No. 715,079. Patented Dec. 2, 1902.

H. JOHN.

RACK MECHANISM.

(Application filed May 14, 1902.)

(No Model.) 3 Sheets—Sheet 1.

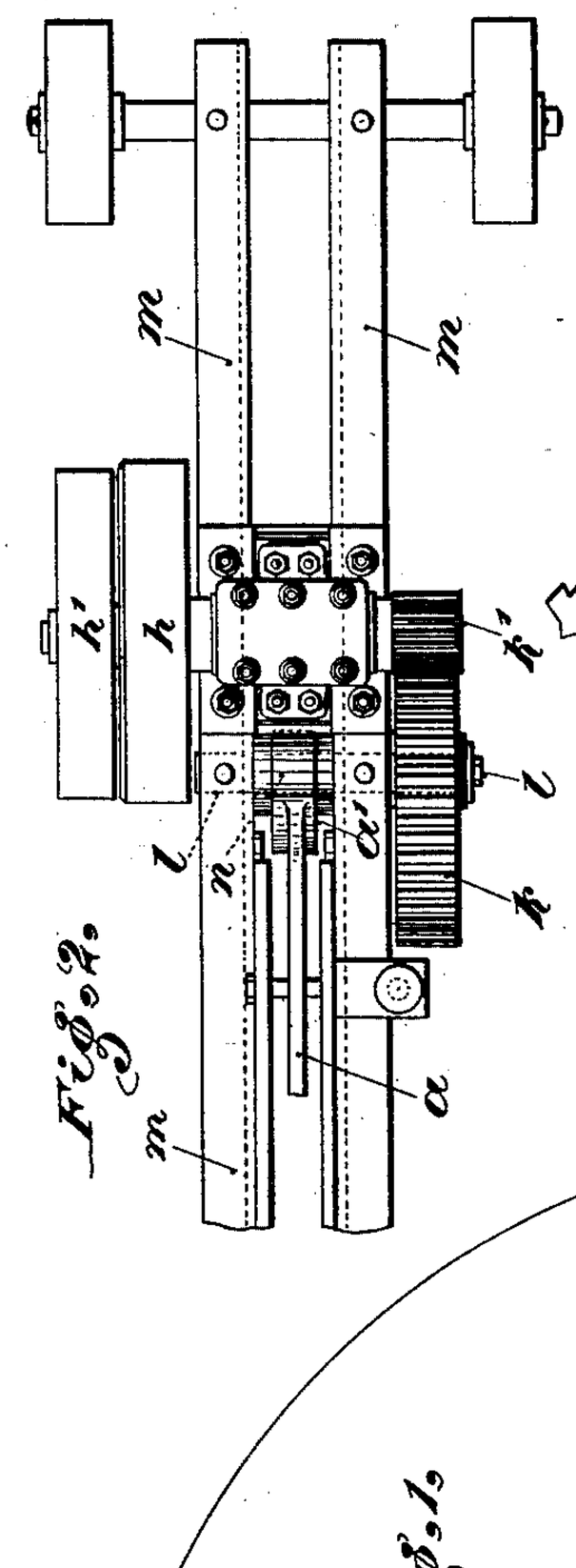

Fig. 2.

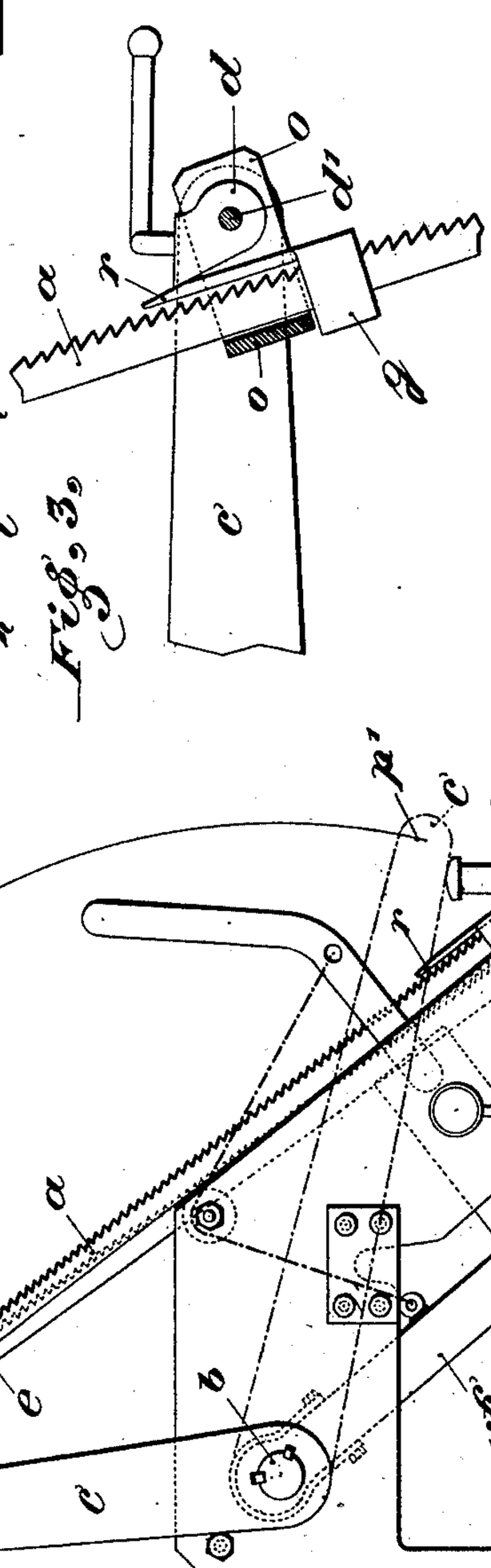

Fig. 3.

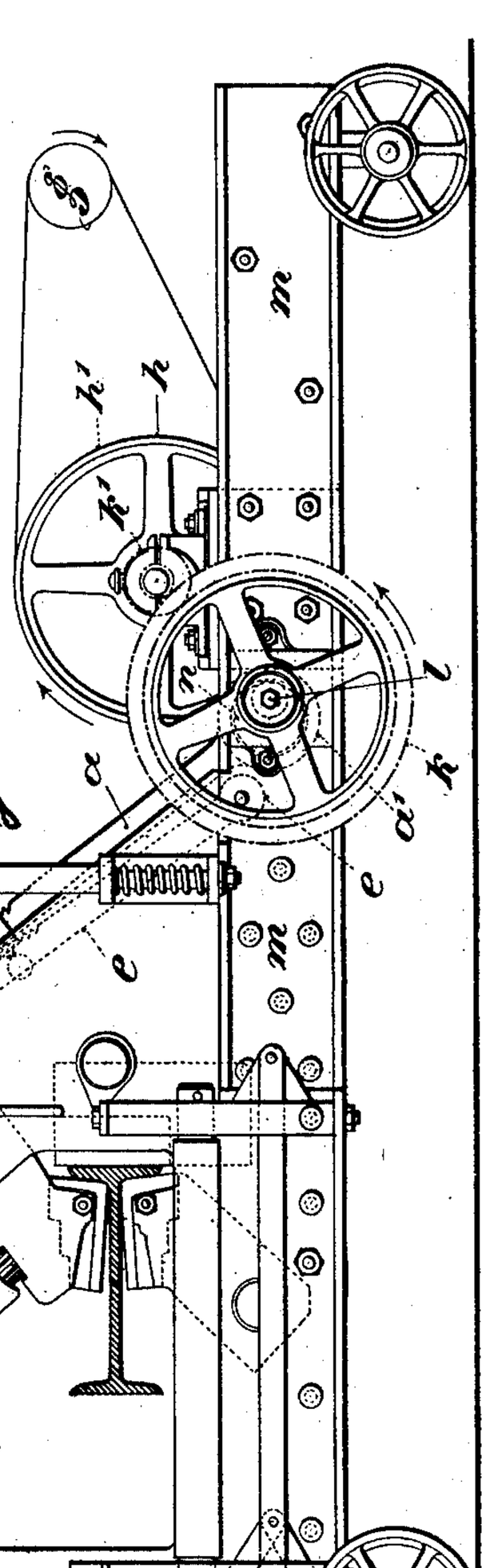

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

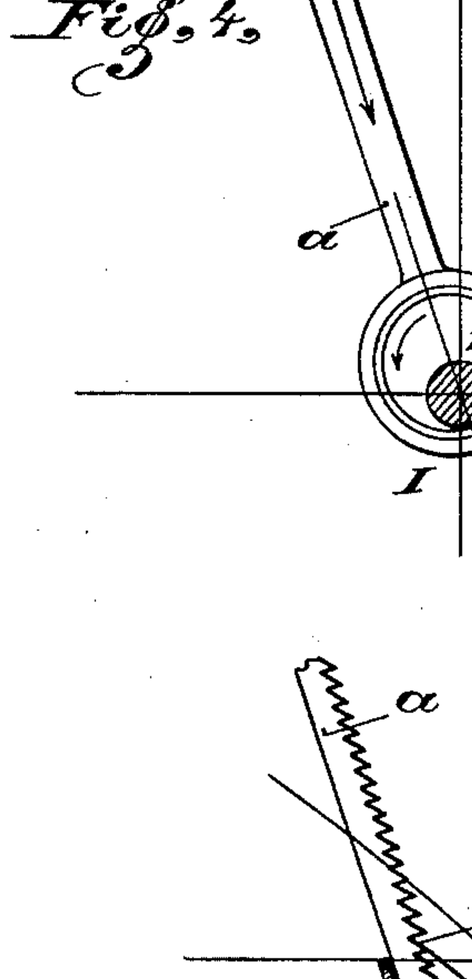


Fig. 4.

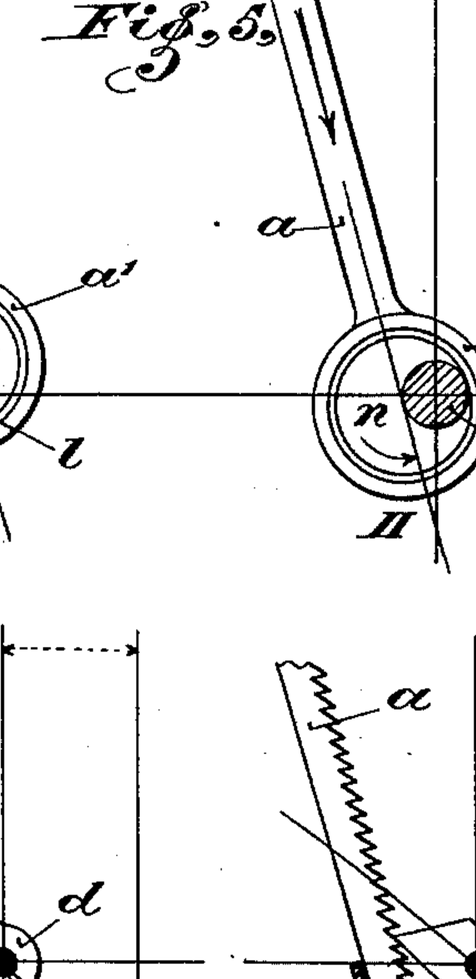


Fig. 5.

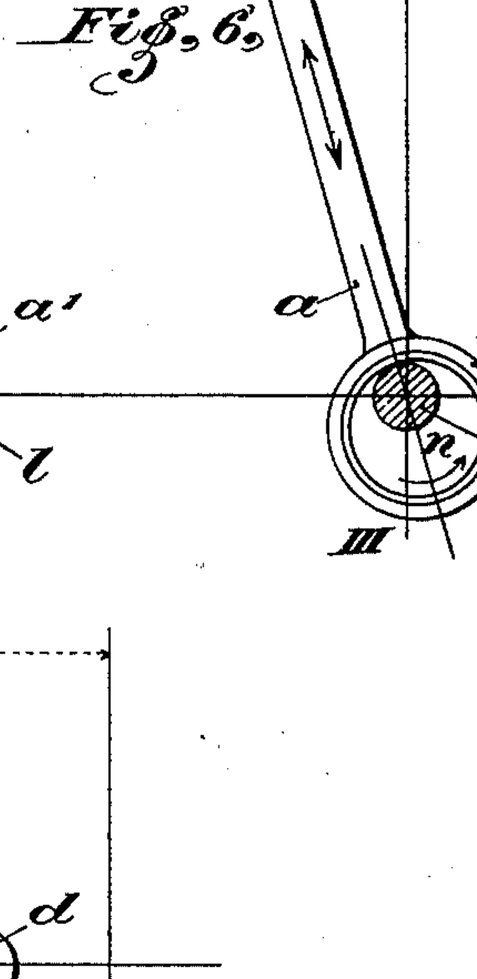
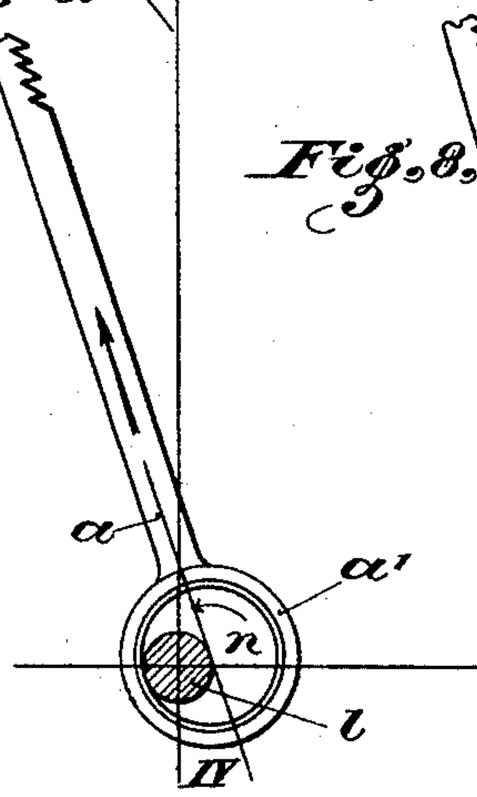
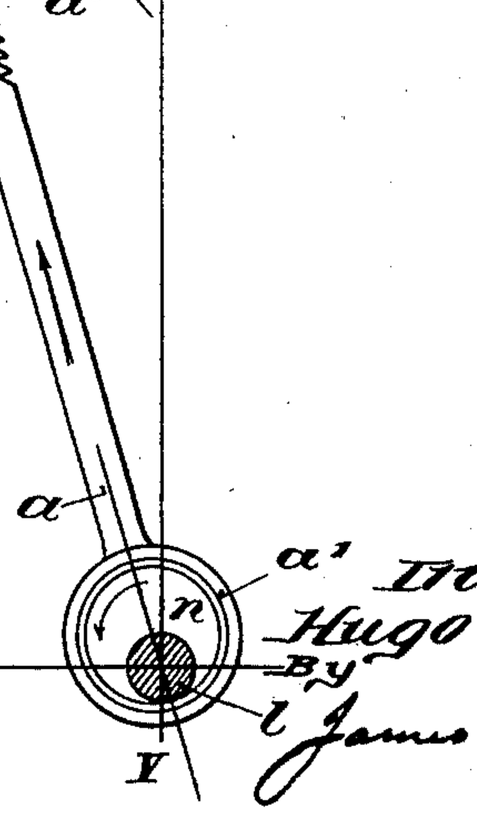


Fig. 6.

Fig. 7.

Fig. 8.





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RACK MECHANISM.

(Application filed May 14, 1902.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 9.

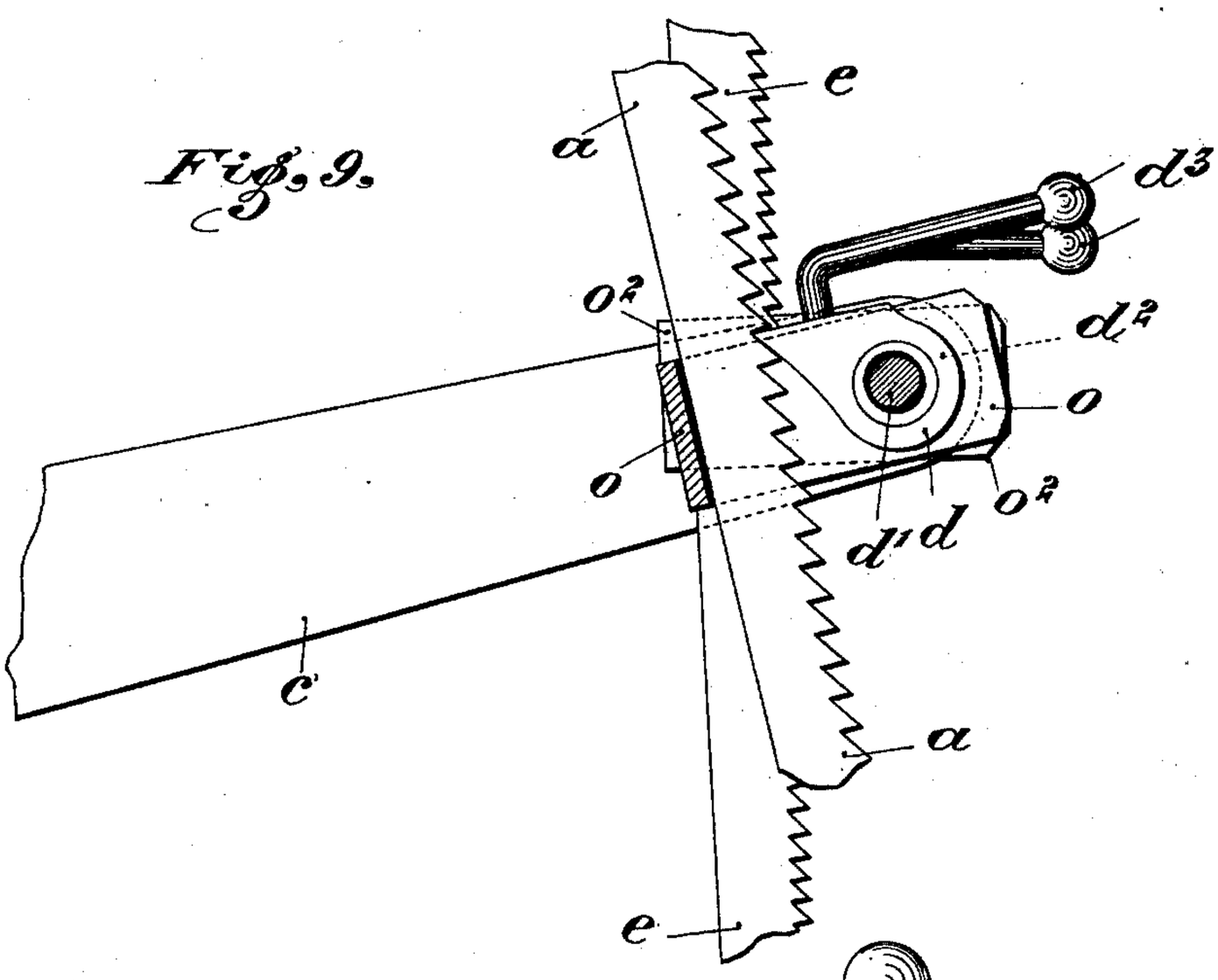
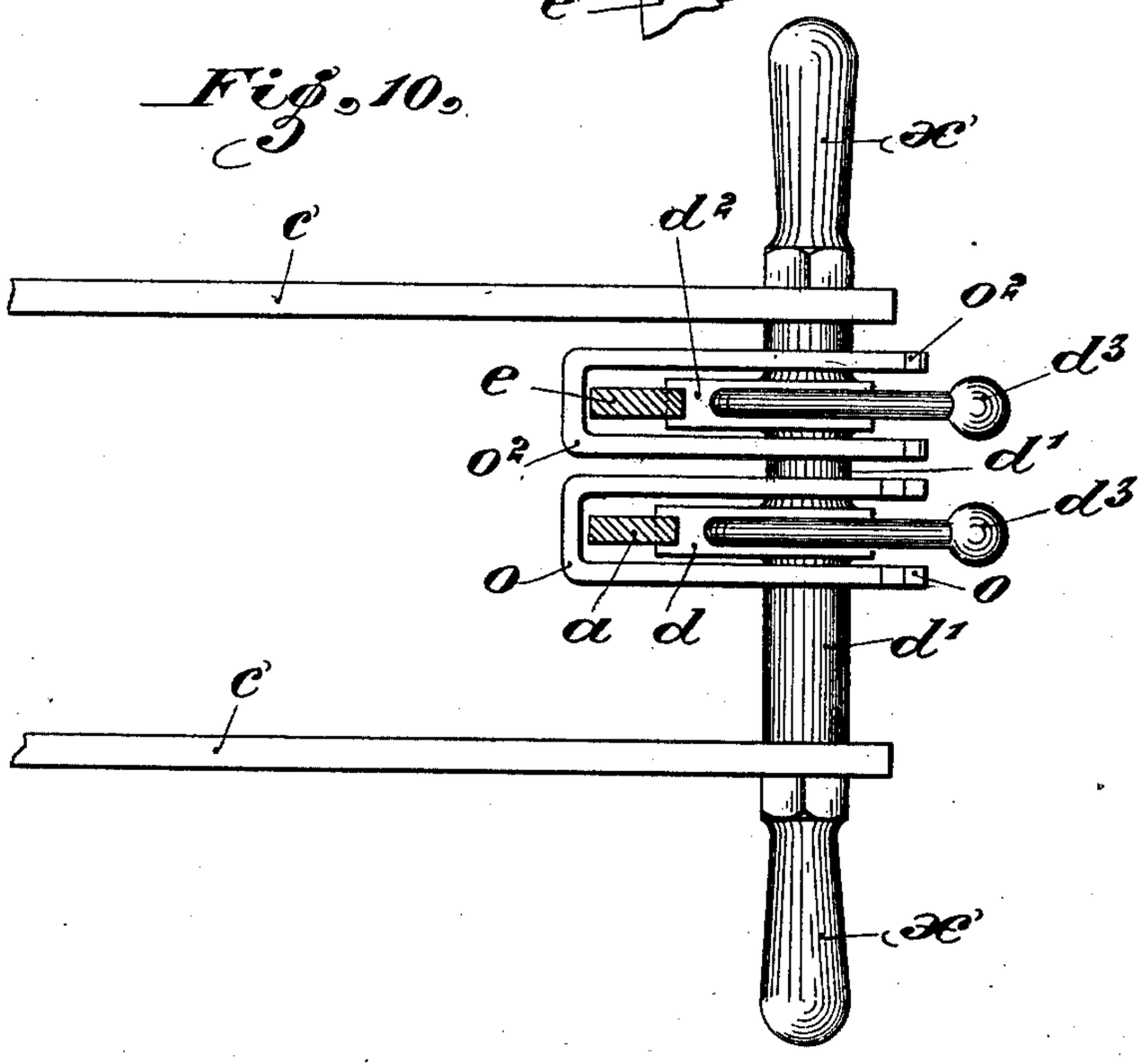


Fig. 10.



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UNITED STATES PATENT OFFICE.

HUGO JOHN, OF ERFURT, GERMANY.

RACK MECHANISM.

SPECIFICATION forming part of Letters Patent No. 715,079, dated December 2, 1902.

Application filed May 14, 1902. Serial No. 107,293. (No model.)

To all whom it may concern:

Be it known that I, HUGO JOHN, manufacturer, a subject of the King of Prussia, Emperor of Germany, residing at Erfurt, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Rack Mechanism, of which the following is a specification.

This invention relates to certain new and useful improvements in rack mechanism, particularly applicable for boring and cutting machines.

The invention aims to provide a rack mechanism for boring and cutting machines which can be operated by electric or other motors in order to increase the efficiency of the machine as well as obtaining a considerable saving of time and overcome the operation of the rack mechanism manually; and to this end the invention consists of the novel combination and arrangement of parts hereinafter more specifically described, illustrated in the accompanying drawings, and particularly pointed out in the claims hereunto appended.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, in which like reference characters denote corresponding parts throughout the several views, and in which—

Figure 1 shows an elevation of a cutting-machine provided with my improved rack mechanism. Fig. 2 is a partial plan view thereof. Fig. 3 is a detail of the rack mechanism. Figs. 4 to 8, inclusive, show various positions of the rack mechanism during the operation thereof. Fig. 9 is an enlarged detail view, broken away, of the rack mechanism; and Fig. 10 is a sectional plan thereof, showing the arrangement of the pawls.

Referring to the drawings by reference characters, a denotes a rack-bar, which is formed at its lower end into an eccentric-ring mounted upon a driving-eccentric n.

The reference character g denotes the pulley of a motor which is connected to and drives the fast and loose pulleys h h', supported by an auxiliary shaft suitably journaled in the frame of the machine. The auxiliary shaft carries a pinion k', which in turn drives the gear k, carried by the main driving-shaft l. The latter is journaled in the sides m of the machine-frame and carries the driving-eccentric n, which is mounted in the eccentric-ring formed on the lower end of the rack a.

The reference character c denotes a lever connected to an eccentric-support b, suitably mounted in the frame of the machine. When the lever c is operated, it is adapted to give to the eccentric-support a slow rotatable motion.

The reference character d denotes a pawl connected with the lever c. The pawl is adapted to engage the rack a, so that when the rack is operated it will engage the pawl to move the lever c.

The reference character e denotes a rack or locking-bar, which is adapted to be engaged by the pawl d^2 to arrest the forward movement of the lever c upon backward movement of the rack a.

The pawl d is kept against its corresponding rack a by a yoke-shaped part o. In a similar manner the rack e is surrounded by a yoke o^2 with a pawl d^2. Both pawls d and d^2 are loosely mounted on a cross-rod d', connecting the free ends of the two arms of the lever c. The pawls d and d^2 are kept in engagement with their corresponding racks a and e, respectively, without the employment of springs by their own weight and by the resistance which the material to be worked offers in the upward direction to the lever c when the latter is moved downward.

When the rack a is moved down by the rotating eccentric n, it carries with it the pawl d, which is, as above stated, revolubly mounted on the free end of lever c. During this movement the other pawl d^2 in the yoke o^2 slides over the teeth of the rack e, which is pivoted in the lower part of the frame, and upon the following upward movement of the rack a the pawl d^2 keeps the lever c immovable until the rack a comes again in operative engagement with pawl d, and so on, Figs. 1, 9, and 10. The racks a and e therefore prevent alternately the lever c from moving back, this lever being constantly together, with the pawls d and d^2 pressed upward against the teeth of the racks by the resistance of the work.

The operation is as follows: Assuming a counter-clockwise rotation of the shaft l, the

latter causes a reciprocating motion to be imparted to the rack a. This rack is held in engagement with the pawl d by a yoke o. In moving downward the rack a draws the pawl d downwardly with it, and as the latter is rotatably fixed on the free end of the lever c the end of the latter is gradually moved through the arc of a circle $p\,p'$, Fig. 1. Upon the ascent or resting of the rack a the pawl of the locking-bar e engages with the latter and prevents backward motion of the lever c, which is acted upon, owing to the resistance of the material to be worked. As shown in Figs. 4 to 8, the rack a is on its upper side provided with ratchet-teeth. As the lever c determines the position of the fulcrum d' of the pawl d and the yoke o guides the rack and is also rotatable about d', Figs. 1 and 3, the upper end of the rack tends to turn in clockwise direction, as indicated by the arrow I, Fig. 4. Thereby a deeper and surer engagement of the pawl with the teeth of the rack is obtained, considering the rapid motion of the rack, than when it is manually operated. Such a safe engagement is according to Fig. 5 (position II) and Fig. 6 (position III) effected so long as the rack is drawn downwardly by the eccentric-ring a'. Upon the ascent of the rack (positions IV and V, Figs. 7 and 8) the end of the rack a above the yoke o tends to move out of engagement with the pawl d, so that upon the ascent of the rack (during which the latter is inoperative) there is no engagement of the pawl d with the teeth of the rack. It is obvious that with such a driving device the operation is very convenient for an efficient working of the machine.

In order to automatically effect the disengagement of the pawl d from the teeth of the rack a when the lever c is turned down to a certain point, and consequently the cutting operation has been effected completely or up to a certain stage, an adjustable slide g is arranged upon the rack a and provided with a spring upwardly-turned projection r, Figs. 1 and 8, which glides over the face of the teeth of the rack. On encountering the point of the pawl d the projection r lifts the pawl out of the teeth of the rack a, and thereby stops the lever c from further downward movement. This automatic release is arranged for the precise adjustment of the depth of cut of the cutter in cutting-machines and serves for the control of the cutting. It must be understood that as new unground cutters have their wider cutting edges more distant from the cutter-holders than used and partly-worn cutters it is necessary in order to prevent the cutting edges from interfering with each other and from being damaged upon the use of new cutters to throw the cutting-machine driven by motor-power sooner out of engagement, and thus to move the slide q higher up than if already-worn and ground cutters are used.

When the machine is disengaged by means of the spring projection r, the lever c can be brought back into its highest position (indicated in full lines in Fig. 1) by hand by means of the handles x.

The handles d^3 serve to move the pawls d and d^2 out of engagement with their racks.

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

1. In a rack-driving mechanism for cutting and boring machines, the combination with a driven lever, of a toothed bar terminating at its lower end in an eccentric-ring, operating means engaging the ring for reciprocating the bar, a pawl pivotally connected with the lever and adapted to be engaged and moved by said rack during its descent to drive the said lever, and a yoke connected with the lever and adapted to retain the pawl against the rack.

2. In a rack-driving mechanism for cutting and boring machines, the combination with the driven lever, of a rack-bar, means engaging the bar for reciprocating it, a pawl pivotally connected with the lever and adapted to be engaged and moved by said rack during its descent for driving the lever, and means for retaining the pawl against the rack.

3. In a rack-driving mechanism for cutting and boring machines, the combination with the driven lever, of a rack-bar terminating at its lower end in an eccentric-ring, operating means engaging in the ring for reciprocating the bar, a pawl pivotally connected with the lever and adapted to be engaged and moved by said bar during its descent for driving the lever, means connected with the lever for retaining the pawl against the rack, and means for locking the lever from movement during the ascent of the bar.

4. In a rack-driving mechanism for cutting and boring machines, the combination with a driven member, of a toothed bar, means engaging the bar for reciprocating it, a pawl pivotally connected with the driven member and adapted to be engaged and moved by said bar during its descent for driving the said member, and means connected with the member for retaining the pawl against the bar.

5. In a rack-driving mechanism for cutting and boring machines, the combination with a driven member, of a toothed bar, means engaging the bar for reciprocating it, a pawl pivotally connected with the driven member and adapted to be engaged and moved by said bar during its descent for driving the said member, means connected with the member for retaining the pawl against the bar, and means for locking the said member from movement during the ascent of the said bar.

6. In a rack-driving mechanism for cutting and boring machines, the combination with a driven member, of a toothed bar, means engaging the bar for reciprocating it, a pawl pivotally connected with the driven member and adapted to be engaged and moved by said bar during its descent for driving the said member, means connected with the member for retaining the pawl against the bar,

and means for automatically releasing the pawl from engagement with the rack to arrest further movement of the said member.

7. In a rack-driving mechanism for cutting and boring machines, the combination with a driven member, of a toothed bar terminating at its lower end in an eccentric-ring, operating means engaging in the ring for reciprocating the bar, a pawl pivotally connected with the said member and adapted to be engaged and moved by said bar during its descent for driving the said member, a yoke connected with the said member for retaining the pawl against the said bar, means for locking the said member from movement during the ascent of the bar, and means for automatically releasing the pawl from engagement with the bar to arrest further movement of the said member.

8. In a rack-driving mechanism for cutting and boring machines, the combination with a driven member, of a reciprocatory toothed bar, a pawl pivotally connected with the said member and adapted to be engaged and moved by said bar during its descent for driving the said member, and means connected with the said member and adapted to retain the pawl against the said bar during the reciprocating movement of the latter.

9. In a rack-driving mechanism for cutting and boring machines, the combination with a driven member, of a reciprocatory toothed bar, a pawl pivotally connected with the said member and adapted to be engaged and moved by said bar during its descent for driving the said member, means connected with the said member and adapted to retain the pawl against the said bar during the reciprocating movement of the latter, and means for locking the said member from movement during the ascent of the bar.

10. In a rack-driving mechanism for cutting and boring machines, the combination with a driven member, of a reciprocatory toothed bar, a pawl pivotally connected with the said member and adapted to be engaged and moved by said bar during its descent for driving the said member, means connected with the said member and adapted to retain the pawl against the said bar during the reciprocating movement of the latter, means for locking the said member from movement during the ascent of the bar, and means for automatically releasing the pawl from engagement with the bar to arrest further movement of the said member.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HUGO JOHN.

Witnesses:
WILHELM BINDEWALD,
ERNST EVERHARDT.