O. SCHOELL.

MECHANISM FOR CONVERTING RECIPROCATING INTO ROTARY MOTION.

APPLICATION FILED NOV. 23, 1908.

924,003.

Patented June 8, 1909.

2 SHEETS—SHEET 1.

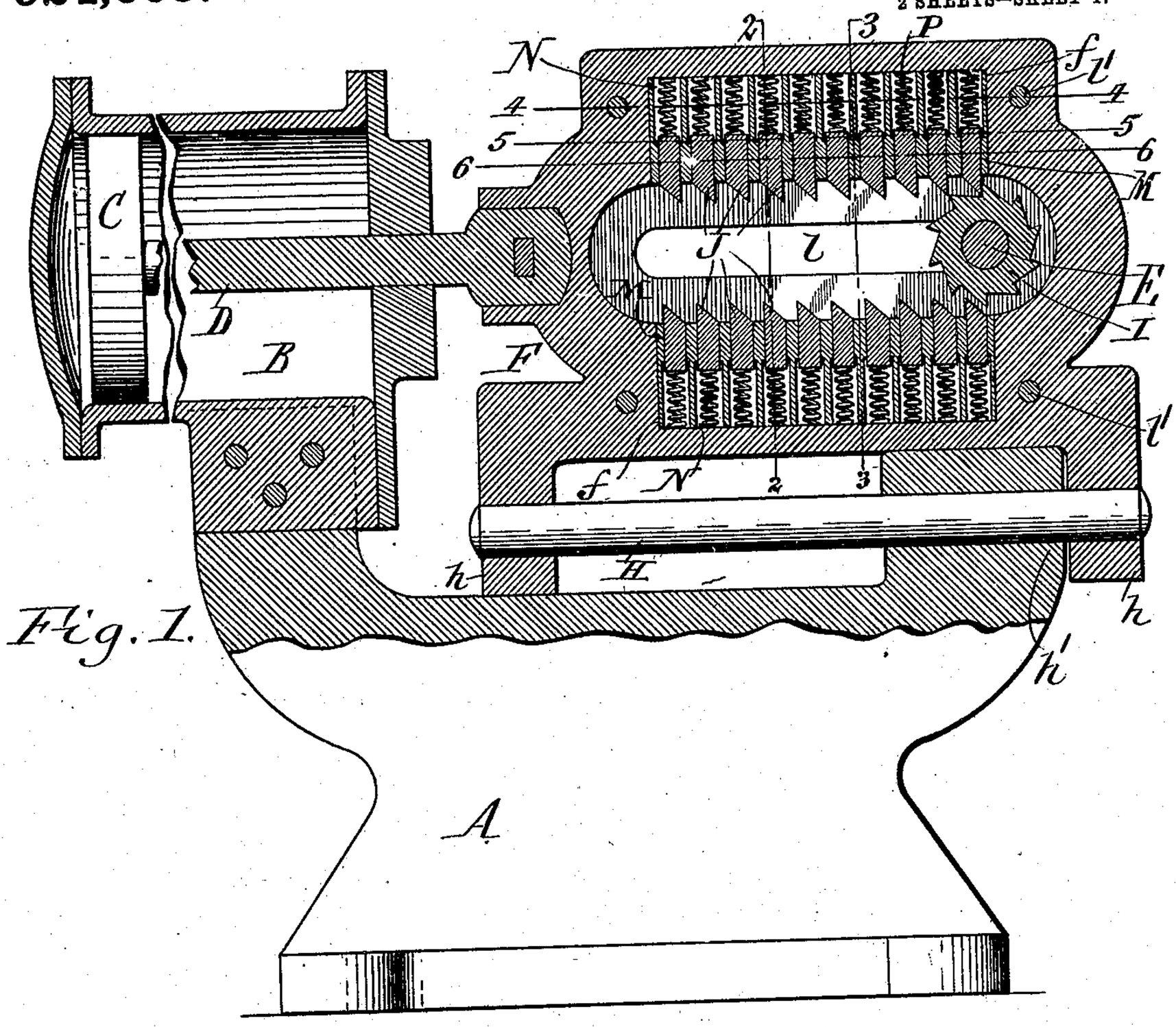

Fig. 1.

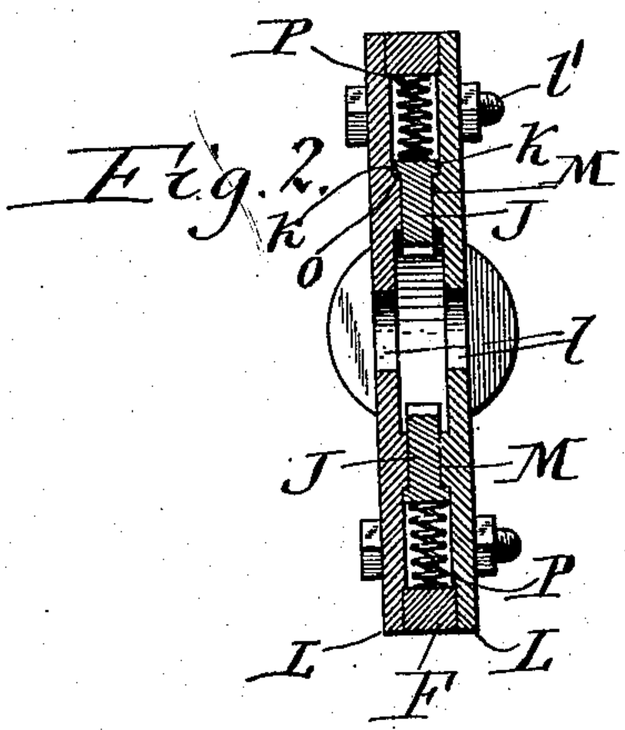

Fig. 2.

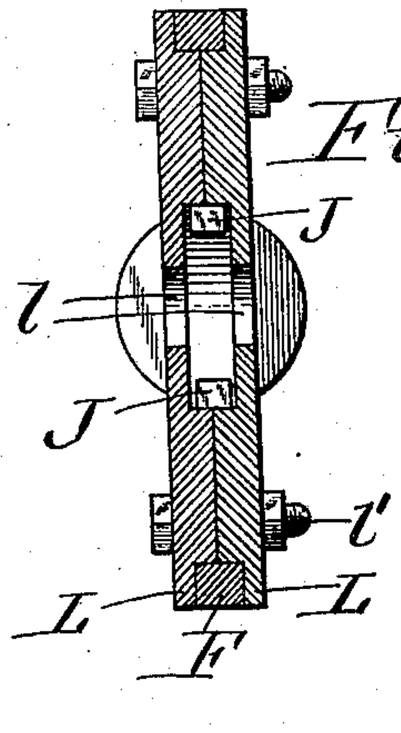

Fig. 3.

Witnesses:-

Gustav W. Hoyer

Richard Sommer.

Inventor

Ottokar Schoell,

by Geyer & Pohle

Attorneys.

O. SCHOELL.

MECHANISM FOR CONVERTING RECIPROCATING INTO ROTARY MOTION.

APPLICATION FILED NOV. 23, 1908.

924,003. Patented June 8, 1909.

2 SHEETS—SHEET 2.

Fig. 4.

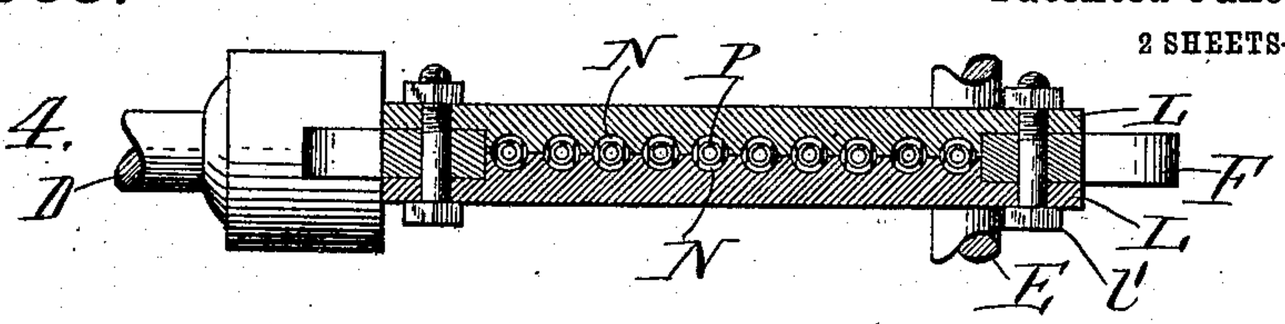

Fig. 5.

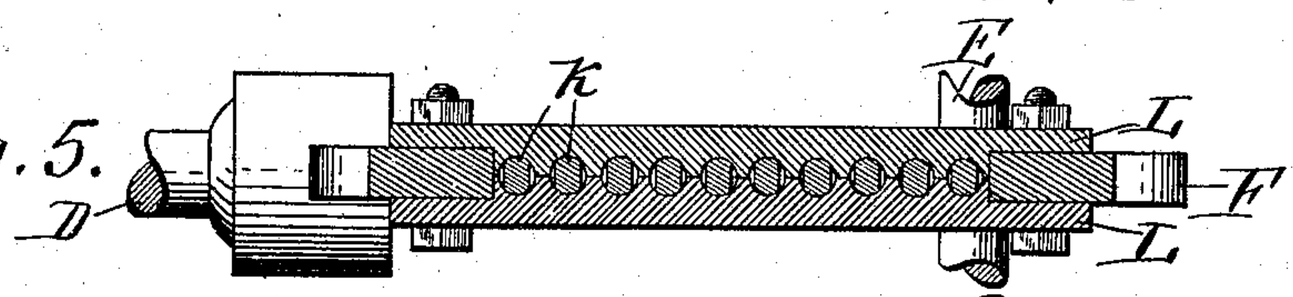

Fig. 6.

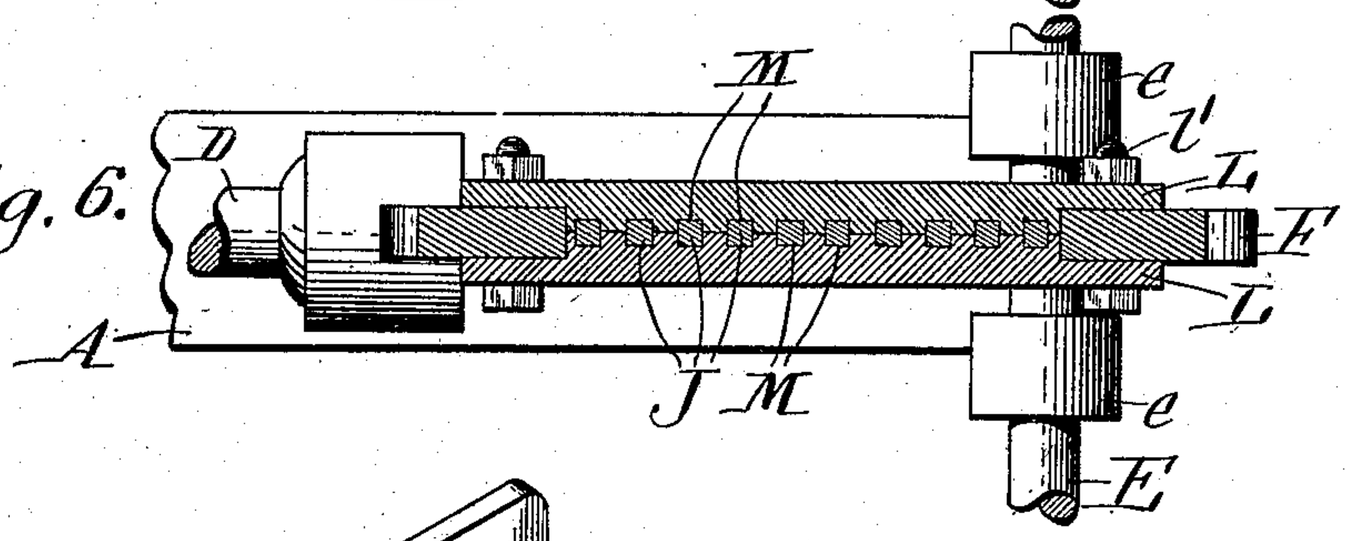

Fig. 7.

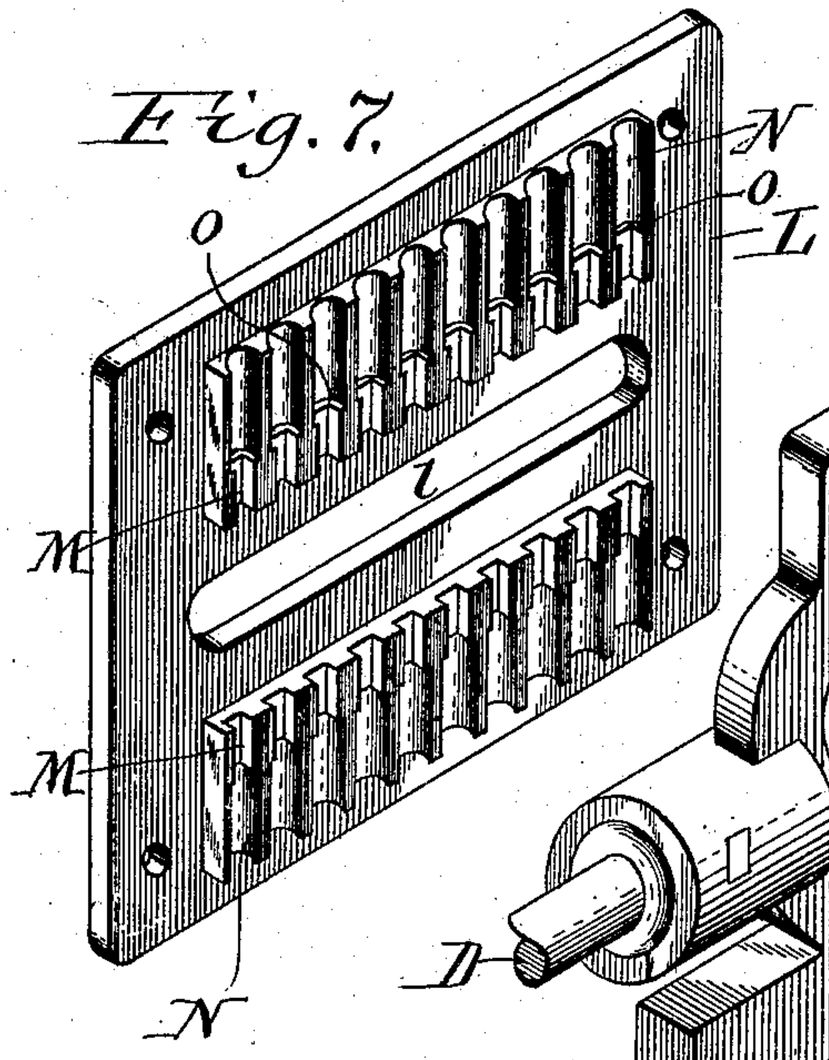

Fig. 8.

Fig. 9.

Witnesses:-
Gustav W. Hoyer.
Richard Sommer.

Inventor.
Ottokar Schoell,
by Geyer & Poppe
Attorneys

UNITED STATES PATENT OFFICE.

OTTOKAR SCHOELL, OF BUFFALO, NEW YORK.

MECHANISM FOR CONVERTING RECIPROCATING INTO ROTARY MOTION.

No. 924,003. Specification of Letters Patent. Patented June 8, 1909.

Application filed November 23, 1908. Serial No. 464,026.

To all whom it may concern:

Be it known that I, OTTOKAR SCHOELL, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Mechanism for Converting Reciprocating into Rotary Motion, of which the following is a specification.

This invention relates generally to means for converting reciprocating motion into rotary motion and more particularly to a mechanism of this kind which is intended for use in rotating a shaft by means of a reciprocating piston which is actuated by steam or other motive medium.

It is the object of this invention to provide a simple, durable and efficient mechanism of this kind whereby the shaft may be rotated more than one half a turn with the uniform application of power during each stroke of the piston which is not liable to get out of order and which can be easily dismembered and assembled for inspection and repairs.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a fragmentary vertical longitudinal section showing my improved motion converting mechanism applied to a steam engine. Figs. 2 and 3 are vertical cross sections of the same in the correspondingly numbered lines in Fig. 1. Figs. 4, 5 and 6 are horizontal sections in the correspondingly numbered lines in Fig. 1. Figs. 7, 8 and 9 are detached perspective views of parts of my improved motion converting mechanism.

Similar letters of reference indicate corresponding parts throughout the several views.

The construction of the steam or other engine which is adapted to receive my improved motion converting mechanism may be varied, that shown in the drawings for illustrating the application of my invention comprising a base A, a cylinder B mounted in a horizontal position on the base, a piston C reciprocating lengthwise in the cylinder, a piston rod D connecting with the piston and passing through the front head of the cylinder, and a horizontal shaft E journaled transversely in bearings *e* on the base in front of the cylinder.

My improved motion converting device is interposed between the front end of the piston rod and the shaft and is constructed as follows:

F represents an open frame or yoke which is provided with a longitudinal slot extending horizontally and lengthwise through the central part thereof, and two rectangular recesses *f* in its upper and lower parts which open into said slot at their inner ends. This yoke is connected at its rear end to the front end of the piston rod and guided on the base of the machine by means of a horizontal longitudinal guide rod H supported at its front and rear ends on lugs *h* depending from the corresponding ends of the yoke and sliding between its ends on a guide lug h^1 rising from the front part of the base, as shown in Fig. 1.

The driving shaft is arranged within the longitudinal slot of the yoke and provided with a ratchet wheel I the teeth of which are inclined on their front sides while the rear sides thereof are abrupt. On the upper and lower parts of the yoke are mounted two sets or rows of spring pressed actuating pawls J one of said sets being adapted to engage with the ratchet wheel on one side thereof during the forward stroke of the yoke and piston, while the other set is adapted to engage with the ratchet wheel on its opposite side during the reverse movement of the yoke and piston, and thereby cause a continued rotation of the shaft in the same direction. Each of these pawls is provided with an abrupt front side whereby the same engages with the abrupt rear side of the teeth of the ratchet wheel for turning the same and an inclined rear side which engages the teeth of the ratchet wheel while moving in the opposite direction and causes the pawl to be deflected out of the path of the teeth of the ratchet wheel and clear the same.

The body of each pawl is preferably rectangular and provided at its outer end with laterally projecting flanges *k* forming a head or shoulder on the pawl, as shown in Fig. 9. L, L represents two side plates which are secured to opposite sides of the yoke, so as to cover the central slot and the top and bottom recesses thereof and which are provided centrally with longitudinal slots *l* through which the shaft extends, thereby permitting these plates to move back and forth with the yoke relatively to the shaft.

These plates may be secured to the yoke by any suitable means but preferably by bolts l^4, as shown in the drawings.

On the inner side of each side plate the same is provided in line with each recess of the yoke with a longitudinal row of guide sections M and at the outer end of each row of guide-sections with a longitudinal row of pocket sections N, each guide-section and its companion pocket section being arranged in line and at right angles to the direction of movement of the side plate and yoke. The guide-sections are of rectangular form in cross section while the pocket sections are preferably circular and of somewhat larger diameter than the guide sections, so as to form an outwardly facing shoulder *o* at the opposing ends of the guide-section and the companion pocket section. Each companion row of guide sections and pocket sections are constructed in the form of a comb on the inner side of a side plate and when the two side plates are secured to opposite sides of the yoke the upper sets of guide sections and pocket sections of the side plates project into the upper recess of the yoke from opposite sides thereof, while the lower guide sections and pocket sections of the side plates project into the lower recess of the yoke from opposite sides thereof. The guide and pocket sections of the two plates are preferably so constructed that when the same are applied to opposite sides of the yoke, the opposing inner edges of the guide and pocket sections meet centrally in the yoke, as shown in Figs. 3, 4, 5, and 6. Each of the actuating pawls is arranged with its square body partly in the guide-section of one side plate and partly in the companion guide section of the other side plate, so that these opposing guide sections form complete guides in each of which a pawl moves into and out of its operative position relatively to the ratchet wheel. Each pocket section of one side plate is in line with the pocket section of the other side plate so that together each pair of opposing pocket sections form a complete cylindrical pocket. In each of these pockets is arranged a spiral spring P which bears at its inner end against the outer end of the pawl therein and at its outer end against the bottom of the respective recess of the yoke and operates to hold the actuating pawl yieldingly in its inwardly projected or operative position relatively to the ratchet wheel. The movement of the pawl under the action of its spring is limited by engagement of the flanges at the outer end of the pawl engaging with the outwardly facing shoulder at the junction of the respective pawl guide-way and spring pocket.

By making the spring pockets round, the same can be easily constructed by boring and by making the guideways rectangular the same can be readily constructed by means of a milling tool and at the same time provide shoulders between the spring pockets and the pawl guideways, thereby materially reducing the cost of manufacture and producing a strong and durable construction which is not liable to get out of order.

During the forward movement of the yoke and connecting parts under the action of the piston, the upper row of pawls engage successively with the teeth of the ratchet wheel and turn the same while the lower pawls trip idly past the ratchet wheel and do not affect the same, but during the backward stroke of the yoke the lower set of pawls operatively engage the ratchet wheel and continue to turn it in the same direction while the upper pawls trip idly past the ratchet wheel. By thus reciprocating the yoke and its spring pressed pawls a continuous rotary movement is imparted to the shaft by the power derived from the reciprocating piston.

The number of pawls which are employed and the extent of the stroke of the piston is preferably so determined that the shaft is turned more than one-half of a rotation during each stroke of the piston, thereby enabling the maximum power to be derived from the motive medium. Furthermore my improved motion converting mechanism provides a practical means for converting reciprocating motion into rotary motion so as to obtain absolute uniformity in the application of the power to the shaft in all parts of its circular movement and avoid dead centers which occur in the use of a crank connection between a motor piston and the shaft operated thereby.

I claim as my invention:

1. A mechanism for converting reciprocating into rotary motion comprising a rotatable ratchet wheel, a reciprocating yoke, a pair of plates secured to said yoke and provided with a row of guides, a row of pockets each arranged in line with one of said guides and shoulders between each guide and the corresponding pocket, a set of pawls each sliding in one of said guides and each having a shoulder adapted to bear against the shoulder between the respective guide and pocket, and springs each arranged in one of said pockets and bearing against the pawl in the respective guide.

2. A mechanism for converting reciprocating into rotary motion comprising a rotatable ratchet wheel, a reciprocating yoke having a recess, a pair of plates secured to opposite sides of said yoke and each provided within the recess of the yoke with a row of guide sections, a row of pocket sections each at the outer end of one of the guide sections and a row of shoulder sections each arranged between one of the guide sections

and the corresponding pocket sections, the guide, pocket and shoulder sections of both plates together forming a longitudinal row of complete guides, pockets and shoulders, a plurality of pawls each arranged in one of said guides and adapted to engage its inner end with the teeth of the ratchet wheel while its outer end is provided with a head adapted to engage with the respective shoulder of said plates, and a plurality of springs each arranged in one of said pockets and bearing at its inner end against the outer end of the pawl in the respective guide while its outer end bears against the back of the recess in the adjacent part of the yoke.

Witness my hand this 14th day of November, 1908.

OTTOKAR SCHOELL.

Witnesses:
THEO. L. POPP,
EMMA M. GRAHAM.