Nov. 13, 1928. 1,691,089

J. F. STEINHELFER

WASHING MACHINE

Filed Nov. 25, 1927 2 Sheets-Sheet 1

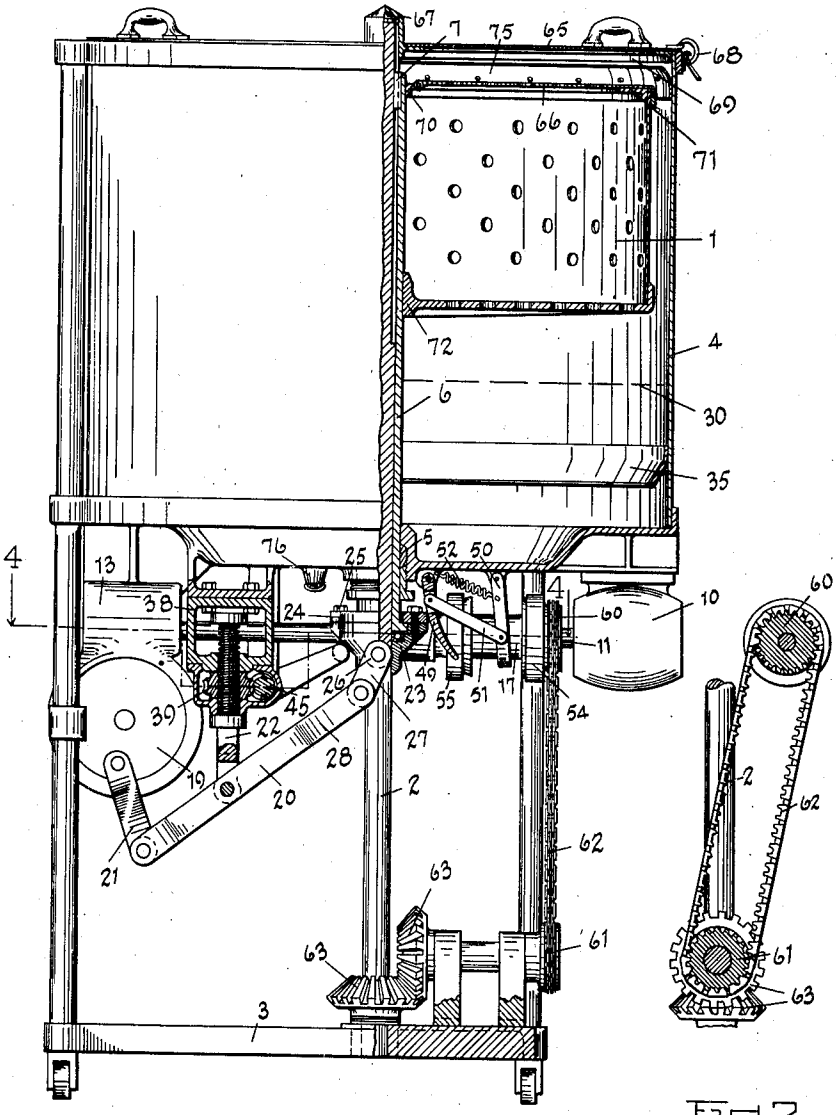


Fig 1

Fig 3

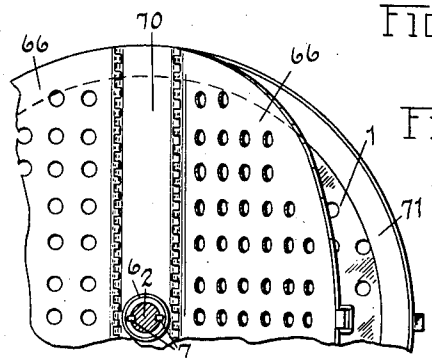


Fig 2

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2 Sheets-Sheet 2

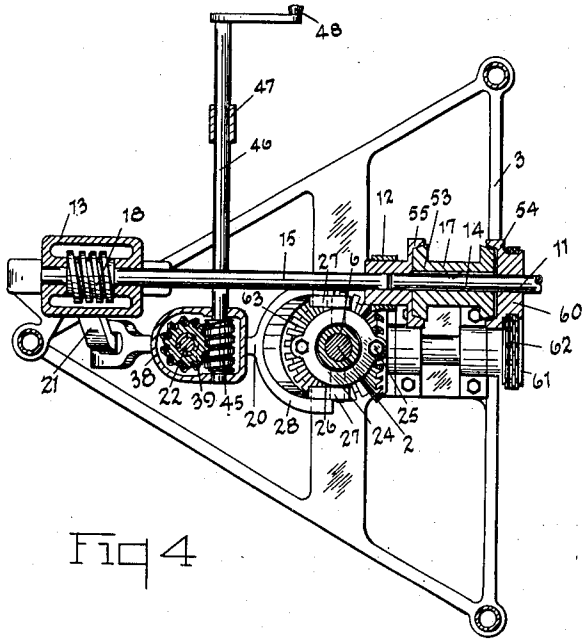


Fig 4

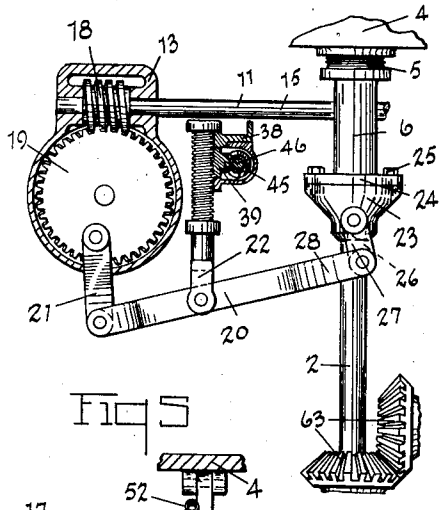


Fig 5

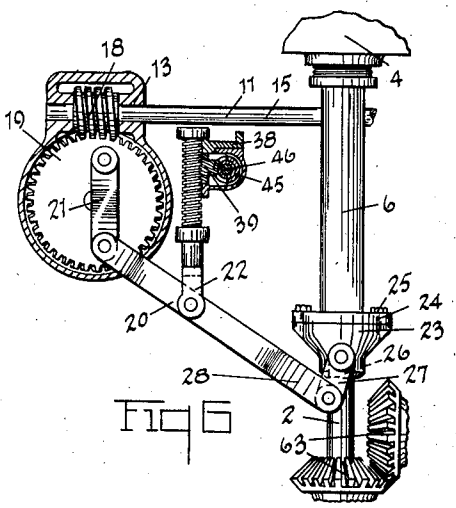


Fig 6

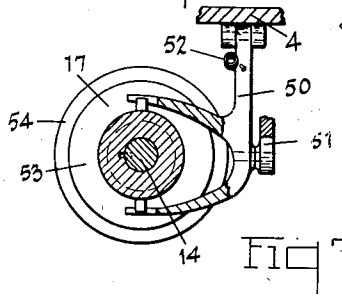


Fig 7

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UNITED STATES PATENT OFFICE.

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WASHING MACHINE.

Application filed November 25, 1927. Serial No. 235,417.

My invention has for its object to provide a washing machine to wash clothes, dishes, or other articles, wherein the articles are moved reciprocally in and out of water. Thus my invention provides a means for alternately plunging articles into and withdrawing them from the water, the cleansing operation being produced by repeated sousing of the articles. Also, the invention provides a means for raising the articles clear of the water and rotating them at a high speed above the water to centrifugally remove the water from the articles.

The invention may be contained in structures of different forms, and, to illustrate a practical application of the invention, I have selected a washer embodying the invention as an example of such structures, and shall describe it hereinafter. The washing machine herein selected is shown in the accompanying drawings.

Fig. 1 is a view showing a side of a part of the washing machine and showing sections of parts of the washing machine. Fig. 2 is a view of the top of the reciprocating article containing drum. Fig. 3 illustrates a chain drive interconnecting parts of the mechanism. Fig. 4 is a view of a section taken along the broken line 4—4 indicated in Fig. 1. Fig. 5 illustrates the means used for reciprocating the article containing drum and shows the positions in which the parts of the mechanism are located when the drum is raised. Fig. 6 is a view similar to that shown in Fig. 5 and shows the relative positions of the parts when the drum is located in its lowermost position. Fig. 7 is a view of a yoke for operating a clutch to disconnect the reciprocating mechanism and to connect the means for rotating the drum for drying purposes.

The form of construction shown in the drawings is particularly applicable to washing clothes. If the machine is to be used for washing dishes, suitable racks may be provided wherein the dishes may be secured or held. A reticular drum 1 is supported on a shaft 2 for not only rotative movements but also for longitudinal movements with respect to the shaft 2. The shaft 2 is supported in bearings formed in the supporting frame 3 of the washing machine and extends through the bottom of the tub 4 which is supported in the upper end of the frame 3, the connecting mechanism being located below the bottom of the tub. The bottom of the tub 4 may be provided with a suitable packing ring 5 for preventing leakage of the water. The drum 1 is secured to a sleeve 6 which is slidably movable along the shaft 2 and is provided with a plurality of slots in which slip keys 7 are located and which interconnect the sleeve 6 and the shaft 2, whereby the sleeve 6, together with the drum 1, may be moved along the shaft 2 and be rotated by the shaft 2, when the shaft 2 is driven.

The mechanism for operating the drum 1 is driven by a suitable motor 10, such as an electric motor, which is secured to the under side of the bottom of the tub 4. The electric motor 10 is connected to the shaft 11 which is supported in suitable bearings 12 formed on the frame 3 and also in a screw housing 13. The shaft 11 is formed of two parts 14 and 15 that are located coaxially and may be interconnected by suitable clutch mechanism which may be in form of friction clutch or a gear clutch. In the form of construction shown, the friction clutch 17 is used for connecting the part 15 with the motor 10. The part 15 is provided with a worm 18 which is located in the housing 13 and the worm 18 meshes with the worm wheel 19. The worm wheel 19 is pivotally supported in the housing 13 and is connected to a lever 20 by means of the link 21 for producing oscillatory movements in the lever 20. The lever 20 is pivotally supported on an end of a threaded rod 22 and is connected to the sleeve 6 by means of a pair of collars 23 and 24 that are bolted together by means of a pair of bolts 25. The sleeve 6 is provided with a suitable flange that is engaged between the collars 23 and 24. The collar 23 is provided with protruding lugs 26 to which links 27 are pivotally connected. The links 27 are also pivotally connected to a yoke 28 that is formed on the end of the lever 20. Thus the oscillatory movements of the lever 20 will be transformed into the reciprocatory movement of the sleeve 6 and the drum 1.

The tub 4 is filled with water, preferably a washing solution to about a depth indicated by the dotted line 30 and the dimension of the lever 20, with respect to the point of connection of the link 21 with the worm wheel 19, is such as to raise the drum 1 clear of the water in the tub 4 and its uppermost position as determined by the reciprocatory movements produced by the lever 20 and the worm wheel 19. When, therefore, the drum 1 is lowered in

its reciprocatory movement, it strikes the surface of the water with a considerable force which produces an impingement of the water against the fibers of the cloth thoroughly and forcibly penetrating each and every fiber of the fabric. Also, when the clothes are raised from the level of the washing solution, and particularly owing to the flatness of the drum, which is located substantially in a horizontal plane, a marked suction is produced which draws the water from the clothes, also since the drum 1 is raised from the water there is a substantially free flow of the water through the clothes as well as over the clothes. In addition to this alternating impingement and suction of the solution against and from the clothes, I have also provided a means for forcing the water into the body of the clothes and drawing the water from the clothes. The lower part of the tub 4 is provided with a flaring annulus 35 that has an inner edge portion that protrudes downward and inward with respect to the wall of the tub 4, and has an inner diameter which is slightly larger than the diameter of the drum 1. The annulus 35 is secured to the inner surface of the tub 4, its outer diameter being substantially the same as the inner diameter of the tub. It is located at a point spaced above the bottom sufficiently to cause a large portion of the lower end of the drum 1 to pass the lower edge of the annulus 35 and while the drum 1 is passing in its reciprocative movement the edge of the annulus 35, there is produced a positive pumping movement to the solution into and out of the drum 1. The annulus 35 thus performs the double function of forcing the water into and out of the drum 1 and forms a means for slowing down the drum 1 in its downward stroke at the point where the lever changes the direction of movement of the drum 1. It thus eliminates the pounding that would be caused by the change in direction of movement of the load that is placed on the lever 20 and it thus forms a cushioning to the load at a time when the weight of the drum and the clothes contained therein is added to the momentum that is induced by the downward movement of the lever 20.

In order to dry the clothes, I have provided a means for raising the drum 1 out of the water and automatically disconnecting the reciprocatory mechanism and connect the rotative mechanism for centrifugally removing the water from the clothes and without opening the circuit of the motor. The threaded rod 22 is slidably movable in the housing 38 and extends through a threaded gear 39 which is rotatably secured between two parts of the housing 38, so that when the gear 39 is rotated, the threaded rod 22, to which the lever 20 is pivotally connected, will be raised and consequently the sleeve 6 and the drum 1 will also be raised, although in this raising movement the lever 20 may continue momentarily to reciprocate to cause reciprocatory movements of the drum 1 and the sleeve 6. When the rod 22 has been raised a very short distance, the collars 23 and 24 operate upon the clutch 17 to disconnect the part 15 of the shaft 11 from the motor 10 and to connect the drum rotatable mechanism with the part 14 of the shaft 11.

To raise and lower the rod 22, a worm 45 is located in the housing 38 and meshes with the worm gear wheel 39. The worm 45 is located on the end of a shaft 46 which is provided with a suitable bearing 47 that may be supported on the bottom of the tub 4. The shaft 46 may be rotated by a suitable crank, such as the crank 48. When the rings 23 and 24 are raised a short distance, they will engage a finger 49 that is pivotally supported on the bottom of the tub 4. The finger 49 is connected to a yoke 50 that is also pivotally supported on the bottom of the tub 4. A link 51 interconnects the finger 49 and the yoke 50 to cause oscillatory movements of the yoke 50. The finger 49 is, preferably, provided with a cam surface that is engaged by the edge of the ring 24 to move the lower end of the finger 49 laterally when the rings 23 and 24 are raised and, consequently, the lower end of the yoke 50 is shifted laterally a relatively short distance as compared to the movement of the lower end of the finger 49. A spring 52 is connected to the yoke 50 to cause a return movement of the yoke 50 and, consequently the return movement of the finger 49 when the ring 24 is lowered. A movable member 53 of the clutch 17 is connected to the yoke 50 and is adapted to engage the complementary clutch members, one of which is connected to the drum rotatable mechanism and the other is connected to the part 15 of the shaft 11. The clutch member 53 is slip keyed to the part 14 of the shaft 11, so that when the clutch member 53 is shifted to one position, connection is established with the clutch member 54 and when it is shifted to the other position, connection is established with the clutch member 55. The member 53 of the clutch 17 thus connects the part 15 of the shaft 11 that drives the worm gear wheel 19 and causes the reciprocatory movements of the sleeve 6 and the drum 1 and when the drum 1 is raised by the operation of the crank 48, the member 53 is shifted so as to connect the clutch member 54 with the motor 10.

The member 54 is provided with a chain gear wheel 60 and drives a chain gear wheel 61 to which it is connected by means of the chain gear 62. The chain gear wheel 61 is connected to the bevel gears 63 which rotate the shaft 2, one of the bevel gear wheels 63 being connected to the lower end of the shaft 2. When, therefore, the drum 1 is raised, not only above the surface of the water, but also so as to be free from the operations of the reciprocatory mechanism,

the drum 1 will be rotated by the motor 10. The reduction of speed from that of the R. P. M. of the motor is such as to produce the desired high speed in the drum 1. Thus the drum may be rotated until substantially all of the water is removed from the clothes. The switch of the motor 10 is then opened and the cover 65 taken off from the tub 4 and one or both of the lids 66 of the drum 1 is opened and the clothes are removed from the drum.

The cover 65 is provided with a suitable bearing part 67 that forms a bearing for the upper end of the shaft 6. The edge of the cover 65 is provided with a plurality of clamping members 68 that lock the cover 65 to the top of the tub 4. Also, the cover 65 is provided with a flange 69 that extends into the tub and fits the inner surface of the tub whereby the cover 65 is securely fastened in position and the bearing part 67 secures the upper end of the shaft 2 in its rotative relation to the tub 4, which permits the drum 1 to be rotated at a high speed without causing an undue vibration of the upper end of the shaft 2. The drum 1 is provided with a pair of semi-circular lids 66 that are hingedly connected to a cross-bar 70 which forms a part of the re-inforcing member 71 that extends around the upper edge of the drum 1. The cross-bar 70 provides a means for rigidly connecting the upper end of the drum 1 with the upper end of the sleeve 6. The bottom of the drum 1 is provided with a boss, or collar 72 which also fits the sleeve 6 whereby the drum 1 is rigidly connected to the sleeve 6.

The upper end of the tub 4 may be provided with an apron 75 that may be formed in the shape of an inwardly extending annulus to prevent the water from being thrown into the crack located intermediate the upper edge of the tub 4 and the periphery of the cover 65. The apron 75 forms a shield for causing the return of the water to the central part of the tub 4. Also, a suitable drain cock, or pipe, 76, may be provided for drawing water from the tub.

I claim:

1. In a washing machine, an article containing drum, a member for reciprocating the drum, a rotatable member for rotating the drum, a driving means, a clutch for connecting the driving means with either the member for reciprocating the drum or the member for rotating the drum the clutch having a part operated by the member for reciprocating the drum for operating the clutch when the path of the movement of the drum reciprocating member in its reciprocation is altered, and means for altering the path of the reciprocating movements of the member for reciprocating the drum.

2. In a washing machine, an article containing drum, an oscillatable member for reciprocating the drum, a rotatable member for rotating the drum, a driving means, a clutch for connecting the driving means either with the oscillatable member or the rotatable member, means for operating the clutch by extended reciprocable movements of the oscillatable member, and means for producing the said extended reciprocatory movements to operate the clutch.

3. In a washing machine, an article containing drum, an oscillatable member for reciprocating the drum, a rotatable member for rotating the drum, a driving means, a clutch for connecting the driving means either with the oscillatable member or the rotatable member, means for operating the clutch and actuated by the oscillatable member when its axis of rotation is changed, and means for shifting the axis of rotation of the oscillatable member to operate the clutch.

4. In a washing machine, an article containing drum, a lever connected to the drum for reciprocating the same, a rotatable member for rotating the drum, a driving means, a clutch for connecting the driving means with the lever or with the rotating member and having a part actuated by the lever upon movement of the center of oscillation of the lever, and means for shifting the center of oscillation of the lever.

5. In a washing machine, an article containing drum, a lever for reciprocating the drum, a rotatable member for rotating the drum, a driving means, a clutch for connecting the driving means with the lever or with the rotating member and having a part in position to be actuated by the lever when the lever is shifted in position, a member for pivotally supporting the lever, and means for shifting the position of the lever supporting member to operate the clutch part upon reciprocatory movement of the drum.

In witness whereof I have hereunto signed my name to this specification.

JACOB F. STEINHELFER.