

June 26, 1934.

A. J. PATCH

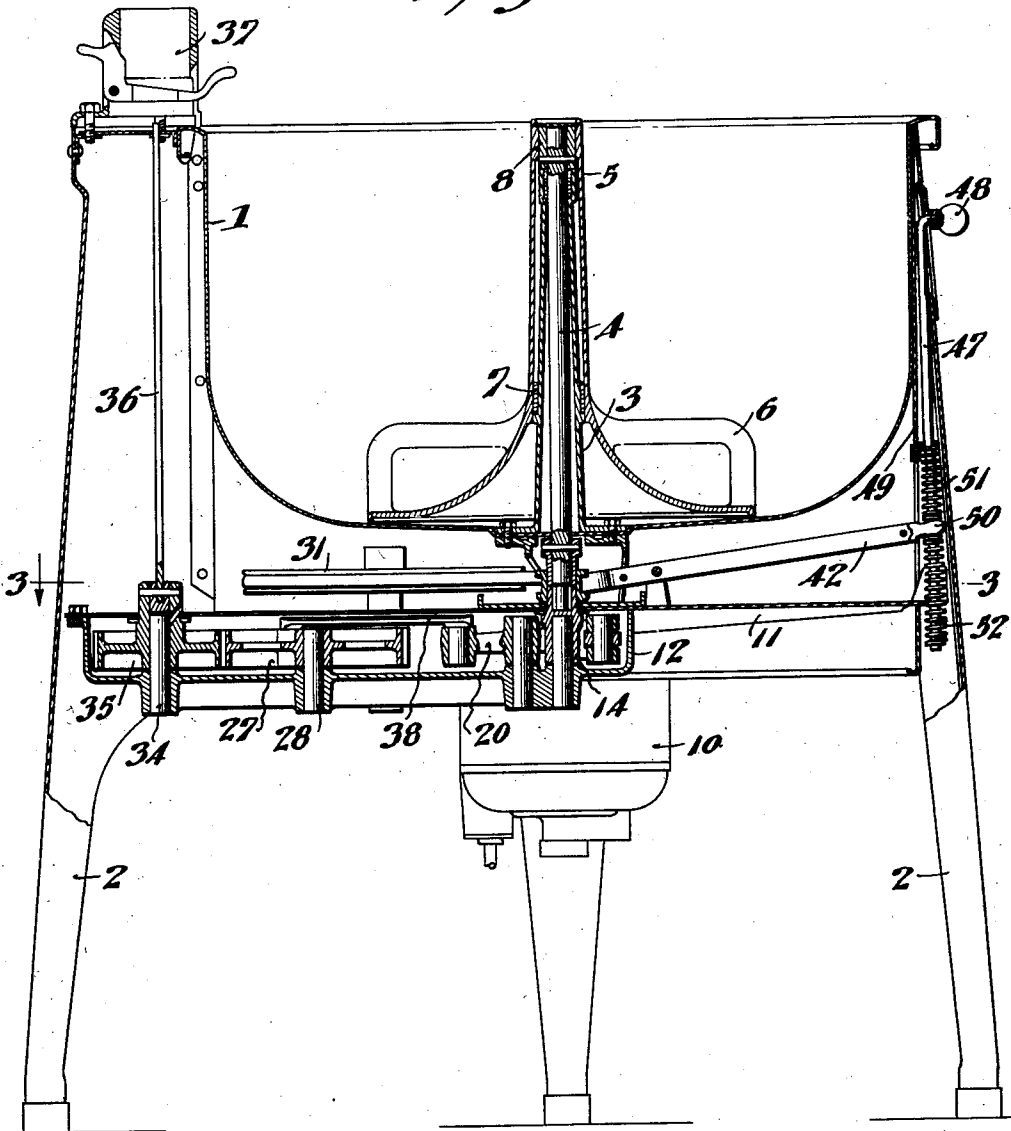
1,964,440

OSCILLATING MECHANICAL MOVEMENT FOR WASHING MACHINES AND THE LIKE

Filed Oct. 27, 1931

5 Sheets-Sheet 1

Fig. 1.



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June 26, 1934.

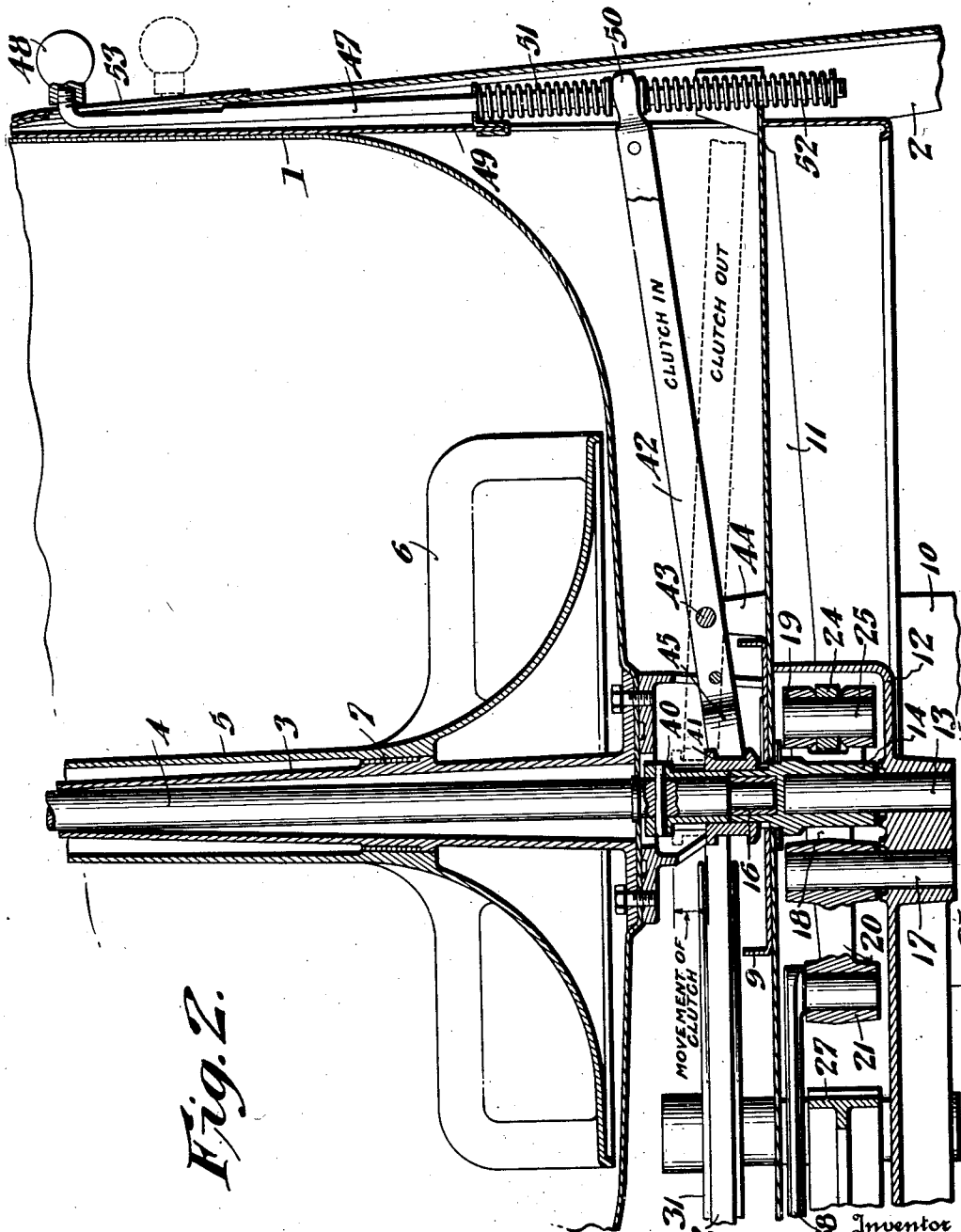
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Fig. 3.

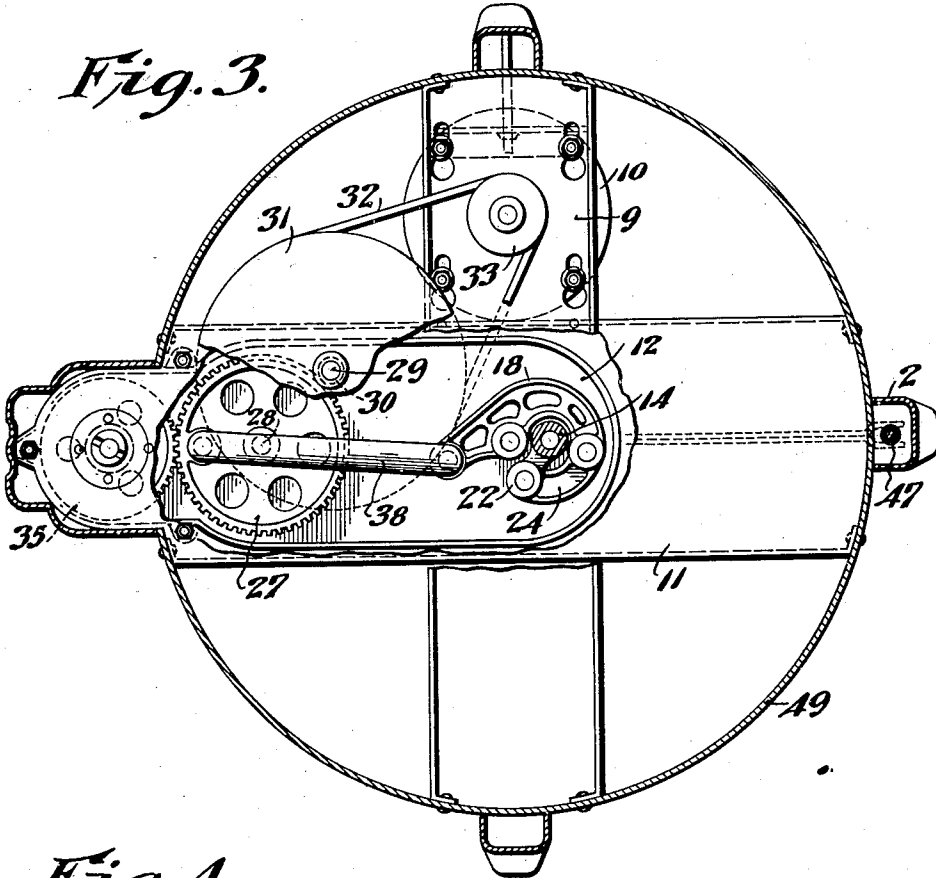
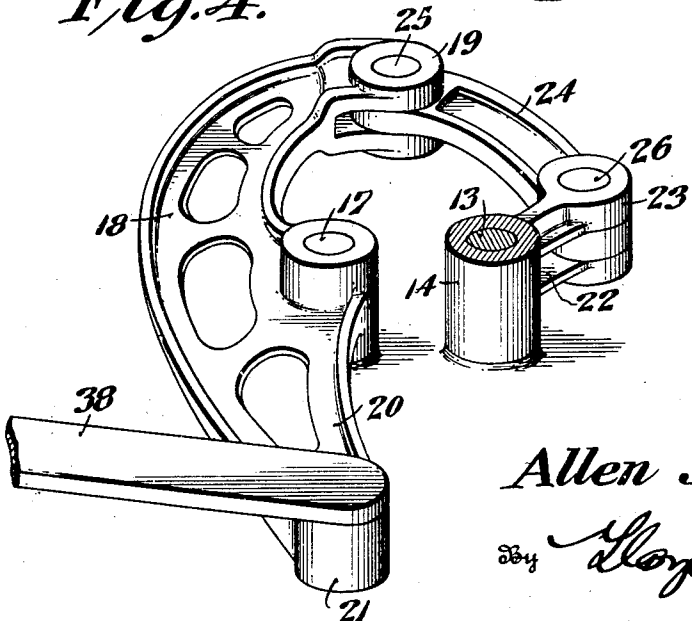


Fig. 4.



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Fig. 5.

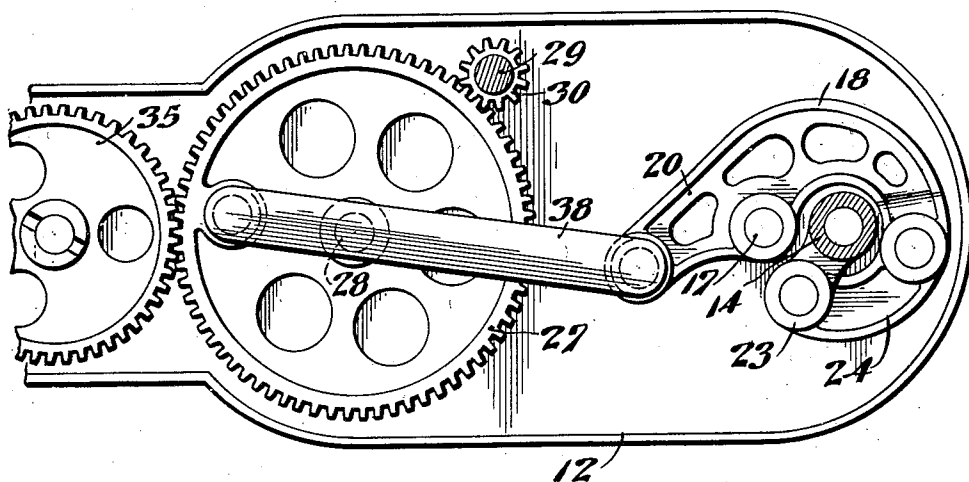


Fig. 6.

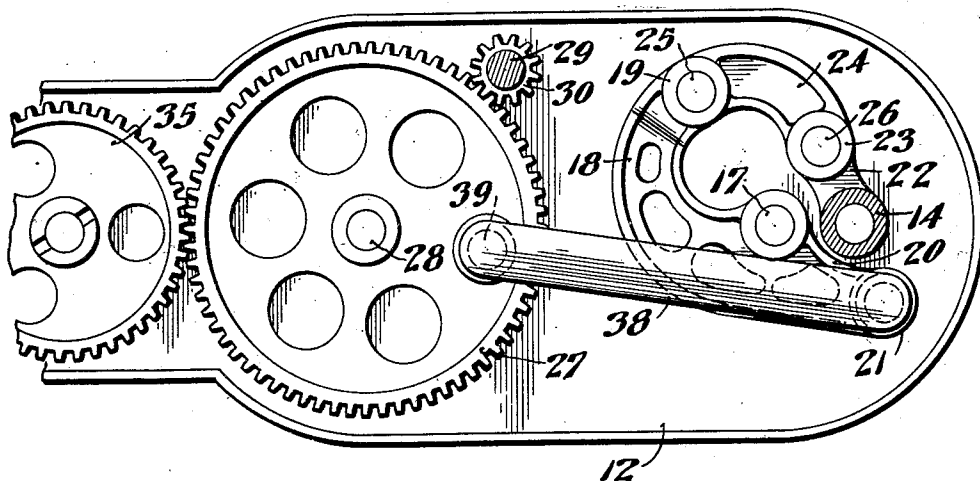
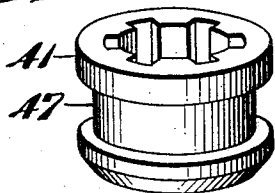


Fig. 11.



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Fig. 7.

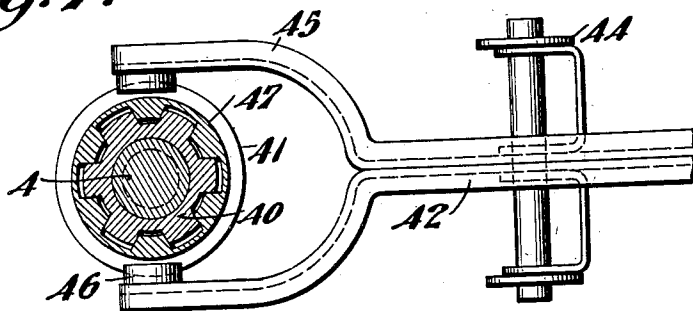


Fig. 8.

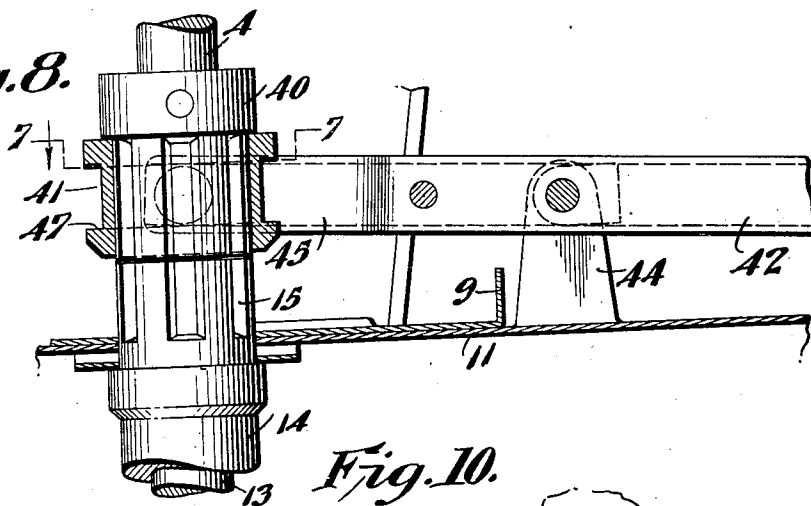
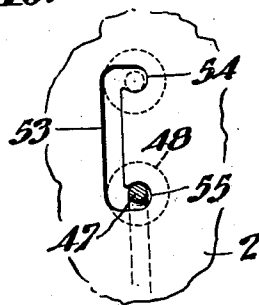
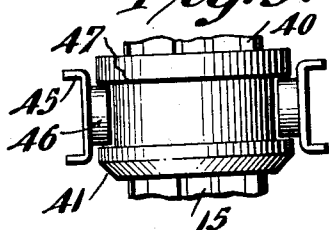


Fig. 10.

Fig. 9.



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UNITED STATES PATENT OFFICE

1,964,440

OSCILLATING MECHANICAL MOVEMENT
FOR WASHING MACHINES AND THE LIKE

Allen J. Patch, Ripon, Wis.

Application October 27, 1931, Serial No. 571,415

7 Claims. (Cl. 259—101)

My present invention pertains to mechanical movements for washing machines and the like, and relates particularly to a mechanism and structure adapted to convert continuous driving motion into an oscillatory driven movement.

The primary object of this invention is to provide a mechanism of the above character by which motion is transmitted from a continuously rotating member and is converted into oscillatory movement at a driven member, to thus oscillate a working part of a washing machine or other like mechanism, together with control means for the oscillated part.

Another object is to provide a mechanism of this sort which does not require the use of internal gear segments, gears and racks, shafts having special cranks formed thereon, or other complicated and expensive mechanical parts, but which is made up of parts simply and cheaply manufactured and assembled and adapted to be applied to and used with straight shafts to accomplish smooth, quiet and efficient operation to impart an oscillatory movement to an agitator or other driven member from a motor or other continuously rotating driving member.

Still another object is to provide means by which the oscillatory movement of the agitator or other working part is controlled. A further object is to so construct and mount the parts that long bearings are provided for all of the working elements, which bearings are set substantially in line in the direction of application of actuating force, thus minimizing the possibility of strain or breakage of the parts through overloading and substantially eliminating uneven or excessive wear of the parts through use.

Yet another object is to so construct, arrange and mount the parts of my improved mechanism that all operated portions and bearings can be readily and efficiently housed within a casing to thus be packed in grease or operated in oil, further contributing to the long life and smooth and quiet operation of the mechanism.

With the above and other objects in view, which will be apparent to those skilled in the art, my present invention includes certain novel features of construction and combinations and arrangements of parts which will be hereinafter set forth in connection with the drawings and then pointed out in the claims.

In the drawings:

Figure 1 is a vertical sectional view through a clothes washing machine having my present invention embodied therein.

Fig. 2 is an enlarged fragmentary sectional view

of portions illustrated in Fig. 1 to better show the construction and operation of the parts.

Fig. 3 is a horizontal sectional view substantially on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged perspective view of the operating lever and linkage connection.

Fig. 5 is an enlarged fragmentary sectional view to better show the construction and mounting of the gearing, lever and linkage arrangements in one extreme position of operation.

Fig. 6 is a view similar to Fig. 5 illustrating the other extreme position of movement.

Fig. 7 is an enlarged fragmentary sectional view taken horizontally through the oscillating shaft to better illustrate the clutch mechanism.

Fig. 9 is a fragmentary view in elevation to better show the clutch operating means.

Fig. 10 is a fragmentary view in elevation of the clutch setting means.

Fig. 11 is a view in perspective showing the clutch collar.

With power operated washing machines having an agitator operating with an oscillatory movement, and in other machines of this character, the rotary movement of the motor or other power unit is customarily translated or transmitted into oscillatory movement by means of gears and racks. Such means of imparting an oscillatory movement has been found objectionable for the reason that the operation of the gears and racks causes considerable noise. In some instances attempts have been made to overcome this objection by replacing the rack elements with internal gear segments, and this has been found helpful in that the noise is materially reduced; but, inclusion of the internal gear segment materially increases the cost of manufacture. Internal gear segments can be successfully manufactured only by the use of expensive tools requiring frequent replacement, and the inclusion of even a single internal gear segment adds materially to the cost of the power mechanism and the completed machine.

Attempts have been made to accomplish oscillatory movement by the use of cranks and links; this can be done satisfactorily only if a special shaft be employed, as it has been found that in washing machines and like mechanisms a proper circulation and water action in the washing machine tub is accomplished only when the agitator has an oscillatory movement greater than 180 degrees and say from 180 degrees to 220 degrees.

If the degree of oscillation of the agitator is

less a proper circulation and agitation of the water in the machine will not be obtained and consequently an incomplete cleansing action results or, the machine must be operated for an excessively long period. With the above objections in mind, it is a purpose of this invention to provide a mechanical movement for washing machines and the like that will permit use of a straight agitator shaft, will give the desired oscillatory movement through cycles greater than 180 degrees, will be extremely smooth and quiet in operation, will be inexpensive to manufacture and assemble, and will be durable and efficient in use.

Where such mechanism is used in a washing machine, or like mechanism, it is desirable that means be provided for efficiently and positively controlling the operation of the oscillated agitator or other element, while not interfering with the continuous operation of the motor or other driving element and the gearing connections to a wringer or like mechanism.

In the present instance I have illustrated my improved mechanical movement embodied with the structure of a washing machine, and in this instance the tub 1, which is substantially circular in plan, is supported by a plurality of legs 2. A bearing sleeve 3 is mounted to rise substantially centrally within the tub 1 and agitator shaft 4 is mounted in suitable bearings 5 at its upper end for oscillatory movement, the upper end of the shaft being extended above the sleeve 3. An agitator 6 is mounted on suitable bearings 7 on the sleeve, to be capable of oscillatory movement and is provided with a sleeve 8 embracing the upper extending end of shaft 4 and secured thereto so that as the shaft 4 is oscillated, the agitator will be carried therewith to have a similar oscillatory movement.

A cross supporting member 9 carries an electric motor 10, or other suitable power unit, and a second cross member 11 has the gear housing 12 supported thereon. This gear housing 12 has a plurality of openings thereon to receive stub shafts, as will be hereinafter more fully set forth and the case is adapted to be bolted upon or otherwise secured to the cross member 11 in such a manner that all joints, connections and openings will be sufficiently tight to retain grease or oil, thus making it possible to operate all parts within this casing or housing while thoroughly packed or bathed in grease, oil, or other lubricant.

A stub shaft 13 is mounted in one of the openings in the gear housing 12 to be disposed substantially axially in line with the agitator shaft 4, and an oscillatable driven member 14 is given bearing mounting on the stub shaft 13. This oscillatable member has a toothed sleeve 15 carried at the upper end thereof and provided with a bearing 16 in which the reduced lower end of agitator shaft 4 is mounted after the manner of a step bearing. With this arrangement the oscillatable driven member 14 is disposed in the axial alinement with respect to agitator shaft 4 and the two members are normally capable of independent movement.

A stub shaft 17 mounted in the gear housing 12 adjacent shaft 13 has an arcuate rocking link 18 mounted thereon, this link being provided at one end with a bifurcated bearing 19 and having a rocking arm 20 extending at its other end on the opposite side of the stub shaft 17. The rocking arm 20 is provided with bearing 21. A bifurcated arm 22 extends radially from oscillatable driven member 14 and is provided at its end with bearing 23. A curved link 24 is connected for pivotal movement at its ends in the bearing portions 19 and 23 by pins 25 and 26. With the linkage arrangement constructed and mounted in the manner set forth, all of the bearings are substantially in the same horizontal plane and are of substantially equal length, thus giving a very rigid structure which will have long life in use.

A drive gear 27 is mounted on stub shaft 28 somewhat separated within the gear housing 12 from stub shaft 17 and a drive shaft 29 revolvably mounted in the gear housing has a pinion 30 thereon in mesh with gear 27. This drive shaft has secured thereon a belt pulley 31 which is driven by belt 32 running over the pulley 33 on the shaft or motor 10.

Stub shaft 34 has wringer drive gear 35 mounted thereon in mesh with drive gear 27, and an extension shaft 36 is connected with wringer drive gear 35 and has its other end disposed to drive a wringer mounted in support 37, in the usual manner.

A pitman rod 38 is connected at one end eccentrically, as at 39, with the drive gear 27 and at its other end has a pin extending into the opening of bearing 21 on rocking arm 20.

With the parts constructed, mounted and connected in the manner set forth, as the motor 10 is placed in operation, drive pinion 30 will be revolved to impart continuous rotation to drive gear 27 to turn the same in one direction.

The pitman rod 38, through its eccentric mounting on gear 27 will cause rocking arm 20 to be oscillated about stub shaft 17 which will impart a similar rocking or oscillatory movement to arcuate link 18. The rocking end of this link 18, connected by curve link 24 with the outer end of arm 22 will cause the oscillatable member 14 to be rocked around stub shaft 13 and the parts will be continuously swung backward and forward between the two extremes of position as best illustrated in Figs. 5 and 6. Through the fact that agitator shaft 4 is loosely mounted in the bearing of toothed sleeve 15 this oscillatory movement of the oscillatable member 14 will not in any way affect agitator shaft 4. As control means is ordinarily embodied directly with the wringer structure, the shaft 36 can be continuously rotated without actually operating the wringer structure.

To impart movement from oscillatable driven member 14 to agitator 6 it is necessary that means be provided to connect shaft 4 with oscillatable member 14, and to this end a clutch hub 40 is secured on the lower portion of the shaft 4 to be slightly separated from but closely adjacent to the toothed sleeve 15 of the oscillatable member 14. The sleeve 15 and clutch hub 40 have the toothed or detent portions thereof made by forming grooves or splines longitudinally on adjacent portions and a clutch sleeve 41, perhaps best shown in Fig. 11 is provided with a central opening so formed that it is received over and is freely slidable endwise upon the toothed portions 15 and 40. The toothed portion of the clutch hub 40 is of sufficient length to entirely accommodate the clutch sleeve when the same is raised as illustrated in Fig. 8 and indicated by dotted lines in Fig. 2, and in consequence the agitator shaft 4 is not then connected with the oscillatable member 14, and it may be said that the clutch is out. When the clutch sleeve 41 is lowered or slid down to the position illustrated in Figs. 1 and 2, the

clutch hub 40 is positively locked to the toothed sleeve 15 and motion is then directly transmitted from the oscillatable member 14 to the agitator shaft 4.

5 To control the clutch it is desirable that some means be provided to be readily accessible to the operator and with this in mind a clutch shift lever 42 is pivoted at 43 in suitable bearings 44 on the cross bar or member 11 so that the forked
10 end 45 thereof embraces the clutch sleeve 41, bearing lugs 46 being provided to fit within the groove 47 of the clutch sleeve. This clutch shifting lever 42 can be moved to the two extreme positions illustrated by the full and dotted lines illus-
15 trated in Fig. 2 and will throw the clutch in or will throw the clutch out, as desired.

To permit manual operation and setting of the clutch I provide a clutch shifting rod 47 slidably mounted in one of the legs 2 and a clutch shifting
20 handle 48 on this rod 47 is disposed to be readily accessible from the outside of the encasing structure 49 which is ordinarily used to enclose the tub or container 1. A fork 50 on clutch shifting lever 42 is received around clutch shift-
25 ing rod 47 and springs 51 and 52 are provided on opposite sides to stabilize the clutch shifting lever as rod 47 is adjusted. To hold adjustments of the clutch shifting rod 47, an arrangement as illustrated in Fig. 10 may be used, and as here
30 shown the handle 48 extends through a slot 53 and the rod may be engaged in notches 54 and 55 at its two extremes of movement. Any other approved structure might be employed to operate the clutch shifting lever and retain adjust-
35 ments of the same.

In the use of my improved mechanism the motor 10 will constantly drive shaft 29 and consequently drive gear 27 will be continuously rotated, a direct connection being accomplished to wring-
40 er shaft 36 through gear 35. As the drive gear 27 is rotated, pitman rod 38 will be constantly actuated through its eccentric mounting between the two extremes of movement as illustrated in Figs. 5 and 6, and arcuated rocking lever 18 will
45 be correspondingly rocked. This will cause the two links to be alternately wound and unwound around the stub shaft 13 as a center, in consequence of which the bifurcated arm 22 will be swung to oscillate driven member 14 through
50 greater than 180 degrees of movement, the actual movement thus attainable with efficiency being substantially an oscillatory movement of 220 degrees or better. As the links 18 and 24 alternately wind and unwind around the stub shaft 13
55 there will be no interference of any part with another part and in consequence a smooth, even, oscillatory movement will be imparted to member 14 continuously during operation of the rotating gear or member 27. Through manipulation of
60 the clutch sleeve 41, the agitator shaft 4 can be readily connected and disconnected at the will of the operator.

With this construction and arrangement of the parts, the mechanism is extremely simple and
65 inexpensive to manufacture and assemble, there being no special crank shafts, racks, or gears associated with the agitator shaft, and as all of the parts can be cast and finished according to ordinary manufacturing processes, a much simpler
70 and cheaper structure is obtained than where racks, gears, segments and the like are required. Further, as cylindrical bearings and corresponding openings can be finished and fitted with extreme accuracy, a very smooth running and quiet
75 operation mechanism is provided.

From the foregoing it will be seen that I have provided a mechanism which is capable of transmitting movement from a rotating driving member to an oscillating driven member having a
80 range of oscillation of more than 180 degrees and that this movement is accomplished with extreme smoothness and quietness of operation by a structure very simply and cheaply constructed and assembled, and yet extremely rugged and durable
85 in use.

While I have herein shown and described only certain specific embodiments of my invention and have suggested only certain possible modifications, it will be appreciated that many other changes and variations can be made in the form,
90 construction, arrangement and assembly of the parts without departing from the spirit and scope of my invention.

I claim:

1. In a washing machine, a tub having side and
95 bottom walls, a driven shaft extending through said bottom into the tub and oscillatable therein, an agitator on said shaft within the tub to oscillate therewith, a case mounted beneath the tub, a drive shaft extending into said case, a pitman
100 rod operatively associated with said drive shaft, an arcuate link pivotally mounted in said case adjacent to said driven shaft for rocking movement around said pivotal mounting, an arm extending from said driven shaft, a connection from
105 said pitman rod to the first mentioned arcuate link, and a second arcuate link pivotally connected with said rockable link and with the outer end of said arm, said parts being so constructed and associated that as the driving shaft is rotated os-
110 cillatory movement is imparted to the driven shaft with the two arcuate links alternately wrapping around and unwrapping from without crossing the axis of said driven shaft.

2. In a washing machine, a tub having side and
115 bottom walls, a driven shaft extending through said bottom into the tub and oscillatable therein, an agitator on said shaft within the tub to oscillate therewith, a case mounted beneath the tub, a drive shaft extending into said case, a pit-
120 man rod operatively associated with said drive shaft, an arcuate link pivotally mounted in said case adjacent to said driven shaft for rocking movement around said pivotal mounting, an arm associated with and extending from said driven
125 shaft, a connection from said pitman rod to the first mentioned arcuate link, a second arcuate link pivotally connected with said rockable link and with the outer end of said arm, said parts being so constructed and associated that as the driving
130 shaft is rotated oscillatory movement is imparted to the driven shaft with the two arcuate links alternately wrapping around and unwrapping from without crossing the axis of said driven shaft, and
135 distinctly operable clutch means to connect and disconnect said arm with respect to said driven shaft.

3. In a washing machine, a tub having side and bottom walls, a driven shaft extending
140 through said bottom into the tub and oscillatable therein, an agitator on said shaft to oscillate therewith, a closed gear case mounted beneath said tub, a stub shaft mounted in said case in line with said oscillatable shaft, an oscillatable member on said shaft, an arm extending radially from
145 said oscillatable member, an arcuate link swingably mounted in its middle portion adjacent to said stub shaft with the end of the link on one side extending as an actuating arm and the end of the link on the other side of the swinging
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mounting curved to substantially conform concentrically around the stub shaft as the link is swung to one position, a curved link, pivotally connected with the curved end of said oscillatable link and with the end of said radially extending arm to lie substantially concentrically around the axis of the stub shaft when the curved end of said oscillatable link is in similar relation, a drive shaft extending into said gear case, and a pitman rod connected with the actuating arm of said oscillatable link and receiving reciprocatory movement from said drive shaft to swing said oscillatable link.

4. In a washing machine, a tub having side and bottom walls, a driven shaft extending through said bottom into the tub and oscillatable therein, an agitator on said shaft to oscillate therewith, a closed gear case mounted beneath said tub, a stub shaft mounted in said case in line with said oscillatable shaft, an oscillatable member on said shaft, an arm extending radially from said oscillatable member, an arcuate link swingably mounted in its middle portion adjacent to said stub shaft with the end of the link on one side extending as an actuating arm and the end of the link on the other side of the swinging mounting curved to substantially conform concentrically around the stub shaft as the link is swung to one position, a curved link, pivotally connected with the curved end of said oscillatable link and with the end of said radially extending arm to lie substantially concentrically around the axis of the stub shaft when the curved end of said oscillatable link is in similar relation, a drive shaft extending into said gear case, a pitman rod connected with the actuating arm of said oscillatable link and receiving reciprocatory movement from said drive shaft to swing said oscillatable link, and clutch means releasably connecting said oscillatable driven shaft to be actuated by the oscillatable member within the gear case.

5. An oscillating mechanical movement comprising, with a housing, an oscillatable shaft extending through said housing, a bearing shaft in said housing spaced from the oscillatable shaft, a rocking lever oscillatably mounted on said bearing shaft in its middle portion and having bearings at its ends, one end of said rocking lever being curved to receive and clear the oscillatable shaft as the lever is rocked so that the bearing at the curved end thereof can pass around and beyond said oscillatable shaft, an arm extending laterally from said oscillatable shaft and provided with a bearing at its end, a curved link connected at one end pivotally with the end of said arm and at its other end pivotally with the bearing at the curved end of said rocking lever, and means connected with the other end of said rocking lever to rock said lever

with oscillatable movement in which the curved link and the curved end of the rocking lever are alternately wrapped around and unwrapped from the oscillatable shaft to oscillate the same without crossing the axis of said shaft.

6. An oscillating mechanical movement for washing machines and the like comprising, a housing, an oscillatable member extending through said housing and having an arm extending substantially radially therefrom provided at its end with a bearing, a bearing shaft mounted within the housing and spaced from said oscillatable member, a rocking lever provided with end and middle bearings and curved at one end having rocking mounting on said bearing member to dispose the curved end to fit around the oscillatable member as the rocking lever is actuated, a curved link connected at one end with the bearing at the curved end of the rocking lever and at its other end with the bearing end of the arm, said link and the curved end of the rocking lever being formed and mounted to wrap substantially concentrically around the oscillatable member and unwrap therefrom to move said oscillatable member through more than one-half of a revolution as the rocking lever is actuated, and actuating means connected with the free end of the rocking lever to operate said lever.

7. An oscillating mechanical movement for washing machines and the like comprising, a housing, a pair of stub shafts mounted in said housing in spaced relation, an oscillatable member mounted on one of said stub shafts and extending from the housing, a rocking lever provided with middle and end bearings mounted in its middle bearing on the second stub shaft and having one end curved to fit substantially concentrically around the oscillatable member with its bearing end carried beyond a center line between the two stub shafts as the rocking lever is oscillated, an arm extending laterally from the oscillatable member and provided with a bearing at its end, and a curved link connected at one end with the bearing of said arm and at its other end with the bearing at the curved end of said rocking lever to wrap in substantially concentric arrangement around the oscillatable member when the curved end of the rocking lever is moved toward said oscillatable member, and reciprocating means connected with the remaining end of said rocking lever to rock said lever with oscillatory movement to alternately wrap said curved link around and unwrap said link from the concentric disposition thereby rocking said oscillatable member through greater than one-half of a complete revolution without any of the parts crossing the center of oscillation.

ALLEN J. PATCH. 135

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