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J. A. FRENIER.

MECHANICAL MOVEMENT.

APPLICATION FILED JAN. 13, 1906.

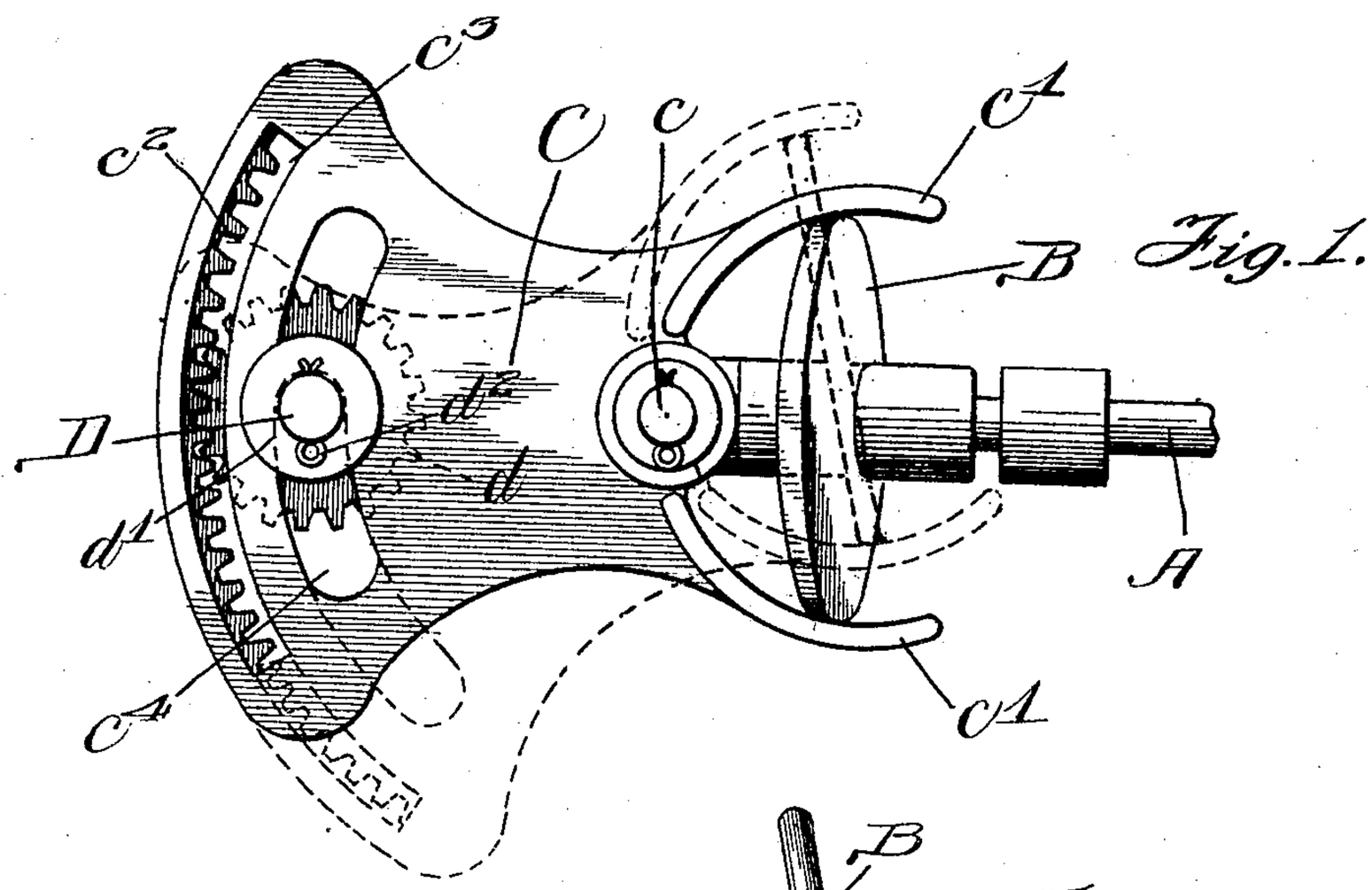

Fig. 1.

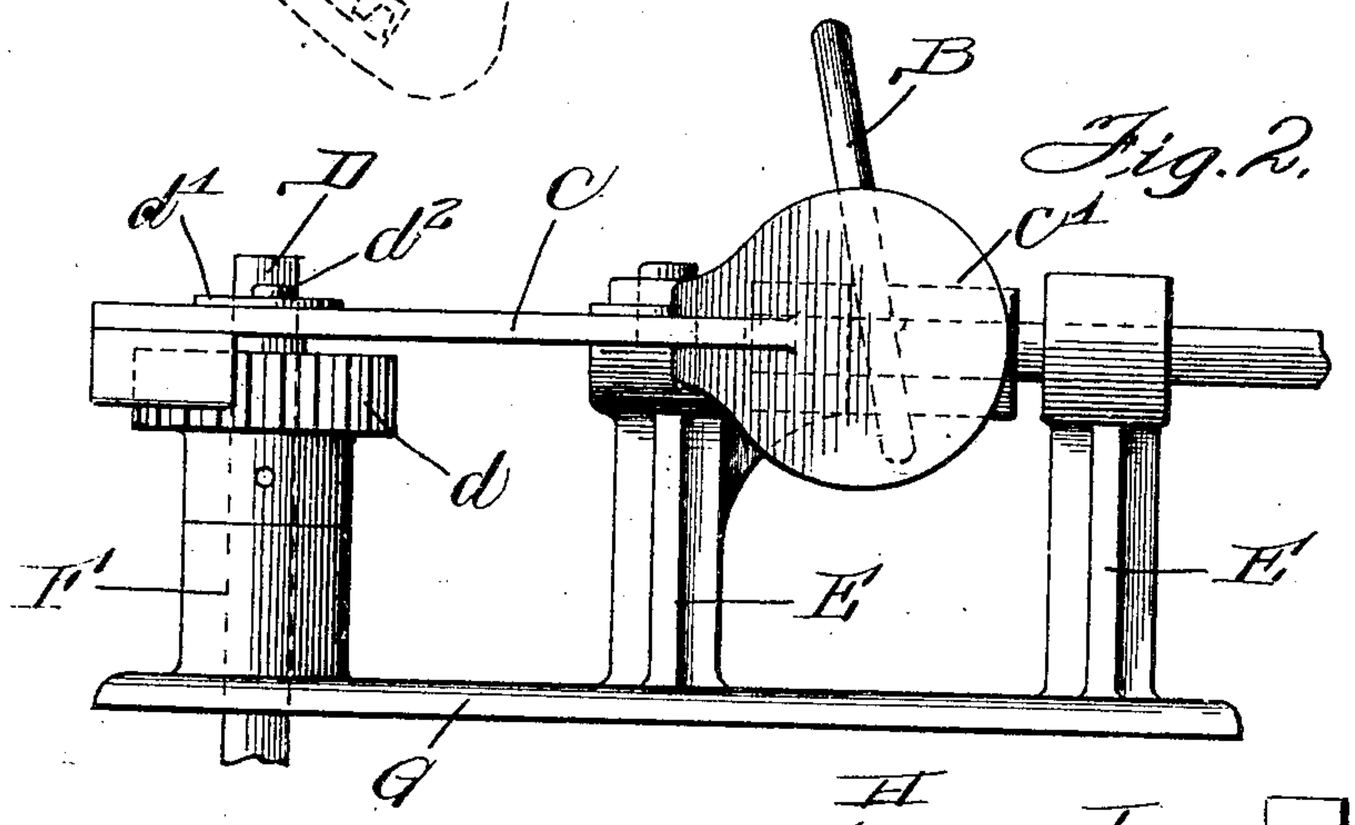

Fig. 2.

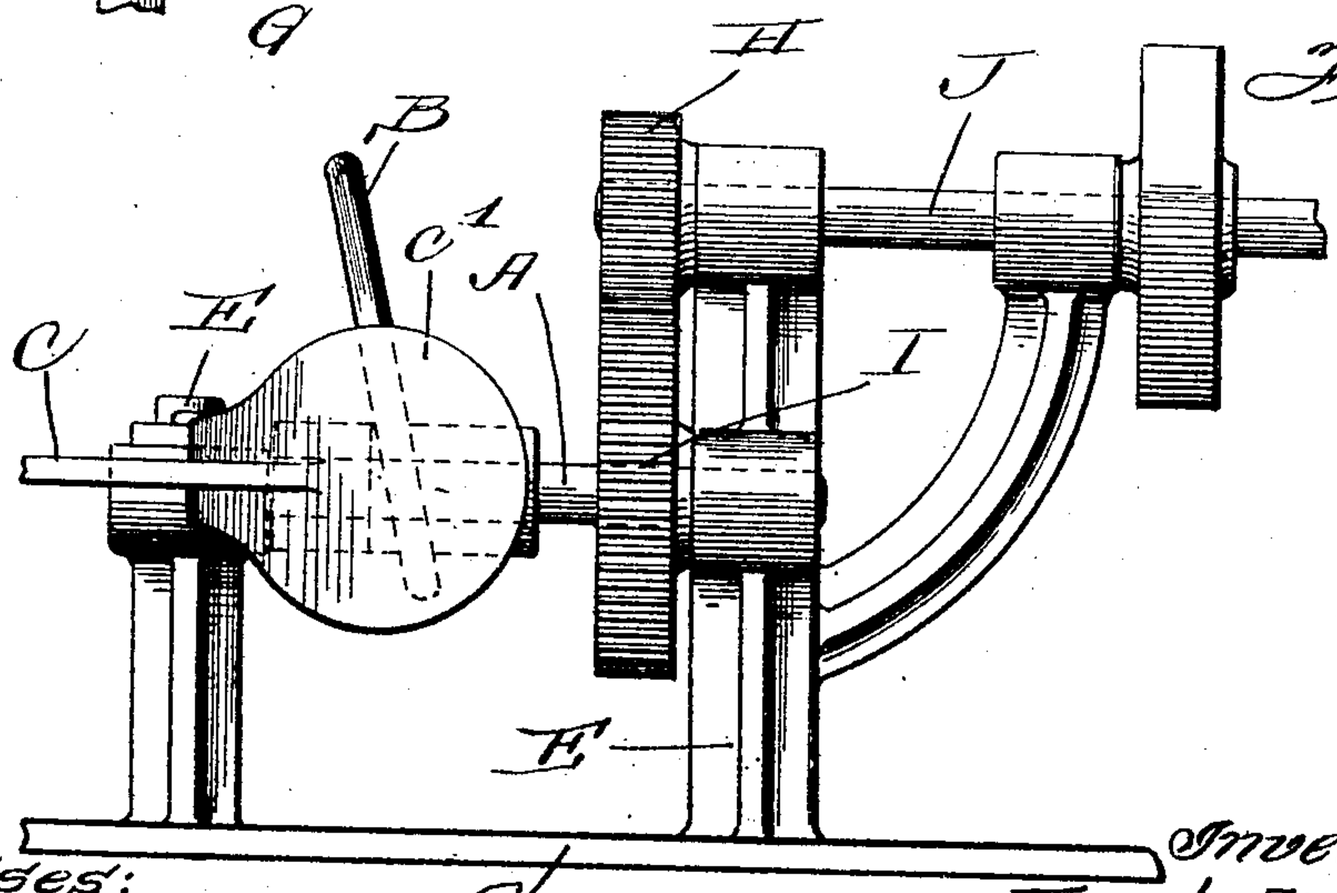

Fig. 3.

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UNITED STATES PATENT OFFICE.

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MECHANICAL MOVEMENT.

No. 835,512. Specification of Letters Patent. Patented Nov. 13, 1906.

Application filed January 13, 1906. Serial No. 295,959.

To all whom it may concern:

Be it known that I, JOSEPH A. FRENIER, a citizen of the United States of America, and a resident of Davenport, Scott county, Iowa, have invented a certain new and useful Improvement in Mechanical Movements, of which the following is a specification.

My invention contemplates a novel and highly-effective mechanical movement for converting rotary motion into a reciprocating or oscillatory motion.

Generally stated, the object of my invention is the provision of an improved and highly-efficient mechanical movement of the foregoing general character.

Special objects of my invention are the provision of an improved construction and arrangement whereby an eccentric device may be employed for converting the continuous rotation of one shaft into a reciprocating or oscillatory motion on the part of another member, the provision of an improved construction and arrangement whereby an eccentric device and a rack-and-pinion device may be combined and employed in coöperative relation to each other for converting the continuous rotation of one shaft into an oscillatory or back-and-forth reciprocal rotation on the part of another shaft, and the provision of certain details and features of improvement tending to increase the general efficiency and serviceablity of a mechanical movement of this particular character.

In the accompanying drawings, Figure 1 is a plan of my improved mechanical movement. Fig. 2 is a side elevation of the same. Fig. 3 is a side elevation of the shaft and gearing for driving the said mechanical movement, the adjacent portions of the latter being shown in side elevation.

As thus illustrated, my improved mechanical movement comprises a shaft A, upon which is mounted a disk B. It will be observed that the said disk or cam is eccentrically mounted, inasmuch as the axis of the shaft is not coincident with the center of the said disk or cam. Furthermore, it will be seen that this eccentric cam is not secured at a right angle to the shaft, but, to the contrary, is arranged obliquely thereto. The reciprocating or oscillatory rack C is pivotally mounted at c and provided with oppositely-arranged arms or cheeks c', adapted always to be in contact with the periphery of the said eccentric cam B. At its other end the said rack is provided with a curved row of rack-teeth c^2, arranged in a curved slot c^3. Between this slot and the axis of the rack a vertical shaft D is provided and arranged to extend upwardly through a curved slot c^4 in the said rack. This shaft D carries a pinion d, adapted to engage the rack-teeth c^2. With this arrangement it is evident that the reciprocation of the rack—that is to say, the oscillation of the entire rack member about its axis c—will produce a rotation of the shaft D in one direction and then a similar rotation in the opposite direction. In other words, the reciprocation or oscillation of this rack member C produces a back-and-forth or reciprocal rotation on the part of the shaft D.

It will be seen that the reciprocation of the curved rack, brought about by the oscillation of the entire rack member about its axis c, is caused by the rotation of the shaft A and the consequent throw or swing of the eccentric cam B from one side to the other. When the eccentric cam swings to one side, the rack-teeth c^2 swing in an opposite direction, and then when the rotation of the shaft A carries the eccentric cam to the other side the said curved rack will be reversed in its motion and caused to rotate the shaft D in an opposite direction. With the eccentric cam thus obliquely mounted on the shaft A it is evident that it will always have an effective contact with the cheeks or engaging portions c', which are rigid with the curved rack. Furthermore, with this arrangement I find that the portions c' can be made shorter than would be the case were the eccentric cam arranged squarely or at a right angle with reference to the shaft. Consequently the throw or stroke of the rack is materially increased, as with the projections c' made comparatively short they do not tend to come into contact with the shaft A or with any of its bearings. The portions c' must, of course, be so proportioned and curved and formed as to keep their inner faces always in contact with the periphery of the eccentric cam. In other words, it is preferable to keep the eccentric cam constantly in contact with the inner surfaces of said portions c', inasmuch as this prevents any tendency toward lost motion.

It will be readily understood that the shafts A and D can be mounted in any suit-

able bearings. For example, the shaft A can be mounted in bearings E and the shaft D can be supported in a bearing F, the pinion *d* being secured in place upon the shaft D and resting upon the said bearing F. These bearings can all be rigidly connected by a base or plate G. If desired, the bearings and the plate can all be cast in one integral piece. The axis *c* can also be mounted in the inner bearing E. A washer *d'* and cotter-pin d^2 can be applied to the upper end of the shaft D for preventing the rack from lifting out of engagement with the pinion *d*. Furthermore, any suitable arrangement can be employed for rotating the shaft A. For example, a speed-down gearing consisting of the pinion H and a gear-wheel I, the latter secured to the shaft A, can be employed for operating the mechanical movement. As shown, the pinion H is secured to a shaft J, which latter can be rotated either by hand-power or by any suitable motive power.

With my improved construction it will be seen that I employ very simple and inexpensive and yet highly-efficient means for converting a continuous rotation on the part of one shaft into a back-and-forth or reciprocal rotation on the part of another shaft. The very simple and novel construction of the mechanical movement makes it possible to manufacture the same at a comparatively low cost. It is obvious, however, that the construction can be varied more or less without departing from the spirit of my invention, and for this reason I do not limit myself to the exact construction shown and described.

What I claim as my invention is—

1. In a mechanical movement, the combination of two shafts arranged at right angles to each other, and means including an eccentric device and pivoted rack arranged intermediate of said shafts, for converting the continuous rotation of one shaft into a back-and-forth or reciprocal rotation on the part of the other shaft, said eccentric device including an eccentric cam, and vibrating means engaging the periphery of said cam, said means having an axis parallel but non-coincident with said other shaft.

2. In a mechanical movement, the combination of a shaft, another shaft arranged in suitable relation to the first-mentioned shaft, and means including an eccentric device and pivoted rack arranged as power-transmitting connection for converting the continuous rotation of one shaft into a back-and-forth reciprocal rotation on the part of the other shaft, said eccentric device including an eccentric cam, and vibrating means engaging the periphery of said cam, said means having an axis parallel but non-coincident with said other shaft.

3. In a mechanical movement, the combination of a horizontal shaft, a vertically-disposed shaft, a pinion on the vertically-disposed shaft, a reciprocating rack adapted to engage said pinion, an eccentric cam on the horizontal shaft, and means carried by the said rack for engaging the said cam, whereby the continuous rotation of the horizontal shaft is converted into a back-and-forth or reciprocal rotation on the part of the vertically-disposed shaft.

4. In a mechanical movement, the combination of a shaft, another shaft arranged at a right angle thereto, a pinion on one shaft, a rack engaging said pinion, an eccentric cam on the other shaft, and means carried by the rack and engaging said eccentric cam.

5. In a mechanical movement, the combination of a shaft, an eccentric cam on said shaft, a rack member mounted to oscillate about an axis extending at a right angle to said shaft, provided with a row of rack-teeth, and with a pair of cheeks adapted to engage diametrically opposite sides of the periphery of said eccentric cam, another shaft, and a pinion on said last-mentioned shaft adapted to engage said rack-teeth, whereby the continuous rotation of the first-mentioned shaft is converted into a back-and-forth or reciprocal rotation on the part of said last-mentioned shaft.

6. In a mechanical movement, the combination of a shaft, a disk mounted obliquely and eccentrically on said shaft, a pivoted rack member provided with rigid portions adapted to engage the periphery of said disk at diametrically opposite sides thereof, said pivoted member being also provided with rack-teeth, a suitable shaft, a pinion thereon adapted to engage said rack-teeth, whereby the continuous rotation of the said cam is converted into a back-and-forth or reciprocal rotation on the part of said pinion.

7. In a mechanical movement, the combination of a rotary eccentric cam, a pivoted oscillatory member provided with oppositely-arranged portions having curved inner engaging surfaces adapted to be retained in constant engagement with the periphery of said cam, and power-transmitting connections for utilizing the oscillatory motion of said member, produced by the continuous rotation of said cam.

8. In a mechanical movement, the combination of a shaft, a pinion, a pivoted rack engaging said pinion, and means including an eccentrically-mounted element arranged as power-transmitting connection for converting a continuous rotation of said shaft into

back-and-forth or reciprocating motion on the part of said rack, said rack provided with a rigid portion engaging said element, the axis of the rack extending at an angle to said shaft.

9. In a mechanical movement, the combination of an eccentric cam and a rack, and separate axes for the same, one axis extending at a right angle to the other, substantially as shown and described.

Signed by me at Davenport, Scott county, Iowa, this 6th day of November, 1905.

JOSEPH A. FRENIER.

Witnesses:

WM. H. BEENK,

J. C. HALL.