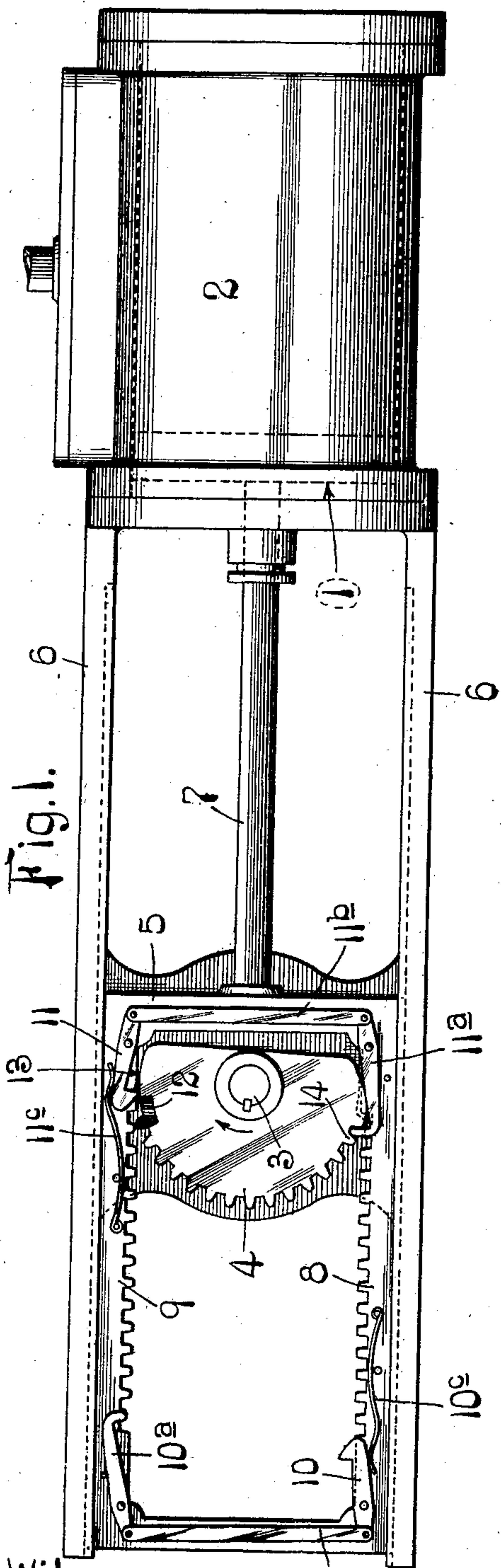


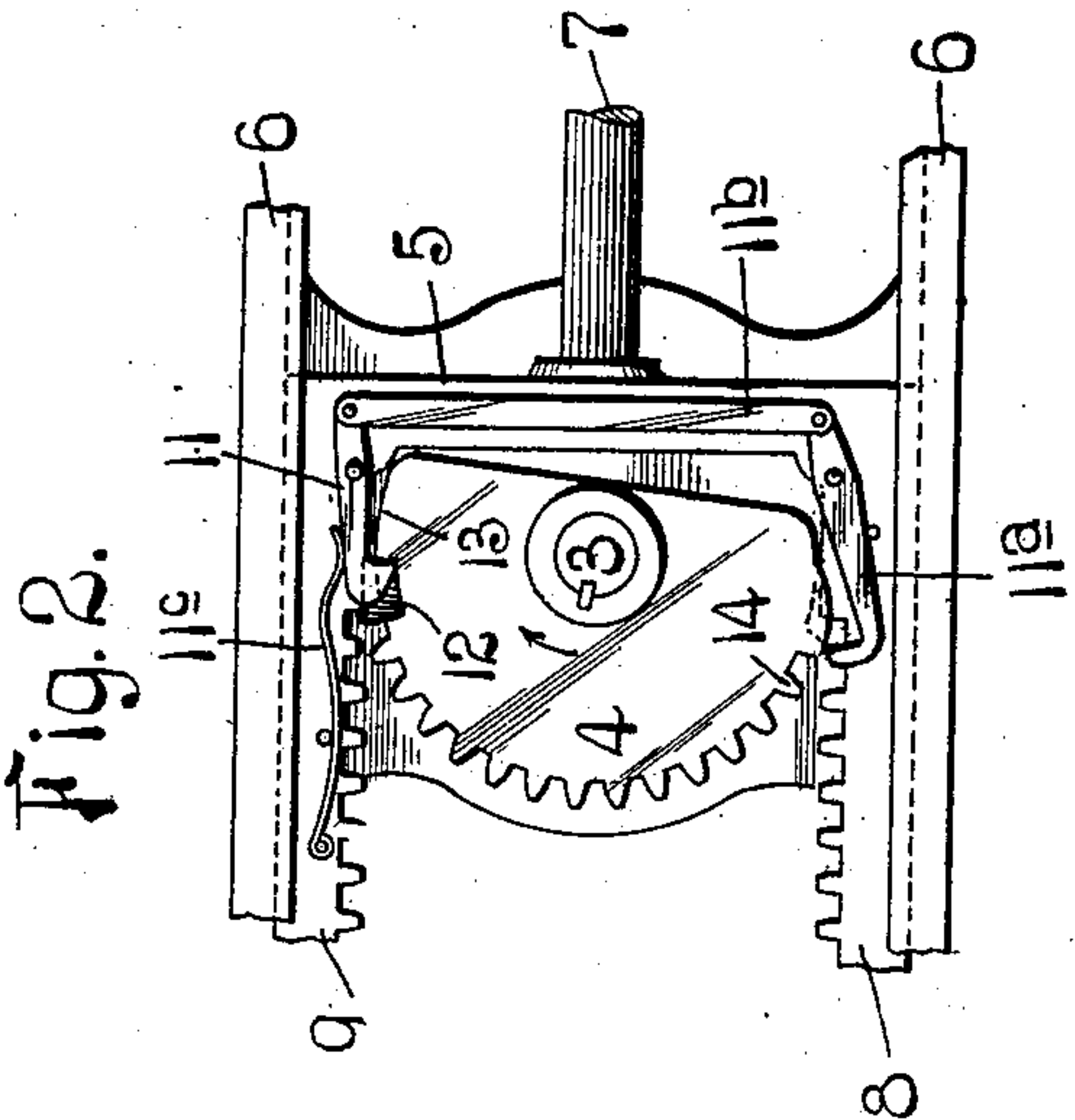
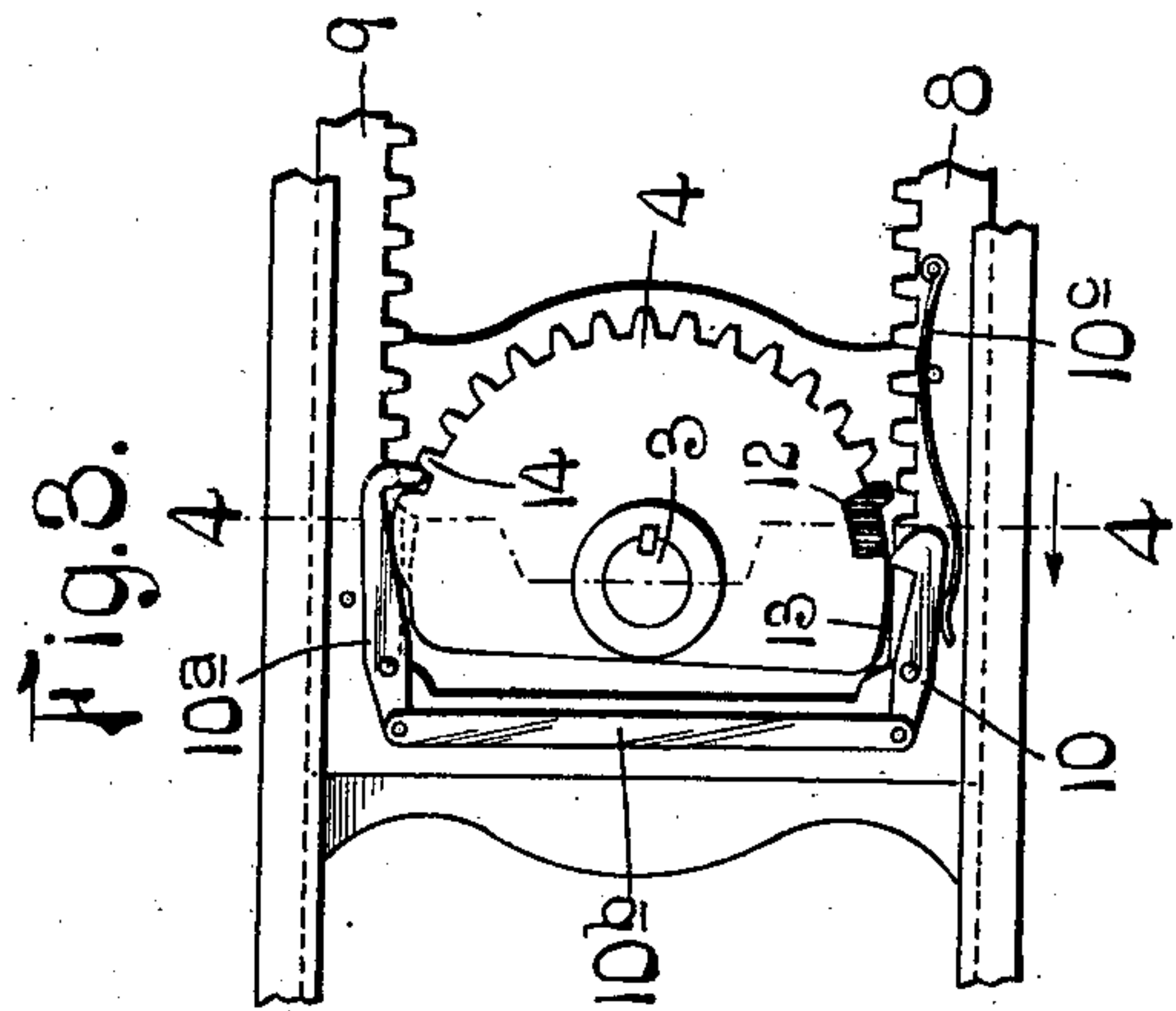
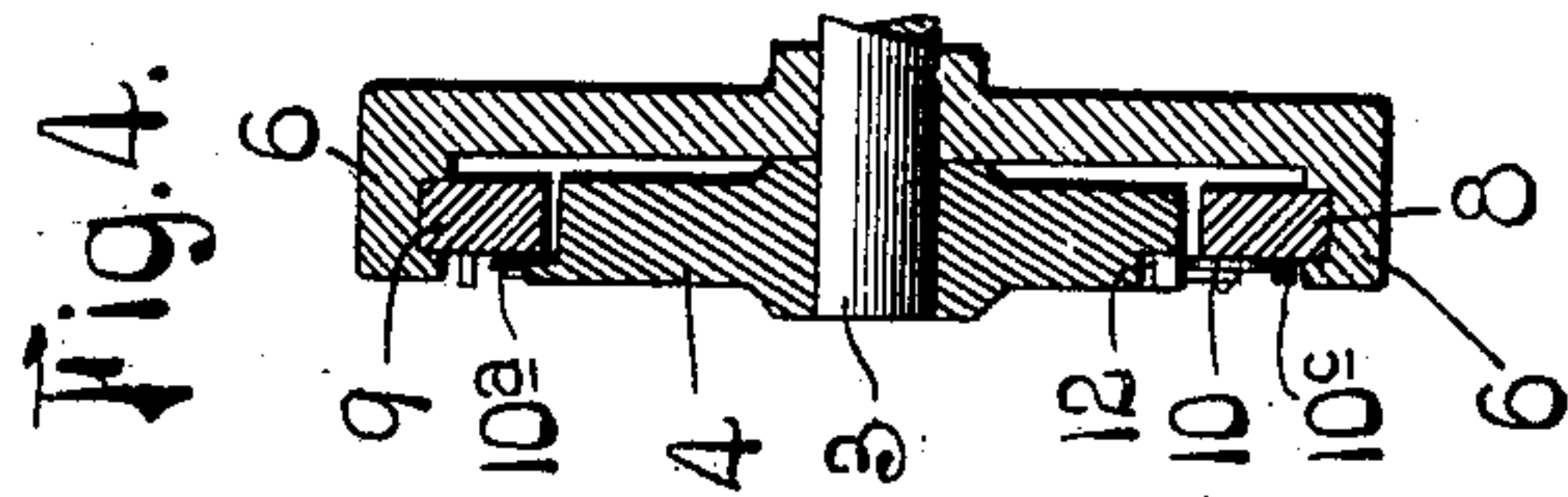
No. 861,807.

PATENTED JULY 30, 1907.

A. B. CIHAK.  
 DEVICE FOR CONVERTING MOTION.  
 APPLICATION FILED APR. 15, 1907.



Witnesses  
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 Atty's.



# UNITED STATES PATENT OFFICE.

ALBERT B. CIHAK, OF ST. LOUIS, MISSOURI.

## DEVICE FOR CONVERTING MOTION.

No. 861,807.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed April 15, 1907. Serial No. 368,399.

*To all whom it may concern:*

Be it known that I, ALBERT B. CIHAK, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Devices for Converting Motion, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevational view of a mechanism embodying my invention; Fig. 2 is a detail view showing parts of the mechanism in a different position from that shown in Fig. 1; Fig. 3 is a detail view showing the parts in still a different position; and Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

This invention relates to devices for converting reciprocating motion into rotary motion. I have herein illustrated my invention in connection with an engine employing a reciprocating piston, the device which embodies my invention being used as a substitute for the crank shaft of the engine. It should be understood, however, that my improved device is not limited to this use as it could be used equally well for numerous other purposes where it is desired to convert reciprocating motion into rotary motion.

Referring to the drawings which illustrate a device embodying the features of my invention, 1 designates the piston of an engine mounted in a cylinder 2, and 3 designates the drive shaft. The drive shaft has rigidly connected thereto a toothed segment 4 arranged inside of a frame 5 that reciprocates in guides 6. Said frame is connected to the piston rod 7 and the two longitudinal side pieces of the frame are provided with racks 8 and 9 that cooperate with the teeth of the segment 4 and impart a continuous rotary movement in one direction to said segment and to the drive shaft as the frame is reciprocated back and forth by the piston. The frame is provided with means in addition to the rack teeth 8 and 9 for actuating the segment 4, said means being designed to engage and move said segment at the time said segment is passing out of mesh with one set of rack teeth and into mesh with the other set of rack teeth on the frame; namely, when the frame arrives at the end of its stroke in each direction. The means herein shown for accomplishing this consists of pairs of pawls 10, 10<sup>a</sup> and 11, 11<sup>a</sup> located at the ends of the frame, the pawls of each pair being connected together preferably by links 10<sup>b</sup> and 11<sup>b</sup>. Upon the forward stroke of the piston, the lower

rack 8 will mesh with the teeth of the segment and turn said segment in the direction of the arrow, as indicated in Fig. 1. As the piston reaches the end of its forward stroke, the pawl 11 at the upper right-hand end of the frame 5 will move into engagement with a shoulder 12 on the segment, as shown in Fig. 2, and thus cause the segment to be rotated forwardly in the same direction when the frame is reciprocated in the opposite direction by the return stroke of the piston, the teeth of the segment passing into mesh with the rack 9 at the upper side of the frame as soon as the pawl 11 has passed out of engagement with the shoulder 12 so that the rack 9 completes the movement of the segment in the direction of the arrow. The pawl 11 is acted upon by a spring 11<sup>c</sup> which holds it normally in position to engage the shoulder 12 on the segment and said segment is provided adjacent said shoulder with a cam 13. The function of this cam is to raise the pawl 11 and thus elevate the pawl 11<sup>a</sup> by means of the link 11<sup>b</sup> so as to move said pawl 11<sup>a</sup> into engagement with the endmost tooth 14 of the segment just prior to the time the piston reaches the end of its forward stroke, as shown in Fig. 1, thereby retaining the segment under control and also acting to rotate the segment after its teeth have passed out of mesh with the lower rack 8.

When the piston has arrived at nearly the end of its return stroke, as shown in Fig. 3, and the teeth of the segment have passed out of mesh with the upper rack 9, the spring-pressed pawl 10 at the front end of the frame will ride up on the cam 13 and thus actuate its companion pawl 10<sup>a</sup> so that it will engage the endmost tooth 14 of the segment so as to continue the forward movement of the segment, the spring-pressed pawl 10 then springing into engagement with the shoulder 12 so as to impart movement to the segment upon the return stroke of the piston before the teeth of the segment have engaged the teeth of the lower rack 8.

From the foregoing it will be seen that the shaft is rotated continuously in the same direction and has no position of dead center so that very little power is required to start the engine.

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

1. A device of the character described, comprising a reciprocating member, a shaft, a toothed segment secured to said shaft, parallel rack bars connected to the reciprocating member and having said segment arranged between them, cooperating pawls mounted on said bars and adapted to engage said segment and control it as it moves out of en-

gement with one rack bar and into engagement with the other rack bar, and a connection between said pawls, said segment having a cam face for actuating one of said pawls; substantially as described.

- 5 2. A device of the character described, comprising a reciprocating member, a shaft, a toothed segment secured to said shaft and provided at one end with a shoulder and a cam surface adjacent thereto, a frame connected to the reciprocating member and provided with parallel rack bars  
10 between which said segment is located, a pair of pawls at each end of said frame, a link connecting the pawls of

each pair together, a spring acting on one pawl of each pair, and a guideway in which said frame travels; substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this twelfth day of April 15 1907.

ALBERT B. CIHAK.

Witnesses:

WELLS L. CHURCH,  
GEORGE BAKEWELL.