Nov. 2, 1965 P. W. DOUGLAS 3,215,232

DOMESTIC LAUNDERING MACHINE

Filed Oct. 11, 1962 3 Sheets-Sheet 1

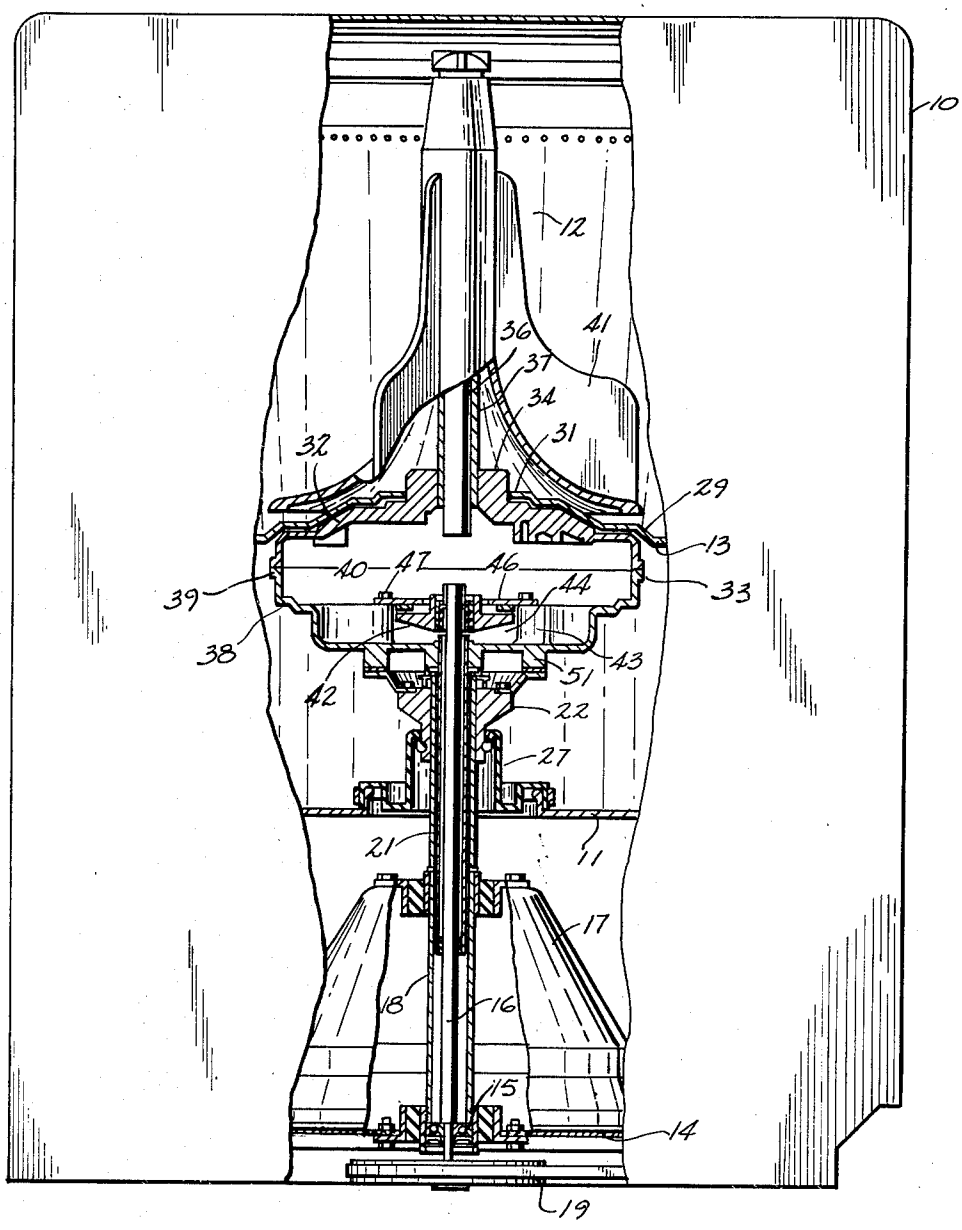

Fig. 1

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3 Sheets-Sheet 2

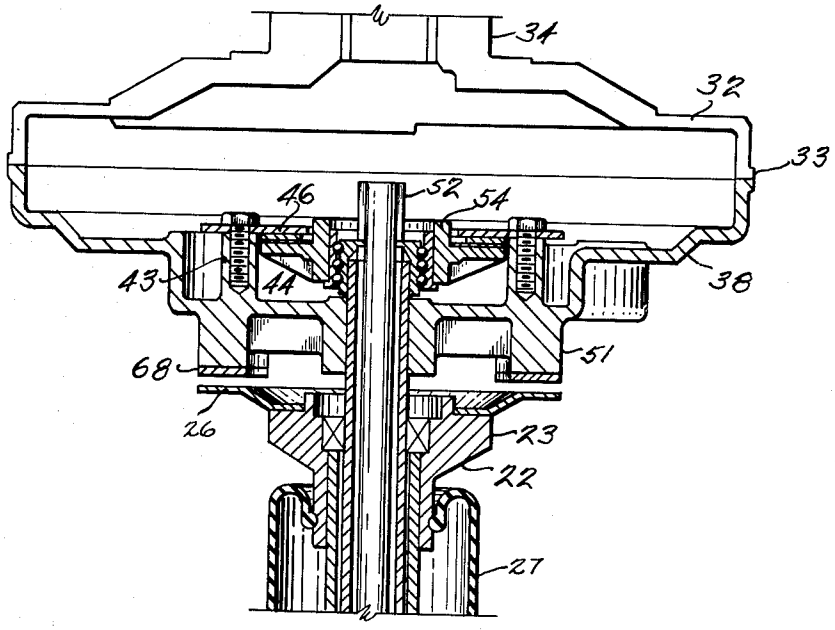

FIG. 3

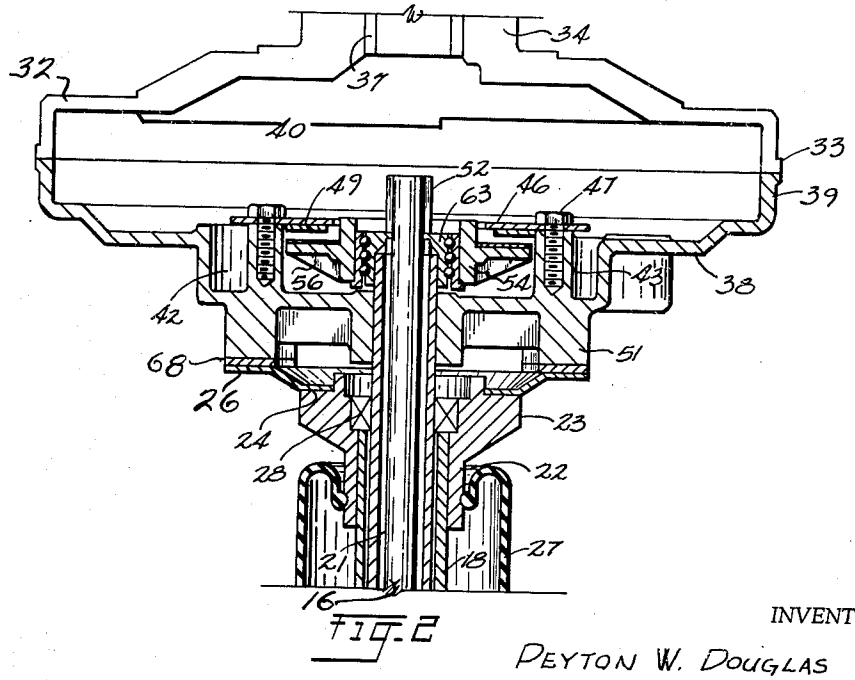

FIG. 2

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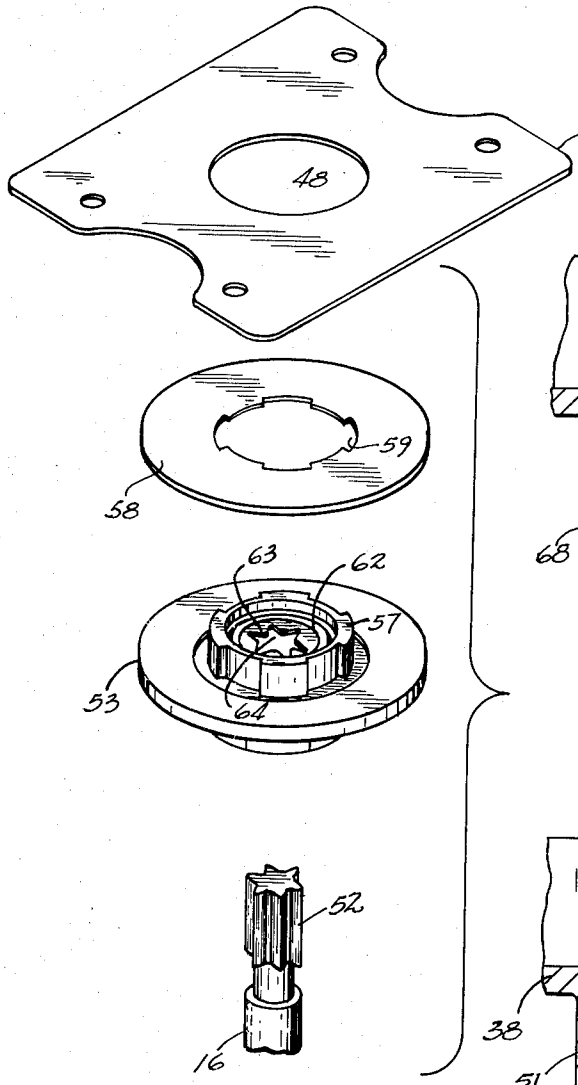

Fig. 4

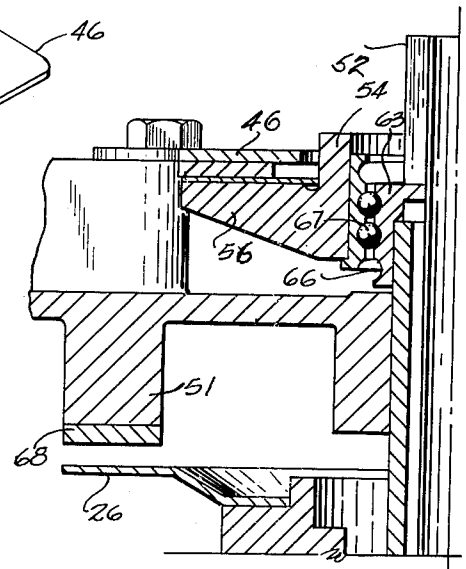

Fig. 6

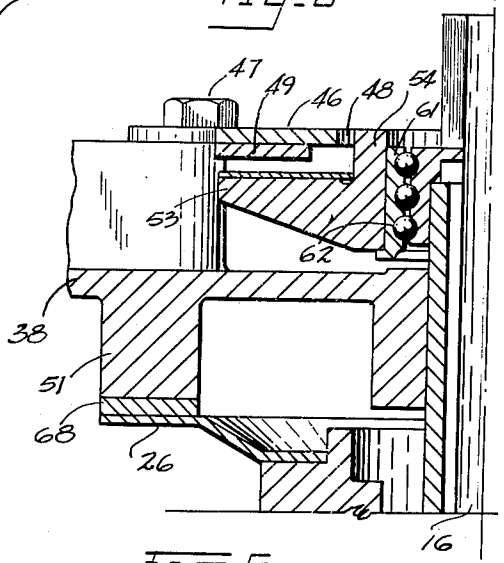

Fig. 5

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United States Patent Office 3,215,232 Patented Nov. 2, 1965

3,215,232

DOMESTIC LAUNDERING MACHINE

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Filed Oct. 11, 1962, Ser. No. 229,923
5 Claims. (Cl. 192—18)

This invention relates to improvements in a domestic washing machine of the type in which a single receptacle is utilized for the operations of washing, rinsing, and centrifugally drying clothes. More particularly, the invention is directed to structural features having to do with the operation of drying clothes.

The present invention is of the nature of an improvement over the A. Lodge Patent No. 2,841,260, dated July 1, 1958, with respect to the receptacle suspension and spin drive therefor. Further, the improved suspension and drive are shown as embodied in a washing machine of the general type shown and described in my pending application, Serial No. 122,598, filed July 7, 1961, now Pat. No. 3,083,558.

It is considered to be a most important object of the invention to provide a support for a clothes receptacle, together with means for lifting the receptacle and rotating it at spin drive speed through the provision of parts so designed and arranged as to be extremely economical to manufacture, easy to install, and which are substantially impervious to wear or damage in use.

Another object of the invention lies in the provision of driving means for the receptacle that includes a clutch mechanism, automatically operable to gradually bring the receptacle up to required rotational speed for a spin drying operation.

A further object of the invention lies in the provision of means forming a part of the drive mechanism that is sequentially operable to raise the receptacle into a position for a spin drying operation and lower said receptacle, upon completion of such an operation, into an "at rest" position.

Other objects and advantages of the invention will be more fully understood and appreciated from a consideration of the following specification, taken in conjunction with the accompanying drawings; and in which—

FIG. 1 is a side elevational view of a cabinet enclosed washing machine in which one form of the present invention is embodied, a part of one vertical cabinet wall being broken away to disclose the location and arrangement of the inventive structure;

FIG. 2 is an enlarged fragmentary vertical sectional view of the central portion of the receptacle base and support therefor, the receptacle being shown in "at rest" or seated position;

FIG. 3 is a view similar to FIG. 2 and shows the position of the parts when the receptacle has been raised into position for a spinning operation;

FIG. 4 is an exploded isometric view of the parts involved in raising and lowering and spinning the receptacle;

FIG. 5 is a greatly enlarged fragmentary vertical sectional view of the parts when positioned as shown in FIG. 2; and

FIG. 6 is a view similar to FIG. 5 in which the parts appear as in FIG. 3.

Referring more particularly to the drawings, the reference numeral **10** is employed to generally designate a rectangular cabinet in which a single receptacle washing, rinsing, and centrifugally drying machine, embodying the invention, is contained. The cabinet forms no part of the invention and is illustrated solely for the purpose of disclosing the general proportions required to enclose the structure. Within the cabinet, a portion of the base

wall **11** of a collector tank is shown and it will be understood that this tank encloses a washing receptacle **12**, the bottom wall **13** of which is shown in part in FIG. 1. A rigid base wall **14** of the cabinet centrally mounts an end-thrust bearing **15** for a drive shaft **16**. The cone-like member **17** and the enclosing sleeve **18** for the shaft form no part of the present invention, being covered in my above referred to pending application. This structure is shown merely to illustrate that the shaft **16** is rotatable by a driven pulley **19** and provides support for the receptacle **12** during a part of a laundering operation. The shaft **16**, fixed sleeve **18**, and an intermediate guide tube **21** project upwardly through the wall **11** of the collector tank, substantially as shown. A tubular member **22** is secured to the upper end of the fixed sleeve **18** and includes a radially enlarged upper end **23**, the top surface of which takes the form of an annular ledge **24** that locates and secures a seat plate **26**. A suitable boot **27**, carried by the base wall of the tank **11**, engages the depending portion of the tubular member **22**. Within the member **22**, a suitable seal **28** is provided by which to prevent liquid contained in the tank **11** from seeping into the area in which the shaft **16** is located.

Centrally, the base **13** of the receptacle **12** includes a series of annular, radially, inwardly stepped up flanges **29** which terminate in an opening **31**. The purpose of this configuration in the base is to accommodate and match the top section **32** of a transmission housing **33**. Centrally the section **32** is reinforced and includes an apertured neck **34** that extends upwardly through the base **13** into the receptacle and serves as a support for the lower end of an agitator shaft **36** and enclosing sleeve **37**. The lower section **38** of the housing **33** includes a rim **39** that matches and is secured to the depending rim of the top section **32**. These parts provide an enclosed space **40** in which the entire mechanism for oscillating the agitator **41** and spinning the receptacle is contained. The section **38** has a central cup-like recess **42**, from the base of which are upstanding lugs **43**. The space **44**, within the lugs **43**, is bridged by a plate **46** which is secured by suitable studs **47** that engage the lugs **43** (see FIG. 2 or 3). The plate **46** has a central opening **48**. The under surface of the plate **46** has attached thereto a friction pad **49**. That portion of the housing part **38** that forms the cup-like recess **42** has an integral depending annular shoulder **51**, the diameter of which is such that it matches the diameter of the seat plate **26**. Inasmuch as the plate **26**, through member **22**, is carried by the fixed sleeve **18**, it is evident that the receptacle, when in position of rest, may seat on the plate **26** and the entire weight of the receptacle and contents will be supported by the sleeve **18**.

As is clearly shown in the drawings, the upper end of shaft **16** projects into the recess **42** and somewhat beyond into the general interior area **40** of the housing **33**. This end of the shaft is cut to form a pinion **52**. The upper end of this pinion, as may be determined by examination of the drawing in Lodge Patent No. 2,733,610, dated February 7, 1956, is employed to operate an oscillating mechanism for the purpose of actuating the agitator **41**. Since this particular mechanism is covered by the above referred to Lodge patent, it is not shown nor considered to be a part of the structure on which patent protection is currently sought. A clutch plate **53** partakes of the nature of a disk and includes a central collar portion **54** which extends above and below the disk. Since this plate, in use, is intended to carry the weight of the receptacle, the under portion of the collar is reinforced by ribs **56**. The upper portion of the collar (see FIG. 4) is provided with a series of laterally projecting lugs **57**. A relatively thin plate **58** of the same diameter as the clutch **53** has a central opening which is notched, as at **59**, to the same extent as lugs

57 are provided, and it is proposed to seat this plate on the clutch with the lugs fitting the recesses 59.

Within the opening formed by the collar portion 54 is a ring 61. In any suitable manner this ring is permanently attached to the circular wall formed by the collar portion 54. The inner surface of the ring 61 is formed with a spiral groove 62. A lift member 63 takes the form of a downwardly opening cup-like nut, the top thereof being apertured, as at 64, to fit and enable mounting it on the pinion 52. This connection requires the member 63 to at all times rotate with the shaft 16. The circumferential vertical wall of this member is formed with a spiral groove 66, and the difference in diameter between the inner wall of ring 61 and the circumferential wall of member 63 provides a slight clearance. When a series of balls 67 are fitted into the spiral grooves of the member 63 and ring 61, the balls may feed upwardly or downwardly of the cooperative grooves, thus providing anti-friction, thread-like connection between the member 63 and the clutch 53.

In explaining operation of the present structure, it will be kept in mind that the drive shaft 16 not only serves to oscillate the agitator when rotating in one direction but also serves to raise and rotate the receptacle 12 when driven in the opposite direction and, of course, it is with this latter phase of a washing cycle that the present invention is particularly concerned. Attention is particularly directed to FIGS. 2 and 5, wherein it will be seen that the receptacle 12, by means of the annular shoulder 51, rests upon and is supported by the seat plate 26 and in this position the pinion 52 of the shaft 16 projects sufficiently into the space 40 of the housing to be engageable with a suitable oscillating mechanism for the agitator 41. In other words, the position of the parts shown in these figures represents the "at rest" position of the receptacle which may be for agitator operation or the shut-down position of all parts of the machine.

In the washing cycle, following an agitator operation, it becomes necessary to remove the liquid contained in the receptacle and this is accomplished by spinning the receptacle. The automatic sequence of operation of a machine of the nature disclosed is such that, following the washing operation, the motor is stopped and then caused to rotate the drive pulley 19 in the opposite direction. In the present showing, this would be clockwise. Immediately the shaft 16 commences rotation in this direction, the lift member or nut 63 rotates and, through balls 67, causes the clutch plate 53 to move upwardly to a position such that it engages the friction pad 49 attached to the under surface of the bridging plate 46. Continued rotation of shaft 16 causes the clutch plate to lift the receptacle from off the seat 26, thus rendering the receptacle free to rotate. The position of the parts in this circumstance are shown in FIGS. 3 and 6. Of course, with the receptacle full of clothes and liquid, there will be a certain measure of slippage between the driven clutch plate and the friction pad 49 until such time as speed of rotation of the receptacle approaches or approximates the speed of rotation of the shaft and clutch plate. Rotation of the receptacle continues through a period timed to remove a substantial part of the liquid contained in the receptacle and in the clothes within it. At this time, the cycling mechanism shuts off the motor and, when the receptacle slows down and comes to a stop, the weight thereof will cause the receptacle, through the clutch plate 53, to rotate in a reverse direction; that is, downwardly to a point such that the shoulder 51 engages the fixed plate 26. A suitable friction pad 68, attached to the under surface of the annular shoulder 51, immediately brings rotation of the receptacle to a stop. In other words, due to the weight of the receptacle, transmission housing, and clothes in the receptacle, the total weight is such that, for purposes of any other operation of the machine, the receptacle has now become one with the fixed support.

It will, of course, be understood that other threadlike means than the bearing structure shown as between the lift member and the clutch plate may be employed and, also, that the extent of movement of the clutch plate and extent of lift of the receptacle may be varied as required, one type of machine with respect to another, without in any way departing from the spirit and scope of the invention as set out in the annexed claims.

Having thus set forth my invention, what I claim as new and for which I desire protection by Letters Patent is:

1. In a washing machine having a receptacle rotatable about a vertical axis and movable axially from an at rest position, to rotative position, a housing on the central bottom portion of said receptacle, a stationary support member adapted to receive and support said bottom portion in the at rest position, a driven shaft having an end extending into said housing, a lift member on said shaft end rotatable therewith at all times, a rotatable clutch plate surrounding said lift member, threadlike means connecting and supporting said plate on said lift member, said shaft when rotated in a given direction causing said lift member to move said clutch plate toward the receptacle on said threadlike connecting means, and a friction surface on said receptacle engaged by said clutch plate intermediate its travel on the threadlike connecting means whereby said receptacle is moved axially from its at rest position on further movement of the clutch plate on the threadlike means and is directly driven on the shaft when the clutch plate reaches the end of its travel on the threadlike means.

2. In a washing machine having a receptacle rotatable about a vertical axis and movable axially from an at rest position to a rotative position vertically spaced from the at rest position, a housing on the central bottom portion of said receptacle, a stationary support member adapted to receive and support said bottom portion in the at rest position, a driven shaft having an end extending into said housing, a lift member on said shaft end rotatable therewith at all times, a rotatable clutch plate surrounding said lift member, threadlike anti-friction means connecting and supporting said plate on said lift member, said shaft when rotated in one direction causing said lift member to move said clutch plate toward the receptacle on said threadlike connecting means, and a friction surface on said receptacle within said housing engaged by said clutch plate intermediate its travel on the threadlike connecting means whereby said receptacle is moved axially from its at rest position on further movement of the clutch plate on the threadlike means and is directly driven on the shaft when the clutch plate reaches the end of its travel on the threadlike means, said shaft when not rotated in said one direction releasing the clutch plate from the friction means to lower the receptacle to its at rest position.

3. In a washing machine, a receptacle rotatable about a vertical axis and axially movable from an at rest position to a rotative position, a housing on the bottom of said receptacle, a fixed stationary member adapted to receive and support said receptacle in its at rest position, a driven shaft having an end extending into said housing, a lift member on said shaft rotatable therewith at all times, a clutch plate surrounding said lift member, the proximate surfaces of said lift member and said clutch plate having spiral grooves, a series of balls engaged between said grooves and providing anti-friction connection between said lift member and said clutch plate, whereby said clutch plate is moved toward the receptacle on rotation of the shaft in one direction, and a friction surface on said receptacle engaged by said clutch means intermediate its travel on the rotating balls whereby said receptacle is moved axially from its at rest position on further movement of the clutch plate on the balls and

is thereafter directly connected to the shaft through said lift member, clutch plate and connecting balls.

4. In a washing machine as claimed in claim 1 wherein the stationary support member includes a hollow shaft surrounding and coaxial with the driven shaft.

5. In a washing machine as claimed in claim 1 wherein said clutch plate carries a friction member fixed thereto engageable with the friction surface on said receptacle.

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