(No Model.) 2 Sheets—Sheet 1.

VAN R. & M. McCULLOUGH.

DEVICE FOR CONVERTING MOTION.

No. 571,679. Patented Nov. 17, 1896.

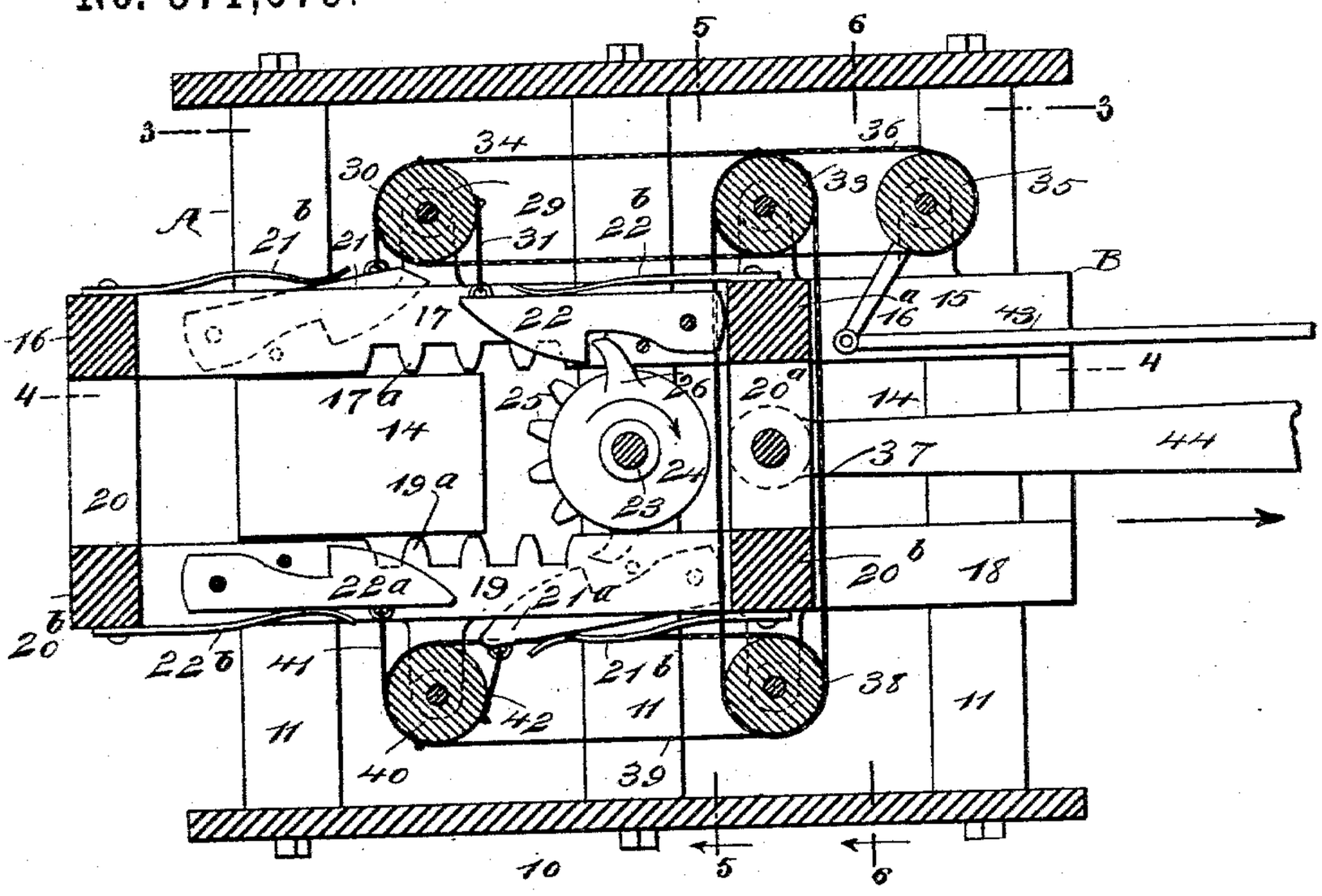

Fig. 1

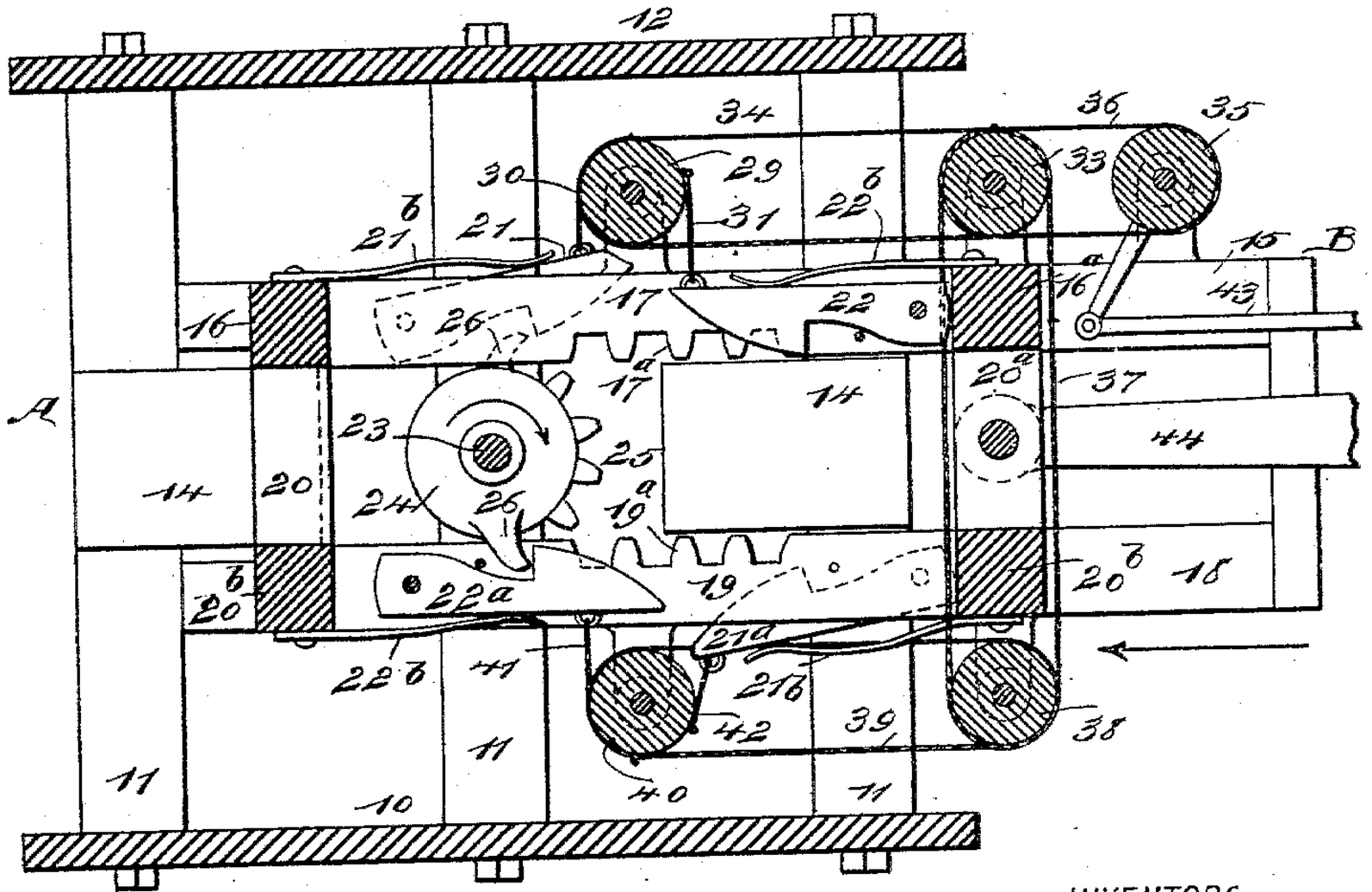

Fig. 2

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(No Model.) 2 Sheets—Sheet 2.

VAN R. & M. McCULLOUGH.

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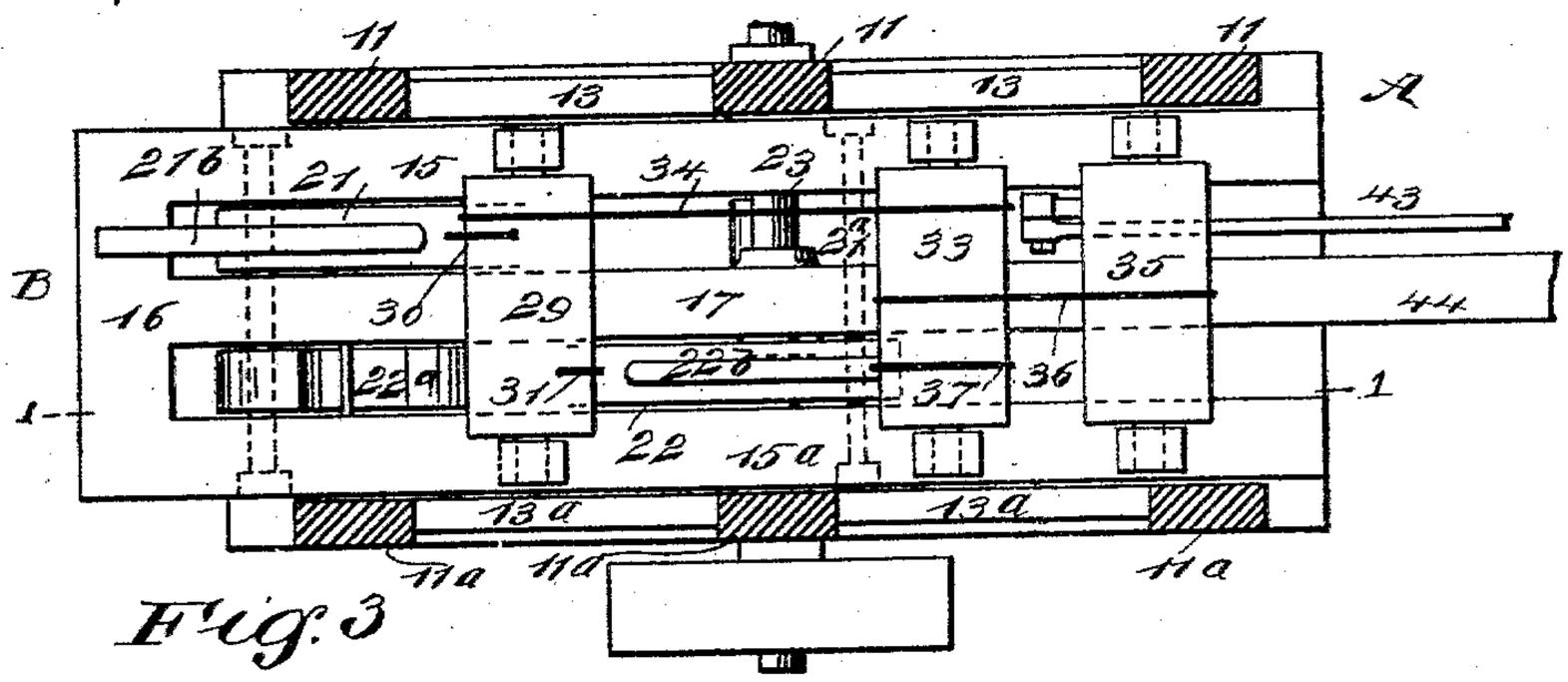


Fig. 3

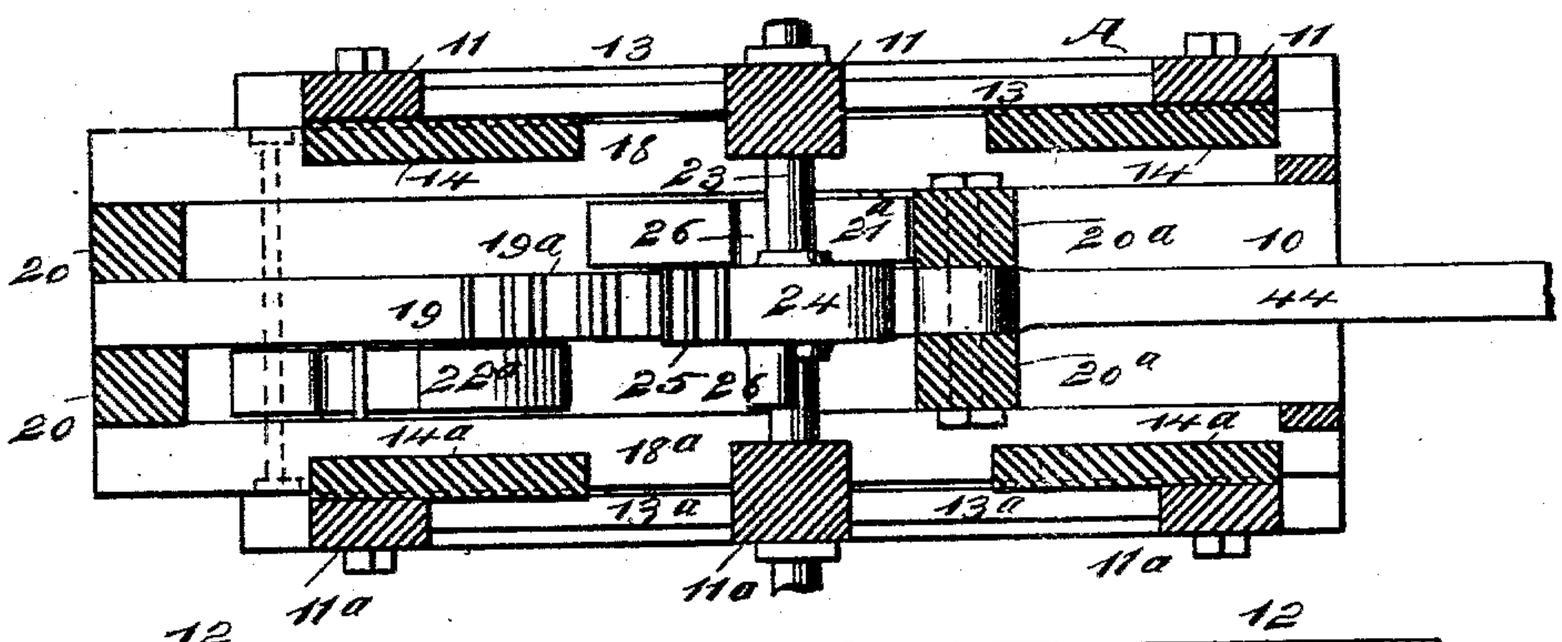
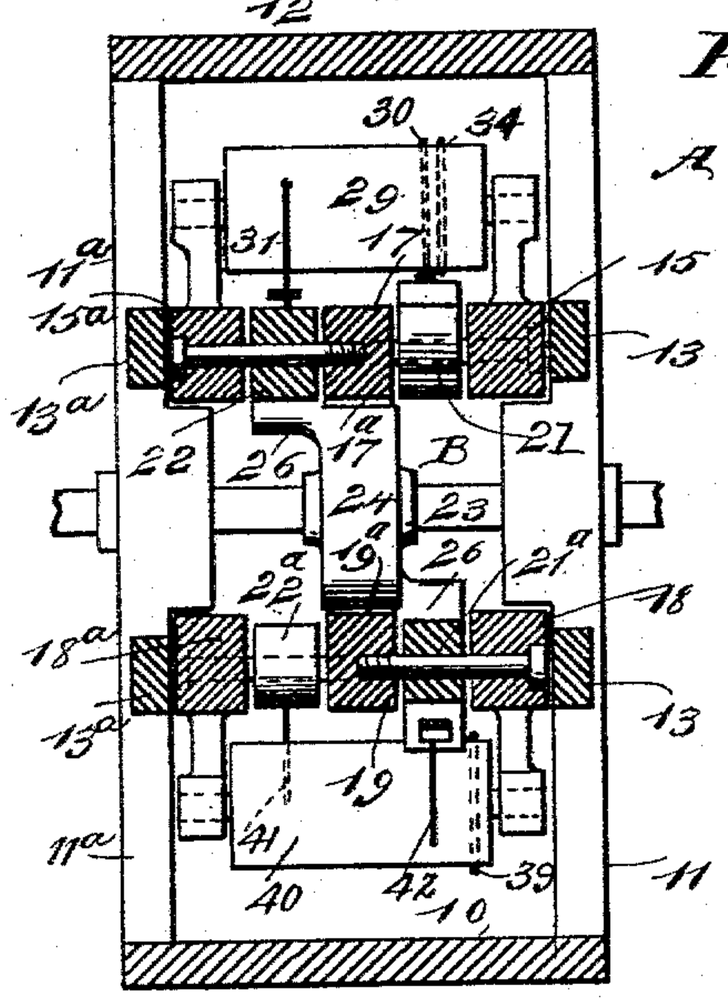


Fig. 4



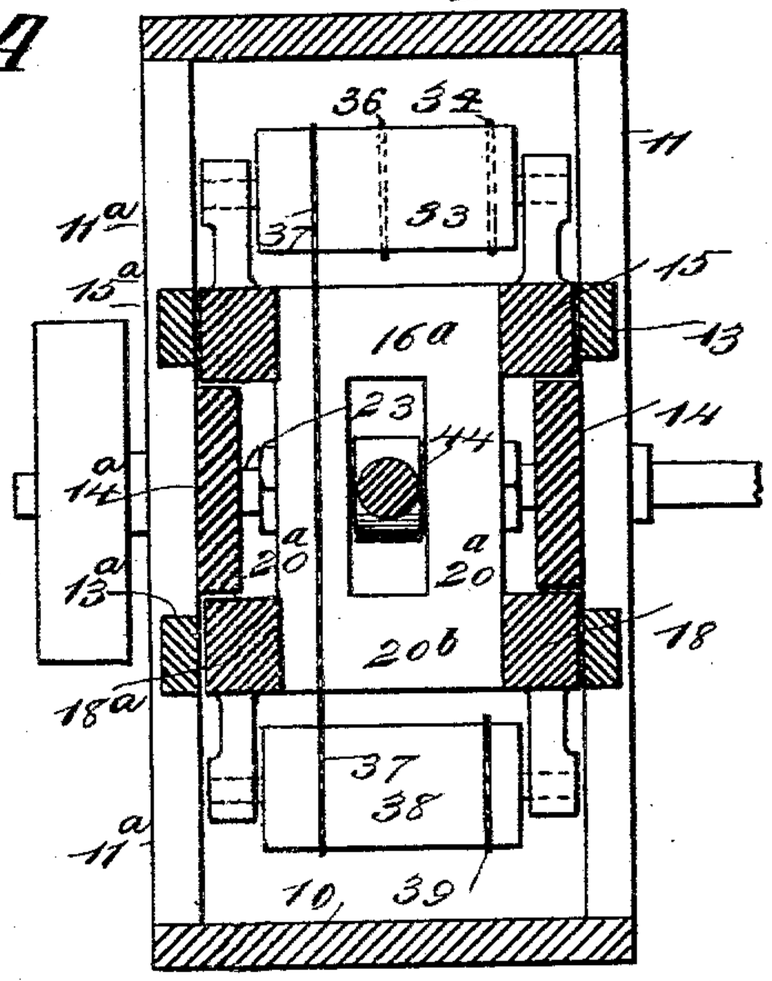


Fig. 5

Fig. 6

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UNITED STATES PATENT OFFICE.

VAN RENSSELAER McCULLOUGH AND MORGAN McCULLOUGH, OF VERNONIA, OREGON; SAID VAN RENSSELAER McCULLOUGH ASSIGNOR TO SAID MORGAN McCULLOUGH, AND SAID MORGAN McCULLOUGH ASSIGNOR OF ONE-HALF TO TIMOTHY J. HOARE, OF MULTNOMAH COUNTY, OREGON.

DEVICE FOR CONVERTING MOTION.

SPECIFICATION forming part of Letters Patent No. 571,679, dated November 17, 1896.

Application filed June 18, 1894. Renewed April 30, 1896. Serial No. 589,788. (No model.)

To all whom it may concern:

Be it known that we, VAN RENSSELAER McCULLOUGH and MORGAN McCULLOUGH, of Vernonia, in the county of Columbia and State of Oregon, have invented a new and Improved Device for Converting Motion, of which the following is a full, clear, and exact description.

Our invention relates to a machine or device adapted for converting a reciprocating into a rotary motion, and it has for its object to provide a machine of such character which will be exceedingly simple and durable and economic in its construction, and furthermore to provide a means whereby the direction of rotary motion may be changed at pleasure.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is vertical section through the piston of the machine and the frame in which it operates, illustrating the piston as at one end of its stroke. Fig. 2 is a similar view illustrating the piston at the opposite end of its stroke. Fig. 3 is a horizontal section through the frame, taken essentially on the line 3 3 of Fig. 1. Fig. 4 is a horizontal section through the frame and the piston, taken practically on the line 4 4 of Fig. 1. Fig. 5 is a vertical transverse section taken essentially on the line 5 5 of Fig. 1, and Fig. 6 is a similar section taken practically on the line 6 6 of Fig. 1.

In carrying out the invention a frame A, adapted to support a piston B, is represented as consisting of a base or bottom 10, standards 11, erected from one side of the base, opposing standards 11^a, erected from the opposite side of the base, a cap-strip 12, secured to the standards, and horizontal bars 13, connecting the standards 11, and horizontal bars 13^a, connecting the standards 11^a. The standards are provided upon their inner faces with guide-blocks 14 upon one side and 14^a upon the opposite side, and these guide-blocks form ways upon which the piston B has longitudinal movement. The piston B is represented as consisting of upper side bars 15 and 15^a, connected by end bars 16 and 16^a, and a central longitudinal bar 17, together with lower side bars 18 and 18^a, lower end bars 20^b, connecting said side bars and upright end bars 20 and 20^a, the end bars, as shown in Figs. 3 and 4, being located one at each side of the upper central longitudinal bar 17, and at each side likewise of the corresponding lower central bar 19, forming a portion of the lower section of the frame. The upper central bar 17, at or near its center, is provided with a series of rack-teeth 17^a in its lower edge, and the opposing lower bar 19 is provided with corresponding rack-teeth 19^a upon its upper surface, the rack-surfaces of the piston thus opposing each other.

In the rear portion of the upper section of the piston a pawl 21 is pivoted between the side bar 15 and the central bar 17, a corresponding pawl being pivoted at the same side of the piston, but near the front and between the side bar 18 and the central toothed bar 19, the head of the lower pawl facing upward and inward, while at the opposte side of the piston, near the forward end, a pawl 22 is pivoted between the side bar 15^a and the central bar 17, a corresponding pawl 22^a being pivoted on the same side in the bottom rear portion of the piston between its central toothed bar 19 and the side bar 18^a. The upper pawl 21 is normally pressed downward by a spring 21^b, and a spring similarly designated is made to press upward the opposing pawl 21^a. The pawls 22 and 22^a at the opposite side of the piston are controlled by springs 22^b.

The shaft 23, which is to be given a rotary movement, is illustrated as journaled in the central standards 11 and 11^a, and upon this shaft a wheel 24 is securely fastened, provided with teeth 25 upon a portion of its periphery, forming thereby substantially a

mutilated or segmental gear, and upon each face of this wheel a dog or spur 26 is firmly secured, the said dogs or spurs being diametrically opposite, and they are curved in direction of the teeth 25 of the wheel 24, one being at each end of a row of teeth. One of these dogs or spurs 26 is adapted to act in conjunction with the upper and lower pawls upon one side of the piston, and the other will act in conjunction with the pawls at the opposite side of the piston, but only one of the spurs is brought into action at any time.

When the left-hand spur is in engagement with the left-hand pawls, the shaft 23 will be turned in direction of the arrows shown in Figs. 1 and 2, and when the other set of pawls is brought into action the shaft will be given a reverse movement. Therefore it will be observed that one set of pawls must be held out of possible engagement with the spurs on the wheel 24 when the other set of pawls is in action. This may be accomplished in any suitable or approved manner, but preferably in the manner illustrated in the drawings, which consists in journaling on the top of the piston in suitable standards a drum 29. This drum is connected by a cable 30, extending from its rear face, with the right-hand upper dog 21, and is connected also by a similar chain or cable 31, extending from the forward face of the drum near its opposite end, with the left-hand upper pawl 22. A second drum 33 is journaled in suitable bearings upon the upper portion of the piston nearer the front end thereof, and this drum is made to actuate the drum 29 by means of an endless belt 34, which is passed, for example, over the right-hand end of the drum 33 and over the corresponding end of the drum 29, being preferably attached to the latter drum, and the drum 33 is actuated from a shifting-drum 35, journaled in bearings upon the upper portion of the piston farther to the front, the shifting-drum being connected with the drum 33 through the medium of an endless belt 36, which is passed around both drums and preferably attached to both.

The intermediate upper drum 33 is connected by an endless belt 37 with a lower drum 38, journaled upon the forward under portion of the piston, and this lower drum in its turn is connected by an endless belt 39 with a second lower drum 40, located preferably in about vertical alinement with the rear upper drum 29, and this rear lower drum 40 at its right-hand end is connected with the rear left-hand lower pawl 22^a through the medium of a cable or chain 41, attached to the drum and extending downward at the rear side thereof, while a cable or chain 42, attached to the forward side of the lower rear drum 40, is connected with the forward right-hand pawl 21^a. The shifting-drum 35 is connected with a shifting-lever 43, which may be operated from any desired point, and the forward end of the piston is connected by a pitman or link 44 with a motor of any description.

When the shifting-drum is moved in one direction, the upper and lower pawl on one side of the piston will be carried out of possible engagement with the spurs upon the wheel 24, while the set of pawls at the opposite side, upper and lower, will be pressed by the springs in the path of the spur on that side of the wheel. By moving the shifting-drum in a reverse direction the latter set of pawls will be thrown out of operation and the former set brought into action.

Supposing the pawls upon the left-hand side to be in engagement with the left-hand spur of the wheel, as shown in Figs. 1 and 2, the right-hand pawls, upper and lower, will be carried out of possible engagement with the right-hand spur on the wheel. Therefore in the operation of the machine, the parts being in the position shown in Fig. 1, in which the piston is at the end of its forward stroke, upon the rear stroke of the piston the spur 26 will be in engagement with the upper pawl 22 and will compel the teeth of the wheel to travel upon the rack-surface 17^a of the upper cross-bar 17, thus rotating the wheel 24 in a forwardly direction or in direction of the arrows shown in Figs. 1 and 2, and when the piston, as shown in Fig. 2, has reached the end of its rearward stroke the spur 26 will have engaged with the rear lower pawl 22^a, and the teeth of the wheel 24 will be compelled to travel upon the opposing rack-surface 19^a of the lower central bar 19 of the piston. Consequently as the piston is moved in a forward direction the wheel 24, and consequently the power-shaft 23, will continue to turn in the same direction as upon the rearward stroke of the piston. In this manner it will be observed that a reciprocating motion can be converted into a rotary one through a simple construction of piston and frame.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a device for the converting of reciprocating into rotary motion, a frame, a piston having guided movement in the frame, the said piston being provided with a double set of spring-pressed pawls, each set comprising an upper and a lower pawl, the piston being further provided with opposing rack-surfaces, a power-shaft to be acted upon, a wheel provided with a toothed segment and carried by the said shaft, and spurs located upon the wheel at opposite sides, one spur at each end of the row of teeth, and means, substantially as shown and described, for carrying one set of pawls out of possible engagement with the said spurs and bringing the other set into engagement whereby the movement of the power-shaft will be reversed as and for the purpose set forth.

2. In a machine for converting reciprocating into rotary motion, the combination, with

a frame and a piston having sliding movement in the said frame, the said piston being provided with two sets of pawls located at opposite sides, each set of pawls comprising an upper and a lower set diagonally located with respect to each other, and an upper and a lower opposing rack-surface located between the two sets of pawls, of a power-shaft, a wheel secured to said shaft and provided with a toothed segment adapted for engagement with the upper and lower rack-surfaces of the piston, spurs located at opposite sides of the wheel, one at each end of the row of teeth, the spurs being adapted for engagement with the set of pawls located upon the corresponding side, and a shifting mechanism for elevating either set of pawls out of possible engagement with the spurs, one set being always in line for engagement with one of the spurs, as and for the purpose specified.

3. In a machine for converting reciprocating into rotary motion, the combination, with a frame, a piston having sliding movement in the said frame, the said piston being provided with two sets of pawls located at opposite sides, each set of pawls comprising an upper and a lower set diagonally located with respect to each other, and an upper and a lower opposing rack-surface formed on the piston and located between the two sets of pawls, of a power-shaft, a wheel secured to said shaft, provided with a toothed segment adapted for engagement with the upper and lower rack-surfaces of the piston, spurs located at opposite sides of the wheel, one at each end of the row of teeth, the spurs being adapted for engagement with the set of pawls located upon the corresponding side, a drum located upon the upper surface of the piston and a drum upon the lower surface of the same, the upper drum being connected at opposite sides with opposing upper pawls, the lower drum being correspondingly connected with the lower pawls, a shifting-drum journaled upon the piston, upper and lower drums located between the drums connected with the pawls and the shifting-drum, a belt connection between the intermediate drums, and between each intermediate drum and corresponding pawl-controlling drum, and a belt connection between the shifting-drum and one of the intermediate drums, as and for the purpose specified.

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