P. GREGERSEN.

APPARATUS FOR CONVERTING MOTION.

No. 185,521. Patented Dec. 19, 1876.

Fig. 1.

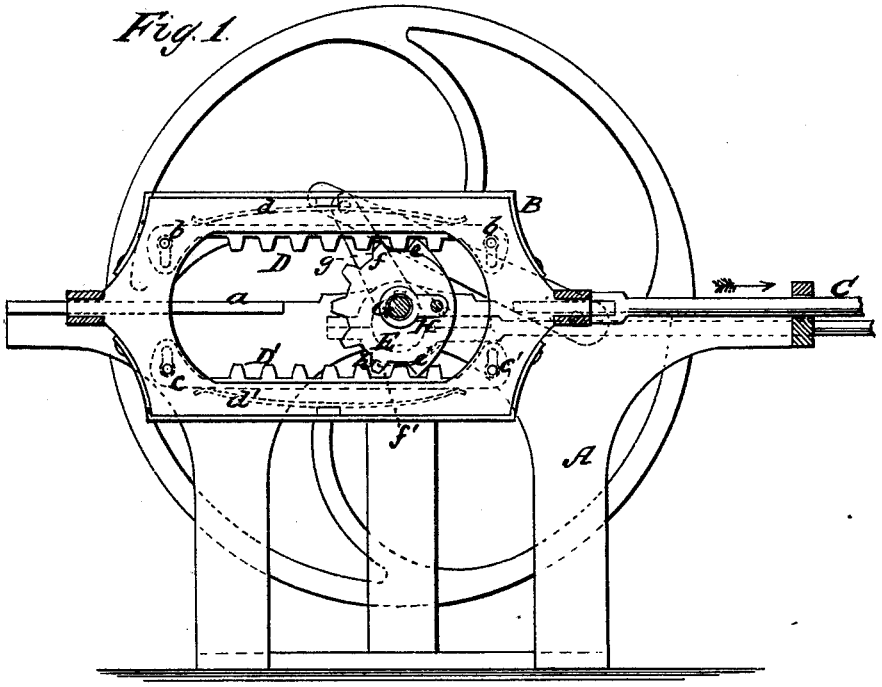

Fig. 2.

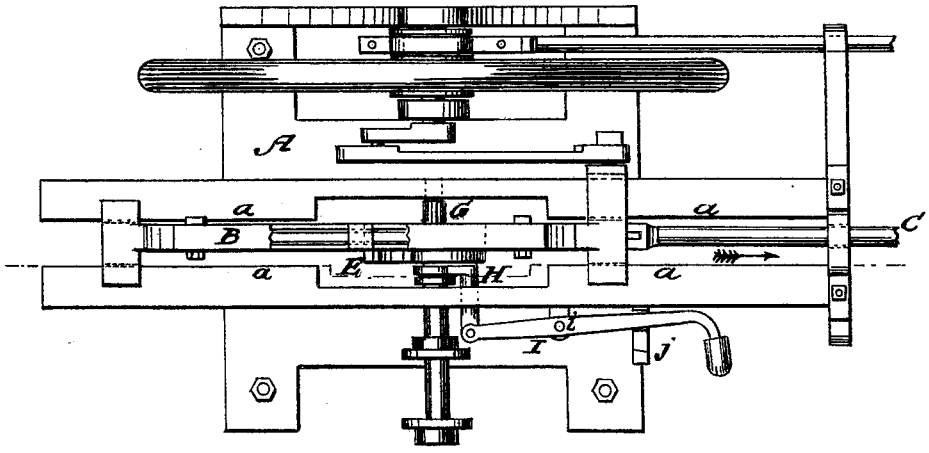

Fig. 3.

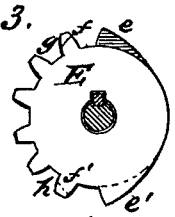

Fig. 4.

WITNESSES:

E. Wolff

J. K. Fairborough

INVENTOR:

P. Gregersen

BY Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

PETER GREGERSEN, OF WAUZEKA, WISCONSIN.

IMPROVEMENT IN APPARATUS FOR CONVERTING MOTION.

Specification forming part of Letters Patent No. **185,521**, dated December 19, 1876; application filed November 11, 1876.

To all whom it may concern:

Be it known that I, PETER GREGERSEN, of Wauzeka, in the county of Crawford and State of Wisconsin, have invented a new and Improved Apparatus for Converting Motion, of which the following is a specification:

Figure 1 is a side elevation. Fig. 2 is a plan view. Fig. 3 is a detail side view of the mutilated pinion and cam. Fig. 4 is an edge view of the same.

Similar letters of reference indicate corresponding parts.

My invention relates to apparatus for converting reciprocating motion to continuous rotary motion; and it consists in the combination of movable racks with a sliding frame that is attached to the piston-rod of an engine; and also in a mutilated pinion that meshes with the movable racks, and is provided with a double cam, by which the motion of the shaft rotated by the said racks is reversed.

The object of the invention is to provide apparatus for converting reciprocating rotary motion, in which dead-points are obviated.

Referring to the drawing, A is the frame of an engine or other machine in which it is desired to convert reciprocating into rotary motion. B is a frame, that is provided with cross-heads that slide on ways *a* attached to the frame A. C is a reciprocating rod, whose motion is to be converted into rotary motion.

The sliding frame B is slotted longitudinally to receive the racks D D′, which are enlarged and slotted at each end, and are supported upon pins *b b′ c c′*, that extend across the slot in the frame B, and through the slots in the ends of the racks. Springs *d d′* are attached to cross-bars extending across the slot in the frame B, and bear upon the backs of the racks, near their ends.

E is a mutilated pinion that is fitted to the main shaft G, which is located in the center of the stroke of the frame B. It is provided with a feather, which permits the said pinion to move longitudinally on the shaft, but carries the shaft when the pinion is revolved.

One-half of the periphery of the pinion E is provided with teeth that are capable of meshing with the teeth of the racks D D′. The face of the pinion E is a little more than double the width of the face of the racks. The part of the periphery of the mutilated pinion that is not provided with teeth has two cams, *e e′*, formed upon it, which are oppositely arranged, as shown in Figs. 3 and 4. The crown of the tooth *f* is cut away diagonally for one-half its width, as shown at *g*, and the tooth *f′* is cut away in a similar manner, as shown by the dotted lines at *h*.

It will thus be seen that the mutilated pinion E is as if it were made up of two similar but oppositely-arranged pinions, having teeth upon one-half of their periphery, one of which in each pinion is cut away diagonally or beveled, as shown at *g h*, and cams *e e′* are formed on the plain portion of the pinion diametrically opposite the beveled teeth. The hub of the pinion E is grooved, and is engaged by a clutch, H, which is operated by a lever, I. This lever is pivoted at *i*, and its free end engages with a notched post, *j*, that projects from the side of the frame A. The shaft G is provided with a fly-wheel, or connected with machinery, as may be desired.

The operation of my improved apparatus is as follows: The pinion E and racks D D′ being in position for the retrograde stroke, the rod C is drawn in the direction indicated by the arrow, when the first tooth of the rack D, being between the cam *e* and tooth *f*, engages with the side of the cam *e*, which acts as one of the teeth of the pinion. This starts the rotation of the pinion E, which is continued by the engagement of the other teeth of the rack with the teeth of the pinion. As the rod C nears the end of stroke, the cam *e* depresses the end of the rack D′, and when the stroke is completed the first tooth in outward end of the rack D′ is forced, by the spring *d′*, between the cam *e* and the tooth *f*, and the rack D′ moves the pinion E during the outward stroke of the rod C. The bevel of the teeth *f f′* permits the rack upon one side of the pinion to disengage itself from the pinion as the rack upon the other side engages with it. The motion of the pinion is reversed by sliding it longitudinally on the shaft G, by means of the clutch H and lever I, bringing the cam *e′* and the tooth *f* into engagement with the racks.

The advantages claimed for this improvement are that there are no dead-points, as

in the case of the crank, the motion of the shaft is uniform, and the power is exerted on the shaft equally throughout the stroke.

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

1. The mutilated pinion E, having oppositely-arranged cams *e e'*, and the beveled teeth *f f'*, in combination with the sliding frame B, movable racks D D', and springs *d d'*, substantially as shown and described.

2. The combination of the mutilated pinion E, feathered shaft G, clutch H, lever I, movable racks D D', and sliding frame B, substantially as shown and described.

PETER GREGERSEN.

Witnesses:
GEORGE BEIER,
LEVI MERRIMAN CULVER.