Feb. 6, 1951 P. E. GELDHOF ET AL. 2,540,724

INTERLOCKING CONTROL MECHANISM FOR A WASHING MACHINE HAVING AN AGITATOR AND A PUMP

Filed Sept. 28, 1945 2 Sheets-Sheet 1

Fig. 1.

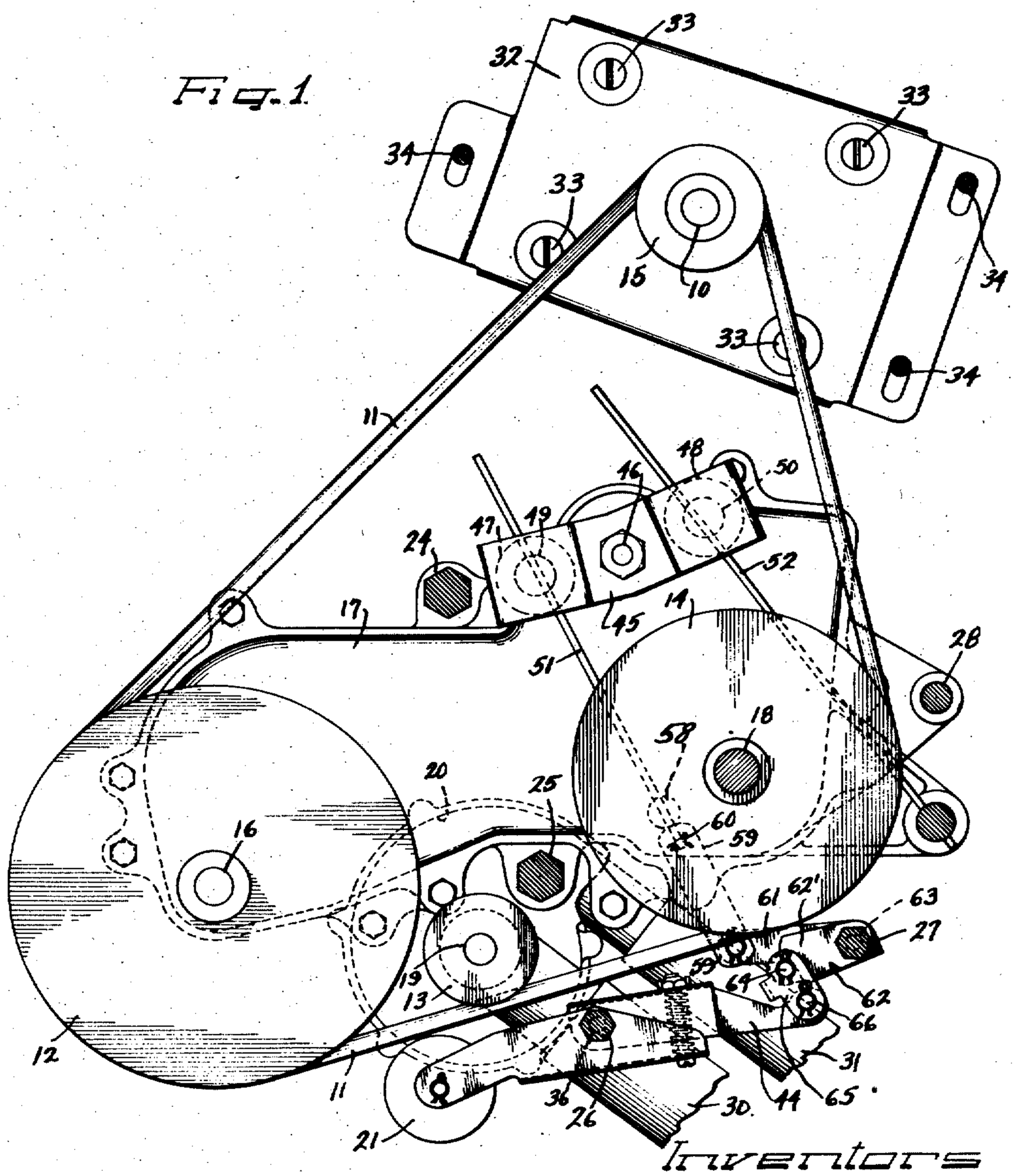

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Fig. 2.

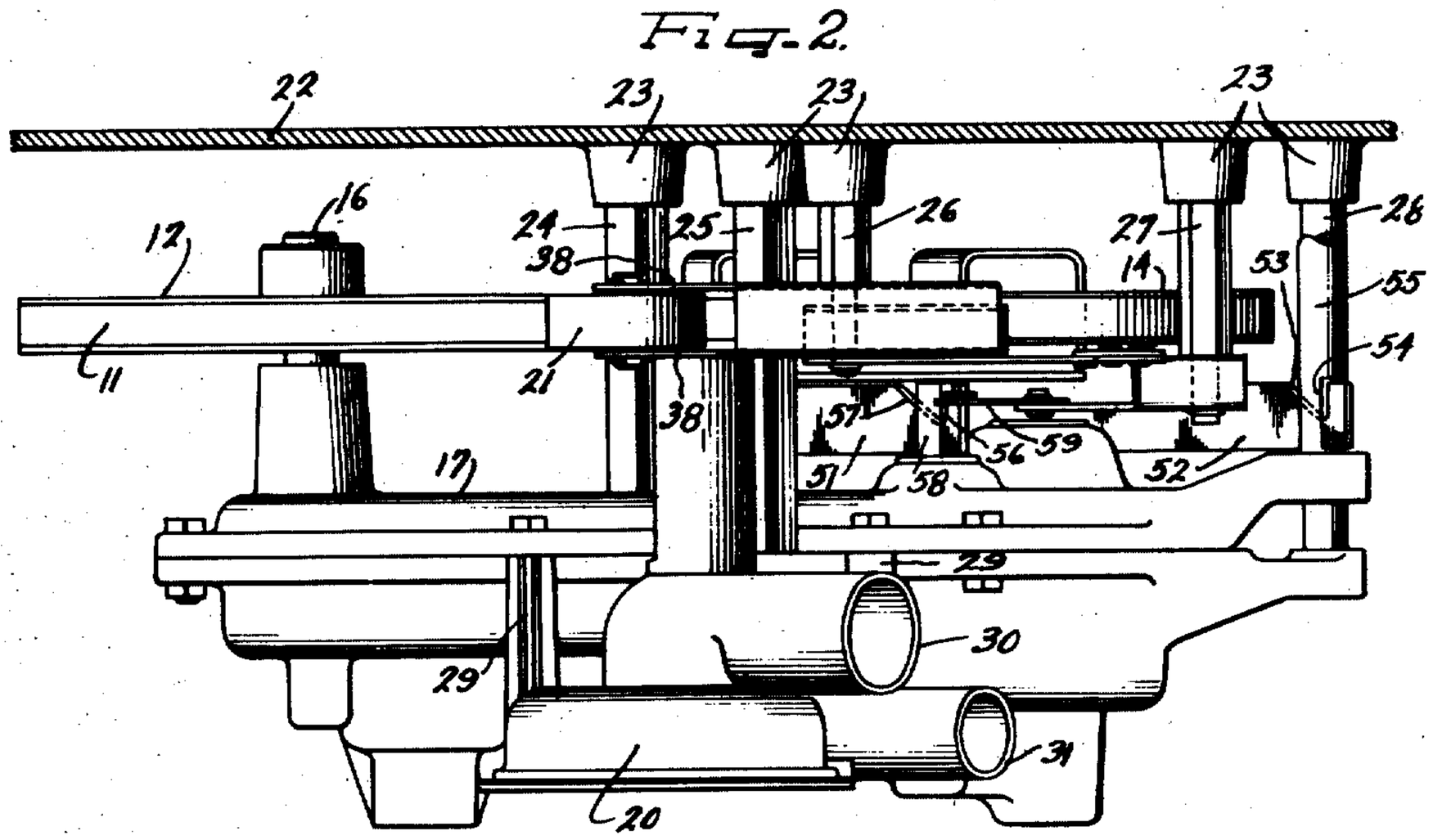
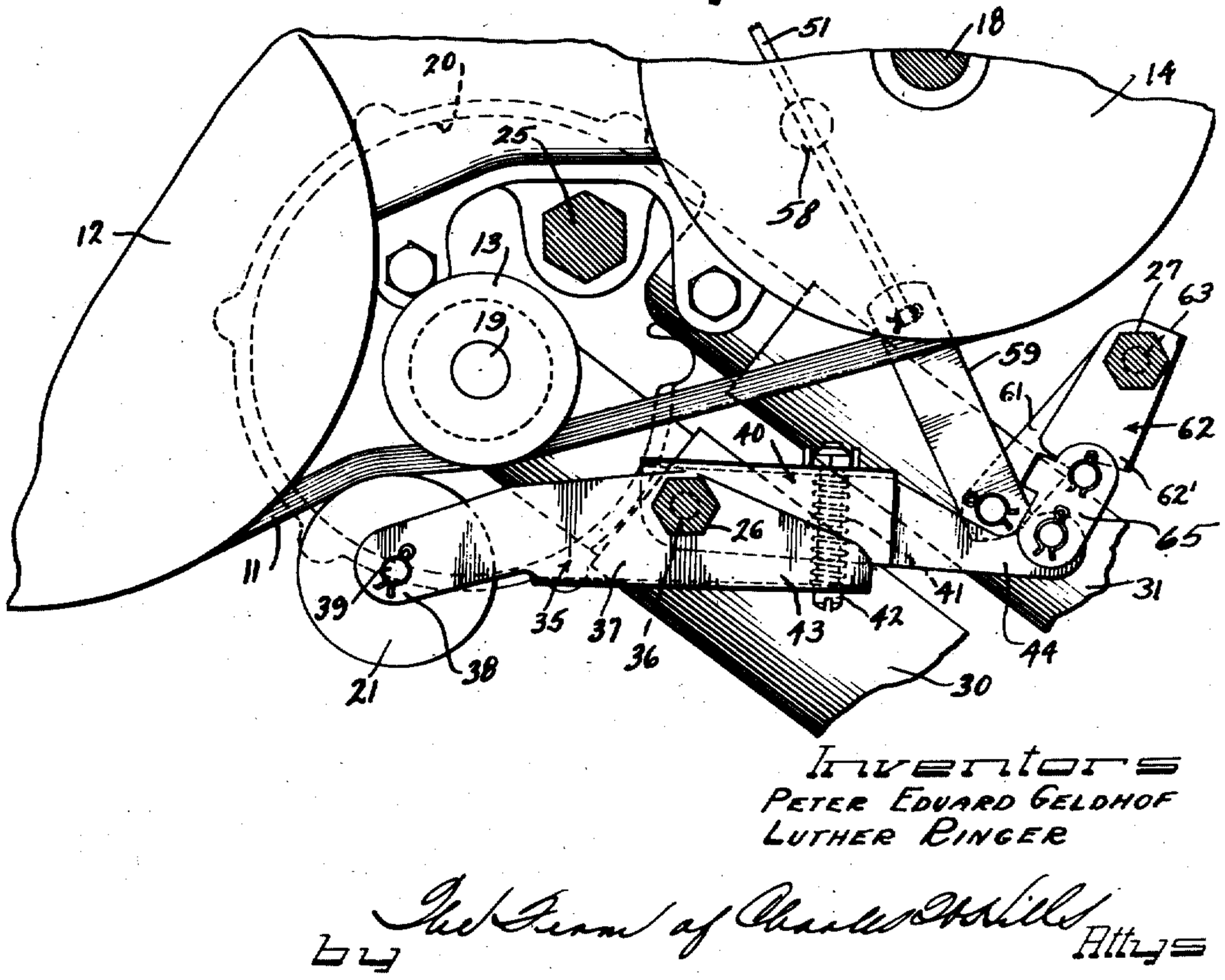


Fig. 3.



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INTERLOCKING CONTROL MECHANISM FOR A WASHING MACHINE HAVING AN AGITATOR AND A PUMP

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4 Claims. (Cl. 68—133)

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This invention relates to control mechanisms and more particularly to a control mechanism for washing machines or the like.

One of the principal applications of the present invention is to domestic or household washing machines which are completely automatic in their operation of the washing, rinsing and drying of clothing or other articles to be cleansed. In machines of this general class means is provided for pumping fluid from one location to another, or for pumping fluid out of the machine. One of the principal features and objects of the present invention is to provide a method and means for driving the pump for controlling the driving thereof.

It is a further object of the present invention to provide a novel control mechanism which is economical to manufacture, rugged and reliable in use and substantially free from noise and vibration.

Another object of the present invention is to provide a novel control mechanism for washing machines or the like.

Another and further object of the present invention is to provide a novel method and means for connecting a motor in driving relation with a pump.

The novel features which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention itself, however, both as to its manner of construction and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

Figure 1 is a plan view of control mechanism embodying the novel principles and teachings of the present invention as attached to a washing machine of the type described and claimed in our copending application entitled "Automatic Washing, Rinsing and Drying Machine," U. S. Serial No. 491,618, filed June 21, 1943, now Patent No. 2,521,159 of September 5, 1950, and assigned to the same assignee as the present invention;

Figure 2 is a front elevational view of the control mechanism shown in Figure 1; and

Figure 3 is an enlarged fragmentary view of the lower portion of Figure 1 showing the control mechanism in its position where the pump is being driven by the driving belt of the motor.

Referring now to the various figures of the drawings there is illustrated therein one embodiment of the control mechanism for an automatic

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washing, rinsing and drying machine. All of the mechanism of the washing machine to which the control mechanism is applied is illustrated in the various figures of the drawings. While it is not necessary for a full understanding of the invention to illustrate the entire automatic washing machine, reference may be had, if desired, to applicants' copending application for "Automatic Washing, Drying and Rinsing Machine," U. S. Serial No. 491,618, filed June 21, 1943, and assigned to the same assignee as the present invention.

As shown in the drawings herein, the main motor shaft 10 of the washing machine in arranged to drive through a belt 11 a plurality of driven members 12, 13 and 14. The motor shaft 10 carries a drive pulley 15 around which the belt 11 extends. The driven member 12 is mounted on a main shaft 16 of the gear case 17, while the driven member 14 is arranged to drive the basket of the automatic washing machine by a rim drive with the upper surface of the outer marginal portion of the driven member 14. As is common practice in many types of automatic washing machines, the agitator shaft 18 extends up through the driven member 14 but is not connected therewith. For the purposes of the present invention it is simply necessary to state that the agitator shaft 18 is arranged to be oscillated by mechanism contained within the gear case 17 from the driven shaft 16 to which the driven member 12 is rigidly secured.

As will be clearly observed from an inspection of Figure 1 of the drawings, the drive belt 11 is in direct engagement with the drive pulley 15 and the driven members 12 and 14 and for that reason the driven members 12 and 14 are rotating at all times that the motor shaft 10 is rotating. The driven member 13, however, is normally slightly out of direct engagement with the drive belt 11 and under normal circumstances is therefore not being driven by the drive belt 11. This driven member 13 is mounted and secured to the pump shaft 19 of the pump 20. The belt 11 is arranged to be selectively moved into driving engagement with the pump member 13 by an idler 21 which also normally is disposed free and clear of the drive belt 11.

Before describing the mechanism for selectively moving the drive belt 11 into and out of engagement with the pump member 13, reference is made to Figure 2, wherein the supporting structure for the mechanism is more fully illustrated. In many automatic washing machines, such, for example, as the washing machine described and

claimed in our copending application Serial No. 491,618 above referred to, a floating base or spider is provided upon which substantially all of the operating mechanism of the washing machine is mounted. This floating base or spider is illustrated in Figure 2 by the reference character 22. A plurality of bosses 23 are formed on the under surface of the floating base 22 and from these bosses 23 a plurality of supporting arms or studs 24, 25, 26, 27 and 28 extend. Arms 24, 25 and 28 are dimensioned to extend down into suporting engagement with the gear case 17 to support the same. Arms 26 and 27 support portions of the control mechanism presently to be described.

The pump 20, which may be of any suitable type or kind, such, for example, as a vane type centrifugal pump, is mounted to the gear case 17 by supporting arms 29. This pump 20 is provided with an intake hose 30 and a discharge hose 31.

The motor (not shown), is not supported from the gear case 17 but is directly supported on the floating base or spider 22 by means of a bracket 32, the motor being secured by means of bolts 33 to the bracket 32, while the bracket 32 is secured to the floating base by means of bolts or securing pins 34 (see Fig. 1).

The selective control mechanism for forcing the drive belt 11 into and out of engagement with the drive pulley 13 of the pump 20 includes means for resiliently pressing the idler pulley 21 against the drive belt 11 to force the latter into driving engagement with the member 13. This means includes an idler arm 35 which is pivotally mounted on a cylindrical portion 36 of the depending stud or arm 26. This idler arm 35 has a main body portion 37 which is U-shaped in transverse cross-section, as may be seen from Figures 2 and 3, and includes a pair of fingers 38 to which the idler pulley is pivotally mounted by means of a pin 39. A second arm 40, of generally U-shaped transverse cross-sectional configuration, is also pivotally mounted on the cylindrical portion 36 of the same stud 26 to which the arm 35 is mounted. The open portion of the U of each of the arms 35 and 40 face each other and a helical compression spring 41 is mounted therein over a bolt 42. This compression spring 41 normally forces the tail portion 43 of the arm 35 away from the main body portion of the arm 40.

If extending finger 44 is held against movement, the spring 41 tends to rotate the arm 35 in a clockwise direction about the shaft 36. This forces the idler 21 against the belt 11 thereby forcing the belt 11 into driving engagement with the wheel 13 secured to the pump shaft 19. It will therefore be seen that in order to selectively move the idler 21 into and out of engagement with the belt 11 to force the latter into and out of driving engagement with the wheel 13, means must be provided for moving the extending finger portion 44 of the member 40.

In our aforesaid copending application Serial No. 491,618, power for operating various control mechanisms is obtained from an arm which is secured to the segment shaft of the gear box and driven from the main gear drive through a crank mechanism. The details of construction of the means by which this arm is operated are not necessary for an understanding of the present invention, it being sufficient to point out that the arm 45 is mounted on the segment shaft 46 of the gear box 17 and is oscillated back and forth preferably through an angle of approximately 60°. The arm 45 is provided with a pair of electric solenoids 47 and 48, whose plungers 49 and 50 respectively are arranged to selectively engage the bars 51 and 52 respectively to move them lengthwise back and forth through a limited distance.

As may be seen best in Figure 2 of the drawings, the bar 52 has a notched out portion 53 near its end which extends through a slot 54 in an upstanding rod 55. The rod 55 is arranged to be raised as the bar 52 moves the left-hand inclined edge of the notch 53 into the slot 54, thereby camming the rod 55 upwardly to effect a control action.

The bar 52 is in this latter position when the solenoid 48 is deenergized, and in its position as shown in Figure 2 when energized. The upstanding rod 55 may, for example, connect the drive mechanism to rotate the clothes basket of the washing machine when in its lower position, and to disengage it when in its upper position.

It has been found very desirable in an automatic washing machine to interrelate the operation of the pump and the agitator in such a manner that the pump is connected whenever the main motor is energized except during the time when the agitator of the washing machine is in operation. It has been found that this may be accomplished by connecting the pump control mechanism with the agitator control mechanism in such a manner that the single operation of connecting the agitator disconnects the pump, and the single operation of disconnecting the agitator connects the pump.

The bar 51 is arranged to be moved back and forth by the oscillating arm 45. When the solenoid 47 is deenergized the bar 51 is in its rear position as shown in Figures 1 and 2 of the drawings. When the solenoid 47 is energized, the bar 51 is in its position as shown in Figure 3 of the drawings. As may be seen in Figure 2, the forward end of the bar 51 is notched out as at 56 to provide a cam surface 57 which extends through a slot in the control rod 58 of the agitator mechanism. Thus the rod 58 is arranged to be raised when the bar 51 moves to its forward position and in this position it will be understood that the agitator shaft 18 is disconnected from a driving engagement with the main drive 16 of the gear box.

When the rod 58 is in its position as shown in Figure 2 it is to be understood that the agitator shaft 18 is connected and is oscillated back and forth through suitable gear crank and segment drives from the main gear box drive 16. Gear box drives of this type are so common in the art that the details of such a drive from the main gear box drive 16 to the agitator shaft 18 is not described herein.

The selective control mechanism for connecting and disconnecting the pump 20 is also connected to the bar 51. More particularly, a link 59 is connected to the end of the bar 51 and held in place by means of a cotter pin 60. The other end of the link 59 is pivotally connected to the finger 61 of a member 62. The member 62 is pivotally mounted on a cylindrical end portion 63 of the stud 27. The member 62 is of generally U-shaped transverse cross-section, and in addition to the finger 61 includes a second finger portion 62', which lies in a higher plane than the plane in which the finger 61 lies. The finger 62' is pivotally connected as at 64 to another link member 65. The other end of the link member 65 is piv-

otally connected as at 66 to the extending arm or finger 44 of the member 40.

As the bar 51 moves from its rear position as shown in Figures 1 and 2, to its forward position as shown in Figure 3, the link arm 59 forces the member 62 in a counter-clockwise direction about its pivot 63. Since there is no relative movement between the finger portions 61 and 62', the counter-clockwise movement of the finger portions 61 and 62' forces the member 40 to move in a clockwise direction about its pivot point 36 through the link connection 65. The link connection 65 is of course, necessary due to the fact that the members 62 and 40 move about different centers.

The clockwise movement of the member 40 about the pivot point 36 moves the member 35 in a clockwise direction about the same pivot point 36 through the spring connection 41. The clockwise movement of the member 35 about the pivot point 36 forces the idler 21 against the drive belt 11, thus forcing the drive belt 11 into driving connection with the wheel 13 secured to the impeller shaft 19 of the pump 20. It will thus be understood that when the bar 51 is in its forward position the pump is being driven by the drive belt 11, and the agitator is disconnected due to the fact that the rod 58 is in its upper position. Conversely, when the bar 51 is in its rear position, as shown in Figures 1 and 2 of the drawings, the link 59 is in its retracted position and the member 35 has withdrawn the idler from engagement with the drive belt 11, thus disengaging the pump. Also in this position the agitator is engaged due to the fact that the rod 58 is in its lower position, as explained above.

From the above description it will be apparent that an extremely satisfactory and simple control mechanism has been provided for an automatic washing machine, and particularly a simple control mechanism for the pump. It will further be observed that by tying in the pump control with the agitator control through direct mechanical means, the operation of the pump is assured at all times that the motor is on and the agitator disconnected. It is furthermore assured that the pump itself is disconnected when the agitator is in operation.

While we have shown a particular embodiment of our invention it will, of course, be understood that we do not wish to be limited thereto, since many modifications may be made and we, therefore, contemplate by the appended claims to cover all such modifications as fall within the true spirit and scope of our invention.

We claim as our invention:

1. Control mechanism for a washing machine of the type having at least a movable agitator and a pump, comprising power means for moving the agitator, a first shiftable control element for connecting and disconnecting the agitator with said power means, means for rotating the pump including a second control element shiftable to produce a driving connection for said pump, and means interconnecting said first and second control elements to shift said control elements concurrently.

2. Control mechanism for a washing machine of the type having at least a movable agitator

and a pump and motive power means for driving said agitator and pump, comprising a clutch controlling the connection of said agitator to said motive power means, a shiftable control link for said clutch, means for driving said pump from said motive power means including a shiftable element controlling the establishment of the driving connection, and a mechanical connection between said control link and said shiftable element to concurrently produce a driving connection of said agitator and disconnection of said pump, or vice versa.

3. Control mechanism for a washing machine of the type having at least a movable agitator and pump and motive power means for driving said agitator and pump, comprising a clutch controlling the connection of said agitator to said motive power means, a shiftable control link controlling operation of said clutch, means for driving said pump from said motive power means including a shiftable element controlling the establishment of a driving connection, and a single rectilinearly movable member having operative connection with said control link and said shiftable element to concurrently produce a driving connection of said agitator and disconnection of said pump, or vice versa.

4. Control mechanism for a washing machine of the type having at least a movable agitator and pump and motive power means for driving said agitator and pump, comprising a clutch controlling the connection of said agitator to said motive power means, a shiftable control link controlling operation of said clutch, means for driving said pump from said motive power means including a shiftable element controlling the establishment of a driving connection, a single rectilinearly movable member having operative connection with said control link and said shiftable element to concurrently produce a driving connection of said agitator and disconnection of said pump, or vice versa, including a power driven rocking member and a selectively operable connection between said rocking member and rectilinearly movable member operable to selectively connect said rectilinearly movable member with said rocking member, for movement therewith for the length of stroke thereof.

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