No. 697,342. Patented Apr. 8, 1902.

E. HORTON.

MECHANICAL MOVEMENT.

(Application filed Aug. 29, 1901.)

(No Model.) 2 Sheets—Sheet 1.

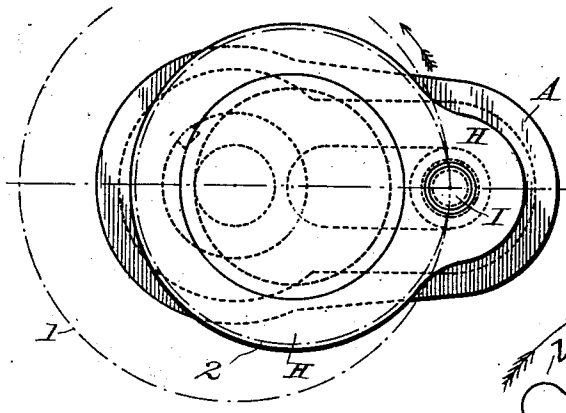


Fig. 1

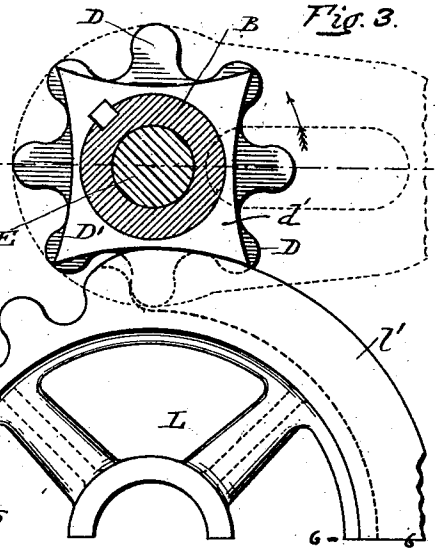


Fig. 3.

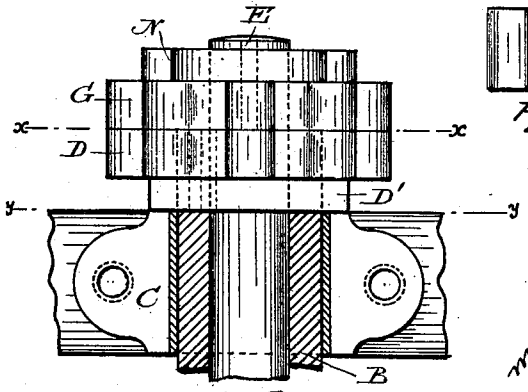




Fig. 5

Fig. 4

Fig. 6



Fig. 7

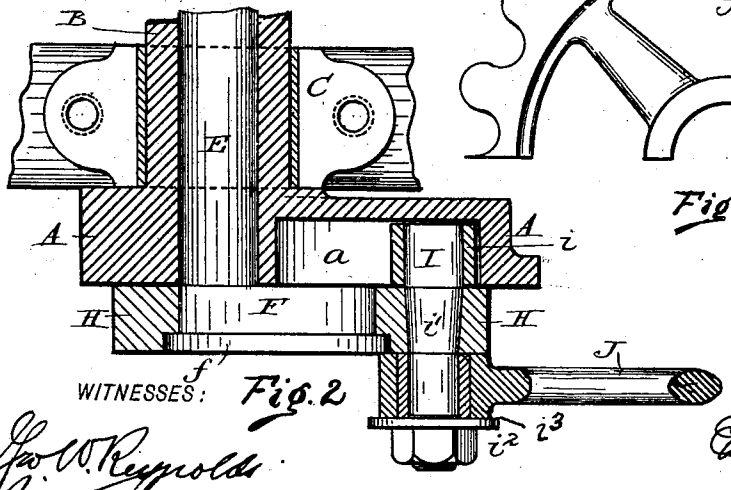


Fig. 2

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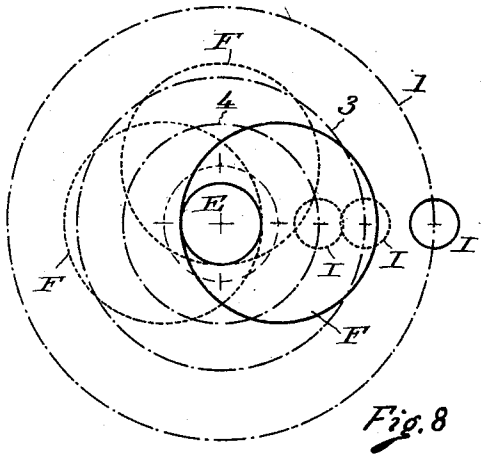


Fig. 8

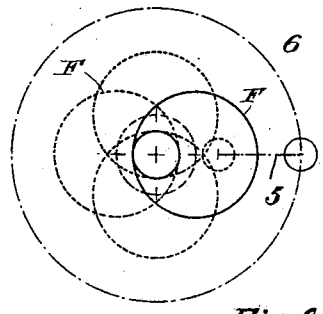


Fig. 9

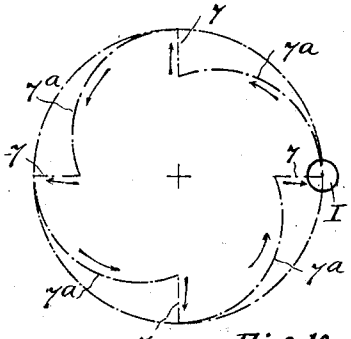


Fig. 10

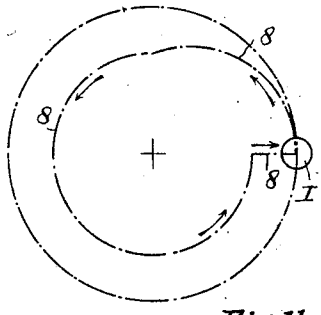


Fig 11

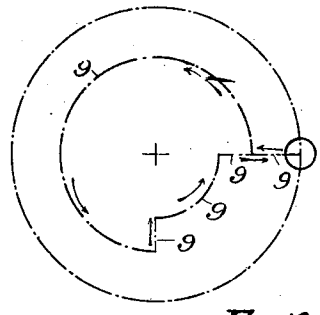


Fig 12

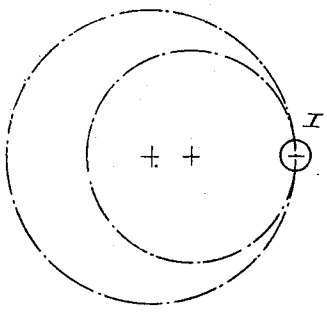


Fig. 13

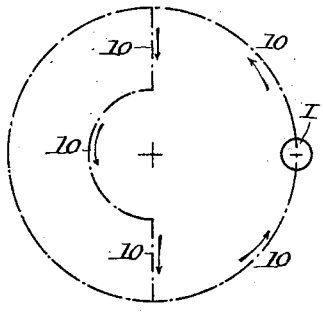


Fig. 14

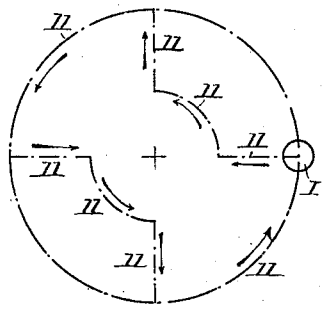


Fig. 15

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UNITED STATES PATENT OFFICE.

EMMET HORTON, OF ELMIRA, NEW YORK.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 697,342, dated April 8, 1902.

Application filed August 29, 1901. Serial No. 73,686. (No model.)

To all whom it may concern:

Be it known that I, EMMET HORTON, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

The object of my invention is to provide improved mechanism for giving a variety of movements to a crank-pin, whereby motions of different kinds may be imparted to mechanism driven from the crank-pin.

The invention consists in providing a crank-arm with a crank-pin which may be moved radially with reference to the axis about which the crank-arm turns by novel mechanism. The mechanism is so constructed and arranged that the crank-pin may be moved around with the crank-arm for a complete revolution of the latter without changing its radial position with reference thereto and may then have its radial position changed with reference to the axis of rotation of the crank-arm in such manner as to cause it to describe another path, or the crank-pin may be moved radially on the crank-arm while the latter is at rest, or the crank-arm may be revolved while the crank-pin is held against a radial movement.

The mechanism may be so operated as to cause the crank-pin to describe paths which are truly circular, or it may be made to move in straight radial lines in arcs of different radii, or in combined arcs and straight lines. The mechanism for producing these results, together with some illustrations of the operation of the apparatus, will be hereinafter described.

In the accompanying drawings, Figure 1 shows an end view of mechanism embodying my invention. Fig. 2 is a view, partly in plan and partly in horizontal section, of such mechanism. Fig. 3 shows particularly how part of the mechanism may be driven intermittently from a continuously-revolving wheel. Fig. 4 shows how another part of the mechanism may be so driven. Fig. 5 shows a section of the driving-wheel on the line 5 5 of Fig. 3. Fig. 6 shows a section on the line 6 6 of Fig. 3. Fig. 7 shows a section on the line 7 7 of Fig. 4. Figs. 8 to 15, inclusive, are diagrams illustrating various paths that the crank-pin may be made to traverse by my improved mechanism.

In the particular form of apparatus shown in the drawings the crank-arm A is formed on or secured to a sleeve-shaft B, which is mounted in bearings C of any suitable construction. On the end of the sleeve opposite the crank end is secured a pinion D, having an uninterrupted series of teeth adapted to mesh with a driving-wheel. A shaft E extends axially through the sleeve-shaft B and on one end carries an eccentric F, while on its opposite end it carries a pinion G, having an uninterrupted series of teeth adapted to gear with another driving-wheel.

H indicates an eccentric-ring surrounding the eccentric F and to which the crank-pin I is attached. The crank-pin extends into a radial groove *a* in the crank-arm and carries an antifriction-roller *i*, engaging the walls of said groove. The pin has a tapered portion *i'*, fitting a tapered socket in the eccentric-ring H, and the outer end of the pin receives one end of a pitman J, which may be connected at its opposite end with the mechanism to be operated. A flanged nut i^2 on the extreme outer end of the pin serves to draw the tapered portion of the pin into the tapered socket in the ring H through pressure of the collar i^3, which it firmly grasps, and to also hold the pitman in place on the crank-pin. The eccentric F is formed with a peripheral flange *f*, which enters a recess in the outer face of the eccentric-ring, and while the eccentric is free to turn within the ring the ring is held in proper place against the crank-arm.

The shafts B and E may be moved independently of each other, and hence the crank-pin may be moved radially on the crank-arm while the latter is still or the crank-arm may be revolved without moving the crank-pin radially.

By employing proper driving mechanism for the pinions D and G a variety of movements may be given to the crank-pin.

In Fig. 3 I have shown a driving-wheel L, having an interrupted series of teeth *l*, arranged to engage the teeth of the pinion D, while an untoothed or plain surface *l'* is arranged to engage a plate D', fast with the pinion D and having a series of curved sur-

faces d', in contact with which the surface l' on the wheel L moves. By such an organization the wheel L will cause the pinion D to revolve for a time and then for a time cease to revolve, while the driving-wheel continues its rotation. Such mechanism is in itself well known and needs no further description.

A wheel M, having a series of teeth m, engages the pinion G, and this wheel is provided with a plain surface m', engaging a plain curved surface n on a plate N, fast with the pinion G. The pinion G may be driven for a time by the wheel M, and then the wheel M may continue to revolve without revolving the pinion G.

It will be understood that the driving-wheels may be variously formed. I have shown only one form of wheel for the purpose merely of illustrating one way of carrying out my invention.

The driving-wheels might be arranged to revolve the pinion once or a number of times during each of their own revolutions, or during each revolution of a driving-wheel the corresponding pinion may be first revolved, then allowed to remain stationary, then revolve again, and so on. In other words, mutilated gear-wheels of various kinds may be used to give the pinions the proper movements to operate the crank-pin in such manner as to impart the desired motion to the mechanism driven therefrom.

In all cases the driving-wheels are preferably rotated continuously, and they may be operated from any suitable prime motor.

In order to illustrate the operation of my invention, I have indicated in Fig. 1 and in Figs. 8 to 15, inclusive, some of the paths that the crank-pin may be made to traverse.

If the crank-pin is at the outer end of the crank-arm and the pinions D and G are revolved simultaneously, the radial position of the crank-pin will not be changed and it will traverse the circular path of large radius indicated at 1 in Figs. 1 and 8. If now the pinion G be thrown out of gear with the teeth on its driving-wheel, so as to hold the eccentric F stationary, and the pinion D is turned for another full revolution, the crank-pin will be made to travel the path indicated by the circle 2 of smaller radius in Fig. 1. The driving-wheels may be arranged to repeat indefinitely this alternate motion of the crank-pin—*i. e.*, first moving for one revolution in a circular path of large radius, then for one revolution in a circular path of smaller radius, then again in a path of large radius, and so on.

If the pinion G be first turned one-fourth of a revolution and then both pinions make a full revolution, the crank-pin will describe a circle of small radius, such as 3 in Fig. 8, the one-fourth revolution of the pinion G having the effect of shifting the crank-pin inward radially. If the pinion G is first given a half-turn, the crank-pin will be moved farther inward, and then if the two pinions are revolved together the pin will describe a circle of smaller radius, such as 4 in Fig. 8.

If the pinion D be held stationary and the pinion G be turned, the crank-pin will be moved back and forth in a straight line, such as indicated, for instance, by the line 5 in Fig. 9.

By first revolving both pinions together and then holding the pinion D stationary the crank-pin will travel a circular path indicated by the circle 6 in Fig. 9 and then travel in the straight line 5. The pin may be made to alternately travel a straight line and a circle repeatedly for a definite time by employing the proper construction of driving-wheel.

In the remaining figures the outer circles indicate the paths taken by the crank-pin when the two pinions D and G are revolved together. The lines within these circles indicate paths taken by the crank-pin under various conditions.

By revolving each pinion alternately one-fourth of a revolution the crank-pin will be made to follow the line 7 7^a in Fig. 10.

If the pinion D be turned one-fourth of a revolution, then both pinions turned three-fourths of a revolution, and then pinion G turned one-fourth of a revolution, the crank-pin will travel in the line 8 of Fig. 11.

A one-fourth revolution of the pinion G, then a three-fourths revolution of both pinions, then a one-fourth revolution of pinion G, then a one-fourth revolution of both pinions, and then a one-half revolution of pinion G will cause the crank-pin to travel in a path indicated by the line 9 in Fig. 12.

Fig. 13 show paths for the crank-pin similar to those shown in Fig. 1.

The crank-pin may be made to travel a path indicated by the line 10 in Fig. 14 by first giving both pinions a one-fourth revolution, then giving pinion G one-half of a revolution, then both pinions one-half of a revolution, then pinion G one-half of a revolution, and then both pinions one-half of a revolution.

By revolving pinion G one-half of a revolution, both pinions together one-fourth of a revolution, pinion G one-half of a revolution, both pinions one-fourth of a revolution, pinion G one-half of a revolution, both pinions one-fourth of a revolution, pinion G one-half of a revolution, and then both pinions one-fourth of a revolution the crank-pin will be made to travel a path indicated by the line 11 in Fig. 15.

I have given several examples of the manner in which the crank-pin may be operated; but there are numerous other paths that the pin may be made to traverse by employing suitable driving mechanism to operate the pinions in the proper way.

The mechanism which I have illustrated for carrying out my invention is simple and efficient, and while I claim this mechanism specifically as my invention and as the best way now known to me of carrying out my invention I wish it understood that I do not limit

my invention to the details of construction shown, as these may be varied and yet accomplish the same general results.

I claim as my invention—

1. A mechanical movement comprising a crank-arm, a crank-pin movable radially with reference to the axis of rotation of the crank-arm, mechanism for revolving the crank-arm, and continuously-running power-driven mechanism for changing the position of the crank-pin provided with devices for at times allowing the crank-pin to remain stationary and at times to move.

2. A mechanical movement comprising a crank-arm, a crank-pin moving radially with reference to the axis of rotation of the crank-arm, mechanism for revolving the crank-arm, and separate mechanism acting automatically at times on the crank-pin to move it radially on the crank-arm.

3. A mechanical movement comprising a crank-arm, a crank-pin movable radially with reference to the axis of rotation of the crank-arm, and mechanism for automatically controlling the relative movements of the crank-pin and crank-arm to cause the crank-pin to describe arcs of different radii during a single revolution of the crank-arm and to repeat these movements during successive revolutions, substantially as described.

4. A mechanical movement comprising a crank-arm, a crank-pin movable radially with reference to the axis of rotation of the crank-arm, mechanism for automatically controlling the relative movements of the crank-pin and crank-arm to cause the crank-pin to describe one or more arcs and one or more straight paths during a single revolution of the crank-arm, and to repeat these movements during successive revolutions, substantially as described.

5. A mechanical movement comprising a crank-arm, a crank-pin movable radially with reference to the axis of rotation of the crank-arm, mechanism for rotating the crank-arm, devices for temporarily stopping the revolution of the crank-arm, and mechanism for moving the crank-pin radially while the crank-arm is at rest.

6. A mechanical movement comprising a crank-arm, a crank-pin movable radially with reference to the axis of rotation of the crank-arm, means for intermittently rotating and stopping the crank-arm, and means for moving the crank-pin while the crank-arm is stationary.

7. The combination of a crank-arm, a shaft on which it is mounted, power-driven mechanism for driving said shaft, a crank-pin movable radially with reference to the axis of rotation of the crank-arm, a shaft connected with the crank-pin, separate power-driven mechanism operating said last-mentioned shaft, and devices for automatically starting and stopping the rotation of said crank-pin-operating shaft.

8. The combination of a crank-arm, a shaft on which it is mounted, a crank-pin mounted radially with reference to the axis of rotation of the crank-arm, an eccentric connected with the crank-pin, a shaft to which the eccentric is secured, gearing for operating the crank-shaft, power-driven gearing for operating the eccentric-shaft, and devices for automatically starting and stopping the rotation of said eccentric-shaft.

9. The combination of a crank-arm, a sleeve-shaft to which it is secured, a pinion on said shaft, a crank-pin movable radially in guides on the crank-arm, an eccentric, an eccentric-strap connected with the crank-pin, a shaft to which the eccentric is secured, a pinion on said shaft, power-driven mechanism connected with the pinion of the crank-operating shaft, and power-driven mechanism connected with the pinion of the eccentric-shaft provided with devices for at times moving said eccentric-shaft, and at times holding it stationary.

10. A mechanical movement comprising a crank-arm, a crank-pin moving radially with reference to the axis of rotation of the crank-arm, means for driving the crank-arm, and mutilated gearing for operating the crank.

11. A mechanical movement comprising a crank-arm, a crank-pin movable radially with reference to the axis of rotation of the crank-arm, mutilated gearing for driving the crank-arm, and mutilated gearing for operating the crank-pin.

12. The combination of a crank-arm, a shaft from which it projects laterally, a crank-pin extending into a radial groove in said arm, an eccentric-ring to which the crank-pin is attached, an eccentric operating said ring, a shaft to which said eccentric is secured, pinions secured to said shafts, and mutilated gearing driving said pinions.

In testimony whereof I have hereunto subscribed my name.

EMMET HORTON.

Witnesses:
GEO. W. REYNOLDS,
JERVIS LANGDON.