P. POLNISCH.

GEARING DEVICE.

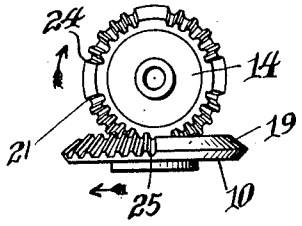
APPLICATION FILED SEPT. 10, 1910.

1,020,309.

Patented Mar. 12, 1912.

2 SHEETS—SHEET 1.

FIG. 3.



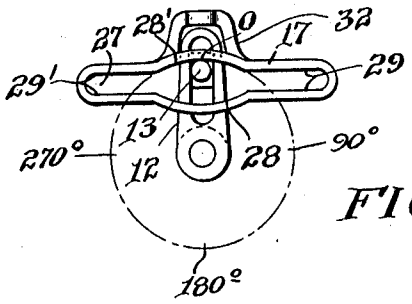


FIG. 4.

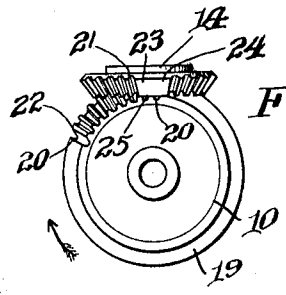


FIG. 2.

FIG. 1

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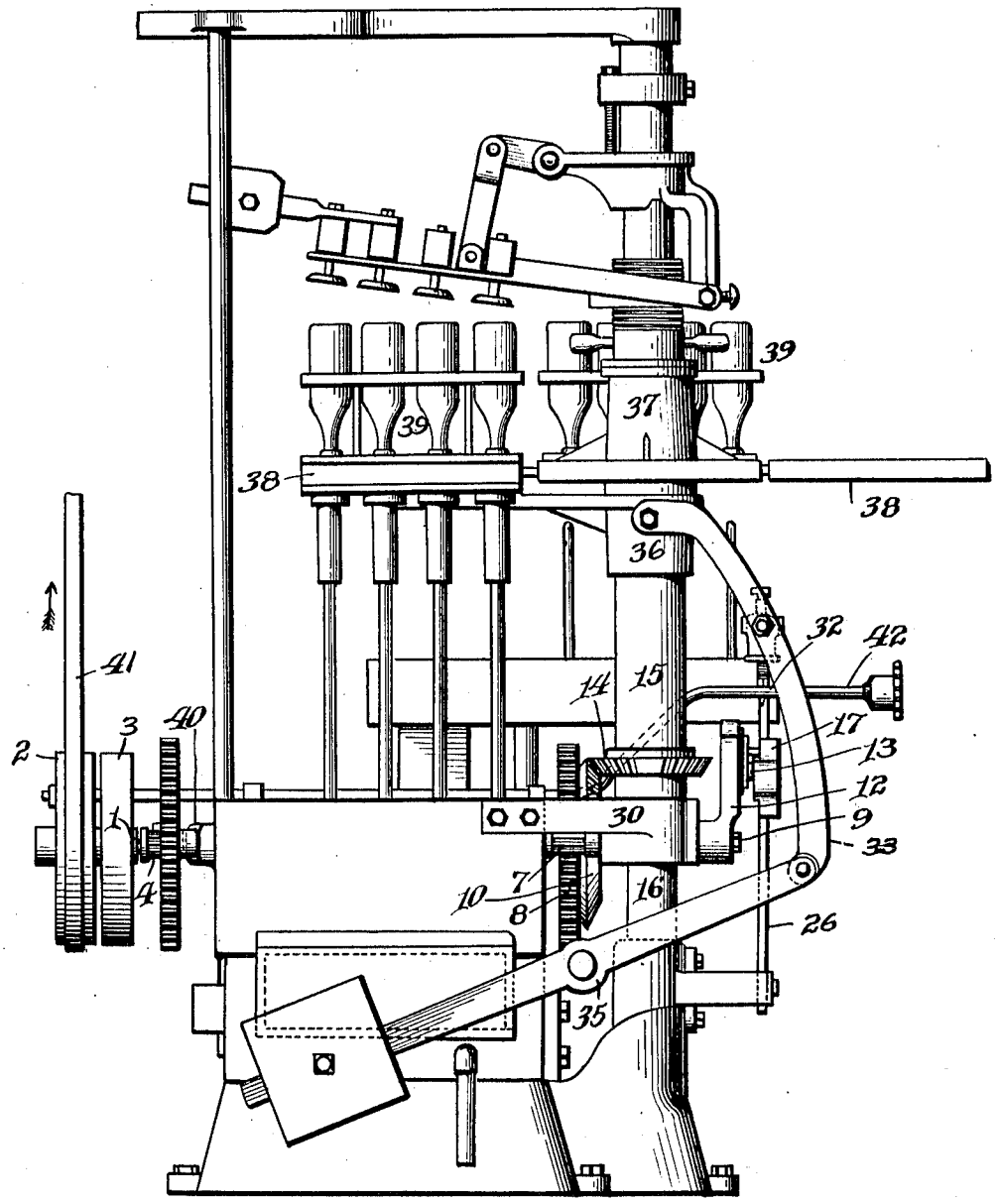
2 SHEETS—SHEET 2.

FIG. 5.



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GEARING DEVICE.

1,020,309. Specification of Letters Patent. Patented Mar. 12, 1912.

Original application filed January 24, 1910, Serial No. 539,852. Divided and this application filed September 10, 1910. Serial No. 581,345.

To all whom it may concern:

Be it known that I, PAUL POLNISCH, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Gearing Devices, (being a division of an application for Letters Patent of the United States for improvements of a bottle washing and rinsing machine, filed January 24, 1910, Serial No. 539,852,) of which the following is a specification.

My invention relates to improvements in gearing devices for converting the continuous rotary motion of a main shaft, into an intermittent rotary motion of another shaft and into an intermittent reciprocating motion of a sleeve, and the object thereof is to accomplish the transformation in such a manner that, during each and every period of revolution of a shaft, an intermittently revolving shaft and a reciprocating sleeve would pass through a cycle consisting of a movement of the sleeve in one direction the intermittently revolving shaft remaining stationary, followed by the motion of the shaft the sleeve remaining stationary, followed by the movement of the sleeve in the opposite direction the shaft continuing stationary, followed by an interval during which both remain stationary.

With this and other objects in view, my invention consists of the combination, construction and the arrangement of parts as will be hereinafter more fully described and claimed and illustrated in the accompanying drawings, it being understood that changes in form, size, shape and other minor details may be made within the scope of my claims without departing from the spirit or sacrificing any of the advantages of this invention.

In the accompanying drawings, Figure 1, is a side elevation of the device; Fig. 2, is a front elevation of a pair of bevel-gears in connection therewith; Fig. 3, is a plan view of Fig. 2; Fig. 4, is a front elevation of a pin and slotted bar in connection with the device, and Fig. 5, is a side elevation of a machine in connection with the device.

Similar figures refer to similar parts throughout the several views.

On a main shaft 1 is mounted a gear 4 meshing with a spur gear 5 mounted on an intermediate shaft 6. On the shaft 6 is mounted a pinion 7 meshing with a driving gear 8 mounted on a driving shaft 9. On the shaft 9 is mounted a mutilated gear 10 and a crank 12 carrying a pin 13. The mutilated gear meshes with a follower 14 mounted on a tubular driven shaft 15 revolubly supported on a post 16 at right angles with the driving shaft. The pin 13 rolls in a slotted bar 17. The gears 10 and 14 are so connected that the uniform rotation of the gear 10 produces a given intermittent motion of the gear 14, and are so constructed that the gear 14 is rotated by the gear 10 through a definite angle and is then held securely in its position until it is again put in motion.

As shown in the drawings, the axes of the gears are intersecting and are therefore constructed from two truncated cones. In the combination shown the gear 14 passes through a quadrant during one-sixth of the period of the gear 10, that is, the gears have a velocity ratio of two to three. After the gear 14 has passed through a quadrant it remains stationary until the gear 10 completes its revolution, the gear 10 having teeth on one-sixth of its conical surface only.

The teeth are constructed in the usual manner, except that the last tooth of the gear 10 is connected with the first tooth by a smooth conical surface 19 joining the root of the last tooth with that of the first, except for the clearances 20, 20. In order to avoid the danger of the teeth of the gears jamming every time they become engaged, the face 21 of every last tooth of the follower, opposite to the face 22 of the last tooth of the driver is projected and is connected by a concave conical surface 23 with the face 24 of a tooth on the follower which must become engaged by the face 25 of the first tooth on the driver, which results in the smooth surface 19 of the driver rolling over the smooth surfaces 23 of the follower successively whenever the teeth become disengaged.

The slotted bar 17, is mounted on a bar 26 which is constrained to slide in a vertical plane parallel with the plane of the crank 12 and perpendicular to the bar 17. The pin 13 rolls in the slot 27 of the bar 17 while

the crank 12 revolves uniformly with the shaft 9 and imparts to the bar 17 a harmonic motion, that is, the velocity of the bar 17 is zero when the angle between the crank 12 and the bar 26 is either zero or 180 degrees and is equal to that of the crank when the angle between the crank and the bar 26 is either 90 or 270 degrees. To make the harmonic motion of the bar 17 periodic, the slot 27 is bounded by a surface 28 centrally above the bar 26 of a radius equal to, or as near as possible, the distance of the center of the pin from the axis of the crank plus the radius of the pin, and the pin rolls over this surface without imparting any motion to the bar. The surface 28′ is equal and opposite to the surface 28, and the bar is stationary whenever the pin rolls over this surface. The surfaces 29 and 29′ are straight and the slot is of a uniform width approximately equal to the diameter of the pin, and when the pin rolls over these surfaces the bar moves in harmony with the crank. The harmonic motion of the bar is thus made periodic.

The crank 12 is mounted on the shaft 9 in such a position relative to the teeth of the mutilated gear that, when the pin enters upon the surface 28′, the mutilated gear begins to impart motion to its follower; the angle subtended by this surface is equal to the angle subtended by the toothed surface of the mutilated gear; the bar therefore remains stationary during one-sixth of the period of motion of the mutilated gear, during which interval the follower passes through a quadrant. The pin now enters the surface 29 and rolls over this surface during one-third of the period causing the bar to descend; it then enters upon the surface 28 and rolls over this surface during one-sixth of the period causing the bar to remain stationary, and then enters the surface 29′ causing the bar to ascend during the remaining one-third of the period, thus completing a cycle.

In connection with my machine referred to above, the shaft 15 is revolubly supported on the post 16 by a bracket 30 provided with bearings 31, 31 for the driving shaft 9. On the bar 17 is mounted a bar 32, which is pivoted on a link 33, pivotally connecting a lever 35 carrying a weight 43 with a sleeve 36 slidingly mounted on the shaft 15, which is free to revolve therein. On the shaft 15 and above the sleeve 36 is mounted a sleeve 37, which is constrained to revolve with said shaft and free to slide thereon with the sleeve 36. The sleeve 37 carries trays 38 on which are mounted crates of bottles 39. The shaft 1 mounted in bearings 40, is driven by a belt 41, in the direction of the arrow, a belt shifter 42 shifting the belt from the loose pulley 2 to the tight pulley 3. The motion is transmitted to the driving shaft 9, through the intermediate shaft 6, by means of gears mounted on the shafts.

In the position shown in Fig. 5 a tray in the position marked A is about to be moved to the position marked B. The teeth of the gear 10 engage the teeth of the gear 14 and the shaft 15 revolves and takes along the sleeve 37. The sleeve 36 is held by the link 33 on which is pivoted the bar 32 mounted on the slotted bar 17. The crank 12 revolves with the shaft 9 and the pin 13 rolls over the surface 28′ of the bar 17. As soon as the tray reaches the position B the smooth surface of the gear 10 rolls over the smooth surface of the gear 14 and the shaft 15 remains stationary. The pin 13 then enters the surface 29 of the bar 17 causing it to descend, and the sleeve 36 slides down followed by the sleeve 37, causing the trays to descend. The pin 13 then enters upon the surface 28 and while it rolls over the said surface the sleeves remain stationary, because the smooth surface of the gear 10 is still rolling over a smooth surface of the gear 14. The pin then enters the surface 29′ and the sleeve 36 is caused to ascend taking along the sleeve 37 which slides on the shaft 15, said shaft being stationary as the smooth surface of the gear 10 is still rolling over the smooth surface of the gear 14. The cycle is completed when the pin 13 arrives at the end of the surface 29′, when the teeth of the gear 10 are just about to become engaged with the teeth of the gear 14, ready to enter upon a new cycle.

Having thus described my invention, what I now claim as new and desire to protect by Letters Patent, is—

1. In a device of the character described, the combination of a main shaft, an intermediate shaft and a driving shaft, a driving gear mounted on the driving shaft and provided with teeth on a portion of its surface and a crank provided with a pin also mounted on the driving shaft, a driven shaft and a follower mounted thereon meshing with the driving gear and provided with teeth arranged in groups and interconnected by concave surfaces to revolve intermittently, a bar having a slot provided with a surface to be rolled over by the crank pin to be given a harmonic motion, said surface consisting of a section bounded by a curve subtending an angle equal to the angle subtended by the teeth of the driving gear, of a straight section, of a section bounded by a curve equal and opposite to the first mentioned section and of a section equal and opposite to the straight section, substantially as described and for the purposes set forth.

2. In a device of the character described, a mutilated driving gear and a crank provided with a pin, a follower meshing with

the driving gear to revolve periodically, a bar provided with a slot for the pin to move periodically with a harmonic motion substantially as described and for the purposes set forth.

3. In a device of the character described, the combination of a mutilated driving gear and a crank provided with a pin, a follower gear meshing with the mutilated gear to revolve periodically and a slotted bar engaged by the pin moving with a periodic harmonic motion comprising an interval of rest corresponding with the interval of motion of the follower, followed by an interval of motion to be succeeded by an interval of rest equal to the interval of motion of the follower, followed by an interval of motion thus describing a cycle of a period equal to the period of motion of the driving gear and consisting of an interval during which the follower gear is in motion and the bar is stationary, followed by an interval during which the bar is in motion and the follower gear is stationary, followed by an interval during which both are stationary, followed by an interval during which the bar is in motion in the opposite direction and the gear is stationary, substantially as described and for the purposes set forth.

4. In a device of the character described, the combination of a bar moving with a harmonic periodic motion and of a gear moving with a rotary periodic motion in a plane of an angle with the plane of the bar, a main shaft, a driving shaft and an intermediate shaft, means for transmitting the motion of the main shaft to the intermediate shaft and means for transmitting the motion of said intermediate shaft to the driving shaft, a mutilated driving gear mounted on the driving shaft for causing the movement of the periodically revolving gear and a crank also mounted on the driving shaft and provided with a pin for causing the periodic harmonic motion of the bar, said bar provided with a slot for the pin to travel in to cause the bar to descend during a part of the interval of rest of the periodically revolving gear, to cause the bar to remain stationary during a further interval of rest of said gear and equal to its interval of motion, to cause the bar to descend during a further interval of rest of said gear, and to cause the bar to remain stationary during the interval of motion of said gear the said bar and gear passing through a cycle of a period equal to that of the driving gear substantially as described and for the purposes set forth.

5. In a device of the character described, the combination of a bar moving with a periodic harmonic motion and of a gear moving intermittently with a periodic rotary motion in a plane at right angles with that of the bar, a main shaft, a driving shaft and an intermediate shaft, a gear mounted on the main shaft and a gear meshing therewith mounted on the intermediate shaft, a gear mounted on said intermediate shaft and a gear meshing therewith mounted on the driven shaft, a mutilated gear mounted on the driving shaft at right angles with a periodically revolving gear and meshing therewith to cause it to revolve during an interval of the period of the revolution of the mutilated gear, a crank mounted on the driving shaft and provided with a pin for causing the bar to move with a periodic harmonic motion, said bar provided with a slot for the pin to roll in and bounded by a surface consisting of sections interconnected in such a manner that the bar remains stationary during the interval of motion of the periodically revolving gear and descends, stops and ascends completing a cycle during a period equal to that of the mutilated gear, during the interval of rest of the periodically revolving gear, substantially as described and for the purposes set forth.

6. In a device of the character described, a shaft, a driving gear and a crank provided with a pin mounted on said shaft, a sleeve, and a follower mounted thereon meshing with the driving gear, a lever and a link pivotally connected therewith, and a means pivoted on the link and engaged with the pin for transmitting the motion of the shaft to the lever.

7. In a device of the character described, a horizontal shaft, a driver and a crank provided with a pin mounted thereon, a vertical sleeve and a follower mounted thereon meshing with the driver, a lever to rock in a vertical parallel plane, and means operatively connecting the lever with the crank pin.

8. In a device of the character described, a shaft and means for rotating it, a driving wheel and a crank mounted thereon rotating therewith in parallel vertical planes, a sleeve and a follower mounted thereon meshing with the driving wheel, a rod, a lever and a link pivotally supported by said rod, and a means for transmitting the motion from the crank to the link.

9. In a device of the character described, a horizontal shaft and means for rotating it, a sleeve, a follower mounted on the sleeve and a driver mounted on the shaft provided with means for intermittently transmitting the motion of the shaft to the sleeve, a lever of the first class and a link pivotally connected therewith, a crank mounted on the shaft and provided with a pin, and a means connecting the pin with the link to rock the lever in a vertical plane during an intermission of rest of the sleeve.

10. In a device of the character described, a rotatable sleeve and a reciprocable weight,

means for rotating the sleeve intermittently in a horizontal plane, and means for reciprocating the weight during the intermissions of rest of the sleeve.

11. In a device of the character described, a sleeve and a gear mounted thereon, a weight, a lever carrying the weight, a link and a rod connecting the link with the lever, a shaft, a gear mounted thereon meshing with the sleeve gear for imparting an intermittent rotary motion to the sleeve, a crank mounted on said shaft and provided with a pin operatively connected with the link for imparting a reciprocable movement to the weight during the intermissions of the rotary movement of the sleeve.

12. In a device of the character described, a sleeve and a gear mounted thereon, a weight, a lever carrying said weight, a link and a rod pivotally connecting the link with the lever, a shaft, a gear mounted thereon meshing with the sleeve gear for imparting an intermittent rotary movement to said sleeve, a crank provided with a pin mounted on said shaft, and a bar provided with a slot for the pin and pivoted on the link for imparting an intermittent reciprocable movement to the weight.

13. In a device of the character described, the combination of a sleeve and a weight carrying lever, means for imparting an intermittent rotary movement to the sleeve, and means for imparting an intermittent reciprocable movement to the weight during an intermission of the rotary movement of the sleeve.

14. In a device of the character described, the combination of a sleeve and a weight, means for rotating the sleeve intermittently, and means for moving the weight intermittently during the intermissions of rest of the sleeve.

In testimony whereof I have attached my signature to this specification in the presence of two subscribing witnesses.

PAUL POLNISCH.

Witnesses:
EMANUEL KLINE,
WM. PORTNER.