March 3, 1942. H. D. CROFT ET AL 2,274,950

WASHING MACHINE DRIVE

Filed Dec. 7, 1939

Fig. 1.

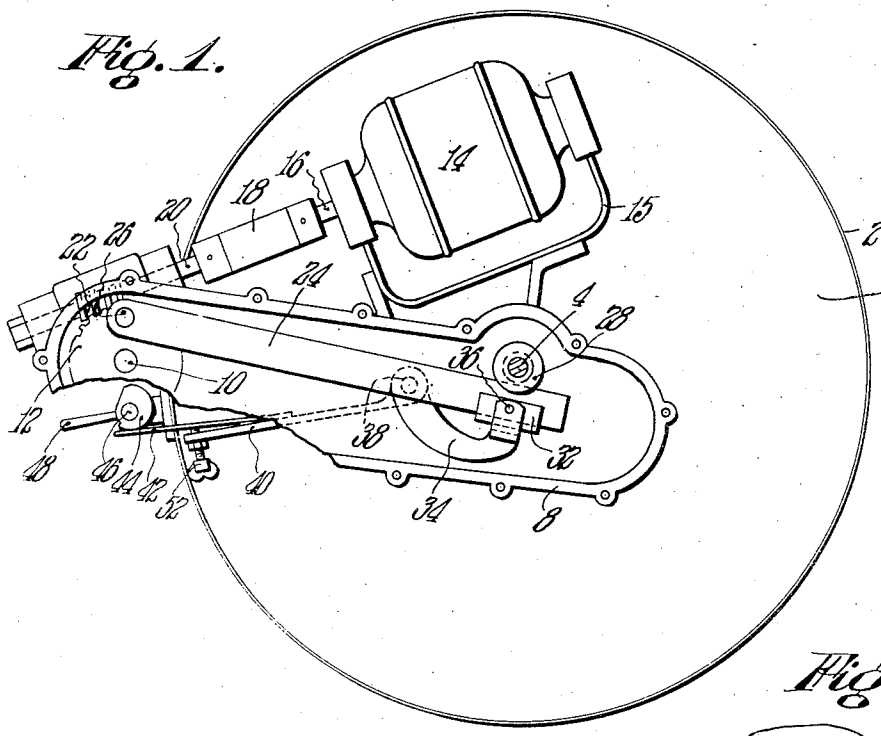



Fig. 3.

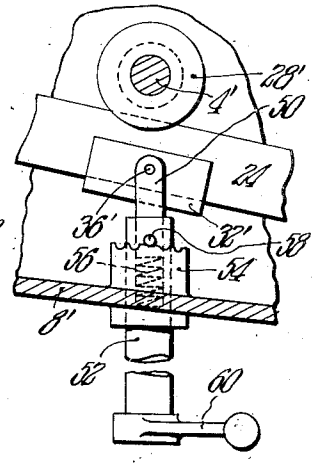
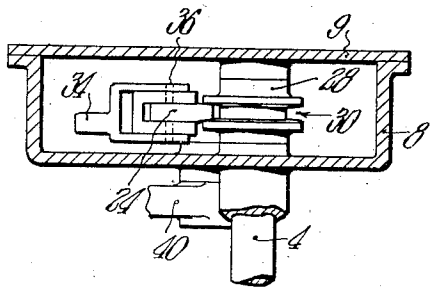



Fig. 2.




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## WASHING MACHINE DRIVE

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8 Claims. (Cl. 74—78)

This invention relates to improvements in washing machine or the like and is directed particularly to washing machines having a new and novel operating mechanism for the agitator or paddle and shaft thereof.

The principal objects of the invention are directed to the provision of a washing machine which is characterized by mechanism including frictionally-engageable driving and driven members for oscillating the agitator, as distinguished from positive means such as gears, and novel means for controlling the action of said members or for causing said mechanism to produce the desired action of the agitator and shaft to the end that the same may be oscillated back and forth through various angles while being load-responsive.

In connection with washing machines having the novel operating mechanism wherein frictionally engageable members are employed, it is desired that the mechanism be responsive to the load applied to the agitator and be adjustable to accommodate or operate on various kinds of material being washed thereby to avoid injury and damage to the materials and the mechanism as well.

Some materials for best results require a more or less violent washing action than others. The frictionally engageable members make it possible to operate the agitator through various angles of oscillation to accommodate the materials being washed. The novel control means for the engageable members assures the desired smooth and efficient action of the mechanism so as to not only avoid injury and damage to the clothes and the mechanism but makes it possible to accurately control the mechanism and provide the desired angle of oscillation and washing action and at the same time eliminate undesirable jerking when the agitator reverses its direction of movement. When operating at a relatively narrow angle of oscillation as when operating on materials and clothes requiring comparatively little washing action, the action is such that the agitator and shaft oscillate back and forth smoothly without undue strains and jerkiness and it is possible to readily and easily vary the angle of oscillation.

Various novel features and advantages of the invention will be hereinafter more fully referred to in connection with the accompanying description of the present preferred form thereof, with reference to the drawing, wherein:

Fig. 1 is an inverted plan view of a washing machine tub having operating mechanism having the novel features of the invention associated therewith;

Fig. 2 is an enlarged sectional elevational view through the operating mechanism housing shown in Fig. 1; and

Fig. 3 is a partial inverted sectional plan view at a larger scale through the housing beneath the tub showing a modified form of the invention.

Referring to the drawing more in detail, the invention will now be fully described.

A tube of a washing machine is represented by 2 in an inverted position. A shaft for the washing machine agitator is represented by 4. Said shaft extends upwardly through the lower wall 6 of the tub, wherein it is journalled, and carries within the tub the paddle or agitator. The lower end of the shaft 4 extends downwardly into a casing or housing 8 which is provided for supporting and enclosing the operating mechanism. The housing is usually secured to the tub in some suitable manner while a cover 9 is provided for the housing so as to provide a lubricant tight casing enclosing the operating mechanism.

A shaft 10 is suitably journalled in the housing at its outer end and extends upwardly along side of the tub 2 for operating a wringer mechanism. It has fixed thereto at its lower end in some suitable manner a worm gear member 12.

An electric motor 14 is secured as by a bracket 15 to the housing 8 and its shaft 16 is connected as by a coupling 18 to a worm shaft 20 which is rotatable in the housing 8. A worm 22 on said shaft 20 is in operative engagement with worm gear 12 for rotating the same.

The motor and gear 12 with their connections constitute a driving means for a driver or driving member 24 which is pivoted to gear 12 at 26. The free end portion of the driver frictionally engages a driven member 28 on oscillatable shaft 4. As member 12 rotates the drive member 24 is restrained so that it reciprocates back and forth. It will be obvious that the member 24 may be reciprocated by other means than that shown.

The members 24 and 28 are provided with frictionally engageable surfaces or faces. In the form of the invention shown, the member 4 has a circumferential groove 30 which is provided with relatively tapering or inclined friction faces, and the upper and lower forward side faces of member 24 at its end portion are arranged complemental to the friction surfaces of the driven member so that when the members 24 and 28 are held in frictional engagement and member 24 is oscillated the driven member will be oscillated

back and forth and thereby shaft 4 and the agitator carried thereby are agitated. Obviously, the drive may be grooved to receive the driven member if desired.

The amount of oscillation of member 4 or its angle of oscillation will depend more or less upon the pressure urging the members 4 and 28 in frictional engagement. To control that pressure and thereby control the oscillatory movements and action of the agitator the means now to be described is provided.

As the member 12 rotates through a revolution to reciprocate driving member 24, the angle of said member 24 is constantly changing. That is, with reference to a certain line such as a line passing through the axes of shafts 4 and 10 the angle of member 24 with reference to said line is constantly changing during a revolution of member 12.

To provide the desired smoothness of operation, uniformity of speed and non-jerking reversal or non-snapping action, the driving and driven members are held in frictional engagement and their action is controlled by the following:

A pressure member or shoe 32 is slotted longitudinally to slidably receive the outer end of the driving member 24 so that it may reciprocate therein and be urged towards the driven member by the pressure member. An arm 34 has a free forward end in which the pressure shoe 32 is pivoted at 36. Said arm 34 is fixed to a shaft 38 journalled in the housing 2 that has a portion extending outside said housing.

A lever 40 is fixed to the extension of the shaft 38 and is adapted to rotate shaft 38 and through lever 34 exert more or less pressure to the driving member accordingly as pressure is applied to said lever 40. As greater pressure is applied to the driving member, the frictional action of the members 4 and 28 will bring about oscillations of shaft 4 which are of greater angle or of greater extent than when less pressure is employed.

Secured to member 40 adjacent its end there is an extension 42 having a free end which is adapted to bear on or be engaged by a member such as a cam 44 shown. This member 44 is rotated or adjusted by a shaft 46 to which it is fixed. The shaft 46 may be called the operating shaft and it may extend upwardly alongside of the tub and carry a manually engageable operating member such as a lever 48 shown. The said shaft 46 is journalled in a suitable bearing or bearings such as 50.

An adjusting screw 52 in threaded engagement with the lever 40 so as to be adjustable may be locked in various positions of adjustment by a lock nut or nuts 54. Said screw 52 acts on member 42 to vary the spacing of members 40 and 42. As the shaft 46 is rotated from the position shown, the member 42 is moved to act upon and to swing lever 40 counter-clockwise so that additional pressure is applied to the driver and bring about a greater angle of oscillation of the agitator shaft. The operation is such that very slight effort need be applied to lever 48 to change the oscillatory action of shaft 4 from zero to the maximum angle of oscillation.

The members 40 or the member 42, when used, are somewhat yieldable or they combine to provide yieldability thereby to provide yielding pressure for the frictionally engageable members. The yieldability not only makes the mechanism load-responsive but overcomes the jerking tendency on reversal of movement of the agitator shaft. The control means or pressure applying means is not only variable within wide limits so that the desired angle of oscillation may be obtained but the construction is such as to make adjustments easily and quickly.

It will be noted that the lever 34 is pivoted in such a way and the shoe 32 is pivoted thereto at such a point that pressure is applied to the member 24 directly in line with or towards the axis of shaft 28 in all positions of the driving member 24, whereby the desired pressure is not influenced by the position of the driver. The pivotal connection of the parts 34 and 32 is relatively closely adjacent the axis of shaft 4 whereby as the member 24 in its reciprocation and changing angularity does not move the pivot through a considerable angle from one extreme position of member 24 to its other. Thereby the action is uniform throughout each cycle of operation without objectionable jerkiness at the reversal of movement of the agitator shaft.

The modified form of the invention shown in Fig. 5 will now be described.

The pressure member 32' similar to member 32 slidably receives the driver 24' for urging the same towards the driven member 28' of agitator shaft 4'.

The said pressure member 32' is pivoted at 36' to a member 50 which is slidable in a member 52 that is reciprocable and oscillatable in a bearing 54 of housing 8'. A spring 56 acts on member 50 to yieldingly urge it forwardly. A pin or the like 58 of member 52 abuts an angularly disposed face of the bearing 54 which is provided with sockets, as shown.

The member 52 may be oscillated by any suitable means such as lever 60 fixed to said member and said lever or some other suitable member may be supplied for oscillating shaft 52.

As shaft 52 is oscillated in one direction or the other due to the pin 58 riding the inclined surface of bearing 54, the spring 56 is tensioned more or less to cause member 32' to apply more or less pressure to driver 24'. The seats on the end face of bearing 54 receive the pin 58 to thereby hold the member 52 in various positions of angular adjustment.

While we have described the invention in great detail and with respect to the present preferred form thereof, it is not desired to be limited thereto since changes and modifications may be made therein without departing from the spirit and scope of the invention. The invention may be embodied in other specific forms without departing from the essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What it is desired to claim and secure by Letters Patent of the United States is:

1. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having angularly disposed frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a pressure member relative to which said drive member is reciprocable for urging the drive member towards the driven member, an arm pivotally connected to said housing and piv-

otal connections between said pressure member and arm whereby said pressure member may swing independently of the housing and relative to said arm as said drive member reciprocates.

2. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having angularly disposed frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a pressure member relative to which said drive member is reciprocable for urging the drive member towards the driven member, an arm pivotally connected to said housing and pivotal connections between said pressure member and arm whereby said pressure member may swing independently of the housing and relative to said arm as said drive member reciprocates, the said pivotal connection being closely adjacent the axis of oscillation of said agitator shaft.

3. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having angularly disposed frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a pressure member relative to which said drive member is reciprocable for urging the drive member towards the driven member, an arm pivotally connected to said housing and pivotal connections between said pressure member and arm whereby said pressure member may swing independently of the housing and relative to said arm as said drive member reciprocates, the said pivotal connection being disposed between the axis of oscillation of said agitator shaft and a side of said drive member remote from said axis.

4. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having angularly disposed frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a pressure member relative to which said drive member is reciprocable for urging the drive member towards the driven member, an arm pivotally connected to said housing and pivotal connections between said pressure member and arm whereby said pressure member may swing independently of the housing and relative to said arm as said drive member reciprocates, the said pivotal connection being disposed between the axis of oscillation of said agitator shaft and a side of said drive member remote from said axis, and the pivotal connection of the arm and housing being disposed at a side of a line, passing through said pivotal connection and the axis of oscillation of said agitator shaft.

5. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a shaft journalled in said housing, an arm fixed thereto carrying a pressure member acting on said driving member to urge the same towards said driven member, a yieldable operating lever fixed to said shaft, and adjustable holding means for holding said lever in various positions whereby said pressure member may apply variable yielding pressures to said driving member, said lever including a main lever and an extension secured at one end thereto with its free end movable relative thereto and said holding means including a movable member for engaging said extension.

6. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a shaft journalled in said housing, an arm fixed thereto carrying a pressure member acting on said driving member to urge the same towards said driven member, a yieldable operating lever fixed to said shaft, and adjustable holding means for holding said lever in various positions whereby said pressure member may apply variable yielding pressures to said driving member, said lever including a main lever and an extension secured at one one end thereto with its free end movable relative thereto and said holding means including a movable member for engaging said extension, and adjusting means spacing the extension from said main lever.

7. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a shaft journalled in said housing, an arm fixed thereto carrying a pressure member acting on said driving member to urge the same towards said driven member, an operating lever fixed to said shaft, and adjustable holding means for holding said lever in various positions whereby said pressure member may apply variable yielding pressures to said driving member, said lever including a main lever and a yieldable extension secured at one end thereto with its free end movable relative thereto and said holding means including a movable member for engaging said extension.

8. Mechanism for oscillating the agitator shaft of a washing machine comprising in combination, a housing, a driven member for said shaft having frictionally engageable faces, a drive member having faces for frictionally engaging the same, means to reciprocate said drive member, a shaft journalled in said housing, an arm fixed thereto carrying a pressure member acting on said driving member to urge the same towards said driven member, an operating lever fixed to said shaft, an adjustable holding means for holding said lever in various positions whereby said pressure member may apply variable yielding pressures to said driving member, said lever including a main lever and a yieldable extension secured at one end thereto with its free end movable relative thereto and said holding means including a movable member for engaging said extension, said pressure member including an elongated part having a longitudinal surface reciprocably engaging a side of the drive member.

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