Jan. 21, 1969 J. R. FOSLER 3,422,957

UNBALANCED SENSING SWITCH ASSEMBLY FOR CENTRIFUGAL MACHINES

Filed June 3, 1966 Sheet 1 of 2

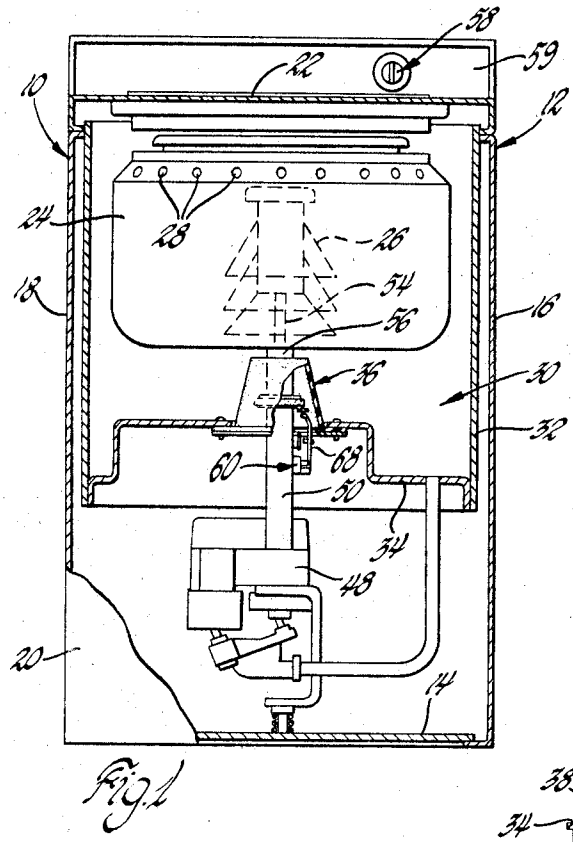


Fig. 1

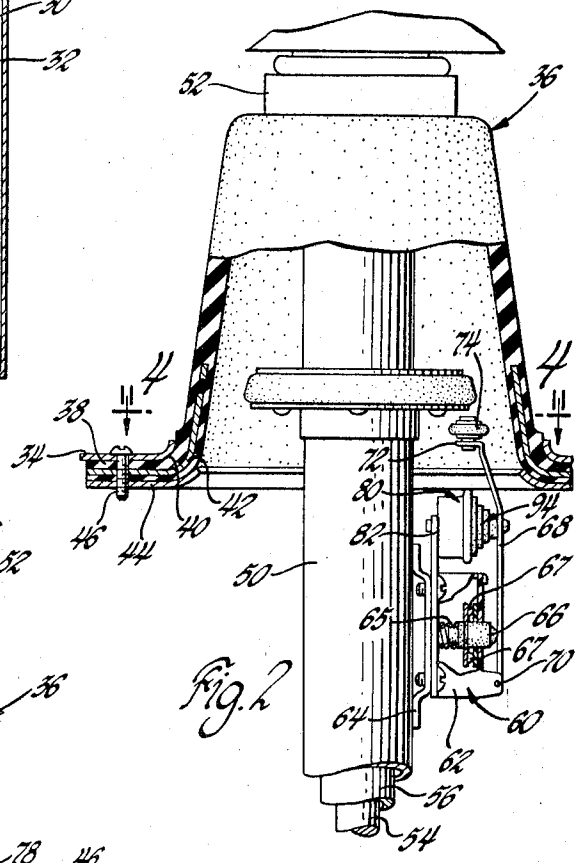


Fig. 2

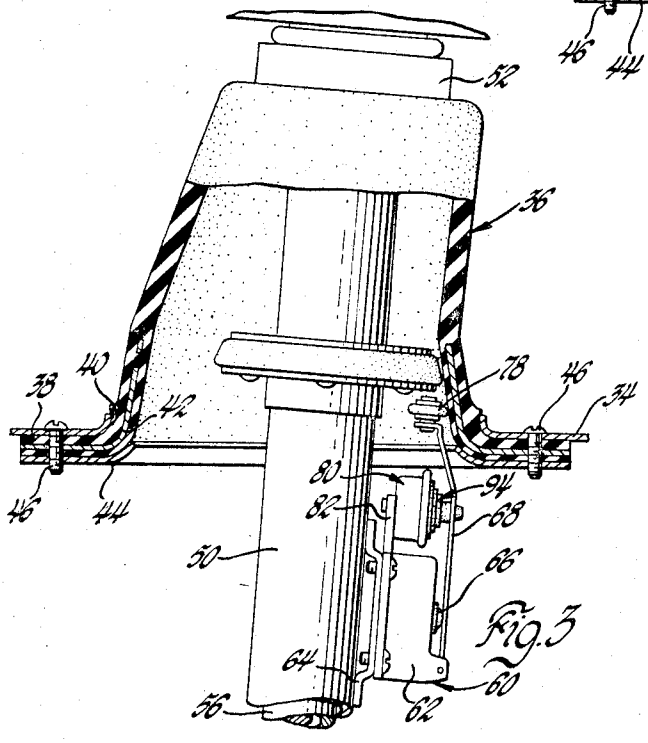


Fig. 3

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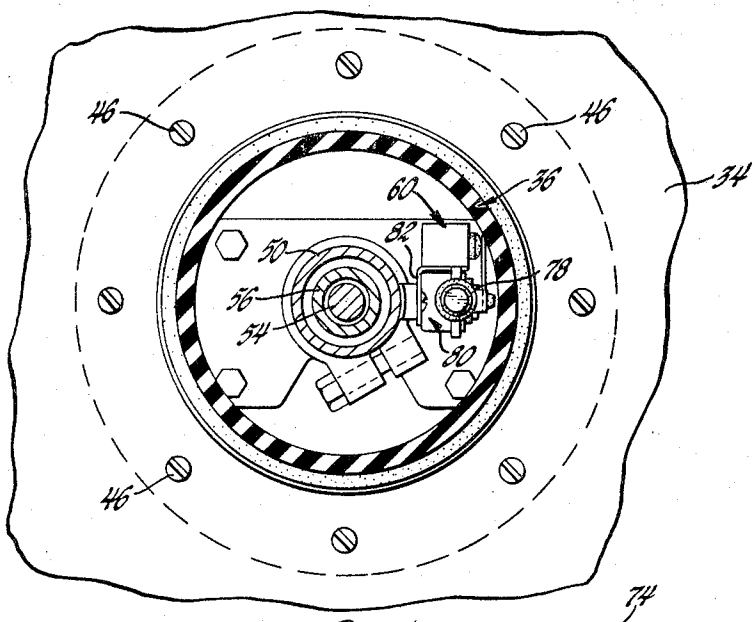


Fig. 4

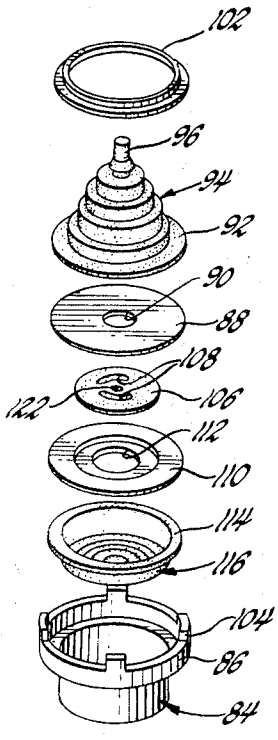


Fig. 7

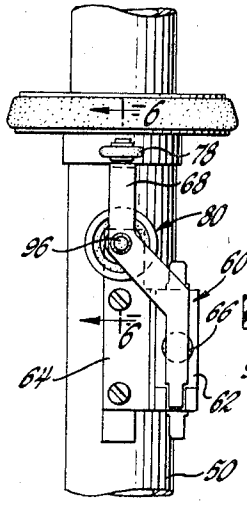


Fig. 5

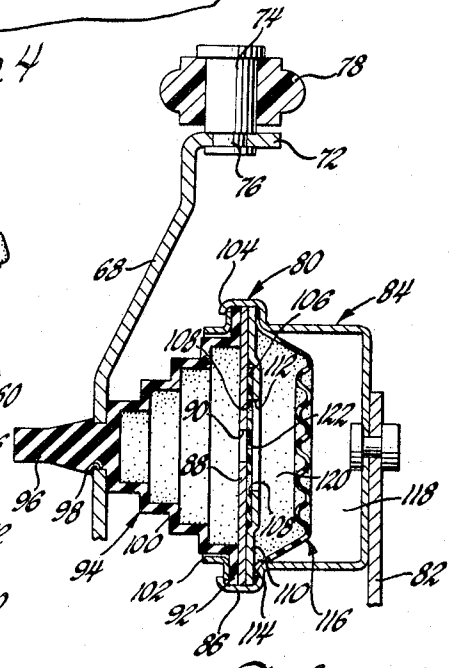


Fig. 6

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UNBALANCED SENSING SWITCH ASSEMBLY FOR CENTRIFUGAL MACHINES

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Filed June 3, 1966, Ser. No. 555,178
U.S. Cl. 210—144 7 Claims
Int. Cl. B01d 35/14

ABSTRACT OF THE DISCLOSURE

A vertical tub domestic clothes washer has an inverted cup-shaped resilient support hat which secures the spin tub to a lower bulkhead of a water container around the tub. A shaft housing depends from the hat outwardly of the container. The washer operation is in part controlled by a bump switch supported on the shaft housing below the hat. The hat protectively covers the switch assembly and constitutes a relatively restrained member against which the bump switch will hit when the machine vibrates due to unbalanced loadings in its tub.

This invention relates to centrifuging machines for extracting liquid from articles by centrifugal force and more particularly to an improved switch assembly therein for detecting unbalance in such machines to initiate a corrective phase of operation in the machine.

In centrifuging machines of the type that have a rotatable receptacle in which liquids and articles are placed and from which the liquid is extracted upon a high speed of rotation of the receptacle often the articles within the rotatable receptacle are arranged to produce a substantial unbalanced force on the receptacle which can cause it to move in a manner to produce excessive vibrations in the machine. A typical example of such machines is a domestic washer having a spin tub in which a liquid cleaning media is contained for removing soil from articles placed in the spin tub. Generally in such appliances there is an agitation or wash cycle of operation wherein the cleaning solvent is surged through the articles to be cleaned for removing the soil therefrom. Following the wash cycle of operation, the spin tub is driven at a high rotative speed to remove the liquid cleaning solvent from the spin tub by centrifugal forces.

In certain instances, the articles to be cleaned are misarranged within the spin tub so as to produce a substantial unbalanced force acting thereon during the high speed extraction or spin cycle of operation. Typically, the unbalanced forces acting on the spin tub will produce a substantial relative movement of the spin tub with respect to its support base. In order to prevent such amplitude movements from creating excessive vibrations in the support of the machine many machines incorporate a control system for de-energizing the drive for the spin tub when the amplitude of movement thereof reaches a pre-determined maximum. Such control systems typically include a bump switch that is contacted by the moving spin tub or a movable water container that encloses the spin tub when a pre-determined maximum movement therein is reached above which undesirable vibrations will occur in the support for the spin tub or the like.

The arrangement of such movement detecting switch assemblies in centrifuging machines has taken many forms in the past depending upon the matter in which the spin tub is supported with respect to the support on which it is carried.

In certain cases, however, the spin tub may either be located in an environment or location in which it is difficult to arrange a conventional bulb switch assembly in

order to both obtain reliable operation of the switch assembly following a period of use and to readily and accurately detect movement of the spin tub that can cause undesirable vibrations in the remainder of the machine. For example, in certain domestic clothes washing machines the rotatable clothes containing receptacle is located within a water container which is fixedly supported on a machine frame work. In such cases, typically, the rotatable receptacle is resiliently supported for movement with respect to the water container and is substantially enclosed by the water container. As a result, any movement detecting switch assembly that is arranged to contact the spin tub is located within the relatively high humidity environment of the water container or located closely adjacent thereto. Consequently, the mechanism of the switch assembly is subjected to a relatively severe environment which can undesirably affect the life characteristics thereof.

Accordingly, an object of the present invention is to improve unbalance correcting systems for centrifuging machines by utilizing a component of the drive for the rotatable receptacle of the centrifuging machine as a movable support for a bump switch and wherein the bump switch and drive component are enclosed by a support element for the rotatable receptacle and the drive component to isolate the bump switch assembly from the environment into which fluid in the receptacle is extracted during a centrifuging operation.

A further object of the present invention is to improve systems for correcting unbalanced loading of a rotatable receptacle in a centrifuging machine wherein the rotatable receptacle is supported on a frame work by a resilient member for yieldable movement with respect to the frame work and wherein the receptacle is rotated by a drive mechanism having a shaft housing secured to the resilient support member to be carried thereby and movable with respect to the fixed support upon movement of the rotatable receptacle with respect thereto by the provision on the shaft housing of a switch secured thereto with an actuatable member that has at least two operative positions for controlling the energization circuit for a drive motor in the system and wherein an actuator arm is secured on the shaft and operatively positioned to engage the actuatable member and to periodically engage the resilient support for the rotatable receptacle upon the occurrence of the pre-determined maximum relative movement between the receptacle and the fixed support.

A still further object of the present invention is to improve centrifuging machines having a rotatable receptacle for extracting liquid which is periodically subjected to unbalanced loading and wherein the liquid containing rotatable receptacle is enclosed by a fixed water container and supported at its base on the fixed water container by a resilient member for relative lateral movement with respect to the water container upon being subjected to unbalanced loading and wherein the rotatable receptacle is driven by means including a shaft housing secured to the resilient member and movable with respect to the water container upon movement of the spin tub by the provision of a switch assembly that is secured to the shaft housing and movable therewith wherein the resilient support shields the switch assembly from the environment within the water container and wherein the switch assembly has an elongated actuator arm that will be moved by the shaft housing against the resilient support and shifted to a position causing an actuatable member of the switch assembly to be moved into a pre-determined operative position to down shift the speed of operation of the machine upon the occurrence of a pre-determined unbalanced loading in the rotatable receptacle.

Yet another object of the present invention is to im-

prove domestic clothes washers of the type including a rotatable article containing basket from whence liquid is extracted by centrifugal force during a spin cycle of operation and wherein the spin basket is enclosed by a fixed water container which carries an inverted resilient hat member that supports the spin tub and a depending drive mechanism including a vertically disposed shaft housing also secured to the resilient hat support element by the provision of a switch mechanism secured to the shaft housing immediately below the resilient hat whereby the hat element shields the switch from the environment within the water container and wherein the switch assembly includes an actuatable member locatable in a first position and a second position and wherein the switch assembly further includes an elongated actuator arm having a pivotally supported end and the opposite end thereof directed inwardly of the resilient hat support element whereby upon a predetermined unbalanced loading in the spin basket the actuator arm will be shifted by the shaft housing into engagement with the hat element and moved with respect to the shaft housing upon such contact to shift the actuatable member into its second position where the drive mechanism is shifted to a lower speed phase of operation; and wherein delay means are included to prevent downshifting by momentary contact of said actuator arm with said hat and means are included to maintain said drive downshifted for a pre-determined period following a sustained contact between the actuator arm and the hat.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1, is a view partially in elevation and partially in section of a domestic clothes washer including the unbalance correcting system of the present invention.

FIGURE 2, is an enlarged, fragmentary view in vertical section of a resilient support and unbalance sensing switch of the present invention;

FIGURE 3, is an enlarged fragmentary vertical sectional view like FIGURE 2 showing the system of the present invention in a second operative position;

FIGURE 4, is a view in horizontal section taken along the line 4–4 of FIGURE 2;

FIGURE 5 is a side elevational view of a portion of a switch assembly in the present invention;

FIGURE 6 is an enlarged, fragmentary vertical sectional view taken along the line of 6–6 of FIGURE 5;

FIGURE 7 is an exploded view in perspective of a damping and reset subassembly in the switch of the present invention.

Referring now to FIGURE 1, a centrifuging machine 10 is illustrated which is representatively shown as being a domestic clothes washer of the type including an outer-casing 12 having a base 14, sidewalls 16, 18, a front wall 20, a top 22, and a rear wall (not shown). The top 22 includes a closure element for an access opening into a rotatable spin tub 24 which is adapted to receive articles to be cleaned in a liquid solvent agent which is directed into the tub through a distributing system (not shown) of the type representatively shown in the U.S. Patent No. 3,087,321 issued Apr. 30, 1963, to Brucken. Brucken.

Within the spin tub 24 is located an agitator member 26 that is movable with respect to the articles within the spin tub 24 during a wash cycle of operation of the machine so as to cause the liquid cleaning agent to be surged through the articles within the spin tub for removing soil therefrom.

In the illustrated arrangement fluid is centrifugally extracted from the spin tub 24 through a plurality of openings 28 located adjacent the open end of the tub 24 and hence are discharged during a high spin speed extraction cycle of operation into a space 30 surrounding the spin tub 24 which is bounded by an open-ended water container 32 having a bottom bulkhead 34. The container 32 is fixedly secured to the outer casing 12 by suitable bracket means.

In the illustrated arrangement an inverted cup-shaped resilient support element or hat 36 is arranged on the bottom bulkhead 34 to support the spin tub 24 and agitator member 26 thereon. More particularly the support hat 36 includes a radially outwardly directed lip 38 at the open end thereof which underlies the peripheral edge of an opening 40 through the bottom bulkhead 34. The lip 38 has a metal insert 42 directed therethrough which extends through a portion of the height of the side walls of the hat 36 to reinforce the lower segment of the hat. The lip 38 has an annular retainer element 44 overlying the exposed surface thereof exteriorly of the bulkhead 34 into which are threadably received a plurality of fastening elements 46 representatively shown as screw elements directed through the bulkhead 34, lip 38, and reinforcing member 42 for maintaining the lip 38 in a tight sealed relationship about the opening 40 in the bottom bulkhead 34 thereby to prevent leakage of fluid from the container 32.

In the illustrated centrifuging machine one characteristic thereof is that the drive mechanism both for reciprocating the agitator 26 and for rotating the spin tub 24 is characterized by the fact that it is supported by the hat 36 in a depending fashion whereby when the spin tub 24 is subjected to unbalanced loadings of a magnitude that will cause excessive gyrating movement thereof with respect to the fixed water container 32 the drive mechanism will be moved in a like fashion.

More particularly in the illustrated arrangement the drive mechanism includes a friction roller drive assembly 48 of the type more specifically set forth in the above mentioned Brucken patent. Such a mechanism 48 includes a vertically disposed upwardly directed shaft housing 50 that is directed through the opening 40 in the bottom bulkhead 34 of the water container 32 and arranged co-axially of the inner surface of the hat 36. The shaft housing 50 is secured to the top of the support hat 36 to be dependingly supported thereby on the container 32. A seal assembly 52 covers the upper end of hat 36 to prevent the escape of water from container 32 down the shaft housing 50. Within the shaft housing 50 are located an agitate shaft 54 which is secured to the agitator member 26 and a surrounding co-axially directed spin shaft 56 which is fixedly secured to the base of the spin tub 24.

In the illustrated arrangement a control mechanism 58 on a rearwardly located panel 59 of the outer casing 12 is presettable to select desired cycles of cleaning operation in the centrifuging device 10 as desired. For example, in a typical clothes washer of the type illustrated, the controller 58 will, through suitable electrical circuits, selectively establish a fill-cycle of operation wherein washing solvent is directed into the spin tub 24; thence condition a drive motor of the drive mechanism 48 to operate the agitate shaft 54 to drive the agitator member 26 with respect to the cleaning solvent and articles in the spin tub 24 during a wash cycle of operation which is then followed by a suitable rinse cycle subsequently followed by an extraction or spin cycle of operation wherein the spin shaft 56 is operated by the drive assembly 48 to rotate the spin tube 24 at a high rate of rotation whereby liquid in the spin tub 24 is centrifuged through the extraction ports 28 into the water space 30 for collection in the water container 32. During the spin cycle of operation typically in domestic washers a drain system is rendered operative whereby the collected fluid is discharged through suitable conduit and pump means for removal to a point exteriorly of the water container.

So long as the articles in the spin tub 24 are distributed about the inner periphery thereof in a balanced disposi-

tion the high spin speed phase of operation normally will find the spin basket **24** and drive assembly **48** with its shaft housing **50** vertically disposed as illustrated in FIGURE 2. However, when the articles within the spin basket **24** are arranged so as to produce a substantial unbalanced loading thereon during the high spin speed extraction cycle of operation the basket **24** will gyrate about its normal vertical axis as shown in FIGURE 3 and the resultant movement of the spin tub **24** can cause a substantial deflection in the resilient support hat **36** as illustrated. In the absence of a system for correcting such unbalance it is found that substantial vibrations are induced in the outer casing **12** which are often of a magnitude sufficient to cause the outer casing **12** to walk with respect to its supporting floor. In order to avoid this undesirable effect in the illustrated arrangement, the centrifuging machine **10** incorporates an improved bump switch assembly **60** which is operative to detect such unbalanced loading and to condition the controller **58** to shift the output speed of the spin shaft **56** to a low speed phase of operation to drive the spin tub **24** in a manner to prevent the undesirable vibrations. The reduced speed of rotation of the spin tub reduces the effect of the unbalanced loading in the spin tub insofar as the remainder of the machine is concerned.

In the past, bump switch assemblies to carry out such a corrective phase of operation in centrifuging devices of the type illustrated have been disposed to be in direct operative contact with the spin tub **24** following a predetermined gyratory movement thereof. In cases where the spin tub **24** was enclosed by a fixed water container such as water container **32** or a like container defining a space for receiving fluid extracted from the spin tub it was the practice to locate the switch assembly within the environment surrounding the spin tub which in many cases created substantial corrosion problems in the switch assembly and the like.

One characteristic of the present invention is the manner in which the bump switch assembly **60** is related to the movable spin tub **24** so as to detect excessive movements thereof during the extraction cycle of operation. More particularly, and as representatively shown in the illustrated embodiment of the invention the switch assembly **60** has a micro-switch component **62** that is fixedly secured to the outer surface of the shaft housing **50** by a bracket **64** thereon fastened to the micro-switch component by suitable fastening means. The micro-switch component **62** includes an actuatable plunger **66** that is normally biased outwardly of the housing of the micro-switch component **62** in a spring **65** as shown in FIGURE 2. In this position the actuatable plunger **66** in the illustrated arrangement maintains a pair of contacts **67** in a closed position to complete an energization circuit for the electric drive motor of the friction roller drive mechanism **48**. When the plunger **66** is moved inwardly of the micro-switch component **62** the contacts **67** are opened to de-energize the motor circuit.

Additionally, the bump switch assembly **60** includes an elongated actuator arm **68** having one end thereof pivotally mounted on the housing of the micro-switch component **62** by a pivot pin **70** and the opposite end thereof located interiorly of the support hat **36** and off-set when the washer is in a balanced condition as seen in FIGURE 2 radially inwardly of the reinforced portion at the base of the hat **36**. The distal end **72** of the actuator arm **68** is bent over and has a pin **74** secured thereto by upsetting a small diameter end **76** thereon into locking engagement with the bent distal end **72** of the actuator arm as best seen in FIGURE 6. Upon the pin **74** is located a roller element **78** that is freely movable about the axis of the pin **74**. In one working embodiment the roller **78** is made of a low coefficient of friction material whereby when the roller **78** contacts the inner periphery of the hat **36** at the reinforced end thereof there will be little or no tendency for the arm **78** to abrade the hat **36**.

Additionally, the switch assembly **60** includes a time-delay subassembly **80** that controls the movement of the actuator arm **68** in a pre-determined manner to maintain the actuatable plunger **66** of the micro-switch component **62** at one of its plural control positions to assure that unbalanced loading conditions in the spin tub **24** will be corrected. The time delay subassembly **80** is supported on an arm **82** that extends in the illustrated arrangement upwardly of the housing of the micro-switch component **62**. On the arm **82** is secured a cup-shaped housing **84** having the base thereof secured to the arm **82** by a suitable fastener and including a radially outwardly directed flanged portion **86** of a channel shaped cross-section at its opposite end. Seated within the channel shaped flange **86** is a valve plate **88** that has an opening **90** directed centrally therethrough. On the exterior face of the valve plate **88** is seated a radially outwardly directed flange **92** at the open end of a bellows **94** which has an elongated tip **96** thereon directed through an opening **98** in the actuator arm **68** to be located in inter-locking engagement therewith. The bellows **94** and valve plate **88** in cooperation with one another define a first fluid chamber **100** on one side of the valve plate. The bellows **94** is secured to the cup-shaped housing **84** of the assembly **80** by a retainer ring **102** that seats against the bellows flange **92** and which is held in engagement therewith by turned over outer tabs **104** on the flanged portion **86** of the element **84**. On the opposite side of the valve plate **88** is located a flexible check valve element **106** in the form of a thin disk having a plurality of openings **108** therein located at a position offset from the opening **90** through the valve plate **88**. The check valve element **106** is retained in place against the opposite face of the valve plate **88** by an annular plate **110** that has a large dimeter opening **112** therethrough having a planar extent which encompasses the location of the openings **108** and **90** in a co-axial direction. The outer edge of the plate **110** is seated in the channel shaped flange **86** and against the outer edge **114** of an internal diaphragm **116** that extends within the interior **118** of cup member **84**. Valving element **106** and diaphragm **116** cooperate to form a second chamber **120** on the opposite side of the valve plate **88** as best seen in FIGURE 6. By virtue of the above illustrated subassembly **80**, when the spin basket **24** is subjected to substantial unbalanced loading sufficient to cause the shaft housing **50** to be shifted from its normal vertical position to a position inclined from the vertical as seen in FIGURE 3, the roller **78** will contact the reinforced portion of the resilient support hat **36** and thereby shift the actuator arm **68** toward the shaft housing **50** and against the diaphragm **94**. Fluid in the space **100** is thereby forced through the opening **90** of the valve plate **88** and thence is forced across the valving element **106** into the chamber **120** formed in part of the internal diaphragm **116** which is expanded by the influx of fluid into the chamber **120** into space **118**. The restriction constituted by the valving element **106** will produce a pre-determined degree of damping against movement of the actuator arm **68** toward the shaft housing **50** whereby any momentary contact of the roller **78** with the resilient support hat **36** will be insufficient to shift plunger **66** from its motor energizing position shown in FIGURE 2. A contact between the roller **78** and the resilient support hat **36** of a pre-determined longer duration, however, will cause the actuator arm **68** to shift inwardly against the diaphragm **94** of the time delay mechanism **80** a sufficient distance to cause the actuatable plunger **66** to be located in its motor de-energizing position.

One feature of the above illustrated arrangement is that the actuator arm **68** is maintained in a pre-determined attitude with respect to the actuatable plunger **66** without the arm **68** being twisted about its longitudinal axis to a point where the switch assembly **60** might condition the control circuit either prematurely or only following an undesirable shifting movement of the spin tub **24** capable

of causing undesirable vibrations in the outer casing **12**. The aforedescribed twisting of the actuator arm **68** is possible by virtue of the fact that the spin tub **24** may have a tendency in certain cases as upon substantial unbalanced loading therein and a pre-determined accelerative phase of operation thereof, to cause the flexible end of the support hat **36** to twist sufficiently to cause the shaft housing **50** to be twisted upon its axis sufficiently to cause the end of the actuator arm **68** as it contacts the inside surface of the hat **36** to be held in engagement therewith. However, the presence of the roller **78** on the end of the actuator arm **68** prevents such binding between the actuator arm of the switch assembly **60** and the resilient support hat **36** by freely turning about the pin **74** to compensate for any tendency for such binding action. Additionally, the bellows **94** serves as a still further restraint against torsional movement of the actuator arm **68**.

Assuming that bellows **94** of the time delay assembly **80** has been shifted by the actuator arm **68** to cause fluid in the chamber **100** to be passed into the chamber **120**, a subsequent time delay function is produced to assure that the actuatable member **66** of the micro-switch component **62** will be maintained in its motor de-energizing position for a sufficient period of time to allow the spin tub **24** to be driven through its critical speed where large amplitude movement can occur without unbalance in certain cases.

The second time delay function is obtained in the illustrated embodiment of the invention in the following manner. Following contact of the roller **78** with the inside surface of that hat **36** and a de-energization of the drive motor for the spin tub **24**, the tub **24** will gradually be reduced in speed whereby the unbalanced force thereon will be reduced in magnitude to a point where the shaft housing **50** will be shifted back toward its normal vertical location. At this time, the actuator arm **68** will be freed from contact with the inside surface of the resilient hat **36** and air leakage across the flange **86** into the interior **118** of the cup-shaped housing member **84** will act on the internal diaphragm **116** to force fluid therefrom through a small diameter opening **122** in the valving element **106** that communicates the chamber **120** directly with the chamber **100** through valve plate opening **90**.

Another feature of the present invention is that the bump switch assembly **60** has the resilient support hat **36** disposed co-axially thereof and in an over-lying relationship therewith whereby the hat shields the switch assembly **60** against the high humidity atmosphere within the water container **32**. This results in a substantial improvement in the reliability of operation of the assembly **60** as compared to other bump switch assemblies for correcting unbalanced loading in centrifuging machines of the type that include a fixed container located about rotatable component of the device that gyrates with respect to the fixed container.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is:

1. In a centrifuging machine, the combination of a fixed support, a rotatable spin tub, means for resiliently supporting said rotatable spin tub on said fixed support, means for driving said spin tub including a shaft housing suspended on said resilient support means and movable with said spin tub with respect to said fixed support, switch means secured to said shaft housing, said switch means including an actuatable member and actuator member pivotally supported with respect to said shaft housing for movement with respect to said shaft housing, said actuator arm having a free-end portion engageable with said resilient support means upon a pre-determined movement of said spin tub with respect to said fixed support to cause said actuator arm to move said actuatable member into a first operative position, said resilient support means including an inverted cup-shaped member with an open-end secured to said fixed support, said shaft housing being directed co-axially through said cup-shaped member, said spin tub being subjected by unbalanced loadings therein during a pre-determined phase of operation to tilt said shaft housing with respect to said open-end of said cup-shaped support member whereby said free-end portion of said actuator arm is moved against said cup-shaped member to produce conditioning of said actuatable member to its first operative position.

2. In a clothes treating appliance, the combination of a fixed fluid container, a rotatable receptacle for treating articles disposed within said container, means for resiliently supporting said rotatable receptacle on said fluid container, means for driving said rotatable receptacle, said rotatable receptacle being affected by the presence of a pre-determined unbalanced loading therein to have pre-determined magnitude of movement with respect to said enclosing container, said means for driving said receptacle including a drive shaft secured to said spin tub and being movable with respect to said fluid container during movement of said spin tub relative thereto, movement detecting means on said shaft including an electrical switch means and actuator means moved by a pre-determined relative movement between said shaft and said fluid container to condition said switch means in response to such movement, said rotatable receptacle support being a resilient inverted cup-shaped member having an open-end thereof secured to said fluid container, said switch means being covered by said cup-shaped member to protect said switch means from the environment within said fluid container, said cup-shaped member having a relatively rigid portion thereon located adjacent said container and a more flexible portion thereof connecting said rotatable receptacle to said rigid portion, said more flexible portion of said cup-shaped member yielding upon an unbalanced condition in said rotatable receptacle to move with respect to said container and said more rigid portion of said cup-shaped member to cause said drive shaft to be inclined with respect to said container, said actuator means being an elongated arm having a distal end thereon engageable with said rigid portion of said protective cup-shaped member and movable upon engagement therewith to condition said switch means to a pre-determined operative state.

3. A bump switch assembly comprising a micro-switch housing, an actuatable plunger extending outwardly of said housing, spring means maintaining said plunger in a first operative position outwardly of said housing, an elongated arm having one end thereof pivotally secured to said micro-switch housing and the distal end thereof spaced a substantial distance from said actuatable plunger, positioning means for maintaining said distal end at a first operative position wherein said elongated arm engages said plunger at its first operative position without overcoming the spring-biasing force acting thereon, said positioning means including first damping means for retarding movement of said distal end in a direction toward said plunger to prevent transient vibrations from shifting said arm to operate said plunger, said positioning means including second damping means for delaying movement of said arm in a direction away from said plunger once said plunger has been moved inwardly of said housing by said arm.

4. In a centrifuging device, the combination of, a rotatable receptacle, fixed support means, means for resiliently supporting said rotatable receptacle on said fixed support, means for driving said rotatable receptacle including a shaft housing suspended on said resilient support means, said resilient support means maintaining said shaft housing in a substantially vertical location during periods when said rotatable receptacle is balanced, said resilient support means yielding in a pre-determined manner during rotation of said rotatable receptacle under unbalanced conditions to cause said shaft housing to be in-

clined from the vertical, control means for de-energizing said drive means, said control means including switch means on said shaft housing movable therewith from the vertical to the inclined positions thereof, said switch means including means selectively engageable with said resilient support means to condition said control means to a pre-determined operative state, said switch means including a micro-switch having an actuatable member normally disposed in a first operative position, an elongated arm having one end thereof pivotally secured to said micro-switch and the distal end thereof spaced a substantial distance from said actuatable member, means for biasing said distal end to a first operative position wherein said elongated arm is in a first operative engagement with said actuatable member at its first operative position, said means for biasing said arm into its first operative position including means for damping movement of said distal end in a direction to cause said actuatable arm to be moved from its first operative position, said damping means including means for delaying return of said distal end to its first operative position from a second operative position wherein said actuatable member is maintained in a second operative position for a pre-determined time period.

5. In combination of claim 4, a roller member secured to said portion of said actuator arm located in close spaced relationship with said cup-shaped member, said roller member engaging said cup-shaped member on a pre-determined unbalanced condition in said rotatable receptacle and being freely movable with respect to said cup-shaped member to prevent torsional movement of said actuator arm along its longitudinal axis whereby said actuator arm is movable with respect to said actuatable member primarily in response to a lateral component of movement of said rotatable receptacle with respect to said fixed support means.

6. In combination of claim 4, damping means located between said actuator arm and said actuatable member including a resilient member for damping relative movement between said actuatable arm and said actuatable member to prevent momentary contact between the said actuator arm and said resilient support member from moving said actuatable member, said resilient member resisting torsional movement of said elongated arm about its longitudinal axis so that said actuator arm is maintained in a pre-determined attitude with respect to said actuatable member throughout its relative movement with respect thereto.

7. In a centrifuging device, the combination of, a rotatable receptacle, fixed support means, means for resiliently supporting said rotatable receptacle on said fixed support, means for driving said rotatable receptacle including a shaft housing suspended on said resilient support means, said resilient support means maintaining said shaft housing in a substantially vertical location during periods when said rotatable receptacle is balanced, said resilient support means yielding in a pre-determined manner during rotation of said rotatable receptacle under unbalanced conditions to cause said shaft housing to be inclined from the vertical, control means for de-energizing said drive means, said control means including switch means on said shaft housing movable therewith from the vertical to the inclined positions thereof, said switch means including means selectively engageable with said resilient support means to condition said control means to a pre-determined operative state, said resilient support means including an inverted cup-shaped member having an open end thereof secured to said fixed support and a bottom portion thereof secured to said shaft housing, said switch means including a cover secured on one side of said shaft housing and having an actuatable member directed outwardly of said cover, an actuator arm, means for pivotally securing said arm to said shaft housing and for locating a portion thereof in close spaced relationship to the interior surface of said cup-shaped member, said actuator arm upon inclination of said shaft housing moving into engagement with said cup-shaped member for causing movement of said actuator arm to shift said actuatable member with respect to said switch cover.

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