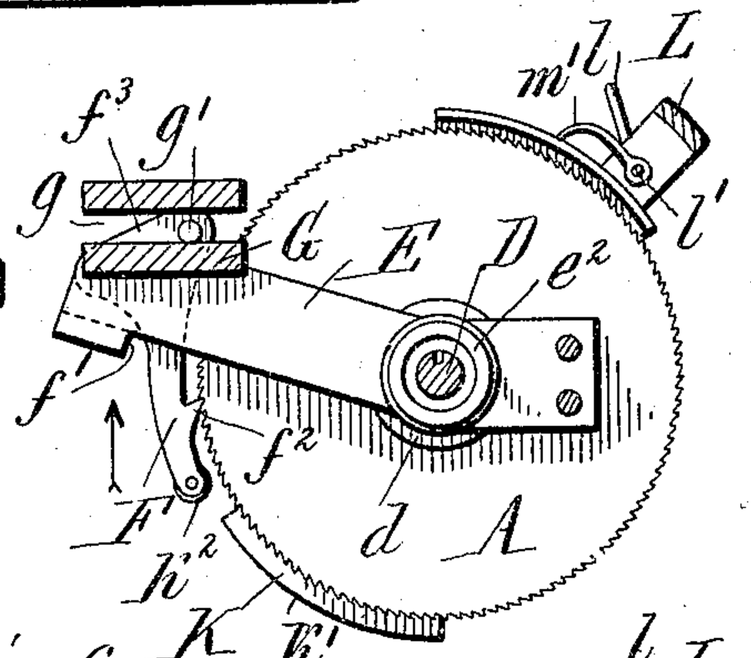


Fig. 7.

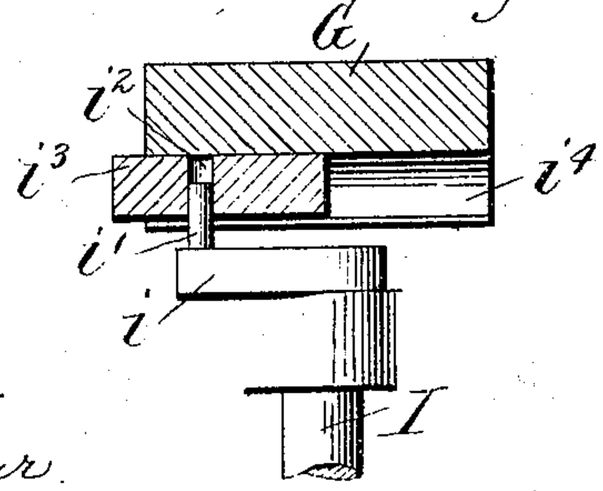
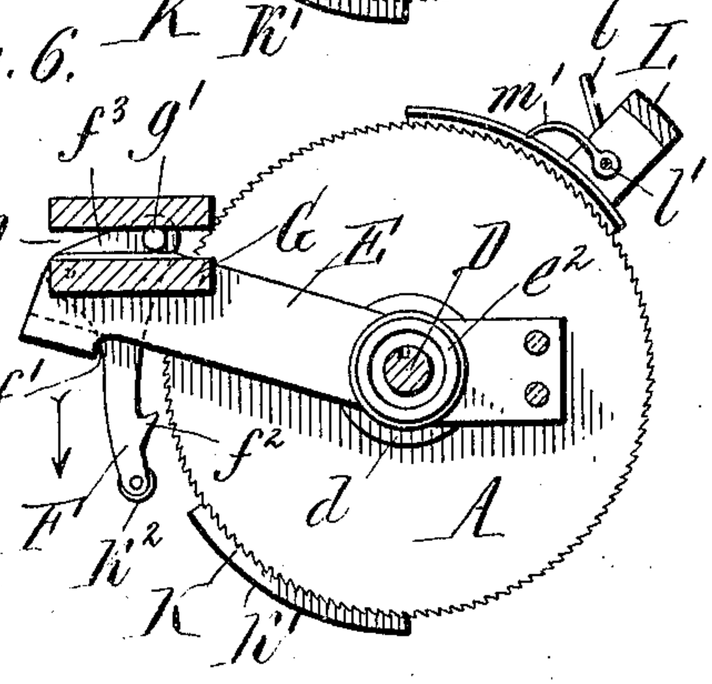


Fig. 8.



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No. 775,557. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

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RATCHET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 775,557, dated November 22, 1904.

Application filed February 15, 1904. Serial No. 193,582. (No model.)

To all whom it may concern:

Be it known that I, CARL F. DIECKMANN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Ratchet Mechanisms, of which the following is a specification.

This invention relates to a ratchet mechanism for producing intermittent motion of a driven part in one direction.

One object of the invention is to provide a ratchet mechanism of simple, strong, and durable construction in which the pawl is positively moved into and out of operative engagement with the driven part and is held out of contact with such part during its return or inactive movement to lessen the wear on the parts and render the mechanism practically noiseless in operation.

Other objects of the invention are to avoid the use of springs in the mechanism, to so construct and arrange the parts that the driving-pawl acts as a brake or device for holding the driven part from movement by its momentum in advance of and from backward movement with the pawl in its return or inactive movement, and to provide for regulating or varying the lengths of the forward movements of the driven part by the pawl.

In the accompanying drawings, consisting of two sheets, Figure 1 is a front elevation of a ratchet mechanism embodying the invention. Fig. 2 is a plan view thereof. Fig. 3 is a transverse vertical sectional elevation thereof, on an enlarged scale, in line 3 3, Fig. 2. Fig. 4 is a longitudinal sectional elevation thereof in line 4 4, Fig. 2. Figs. 5 and 6 are rear elevations, partly in section, of the ratchet-wheel and pawl, showing different positions of the parts. Fig. 7 is a detail section, partly in plan, in line 7 7, Fig. 3.

Like letters of reference refer to like parts in the several figures.

The ratchet mechanism hereinafter forming the subject-matter of this application is shown in connection with parts of a microtome of the character disclosed in my application for United States Letters Patent, filed of even date herewith, for intermittently operating the feed-screw for the knife-carriage. The invention, however, is not restricted to this particular adaption, but is capable of use for producing intermittent motion in any machine.

A represents a ratchet-wheel or other driven part, which in the construction shown in the drawings is secured to a rotary hollow shaft *a*, loosely supported to rotate on a journal or bearing B, secured to a suitable frame or supporting structure C. This hollow shaft is connected with and drives a feed-screw D, as fully described and shown in my said application; but the ratchet-wheel or driven part may be movably mounted in any suitable manner for operating a part to which it is connected. The shaft *a* shown is held from longitudinal movement on its journal by a divided washer or collar *d*, secured to the central portion of the ratchet-wheel and entering an annular groove in the journal or bearing.

E represents a movable pawl-carrier, in the present instance in the form of a lever or arm provided at its inner end with a hub surrounding and capable of turning on the journal or bearing for the shaft. The hub of the pawl carrier or lever is confined between an annular shoulder *e* on the journal and a washer *e'*, between the end of the hub for the pawl carrier or lever, and an adjustable nut e^2, which is screwed into a threaded opening in the journal or bearing. By adjusting the nut e^2 the hub of the pawl lever or carrier is forced with more or less pressure against the stationary shoulder on the bearing to increase or decrease the freedom of its movement on the bearing.

F represents a pawl which is pivoted on the outer or free end of the pawl carrier or lever. The latter is preferably provided with a laterally-projecting portion which is slotted or recessed at *f*, as shown in Fig. 2, to receive the pawl and hold the same from lateral play on the lever. The lateral projection of the pawl carrier or lever affords a stop *f'*, Fig. 1, which limits the swing of the pawl away from the ratchet-wheel or driven part. The pawl is provided with an arm or tail, preferably having a projecting tooth f^2, to engage teeth

on the ratchet-wheel or driven part to move the latter, and is also provided with an arm or portion f^3, which projects at an angle to the tooth arm or tail toward the ratchet-wheel or driven part.

G represents a reciprocating part or head located adjacent to the pawl carrier or lever for operating the latter and the pawl. The reciprocating part or head preferably has a groove g in its side next to the pawl, in which slidably engages an operating pin or projection g' on the arm of the pawl which projects toward the ratchet-wheel or driven part. The pawl-operating part or head is mounted and reciprocated in any suitable manner to operate the pawl and its carrier or lever. In the construction illustrated the reciprocating part or head G is pivoted to the free ends of parallel swinging links h, which are pivoted to the main frame or supporting structure in any suitable manner. The pawl-operating part or head G is reciprocated by suitable means—for instance, by a drive-shaft I, Figs. 2 and 4, journaled in suitable bearings on the main frame or supporting structure and provided with a crank i, having a pin i', which enters a hole i^2 in a slide-block i^3, Figs. 4 and 7, arranged to slide in a way or groove i^4 on the pawl-operating part or head. i^5 is a hand-wheel or other means for turning the drive-shaft.

The described manner of mounting and reciprocating the pawl-operating part or head G is not essential to the operation of the ratchet mechanism, and other reciprocating devices could be employed for operating the pawl and its carrier or lever.

When the reciprocating pawl-operating part or head is moved in one direction—for instance, upwardly, as indicated by the arrow in Fig. 5—the lower side of the groove for the operating-pin of the pawl engages said pin and lifts the latter, thereby swinging the pawl on its fulcrum and throwing its tooth toward and into engagement with the teeth of the ratchet-wheel or driven part. The continued upward movement of the pawl-operating part or head holds the tooth of the pawl in engagement with the teeth of the ratchet-wheel or driven part and moves the pawl-carrier and the ratchet-wheel or driven part upwardly. When the movement of the reciprocating part is reversed—for instance, when it moves downwardly, as indicated by the arrow in Fig. 6—the operating-pin for the pawl is engaged by the upper side of the groove in the pawl-operating part or head and the pin is pressed downwardly, thereby swinging the tooth of the pawl away from and out of engagement with the teeth of the ratchet-wheel or driven part until the outward movement of the pawl is arrested by its engagement with the stop f' in the pawl-carrier. The continued downward movement of the pawl-operating part or head lowers or returns the pawl carrier or lever. Thus at each forward or active movement of the reciprocating pawl-operating part or head the pawl is thrown into engagement with and moves the ratchet-wheel or driven part, and at return or inactive movement thereof the pawl is moved and held out of engagement with the teeth of the ratchet-wheel, so that it does not ride or slide over the teeth of the ratchet-wheel or driven part. The pawl therefore has no tendency to carry the ratchet-wheel or driven part back with it on account of the engagement of and friction between the parts. The wear on the teeth of the pawl and ratchet-wheel or driven part is greatly reduced, and the mechanism is practically noiseless in operation. As the pawl-tooth is pressed firmly against the ratchet-wheel or driven part during its forward movement and as the latter comes to a stop at the end of its forward or operative movement, the pawl is arrested and momentarily held stationary while pressed against the ratchet-wheel or driven part before it is moved out of engagement with the teeth of the latter, thereby positively holding the ratchet-wheel or driven part from being thrown in advance of the pawl by reason of its momentum when the pawl is operated rapidly. By reason of the described construction no means other than the pawl is necessary for holding the ratchet-wheel or driven part from movement in advance of the pawl or rearwardly with the return movement of the pawl.

Suitable means are provided for holding the tooth of the pawl out of engagement with the teeth of the ratchet-wheel or driven part during a greater or less portion of the forward movement of the pawl to vary the length of the movements of the ratchet-wheel or driven part, as desired. The following mechanism is shown in the drawings for this purpose.

K represents a segmental adjusting-shield which is mounted to turn on the shaft for the ratchet-wheel between the latter and a nut k, screwed on the threaded end of the shaft. The adjusting-shield has a circular edge k', on which a roller k^2, or part of the tail or tooth-arm of the pawl is adapted to engage to hold the tooth of the pawl out of engagement with the teeth of the ratchet-wheel or driven part. The adjusting-shield is provided with a lateral flange overhanging the ratchet-wheel or driven part and passing between the legs of an inverted-U-shaped clamp L, one leg of which is fixed to the frame or supporting structure of the mechanism. The other or movable leg of the clamp is forced toward the fixed leg to grip and hold the adjusting-shield between the legs of the clamp by a thumb-nut l, screwed on the threaded end of a pin l', which is secured to the fixed leg of the clamp and passes through a hole in the movable leg. The lateral flange of the adjusting-shield is preferably provided with graduations m, (see Fig. 2,) and a pointer or index m' is pivoted

on the pin of the clamp with its free outer end adjacent to the graduations on the adjusting-shield. When the pawl-carrier moves rearwardly or downwardly, the roller on the pawl engages and rides on the circular edge of the adjusting-shield, which holds the tooth of the pawl out of engagement with the ratchet-wheel in the forward or active movement of the pawl-carrier until the roller passes off of the shield. By adjusting the circular edge of the shield away from or toward the pawl-carrier the tooth of the pawl can be made to engage with the teeth of the ratchet-wheel or driven part sooner or later in its forward or active movement, thereby regulating the amount of movement of the ratchet-wheel or driven part at each forward movement of the pawl.

I claim as my invention—

1. The combination of a driven member, a movable pawl-carrier, a pawl pivoted thereon, and a driving part movable relative to said pawl-carrier and having a sliding connection with said pawl to swing the same on its pivot into and out of engagement with the driven member and to also move said pawl-carrier, substantially as set forth.

2. The combination of a ratchet-wheel, a pivoted pawl-carrier, a pawl pivoted on said pawl-carrier, and a reciprocating driving part which is mounted on parallel swinging links and is connected to said pawl and which swings the latter on its pivot independently of the pawl-carrier into and out of engagement with the ratchet-wheel, and which also moves said pawl and pawl-carrier together, substantially as set forth.

3. The combination of a driven part, a movable pawl-carrier, a pawl pivoted thereon, and a driving part movable relative to said pawl-carrier and having a pin-and-slot connection with said pawl to swing the same on its pivot independently of the pawl-carrier into and out of engagement with the driven part and which also moves said pawl and pawl-carrier together, substantially as set forth.

4. The combination of a movable pawl-carrier provided with a stop, a pawl pivoted on said pawl-carrier and adapted to engage said stop to limit the swing of the pawl, a driven part, and a reciprocating part having a sliding engagement with said pawl to swing the same on its pivot into and out of engagement with the driven part and to move said pawl-carrier, substantially as set forth.

5. The combination of a ratchet-wheel, a pawl-lever pivoted concentrically with said ratchet-wheel, a pawl pivoted on said pawl-lever and having a tooth to engage the teeth of the ratchet-wheel, a stop to limit the swing of the pawl away from the ratchet-wheel, a reciprocating part provided with a groove, and a pin on said pawl extending into said groove, substantially as set forth.

6. The combination of a ratchet-wheel, a pawl-lever pivoted concentrically with said ratchet-wheel, a pawl pivoted on said pawl-lever and provided with a portion having a tooth to engage the teeth of the ratchet-wheel, and a portion projecting toward the ratchet-wheel, a stop to limit the swing of the pawl away from the ratchet-wheel, a reciprocating pawl provided with a groove, and a pin on the portion of the pawl projecting toward the ratchet-wheel and extending into said groove, substantially as set forth.

7. The combination of a movable pawl-carrier, a pawl pivoted thereon, a driven part, a reciprocating part connected to said pawl to swing the same on its pivot into and out of engagement with the driven part and to move said pawl-carrier, a stop to limit the swing of the pawl away from said driven part, and an adjustable shield for regulating the length of the operative movement of the pawl, substantially as set forth.

8. The combination of a ratchet-wheel, a pivoted pawl-lever, a pawl pivoted on said pawl-lever and provided with an arm having a tooth to engage the teeth of the ratchet-wheel, and an arm projecting toward the ratchet-wheel, a stop to limit the swing of the pawl away from the ratchet-wheel, a reciprocating part connected to said arm of the pawl which projects toward the ratchet-wheel, and an adjustable shield which engages the tooth-arm of the pawl to regulate the length of the operative movement of the pawl, substantially as set forth.

Witness my hand this 11th day of February, 1904.

CARL F. DIECKMANN.

Witnesses:
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C. B. HORNBECK.