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WASHING MACHINE MECHANISM

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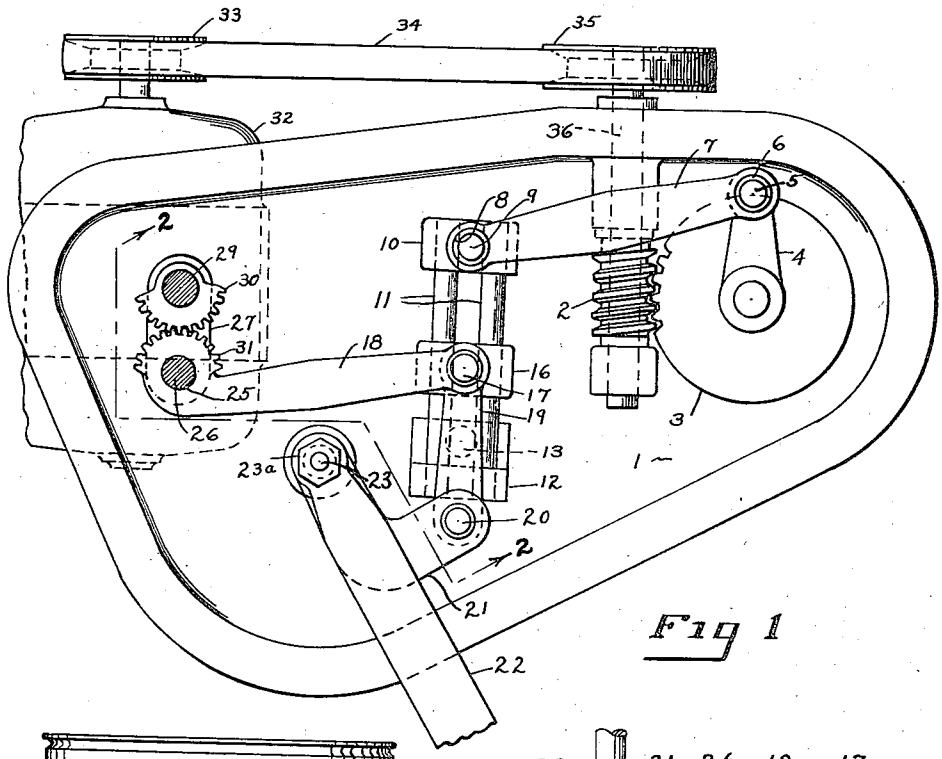

Fig 1

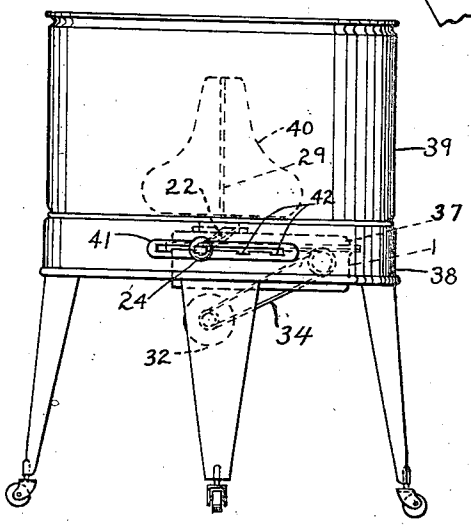

Fig 3

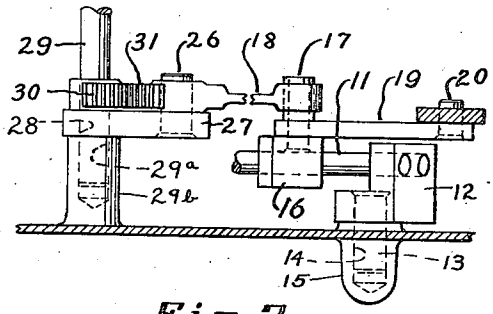

Fig 2

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WASHING MACHINE MECHANISM

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17 Claims. (Cl. 74—81)

This invention relates to washing machine mechanism and in particular to the gearing for washing machines of the type employing an agitator or washing device which oscillates about a vertical axis.

One of the objects of this invention is the provision of an improved form of mechanism for starting and stopping the operation of a washing machine agitator whereby at the same time the amplitude of the agitator oscillations can be selectively controlled.

Another object of this invention is the provision of an improved form of gearing for increasing the throw of a washing machine agitator shaft and agitator.

A further object of this invention is to provide a generally simplified form of washing machine mechanism of high efficiency, constructed of a relatively small number of parts which accomplish new and improved results as will hereinafter be pointed out.

With these and other objects in view, the invention consists in the novel construction, arrangement and combination of parts, hereinafter illustrated and described and some of its embodiments in the accompanying drawing, and particularly pointed out in the appended claims.

Stated in general terms this improved mechanism comprises the use of any suitable form of reduction gear to which suitable connections are provided for oscillating a fulcrum lever. The fulcrum lever carries a cross-head or any other suitable means whereby an element can be shifted along the fulcrum lever from a point coinciding with the center of oscillation of such lever to a point adjacent to its outer end. Any suitable means are provided for effecting the shifting of the cross-head along the fulcrum lever.

A suitable connecting rod or pitman is pivotally connected to the cross-head and this rod at its end remote from the fulcrum lever is provided with a gear arranged to mesh with a second gear fixedly carried by a vertical shaft. The gears are maintained in engagement with each other by any suitable means so that upon the reciprocation of the pitman the vertical shaft is oscillated with a stroke of considerably greater amplitude than would be possible if the pitman were connected by a crank to such shaft. The increased amplitude of the stroke of the agitator is effected by reason of the angular movement of the pitman which is transferred through the aforesaid gears to the shaft thereby increasing the angular movement of the vertical shaft through the utilization of the compound movement of the pitman.

Referring to the drawing, Figure 1 is a plan view of a washing machine gear mechanism illustrating one embodiment of this invention.

Figure 2 is a detail sectional view taken on line 2—2, Figure 1.

Figure 3 is a side elevational view showing a washing machine employing the mechanism shown in Figures 1 and 2.

The mechanism disclosed in the drawing illustrates one mode of carrying out this invention in which a suitable gear case 1 is provided for the housing of the operating elements of the device. The mechanism in the gear case comprises a worm 2 meshing with a worm gear 3 to which is fixedly secured a crank 4 for rotation with the worm gear. The outer end of the crank 4 is provided with a stub shaft 5 journaled in a bearing 6 formed in one end of a pitman 7. The other end of the pitman 7 is formed with a similar bearing 8 in which a second stub shaft 9 is rotatably received.

The stub shaft 9 is fixedly carried by a member 10 rigidly secured to the outer ends of a pair of rods 11. The other ends of the rods 11 are received in a block 12 to which is fixedly secured a pin 13 mounted for rotation in a bearing 14 formed in a boss 15 of the gear case 1. Thus upon the operation of the worm and its gear the crank 4 is rotated effecting the reciprocation of the pitman 7 and the oscillation of the fulcrum lever formed by the rods 11.

A cross-head or slide block 16 is slidably carried by the fulcrum lever rods 11. This member is provided with an upstanding pin 17 on which is journaled a connecting rod 18 and a link 19. The other end of the link 19 is pivotally connected by means of a pin 20 to a link 21 rigidly connected to a control lever 22 by means of a pin 23 journaled in a suitable bearing formed in the gear case 1. The lever 22 is detachably secured at one end to the pin 23 by a nut 23^a and at its opposite end it is provided with an operating knob or handle 24 whereby the lever may be shifted to various predetermined positions.

The connecting rod 18 is provided at its end remote from the fulcrum lever with a bearing portion 25 in which a pin 26 is journaled. The pin 26 is fixedly carried in one end of a link 27 and the other end of this link is apertured to provide a bearing 28 for the reception of a vertical agitator shaft 29 journaled in a bearing 29^a formed in the boss 29^b of the gear case. A gear 30 is fixedly secured to the agitator shaft 29 and meshing with this gear is a second gear 31 which is fixedly secured to the connecting rod 18 and

for convenience it may be integrally formed with such rod as shown.

The shape and size of gears 30 and 31 may be varied to suit conditions. In the preferred form of construction the gear 30 is coaxial with the agitator shaft 29 and fixed for rotation therewith, and the gear 31 is fixedly connected to the connecting rod 18 and has its axis coinciding with the axis of the pivotal connection 26 of the rod 18. From the foregoing it is apparent that upon the reciprocation of the connecting rod 18 the gear 31 will oscillate bodily about the axis of the gear 30 and at the same time it will be oscillated about its own axis due to the angular movement of the connecting rod 18. In this manner both components of the compound movement of the connecting rod are utilized in effecting the oscillation of the agitator shaft. It is also within the contemplation of this invention to secure the end of the rod 18 remote from the gear 31 directly to the shaft 5 and thus drive the agitator shaft directly from the worm gear without the use of the variable stroke mechanism shown.

The aforesaid mechanism can be conveniently driven by means of a motor 32 having a pulley 33 provided for the driving of a belt 34 which in turn serves to drive the worm 2 through a pulley 35 which is fixedly secured to the worm shaft 36.

Figure 3 illustrates one mode of mounting the mechanism in a washing machine wherein the gear case 1 is shown as provided with a cover 37, such case and the associated driving motor being supported by a frame member 38 upon which a washing tub 39 is carried. The gear case is provided with a proper amount of suitable oil or grease to insure the lubrication of the operating parts in the gear case. Within the washing machine tub any suitable form of agitator 40 is provided. This agitator is secured to the agitator shaft 29 and during the operation of the mechanism it swings back and forth through an arc of about 180° during the full stroke operation of the machine.

The frame member 38 is provided with a control plate 41 having a series of notches 42 providing stops for the control lever 22. Referring to Figure 3, when the control lever is in the notch shown to the extreme left of the drawing, the pins 17 and 13 are in axial alignment with each other and the movement of the fulcrum lever about the pin 13 does not effect any movement of the connecting rod 18 or the agitator 40. When the control lever is shifted to the first notch to the right, the agitator 40 is driven with a very short stroke and in a similar manner shifting the lever to the next notch increases the stroke and in the last notch the machine operates with its maximum stroke. If desired the number of notches may be increased or decreased to permit the selection and use of a greater or lesses number of stroke lengths.

From the foregoing it is apparent that the mechanism shown constitutes a simple and foolproof form of washing machine gearing of generally simplified form in which the conventional clutch is replaced with a simple form of variable stroke mechanism. This feature of the device eliminates all clutch troubles and serves to greatly quiet the operation of the machine.

The improved form of mechanism for increasing the throw of the agitator shaft constitutes a very efficient arrangement and it is generally much more economical in the use of power than mechanisms employing a rack or segment for this purpose. The variable stroke mechanism permits the use of a form of gearing whereby the agitator shaft pinion and its driving gear are maintained in constant mesh with each other thereby eliminating the possibility of changing the intermeshing relation of the teeth of such gears as occurs when the clutching operation is effected through the engagement and disengagement of the gears, and when these gears are once worn in they will operate in a noiseless manner over extended periods of time.

Furthermore by reason of the small amount of relative movement of such gears, it being noted that part of the movement of the agitator is effected by the bodily movement of the gear 31 about the gear 30, the wear on such gears is considerably less than it is in the conventional segment gear or rack bar form of drive gearing. These advantages permit the use of relatively inexpensive die-castings for the gears 30 and 31, thereby achieving a material saving in the cost of such gears and again further advantages result from the fact that the lubrication of this form and arrangement of gearing is more easily accomplished as it not necessary to flood the gears with oil in order to properly lubricate them and a small quantity of oil will serve for this purpose.

The washing machine illustrated in Figure 3 is shown merely for purposes of illustrating one mode of applying the invention. This form of gearing is applicable to wringer and wringerless types of washing machines and the details of such forms of machines are not herein illustrated as they are not essential to the disclosure of this invention.

Furthermore it is to be understood that the particular forms of apparatus shown and described, and the particular procedure set forth are presented for purposes of explanation and that various modifications of said apparatus and procedure can be made without departure from this invention as described in the appended claims.

Having thus described my invention what I claim is:

1. A mechanism comprising in combination, a continuously rotating driving member, an oscillatable driven shaft, bearing and support means therefor, and motion converting and power transmission means interposed between said driven shaft and driving member for utilizing both components of the rotational movement of said driving member in imparting an oscillatory movement to said driven shaft.

2. A movement converting mechanism comprising, a support, a driven shaft and its bearing carried thereby, a driving member, means for continuously rotating said driving member, power transmission means eccentrically connected to said driving member including an element driven with a compound movement, a gear fixed on said driven shaft, a second gear in mesh therewith, and means for supporting said second gear for bodily movement about the axis of said shaft and for movement about its own axis, said second gear being connected to said element and thereby driven with an oscillatory movement about its own axis and bodily about the axis of said first gear.

3. A movement converting mechanism comprising, a support, a driven shaft and its bearing carried thereby, a driving member, means for continuously rotating said driving member, power transmission means eccentrically connected to

said driving member including an element which is reciprocated thereby with a compound movement, and a pair of intermeshing gears, one of said gears being fixed to said shaft and the other of said gears connected to the element of said power transmission means for utilizing the compound movement of said element in driving said driven shaft with reversely rotary movement.

4. A movement converting mechanism comprising, a support, a driven shaft and its bearing carried thereby, a connecting rod, means for reciprocating said rod with a compound movement, and gearing connecting said rod to said driven shaft and utilizing the compound movement of said rod for driving said shaft with reversely rotary movement.

5. A movement converting mechanism comprising, a support, a driven shaft and its bearing carried thereby, a driving member, means for continuously rotating said driving member, power transmission means operably connected to said driving member including an element which is driven with a compound movement, and mechanism connecting said means to said shaft for utilizing more than one of the components of the compound movement of said element for driving said driven shaft with reversely rotary movement.

6. A movement converting mechanism comprising, a supporting member, a driven shaft journaled therein, a connecting rod, means for driving said connecting rod with a compound movement, and mechanism connecting said rod to said driven shaft for utilizing more than one of the components of the compound movement of said rod for driving said driven shaft with a reversely rotary movement.

7. A movement converting mechanism comprising, a support, a driven shaft journaled therein, a gear carried with said driven shaft and fixed to rotate therewith, a second gear meshing with said first named gear and mounted for rotational movement about its own axis, and means for rotating said second gear about its axis while at the same time shifting such axis whereby to drive said named gear with a reversely rotary movement.

8. A movement converting mechanism comprising, a support, a driven shaft journaled therein, a gear coaxial with said driven shaft and fixed to rotate therewith, a second gear meshing with said first named gear, means for supporting said second gear for rotational movement about its own axis and for bodily movement about the axis of said driven shaft, and means for alternatively imparting such movements to said second gear, first in one direction and then in a reverse direction to drive said driven shaft and first named gear with a reversely rotary movement.

9. A mechanism comprising in combination, a continuously rotating driving member, an oscillatable driven shaft, bearing and support means therefor, and motion converting and power transmission means interposed between said driven shaft and driving member for utilizing both components of the rotational movement of said driving member in imparting an oscillatory movement to said driven shaft, said motion converting and power transmission means including devices for varying at will the amplitude of the oscillatory movement of said shaft.

10. A movement converting mechanism comprising, a support, a driven shaft and its bearing carried thereby, a connecting rod, means for reciprocating said rod with a compound movement including mechanism for varying the amplitude of the reciprocations thereof, and gearing connecting said rod to said driven shaft and utilizing the compound movement of said rod for driving said shaft with reversely rotary movement.

11. A movement converting mechanism comprising, a supporting member, a driven shaft journaled therein, a connecting rod, means for driving said connecting rod with a compound movement including mechanism for varying at will the extent of such movement, and mechanism connecting said rod to said driven shaft for utilizing more than one of the components of the compound movement of said rod for driving said driven shaft with a reversely rotary movement.

12. A gear mechanism comprising, a support, a driven shaft journaled therein, a rotatable driving member, a pitman eccentrically connected to said driving member, means for varying the eccentricity of the connection of said pitman to said driving member, a pair of intermeshing gears, one of said gears being fixed to said shaft and the other of said gears being fixed to said pitman, and a link pivotally connected at one end to said shaft and at its other end to one end of said pitman for holding said gears in mesh and permitting the end of said pitman and gear to swing in an arc about the axis of said shaft.

13. A gear mechanism comprising, a gear case, a rotatable driving member carried in said case, a lever mounted in said case for oscillation about a fixed axis, a transmission member eccentrically connected to said driving member and to said lever for effecting the oscillation of the latter, an element carried by said lever and movable therealong, means accessible from the exterior of said case for effecting such movement of said element in a controllable manner, a shaft in said case extending through one wall thereof, a gear in said case secured to said shaft, a second gear in mesh therewith, and means connecting said second gear to said element for imparting a compound movement to said second gear whereby oscillation of said shaft is effected.

14. A gear mechanism comprising, a gear case, a rotatable driving member carried in said case, a lever mounted in said case for oscillation about a fixed axis, a transmission member eccentrically connected to said driving member and to said lever for effecting the oscillation of the latter, an element carried by said lever and movable therealong, means accessible from the exterior of said case for effecting such movement of said element in a controllable manner, a shaft in said case extending through one wall thereof, a gear fixed for rotation with said shaft, a second gear in mesh therewith, and means connecting said second gear to said element for effecting the movement of said second gear about the axis of said first gear.

15. A gear mechanism comprising, a gear case, a rotatable driving member carried in said case, a lever mounted in said case for oscillation about a fixed axis, a transmission member eccentrically connected to said driving member and to said lever for effecting the oscillation of the latter, an element carried by said lever and movable therealong, means accessible from the exterior of said case for effecting such movement of said element in a controllable manner, a shaft in said case extending through one wall thereof, a gear in said case secured to said shaft, a second gear in mesh therewith, and means operably connected to said element for moving said second gear about its own axis and about the axis of said first named gear.

16. A gear mechanism comprising, a support, a driven shaft journaled therein, a driving member, a pitman connected to said driving member, a pair of intermeshing gears, one of said gears being fixed to said shaft and the other of said gears being fixed to said pitman, and means pivotally connected to said shaft and to one end of said pitman for holding said gears in mesh and permitting the end of said pitman to swing in an arc about the axis of said shaft.

17. A gear mechanism comprising, a support, a driven shaft journaled therein, a rotatable driving member, a pitman eccentrically connected to said driving member, a pair of intermeshing gears, one of said gears being fixed to said shaft and the other of said gears being fixed to said pitman, and a link pivotally connected at one end to said shaft and at its other end to one end of said pitman for holding said gears in mesh and permitting the end of said pitman and gear to swing in an arc about the axis of said shaft.

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