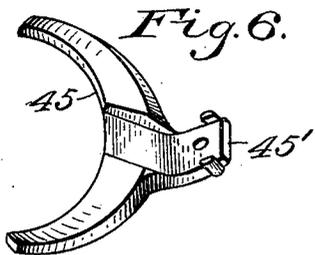
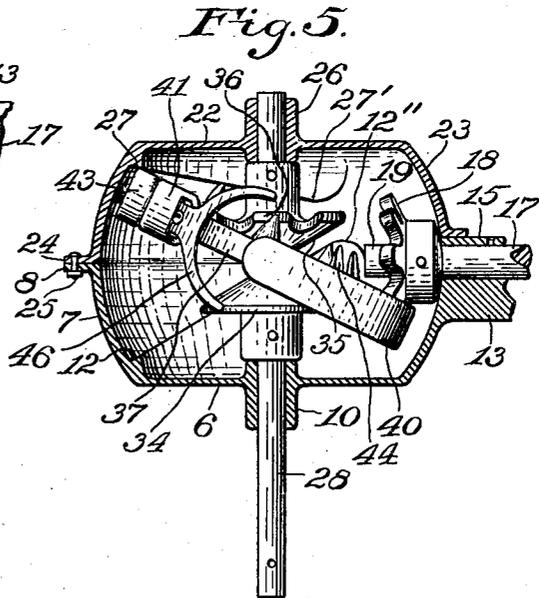
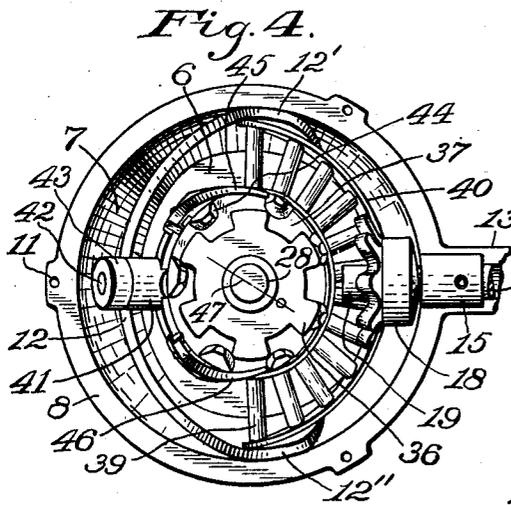
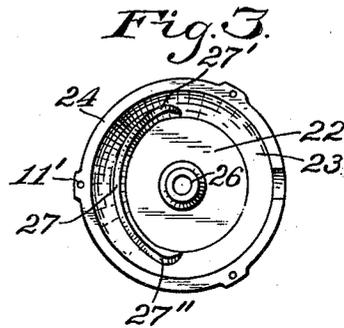
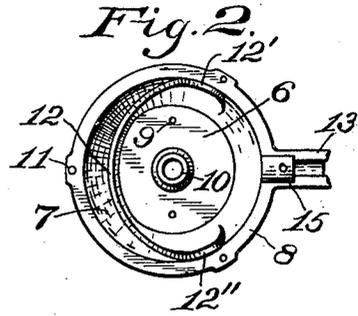
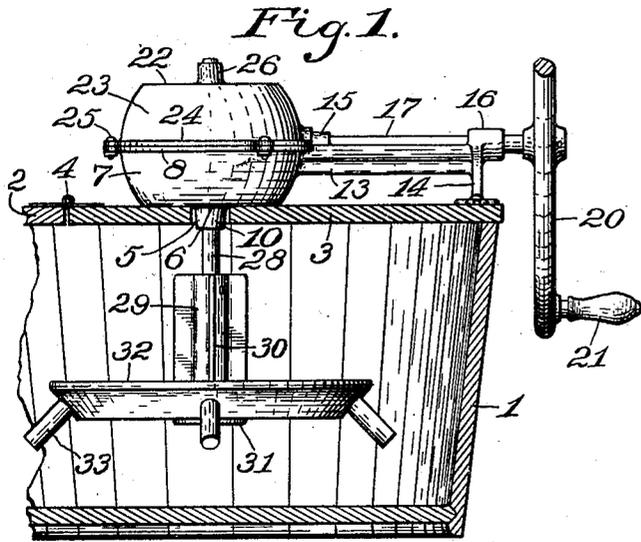


903,613.

Patented Nov. 10, 1908.
 2 SHEETS—SHEET 1.



WITNESSES:

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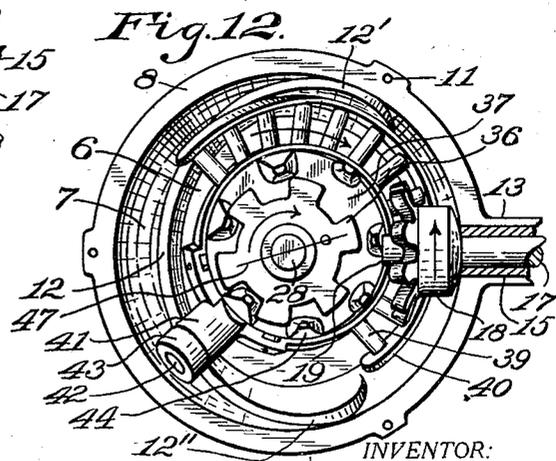
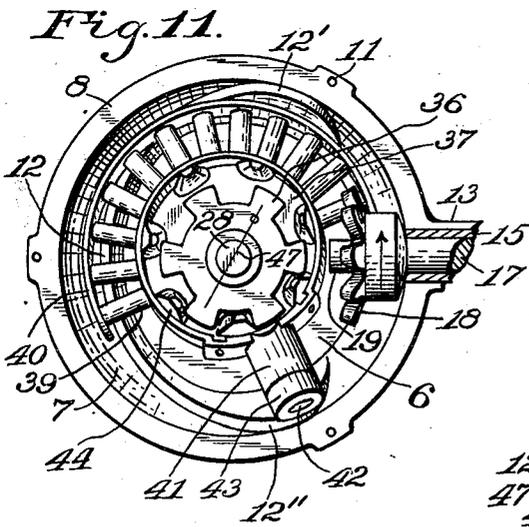
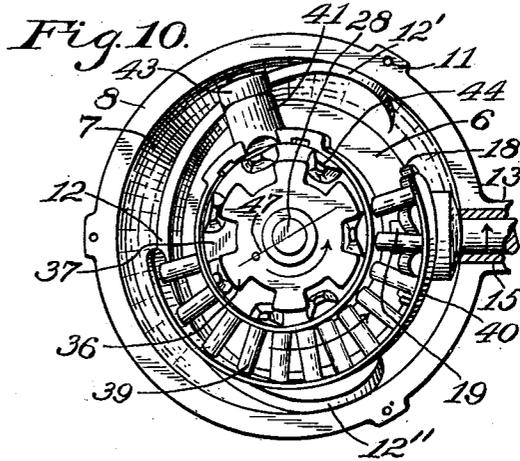
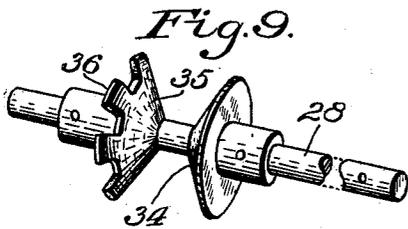
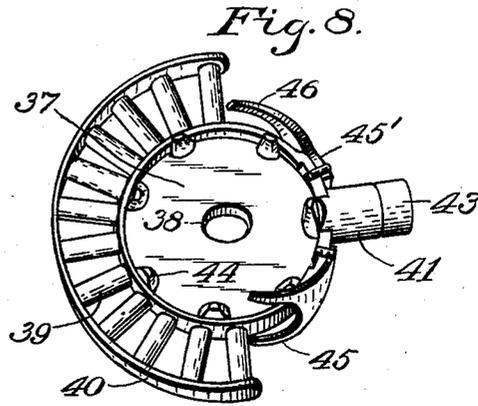
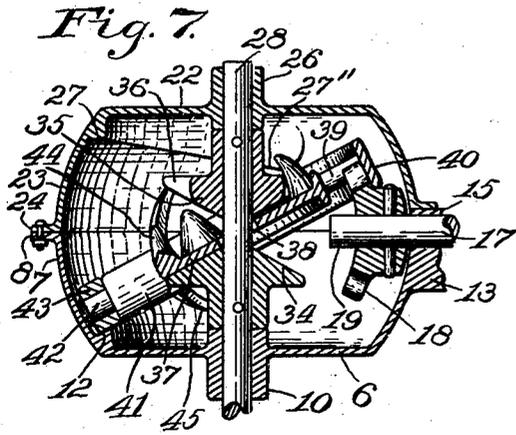
INVENTOR:

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H. L. STALEY.
 OSCILLATORY ROTARY GEARING.
 APPLICATION FILED APR. 3, 1908.

903,613.

Patented Nov. 10, 1908.
 2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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OSCILLATORY ROTARY GEARING.

No. 903,613.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed April 3, 1908. Serial No. 425,009.

To all whom it may concern:

Be it known that I, HARRISON L. STALEY, a citizen of the United States, residing at Martinsville, in the county of Morgan and State of Indiana, have invented certain new and useful Improvements in Oscillatory Rotary Gearing; and I do declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to gearing for producing oscillatory-rotary motion or that motion in which a rotatively mounted shaft moves forward and backward intermittently and also advances step by step with each oscillation, so as to also make complete revolutions, the invention having reference particularly to gearing whereby the oscillatory-rotary motion is automatically converted from a rotary shaft.

Objects of the invention are to provide gearing whereby rotary motion may be converted into oscillatory-rotary motion for various purposes, such as for mixing substances in vessels, another object being to provide an improved gearing for washing machines that may be operated by means of a rotative shaft and whereby articles may be moved back and forth in a tub and also shifted progressively, in order to thoroughly expose all parts of the articles to the action of the washing solution and also to the rubbing devices.

The invention consists in oscillatory-rotary gearing comprising a rotative driving shaft, a rotative driven shaft, and gearing connecting the driving shaft with the driven shaft whereby to transmit oscillating movements and also ultimate rotary movement to the driven shaft. And the invention comprises certain novel parts and combinations and arrangements of parts as hereinafter particularly described and defined in the appended claims.

Referring to the drawings, Figure 1 is a fragmentary vertical central sectional view of a wash tub to which the invention is applied and shown in elevation; Fig. 2, a top plan of the main portion of the housing of the gearing; Fig. 3, an inverted plan view of the removable portion of the housing; Fig. 4, a top plan of the gearing as seen with the removable part of the housing removed; Fig. 5, a vertical central sectional view of the housing and side elevation of the gearing

therein; Fig. 6, a perspective view of one of the reverse motion guides of the gearing detached therefrom; Fig. 7, a vertical central sectional view of the gearing and housing; Fig. 8, a perspective view of a rolling gear-segment forming a part of the gearing; Fig. 9, a perspective view of the driven shaft and guides for the rolling gear-segment; Fig. 10, a top plan of the gearing shown in one of its positions; Fig. 11, a top plan of the gearing in another position; and Fig. 12, a top plan of the gearing in still another position, Figs. 10, 11 and 12 having the gearing shown without the reversing guides, being intended merely to illustrate the manner in which the rotary or advance movements of the driven shaft are obtained in addition to the forward and backward rotative movements of the driven shaft.

Similar reference characters throughout the different figures of the drawings designate corresponding elements or features of construction.

In the drawings, the invention is represented as constructed for one of the many purposes to which it may be adapted, the numeral 1 designating a wash tub; 2, a stationary part of the cover of the tub; 3, a movable part of the cover that is connected to the stationary part by hinges 4 and having an aperture 5 therein arranged centrally of the cover, the cover being adapted to support the machinery of the apparatus that is designed for cleansing various fabric articles in liquid washing solution. The invention and the various parts thereof will therefore be described as forming features of a washing machine and the driving shaft arranged horizontally, with the driven shaft in vertical position, and the other parts conforming in arrangement to the relative positions of the shafts, but it should be understood that the improved gearing may operate in various positions, as may be required for various purposes, and of course the housing may be variously designed to suit requirements.

In the construction as illustrated, the main part of the housing is bowl-shaped, having a flat bottom 6 and a side wall shaped like a portion of the hemisphere, the wall having a flanged top 8 and the bottom having bolt holes 9 to receive bolts for securing it to the cover part 3 of the tub on which the bottom is secured, the center of the bottom being provided with a journal box 10, and

the top 8 having bolt holes 11 therein. A guide rail is formed with its face uppermost on the inner side of the wall 7 and extending along the greater portion of the wall, the middle part 12 of the rail being lowermost, and the end portions of the rail 12' and 12'' being higher so that the higher portions are farther than the middle portion of the guide rail from the axis of the journal box 10, the rail therefore having an elliptical contour in plan. The main or base part of the housing has an integral arm 13 provided at its end with a foot 14 that is suitably secured to the top part 3 of the tub, and the arm 13 is provided with journal boxes 15 and 16 in which is mounted a driving shaft 17 to which is secured a dished long-toothed pinion 18 at the inner side of the housing part, the shaft extending through the pinion so as to form a guide pin 19 at the inner side of the pinion. A balance wheel 20 is attached to the driving shaft and is provided with a handle 21 for rotating the shaft. The removable or cap part of the housing is shaped like the base part above described, but is inverted with respect thereto and has a top 22 and side wall 23 that has a flanged bottom 24 in which are bolt holes 11' to receive securing bolts 25 for holding the two parts of the housing together, the middle part of the top 22 being provided with a journal box 26. A guide rail is formed on the inner side of the wall 23 and has a relatively high middle portion 27 and lower end portions 27' and 27'', this guide rail being somewhat shorter but arranged opposite to the guide rail in the base part of the housing, and a suitable distance therefrom, with the middle portions of the rails farther apart than the end portions thereof. A rotative shaft 28, herein referred to as the driven shaft, is mounted in the journal boxes 10 and 26 and extends into the tub 1, the shaft having a relatively long hub 29 secured thereto that is provided with ribs 30 and a collar or flange 31 at the lower end of the hub, there being a rubbing plate 32 mounted on the hub so as to move vertically thereon, and having suitable slots to receive the ribs 30 whereby to rotate the rubbing plate, the rubbing plate being provided with a suitable number of projections 33 to turn the articles that are to be washed in the tub. A conical guide 34 is attached to the shaft 28 upon the journal box 10, and a combined conical guide and gear wheel 35 is attached also to the shaft 28 above the guide 34 and has peripheral notches, so that relatively thick gear teeth 36 are provided for actuating the driven shaft. The body of the combined cone guide and gear wheel engages the lower end of the journal box 26 so that longitudinal movement of the shaft is prevented, the guide 34 engaging the other journal box 10 and supporting the shaft.

The rolling gear-segment comprises a circular plate 37 having a central guide opening 38 therein that is slightly greater in diameter than the shaft 28 which extends through the opening. A suitable number of pin teeth 39 extend radially from the periphery of the plate 37, and the outer ends of the teeth have a guide rail 40 connected thereto. The plate is arranged between the conical guides 34 and 35 and may roll thereon while the teeth 39 are in engagement with the pinion 18. An arm 41 extends from the plate 37, at the opposite side thereof from the pin teeth and has an axle 42 on which is mounted a guide roller 43 that is adapted to roll on the guide rails of the housing to guide the gear-segment and assist in maintaining the connection between the teeth of the gear-segment and the driving pinion during reversing movements especially. A suitable number of gear teeth 44 project upwardly from the plate 37 and are tapering and arranged in a circle of greater diameter than the pitch line of the teeth 36. It should be observed that there are six teeth 36 and seven teeth 44, such a disparity being necessary to attain the desired end in the present case. A pair of crescent shaped reversing guides 45 and 46 are suitably secured to the plate 37 opposite the terminal pin teeth 39 of the group, each guide being supported by a shank 45'. The guides are adapted to engage the guide pin 19 when the gear-segment is being reversed in motion. In Figs. 4, 10, 11 and 12 a pointer 47 is shown merely for indicating the different relative positions of the driven shaft and the gear teeth 36 but has no place in the practical machine.

It will be seen from the foregoing that the housing serves not only to support various parts of the mechanism but affords a neat inclosure therefor, but it should be understood that the housing need not be formed as a closed housing, and the guide rails therein may be otherwise supported than as parts of the housing.

In practical use, the driving shaft 17 may be rotated continuously in either direction without detracting from the efficiency of the gearing; the results of operation being the same in either case. When articles are placed in the tub in water with suitable washing compound, the rubbing plate 32 will rest on the articles, being adjustable vertically to suit the bulk of the articles to be washed, and the projections 33 will cause the articles to be moved when the rubbing plate moves.

In operation, the shaft 17 may be turned in the direction indicated by the arrows thereon. By reference to Fig. 10, it will be seen that the gear-segment is above the pinion 18 and will move in the direction of the arrow on the teeth 39 but not in horizontal

plane, because the roller 43 is descending the guide rail in the base part of the housing from the higher portion 12' to the lower portion 12, the guide 40 engaging the hub of the pinion 18, and the plate 37 engaging the conical guides 34 and 35 at opposite sides of the shaft 28, so that the gear-segment will not move in an inclined plane. It will be observed that one of the gear teeth 44 that is on the higher portion of the plate 37 is between two of the teeth 36, while the teeth 44 on the lower side of the plate are disengaged from the teeth 36, being in a lower plane. Now if the shaft 17 be further rotated so as to cause the gear-segment to rotate approximately one-half of a revolution to the position shown in Fig. 11, the shaft 28 will have rotated somewhat more than one-half of a revolution, as may be seen by comparing the positions of the pointer 47 in the two figures.

As represented in Fig. 11, the roller 43 has risen to the higher portion 12'' of the guide rail, and the motion of the segment is assumed to have been stopped by reason of the guide 46 being in engagement with the guide pin 19. If the movement of the shaft 17 be continued, the pin teeth of the gear-segment will be drawn under the pinion 18, thus causing the segment to roll and the rotative motion be reversed, the roller 43 now rising so as to engage the curved guide rail in the upper portion of the housing, the position of the gear-segment being indicated in Fig. 12 in its reverse movement. The roller 43 will follow the guide rail to the opposite end thereof while the guide rail 40 will engage the hub of the pinion 18, and further rotation of the shaft 17 will bring the guide 45 into engagement with the guide pin 19 to again reverse the motion of the gear-segment. When the gear-segment teeth 39 travel over the pinion 18 (in either direction) the teeth 36 that are farthest from the pinion 18 at the opposite side of the shaft 28 move faster than the adjacent teeth 44, so that there is an advance of the shaft 28 equal to the space of one tooth, the amount of movement being greater than when the parts are moving in the reverse direction with the teeth 39 under the pinion 18, as will be clearly seen by comparing the positions of various teeth with the positions of the pointer 47 in Figs. 10, 11 and 12, so that with each alternate movement of the shaft 28, it advances a fraction of a revolution until a complete and of course succeeding revolutions are made, thus positively shifting the articles in the tub over and over and completely changing their positions while at the same time moving them back and forth, resulting in the highest degree of efficiency in operation. It may be further explained that while the gear-segment is rolling so as to bring the pin teeth 39 from underneath to

the top of the pinion 18, the step-forward or gain of the shaft 28 occurs in a more marked degree because that while the plate 37 does not at this moment rotate so as to carry the teeth 44 around the shaft, the plate tilts so that one tooth 44 swings about the axis of the arm 41 and continues to move the shaft 28 by reason of having engagement with one of the teeth 36, but this advance movement does not occur when the segment teeth are passing from above down under the pinion 18, so that therefore the oscillating movement of the gear-segment is greater in one direction than in the opposite direction.

Having thus described the invention, what is claimed as new is—

1. Oscillatory-rotary gearing including a rotative driving wheel, a rotative driven shaft, and means for converting continuous rotary motion of the driving wheel into intermittent rotary and oscillatory motions for the driven shaft.

2. Oscillatory-rotary gearing including a rotative driving shaft, a pinion secured on the driving shaft, a rotative driven shaft, and means connecting the driven shaft with the pinion for converting continuous rotary motion of the driving shaft into intermittent rotary and oscillatory motions for the driven shaft.

3. Oscillatory-rotary gearing including a rotative driving shaft, a pinion secured on the driving shaft, a rotative driven shaft, a pair of opposing conical guides mounted on the driven shaft, and a gear-segment on the driven shaft between the conical guides to roll thereon and having teeth in engagement with the pinion, for converting rotary motion into oscillatory-rotary motion.

4. Oscillatory-rotary gearing including a rotative driving gear wheel, a rotative driven shaft, a gear-segment mounted loosely on the shaft in engagement with the wheel, means for guiding the gear-segment in engagement with the wheel to oscillate the gear-segment by continuous rotation of the wheel, means connecting the gear-segment with the driven shaft to move the driven shaft forward and backward rotatively, and means for causing the driven shaft to move farther in one direction alternately than in the reverse direction.

5. Oscillatory-rotary gearing including a rotative driving gear wheel, a rotative driven shaft, a toothed-wheel secured to the driven shaft, a gear-segment mounted loosely on the driven shaft in engagement with the driving gear wheel and provided with gear teeth for engaging the toothed wheel, means for guiding the gear-segment in engagement with the driving gear wheel, and means for imparting rolling motion to the gear-segment to shift the gear teeth of the gear-segment into and out of engagement with the different teeth of the toothed wheel and maintain constant

connection between the gear-segment and the toothed wheel.

6. Oscillatory-rotary gearing including a rotative driving gear wheel, a rotative driven shaft, means for continuously rotating the driving gear wheel, a gear-segment mounted loosely on the driven shaft and having connection with the driving gear wheel alternately at opposite sides thereof for oscillating the gear-segment, guiding means for maintaining constant connection of the gear-segment with the driving gear wheel, means connecting the driven shaft with the gear-segment to move the driven shaft forward and backward rotatively, and means for moving the driven shaft rotatively farther in one direction than in the reverse direction during continuous rotation of the driving gear wheel.

7. Oscillatory-rotary gearing including a rotative driving gear wheel, a rotative driven shaft, two conical guides secured to the driven shaft, one of the guides having gear teeth thereon, a gear-segment mounted loosely on the driven shaft to roll on the conical guides and provided with gear teeth to engage the gear teeth of the conical guide, the gear-segment having also gear teeth thereon that are in coöperation with the driving gear wheel, guiding means holding the gear-segment in rolling contact with the conical guides, and means for continuously rotating the driving gear wheel.

8. Oscillatory-rotary gearing including a housing, a driving gear wheel having a guide pin and mounted in the housing, a driven shaft mounted in the housing, two conical guides and a toothed wheel mounted fixedly on the driven shaft, said housing having two oppositely-disposed curved guide rails supported thereby and extending partially about the driven shaft, one rail being longer than

the other rail, the middle portions of the rails being farther apart than the end portions thereof, a gear-segment comprising a plate mounted loosely on the driven shaft to roll in contact with the conical guides and having gear teeth thereon to engage the driving gear wheel and also gear teeth to engage the toothed wheel, an arm on the plate to engage either one of the guide rails, and curved reversing guides on the plate to engage the guide pin.

9. The combination, with a stationary support, of a housing mounted on the support, a driving shaft mounted in the housing to rotate continuously, a driven shaft mounted in the housing and extending through the support, a pinion secured to the driving shaft, and means in the housing coöperating with the pinion and the driven shaft for receiving motion from the rotating pinion and converting the rotary motion into oscillatory-rotary motion to move the driven shaft rotatively forward and backward alternately and farther in one direction than in the reverse direction.

10. In a washing machine, the combination of a stationary support, a housing secured to the support, a driving shaft mounted in the housing, a pinion secured to the driving shaft, a driven shaft mounted in the housing and extending through the support, and means in the housing connecting the driven shaft with the pinion to rotate and also oscillate the driven shaft intermittently.

In testimony whereof, I affix my signature in presence of two witnesses.

HARRISON L. STALEY.

Witnesses:

JOSEPHINE POWELL STALEY,
J. E. WINTER.