

Nov. 12, 1929.

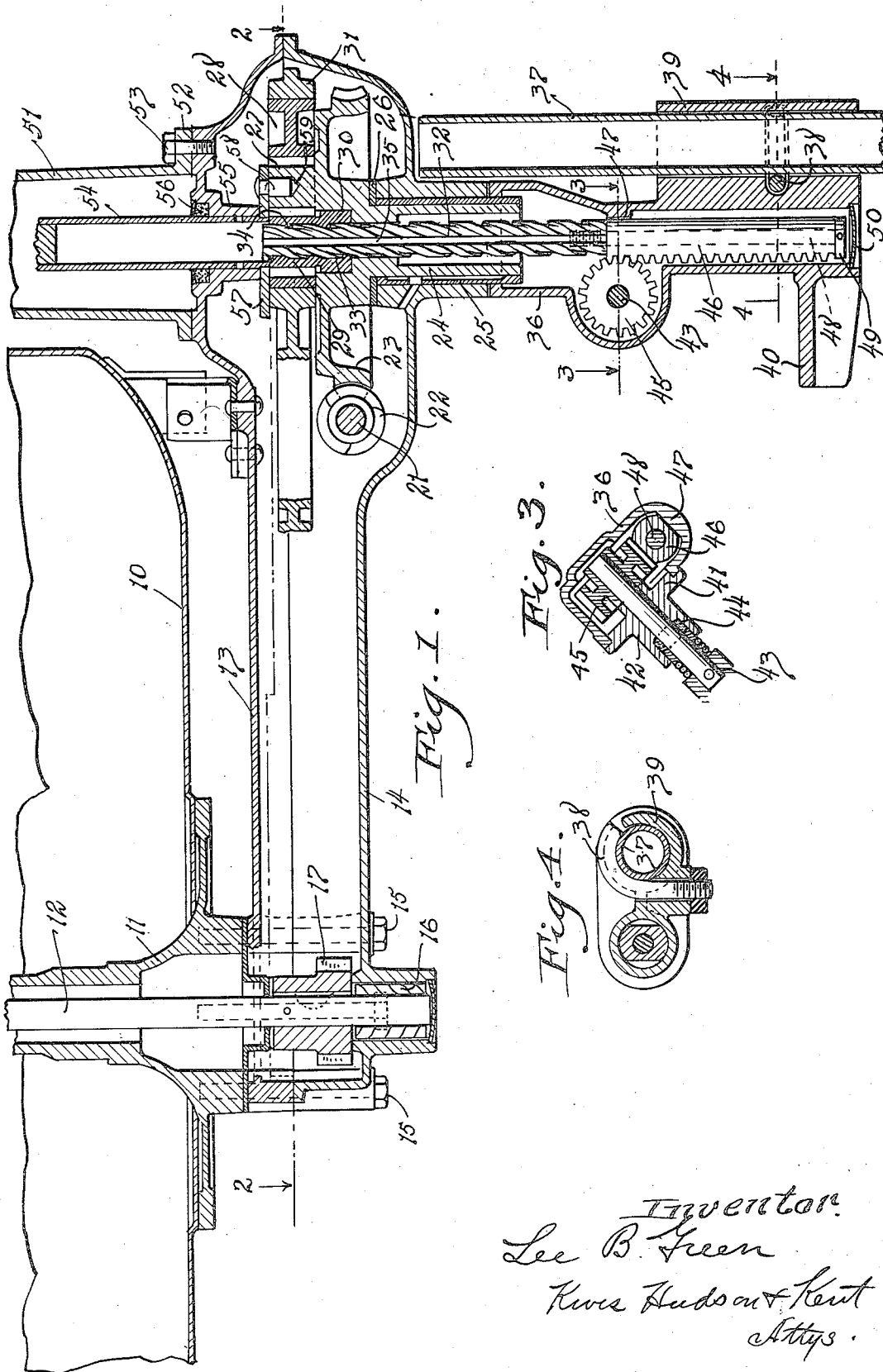
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DRIVE MECHANISM

Filed Jan. 9, 1929

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2 Sheets-Sheet 2

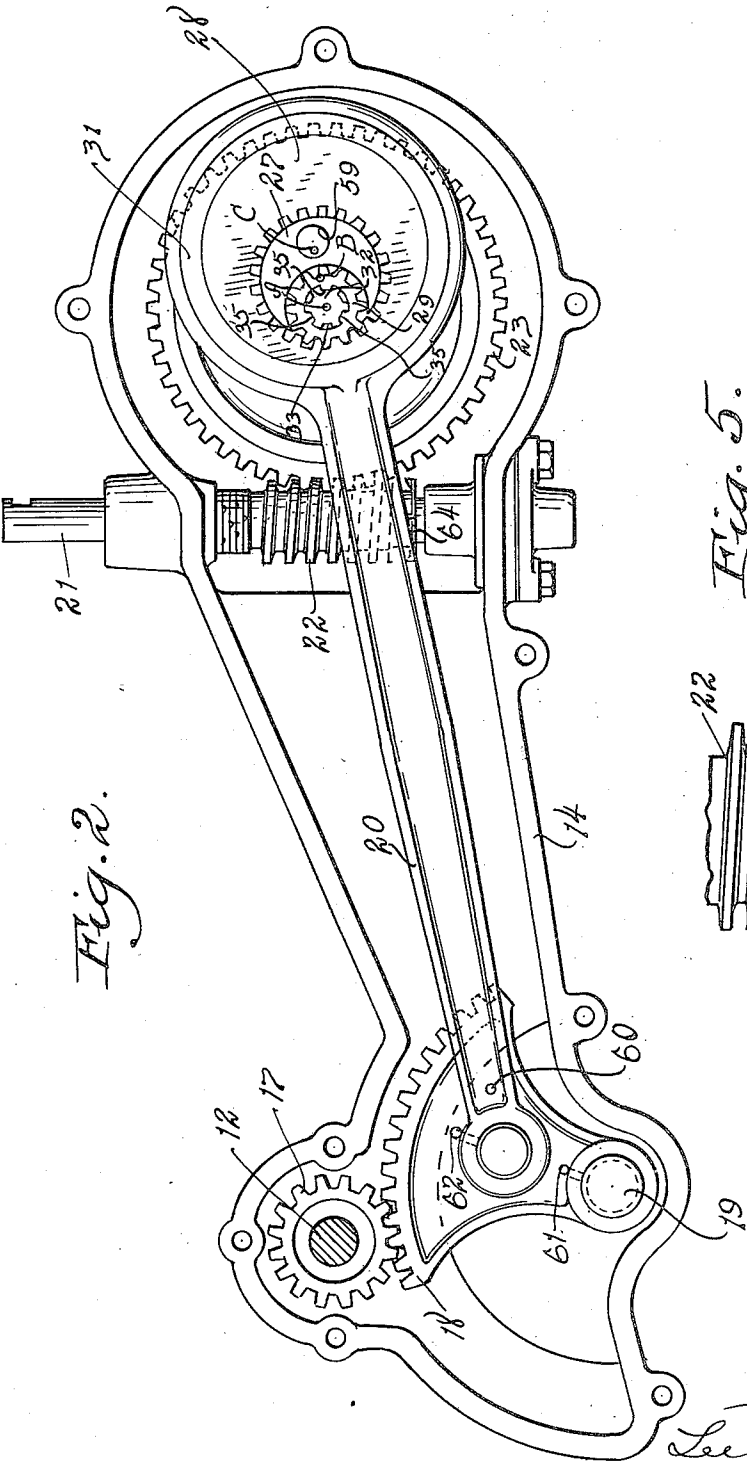


Fig. 2.

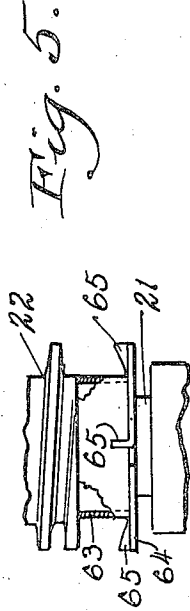


Fig. 5.

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UNITED STATES PATENT OFFICE

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DRIVE MECHANISM

Application filed January 9, 1929. Serial No. 331,276.

This invention relates to improvements in a drive mechanism for washing machines and the like, and relates to machines of the same character as that disclosed in my co-pending application, Serial No. 307,448, filed September 21, 1928.

One of the objects of the invention is the provision of a simple and easily operable means for varying the eccentricity of an eccentric, whereby the stroke of a connecting rod may be altered.

A further object is the provision in connection with such means of a continuously operating rotary connection between the eccentric carrier and a shaft mounted in alignment with the carrier, whereby the rotation of the shaft is unaffected by the adjustment of the eccentric, and in fact is entirely independent of the eccentric adjusting means.

Still another object is the provision in a mechanism of the kind stated wherein continuous rotation is imparted to a shaft by the eccentric carrier, of means for varying the eccentricity of the eccentric, which means shall not be called upon to take the load of the shaft or other rotating parts and may, therefore, be easily operated.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which:

Fig. 1 is a vertical sectional view illustrating my invention as applied to a washing machine;

Fig. 2 is a plan view of the operating mechanism with the upper section of the gear casing removed, the view being taken substantially upon the line 2—2, Fig. 1;

Figs. 3 and 4 are detail sectional views taken substantially on the line 3—3 and 4—4, respectively, of Fig. 1; and

Fig. 5 is a fragmental detail view on a larger scale of a portion of the worm shaft, showing means for creating a spray of oil.

In the drawings, I have illustrated the invention as applied to a washing machine of the submerged oscillator type, a fragment of the tub being illustrated at 10. At the center

of the tub there is a casting 11 connected to the tub proper by a liquid-tight joint and formed hollow in order to receive the shaft 12, by means of which the oscillator (not shown) is driven.

One end of the gear casing, split into upper and lower sections 13 and 14, is attached to the casting 11 by studs 15. The lower end of shaft 12 is rotatably supported in the casing section 14 by a roller bearing 16 or otherwise. Above its bearing 16, this shaft has keyed thereto a pinion 17 which meshes with a toothed sector 18 that is mounted to oscillate upon a stud 19 mounted in the casing section 14. The sector 18 is pivotally connected with a connecting rod 20.

In the opposite side walls of the casing section 14, below the level of the connecting rod 20, I mount a shaft 21 that is adapted to be attached directly or indirectly to a driving motor (not shown). Within the casing this shaft carries a worm 22 which meshes with a worm wheel 23. The latter has a depending hub 24 which is rotatably supported in a bushing 25 carried principally by a suitably formed portion of the casing section 14. The thrust produced by the weight of the worm and superposed parts is taken upon a washer 26.

The worm wheel 23 is provided with an upwardly extending projection in the form of a crescent 27 which is preferably cast integral with the wheel. The crescent is smooth upon both of its side surfaces. It is surrounded by an internal gear formed upon an eccentric 28, the center of the gear being offset from the center of the eccentric, as clearly shown in Fig. 2. Within the smooth inner wall of the crescent 27, there is a pinion 29 that is provided with an extension hub bearing externally in a counterbore 30 of the worm wheel. The pinion 29 meshes with the gear teeth on the eccentric 28. Consequently, as it rotates, the eccentric is turned upon the crescent 27 and the center of the eccentric thereby revolves about the center of the crescent to vary the eccentricity of the eccentric. An eccentric strap 31 surrounds the eccentric 28, being formed preferably integral with the connecting rod 20.

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The pinion 29 normally rotates with the worm wheel 23. It is capable of limited rotation with respect to the worm wheel 23, however, and this relative rotation is brought about by a slide bar 32 provided with spiral grooves 33 that cooperate with spiral threads 34 on the internal surface of the hollow pinion 29. The slide bar 32 also has rectilinear grooves 35 which engage corresponding splines in the hub of the worm wheel 23. Hence, as the bar 32 moves up and down in the worm wheel 23, its spiral thread connection with the pinion 29 produces rotation of the latter with respect to the worm wheel.

Below the casing section 14, there is an extension casing 36 into which the bushing 25 protrudes. This extension casing is preferably secured to one of the legs 37 of the machine by means of a hook bolt 38 and its nut, the casing 36 having an arm 39 formed to partially embrace the leg 37. There may be provided also an arm 40 for attachment of a leg brace (not shown).

One side of the casing 36 is provided with a removable plate 41 carrying a boss 42 in which is formed a bearing for a shaft 43 provided with a packing 44. On the inner end of the shaft 43 is a pinion 45 which meshes with a rack 46 that is provided with a flat rear face engaging a flattened inwardly extending portion 47 of the casing 36. By the latter means a slide bearing for the rack is provided opposite the pinion 45, and the rack is prevented from turning. The rack is made from tubular material and within its bore rotatably receives a rod 48, which is threaded at its upper end into the bottom of slide bar 32. The lower end of rod 48 has pinned thereto a collar 49. The rack 46 is therefore carried by the bar 32, but does not rotate with that bar. The lower end of the casing 36 may be closed by a Welch plug 50 or other suitable means.

On the upper side of the casing section 13, I mount a hollow wringer post 51 having a flanged base 52 secured to the casing section 13 by screws 53 or the like. Inside the post 51 there is a tubular shaft 54 which is mounted for rotation, its lower bearing 55 only being here illustrated and being formed preferably integral with the upper casing section 13, and carrying packing 56. The bore of the tubular shaft 54 is of sufficient diameter to permit the bar 32 to slide freely therein. At its lower end, the shaft 54 has welded, or otherwise secured thereto, a plate or collar 57 in which is mounted a depending pin 58 that takes into a bore 59 in the crescent-shaped projection 27 of the worm wheel. It is by this means that the shaft 54 is driven. At its upper end, this shaft may have operative connection with a wringer mechanism (not shown). The plate 57 overlies portions of the eccentric 28 and of the eccentric strap 31, and hence holds them in proper position.

This plate, together with the end of the shaft 54, also engages pinion 29 and prevents its upward movement.

The casing extension 36 and the lower part of the casing section 14 are filled with oil. Oil is thrown upwardly by the rapidly rotating worm 22, forming a mist which thoroughly lubricates all of the working parts in that vicinity. Part of the oil thus thrown upward drops into the upper trough-shaped surface of the connecting rod 20 and flows to the outer end thereof, and thence through a hole 60 into the recessed upper surface of the sector 18. Ducts 61 and 62 draw oil from the sector into the bearings around stud 19 and the pivot for the outer end of the connecting rod. The overflow from the sector 18 lubricates the pinion 17 and the bearing 16 for the lower end of the shaft 12. In order to assist the worm 22 in throwing up oil, I may place upon the shaft 21 adjacent one end of the worm 22 a sheet metal sleeve 63 having a radial flange 64 from which are stamped out at intervals blades 65 that are adapted to dip into the oil in the casing as the shaft 21 rotates.

When it is desired to operate the machine, the shaft 21 is caused to rotate, as by means of a suitable electric motor. The worm wheel 23 is thus rotated at a considerably decreased rate of speed. The eccentric 28, which is locked in position upon the worm wheel by means of the intermeshing teeth on the eccentric, and on pinion 29, then revolves and reciprocates the connecting rod 20 which oscillates sector 18 and thereby the agitator shaft 12. At the same time, rotation is imparted to the wringer shaft 54 through the intermediacy of the pin 58 and the plate 57. The position of the eccentric in Fig. 2 is that which it occupies when it is set for the maximum stroke of the agitator. Now should it be desired to reduce the length of stroke, the shaft 43 is rotated manually by any suitable connections to cause pinion 45 to turn anti-clockwise, as viewed in Fig. 1, and thereby to raise the rack 46 and the slide bar 32. This may be done while the machine is in operation. The pinion 29 is thereby rotated in a clockwise direction, as viewed from the top, and the eccentric 28 is made to travel around the crescent 27 by virtue of the intermeshing teeth on the pinion and on the eccentric.

In Fig. 2, I have marked the axis of pinion 29 and of worm wheel 23 with the letter A, and the centers of the crescent 27 and eccentric 28, I have marked B and C, respectively. The point A remains stationary at all times. The point B revolves about the point A during the operation of the machine, the radius of rotation remaining constant at all times. The point C also revolves about the point A during the operation of the machine, but its radius is variable, and when the radius is changed, that is by the opera-

tion of the control mechanism described, the point C moves in an arc of a circle about the point B. With these three points in alignment, as shown, the throw of the eccentric is at its maximum. Its throw is decreased
 5 gradually as the point C moves in its circle toward the point A, and when it arrives at the point A, the eccentricity of the eccentric is zero, and the connecting rod receives no motion whatever.

Hence the control of the eccentricity of the eccentric not only serves to regulate the length of the stroke of the agitator, but serves also as a means for starting and stopping the
 15 agitator. As the crescent 27 is fixed upon the worm wheel 23, the pin 58 revolves constantly in a given circle regardless of the adjustment of the eccentric, and consequently the shaft 54 turns at a constant speed at all times when
 20 the motor of the machine is running.

The slide bar 32 has no work to perform other than the rotation of the pinion 29 with respect to the worm wheel 23, and therefore it may be actuated with a minimum of effort
 25 to effect the necessary adjustments of the agitator stroke and to start and stop the agitator.

Having thus described my invention, what I claim is:

30 1. Driving mechanism of the character herein described, comprising a driven wheel, a shaft in alignment with the axis of said wheel, an eccentric carried by said wheel between the latter and said shaft, means for
 35 varying the eccentricity of said eccentric, and an operative connection between said driven wheel and shaft, independent of said means, for rotating the shaft.

2. Driving mechanism of the character
 40 herein described, comprising a driven wheel, a projection rigidly attached to said wheel and extending laterally therefrom, an eccentric surrounding said projection and operatively connected with said wheel, means for
 45 varying the eccentricity of said eccentric, a shaft in alignment with the axis of said wheel, and an operative connection between said projection and shaft.

3. Driving mechanism of the character
 50 herein described, comprising a driven wheel, a shaft in alignment with the axis of said wheel, an eccentric carried by said wheel between the latter and said shaft, means located concentrically of said wheel for varying the
 55 eccentricity of said eccentric, and an operative connection between said driven wheel and shaft outside of said means.

4. Driving mechanism of the character
 60 herein described, comprising a driven wheel, an eccentric carried thereby, a bar slidable in the hub of said wheel, a hollow shaft in alignment with the axis of said wheel and adapted to receive said bar, an operative connection
 65 between said wheel and hollow shaft outside of the bore of the latter, and means cooperat-

ing with said bar for varying the eccentricity of said eccentric.

5. Driving mechanism of the character described, comprising a driven wheel, an eccentric carried thereby, an eccentric strap surrounding said eccentric, a shaft in alignment
 70 with the axis of rotation of said wheel, a disk attached to the end of said shaft, said disk overlying said eccentric and eccentric strap, whereby the parts are held in operative relation,
 75 and a driving connection between said wheel and said disk.

6. In a mechanism of the character described, a connecting rod, a driven wheel, an eccentric mounted thereon and operatively
 80 connected with said connecting rod, a slide bar movable in the hub of said wheel, a rack carried upon but rotatable with respect to said slide bar, means for preventing the rotation of said rack, a pinion meshing with
 85 said rack, means for operating the pinion, and means cooperating with said slide bar for varying the eccentricity of said eccentric.

7. In a mechanism of the class described, a
 90 driven wheel, a shaft in alignment with said wheel on one side thereof and connected to be driven thereby, an eccentric mounted on said wheel and operatively connected therewith, a connecting rod arranged to be driven by said
 95 eccentric, an axially arranged and axially movable slide bar extending from said wheel in a direction opposite to that of said shaft, and means cooperating with said slide bar for varying the eccentricity of said eccentric.

8. In a mechanism of the class described, a
 100 driven wheel mounted upon a vertical axis, a shaft above said wheel in axial alignment therewith and connected to be driven thereby, an eccentric mounted above said wheel and operatively connected therewith, a bar mounted
 105 in the hub of said wheel and having a limited movement independently thereof, means operatively connected with the lower end of said bar to move the same, and means cooperating with said bar for varying the eccentricity
 110 of said eccentric.

9. In a mechanism of the class described, a
 115 driven wheel mounted upon a vertical axis, an eccentric mounted upon the upper surface thereof and operatively connected therewith, a bar mounted in the hub of said wheel and movable independently thereof, a liquid-tight casing into which said bar depends, a rack
 120 carried by said bar within said casing, a pinion in the casing meshing with said rack, whereby said rack, pinion and bar may run in oil, and means operatively connected with said bar for varying the eccentricity of said
 125 eccentric as said bar is moved vertically by said rack and pinion.

10. Driving mechanism of the character
 130 herein described, comprising a driven wheel, a projection extending laterally therefrom, an eccentric surrounding said projection and operatively connected with said wheel, means

for varying the eccentricity of said eccentric, a shaft in alignment with the axis of said wheel, and an operative connection between said projection and shaft, independent of said means, for rotating the shaft.

5 11. Driving mechanism of the character herein described, comprising a driven wheel, a projection extending laterally therefrom, an eccentric surrounding said projection and
10 operatively connected with said wheel, means located concentrically of said wheel for varying the eccentricity of said eccentric, a shaft in alignment with the axis of said wheel, and an operative connection between said projec-
15 tion and shaft outside of said means.

12. Driving mechanism of the character herein described, comprising a driven wheel, a projection extending laterally therefrom, an eccentric surrounding said projection and
20 operatively connected with said wheel, a bar slidable in the hub of said wheel, a hollow shaft in alignment with the axis of said wheel and adapted to receive said bar, an operative connection between said projection and hol-
25 low shaft outside of the bore of the latter, and means actuated by the longitudinal movement of said bar for varying the eccentricity of said eccentric.

13. Driving mechanism of the character
30 described, comprising a driven wheel, a projection extending laterally therefrom, an eccentric surrounding said projection, an eccentric strap surrounding said eccentric, a shaft in alignment with the axis of rotation of
35 said wheel, a disk attached to the end of said shaft, said disk overlying said eccentric and eccentric strap, whereby the parts are held in operative relation, and a driving connection between said disk and said projection.

40 In testimony whereof, I hereunto affix my signature.

LEE B. GREEN.

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