Aug. 23, 1960 J. BOCHAN 2,950,009

UNBALANCE CORRECTING ARRANGEMENT FOR LAUNDRY MACHINES

Filed Aug. 4, 1958

3 Sheets-Sheet 1

FIG. 1

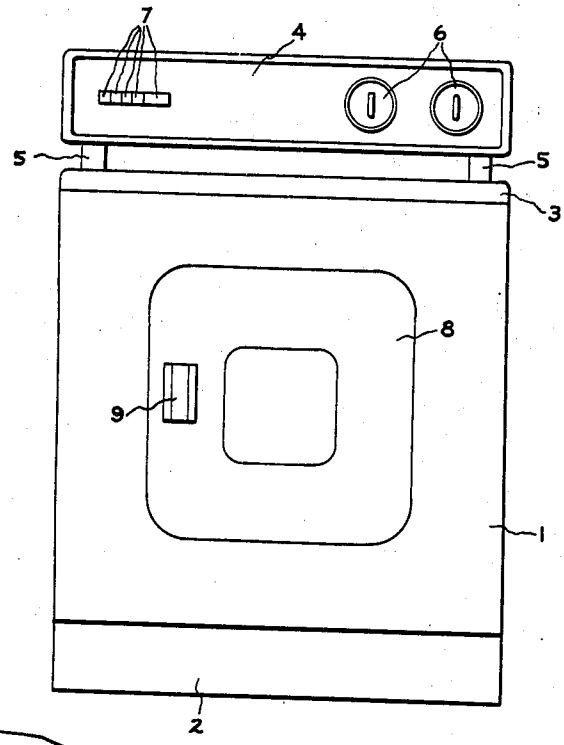
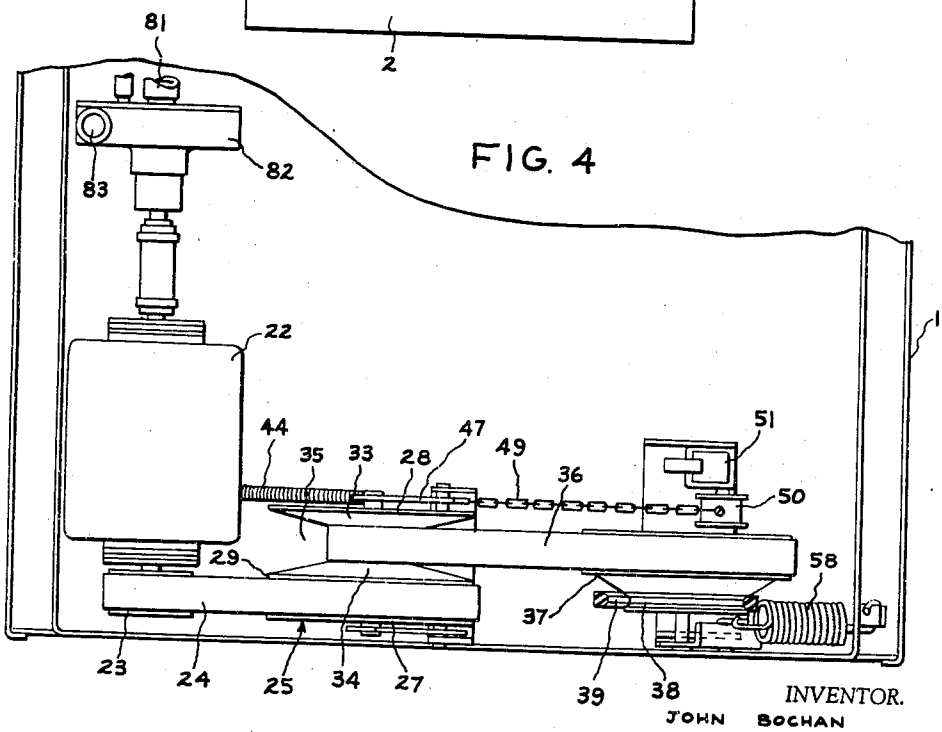


FIG. 4



INVENTOR.
JOHN BOCHAN

BY Donald P Laurence

HIS ATTORNEY

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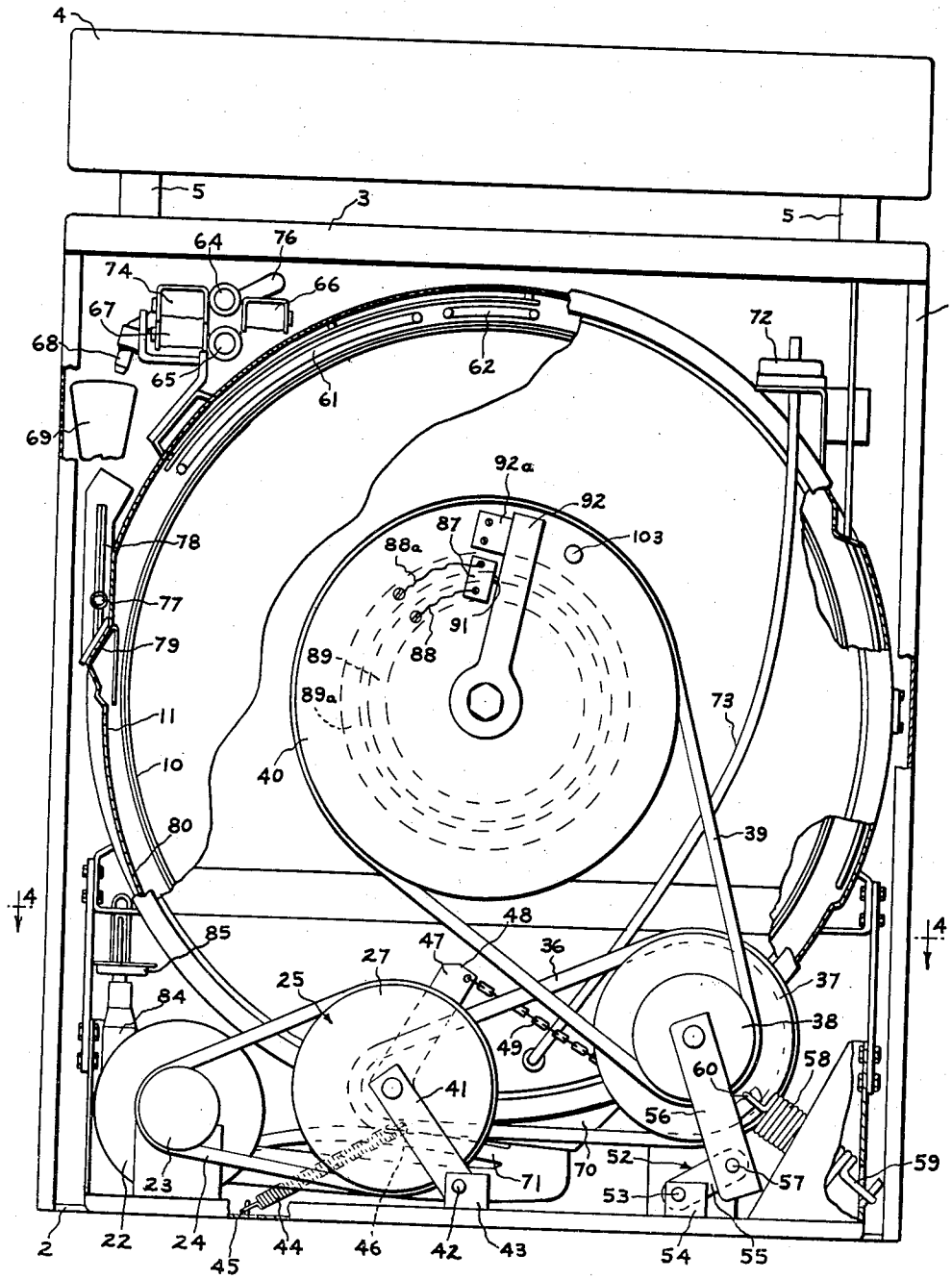


FIG. 2

INVENTOR.
JOHN BOCHAN
BY Orell P Laurence
HIS ATTORNEY

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UNBALANCE CORRECTING ARRANGEMENT FOR LAUNDRY MACHINES

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FIG. 3

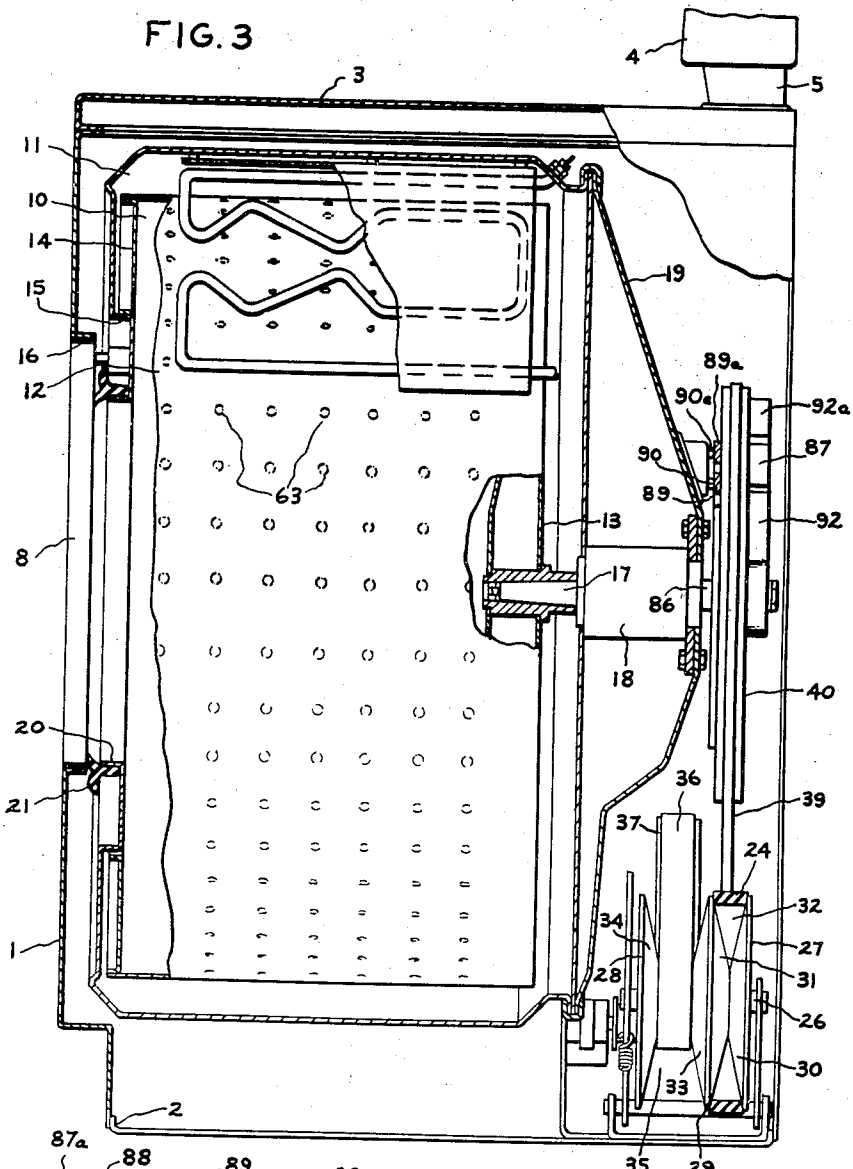
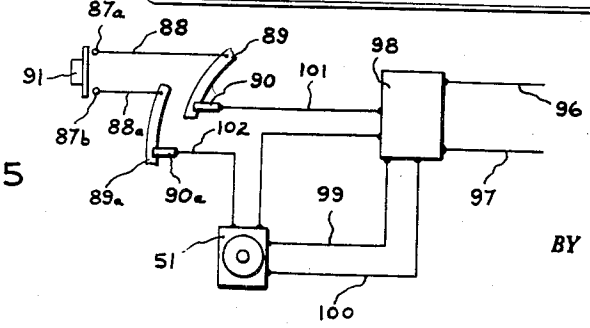


FIG. 5



INVENTOR.
JOHN BOCHAN
BY
Robert P Laurence
HIS ATTORNEY

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2,950,009

UNBALANCE CORRECTING ARRANGEMENT FOR LAUNDRY MACHINES

John Bochan, Louisville, Ky., assignor to General Electric Company, a corporation of New York

Filed Aug. 4, 1958, Ser. No. 752,726

6 Claims. (Cl. 210—144)

This invention relates to unbalance correcting arrangements for laundry machines of the type which provide a centrifugal liquid extraction step after a washing operation, and more particularly to such machines in which the unbalance is sensed and corrected prior to the attainment of speeds at which it will cause harmful vibrations. The invention is particularly applicable to laundry machines of the type which have a clothes container rotatable on a non-vertical axis.

Domestic laundry machines generally proceed through a sequence of first washing and rinsing clothes, and then effect a centrifugal extraction of liquid from the clothes by rotating the receptacle, or basket, at high speed. When the machine is of the type having a clothes receptacle rotatable on a non-vertical (usually horizontal) axis, the washing and rinsing operation is generally carried on by rotating the container at a speed appropriate for the clothes to proceed through a tumbling pattern within the receptacle. In the cases where the machine is intended to perform both the washing and drying functions, a heat drying operation may be provided after the high speed spin operation; this is generally conducted at approximately the same speed as for washing and rinsing, so that the clothes will again have their tumbling pattern in order to have a maximum amount of surface area exposed to the heat. Other modifications, besides the heat drying operation, to the basic cycle of washing, rinsing and spinning are of course possible. For instance, more than one rinse may be provided, and spins may be provided after the wash cycle and intermediate rinses as well as after the final rinse. Nonetheless, the basic cycle of washing, rinsing and spinning is necessarily adhered to in all cases.

While unbalances within the basket during tumbling, which is normally conducted at speeds in the vicinity of 47 r.p.m., do not cause more than a negligible amount of vibration, the unbalances have an increasing vibration-causing effect as the speed of rotation increases. Thus, during the high speed centrifugal extraction operation, a relatively small unbalance of the clothes may cause vibrations of a magnitude which are undesirable from the aspect of possible injury to the machine. To preclude these results, most laundry machines of the general type described above are provided with unbalance mechanisms which may operate in a variety of ways to preclude harm to the machine through excessive vibration. For instance, in some cases, controls are actuated by an unbalance switch when the magnitude of the vibration reaches the undesirable stage, so as to return the clothes receptacle to its low speed for a brief period of time; this gives the clothes a chance to re-orient themselves, and the machine thereafter again attempts the high speed rotation. Another frequently used alternative is simply to shut the machine off if the unbalance switch senses a magnitude of vibration which is deemed to approach the undesirable level.

Regardless of which of the foregoing approaches is used, the presence of substantial unbalance in the basket as it accelerates toward high centrifuging speed has its undesirable aspects. If the machine is shut off completely, the operator has to come back and start it up again. If the machine reaches a substantial speed and then has to be slowed down for redistribution of the clothes, each attempt may take a substantial part of a minute; considering that several attempts may be necessary before a machine has a distributed load which will permit the spin operation to continue, it can be seen that several minutes may be taken up in attempting to obtain suitable redistribution of the clothes. A further point is that the use of a sensing mechanism which depends on vibration before it is tripped must either permit a small amount of undesirable vibration to exist before it trips, or else it must be set low enough to trip before the undesirable vibration is reached in which case it may sometimes trip where it would not be really necessary.

Because of the foregoing, it is desirable to achieve a structure in laundry machines of the type described in which, by the time the machine reaches a speed where all the clothes are plastered about the inner surface of the clothes basket (hereinafter called "plaster speed"), proper distribution of the clothes is insured.

It is therefore an object of the present invention to provide an improved laundry machine construction wherein the parts cooperate to provide even distribution of the clothes around the periphery of the clothes basket by the time the minimum centrifuging speed, i.e., plaster speed, is reached.

A further object of the invention is to achieve such a construction by accelerating slowly from tumble speed (at which the clothes are washed and rinsed) toward plaster speed, with the acceleration being reversed and becoming deceleration in response to unbalances of a predetermined magnitude; this causes the speed to fluctuate up from tumble to the plaster speed, with the clothes becoming more and more evenly distributed until finally, when plaster speed is reached, the distribution is suitable for high speed spin operation.

Another and more specific object of the invention is to provide a preferred sensing arrangement, operable during the fluctuable increase from tumble speed to plaster speed, in which the force of gravity acting on unbalanced distribution of the clothes in the basket is used as a sensing agent to show that the distribution is incorrect before any noticeable vibration results therefrom.

In accordance with the invention, I provide a laundry machine which has a rotatable drum, or clothes basket, and suitable drive means for rotating the basket at clothes tumbling speed and at centrifuging speed. The drive means includes means for accelerating the basket slowly from tumbling speed toward centrifuging speed, and for decelerating slowly back toward tumbling speed. Suitable control means of the conventional type are provided to cause the accelerating and decelerating means to accelerate the basket from clothes tumbling speed toward centrifuging speed. I also provide means sensitive to unbalances in the basket; the unbalance sensing means overrides the control means at a predetermined magnitude of unbalance in the basket, and causes the accelerating and decelerating means to decelerate the basket toward tumbling speed as long as the unbalance stays above the predetermined magnitude. In this manner, the sensing means and control means cooperate in their control of the accelerating and decelerating means to provide a fluctuating increase of the speed of the basket until it finally reaches plaster speed with the clothes in a balanced condition within the basket.

In effect, what happens is that, as the speed of rotation increases, the circle in the basket beyond which the centrifugal force equals or overrides the force of gravity decreases in radius. As this occurs, more and more clothes

become trapped by the centrifugal force and plastered against the basket wall. The brief periods of deceleration release only a few—generally those causing the unbalance. This continues until, eventually, true balance is obtained with all the articles in a plastered condition. At this point, the control can then accelerate the basket rotational speed up to that suitable for centrifugal extraction of liquid from the clothes, generally substantially above 200 r.p.m.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. My invention itself, however, may best be understood by reference to the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a front elevational view of a combination washer dryer of the type which may incorporate my improved clothes unbalance preventing arrangement;

Figure 2 is an enlarged rear elevational view of the combination washer-dryer of Figure 1 with the rear panel removed and certain surfaces broken away to illustrate details;

Figure 3 is an enlarged side elevational view of the machine, partly in section and with certain surfaces broken away to show details;

Figure 4 is an enlarged fragmentary plan view, along line 4—4 in Figure 2, with the clothes basket and tub of the machine removed in order to illustrate details of the drive of the machine; and

Figure 5 is a schematic diagram of a control circuit suitable for use in connection with the inventive construction for providing the fluctuable increase from tumble speed to centrifuging speed.

Referring now to Figures 1, 2 and 3 of the drawings, there is shown a combination clothes washing and drying machine where the operating elements of the machine are included within an outer cabinet structure having a central wrap-around section **1**. Section **1** is supported on a base and toe board assembly **2**, and carries a separate top **3** with a backsplash panel **4** which may, as shown, be mounted on posts **5**. Control panel **4** is provided with appropriate control devices such as, for instance, dials **6** which may be provided for controlling various types of washing and drying sequences, and various drying temperatures, and such as buttons **7**, which may control various other functions, such as water temperature, omission of dryer function, etc. Access to the interior of the machine is provided by a door **8** formed in section **1** and mounted on concealed hinges; door **8** may be opened by any suitable means such as a knee operated latch control **9**.

As shown in Figure 3, the illustrated machine is of the horizontal axis type, that is, it has a substantially cylindrical clothes basket or drum **10** mounted for rotation on a generally horizontal axis within an outer enclosing tub structure **11**. Basket **10** comprises a cylindrical shell or wall **12** which is closed at its rear end by means of a suitable wall **13**. The basket also includes a front wall **14** which is formed so as to define an access or loading opening **15** in registry with an opening **16** provided in wrap-around section **1** for door **8**. The basket is rotatably supported by a shaft **17** which is mounted in an elongated bearing **18** supported from rear wall **19** of tub **11**. The tub is provided with an opening **20** aligned with opening **16** and opening **15** so that clothes may be placed into and removed from the basket when door **8** is opened. The door seals against a suitable gasket **21** during operation of the machine.

Referring now to Figures 2, 3 and 4, during the operation of the machine the basket **10** is driven from an electric motor **22**. The drive from the motor to the basket includes a pulley **23** which is secured to the motor shaft so as to rotate therewith; pulley **23** drives a belt **24** which in turn drives an adjustable sheave assembly **25**. The adjustable sheave assembly includes a shaft **26** to which are rigidly secured sheave plates **27** and **28**. An intermediate sheave plate **29** is keyed on shaft **26** so as to be movable along the shaft to varying distances from plates **27** and **28**. It will be observed (Figure 3) that sheave plate **27** has a sloping surface **30** which, in cooperation with a sloping surface **31** on plate **29** forms a groove **32** of adjustable width.

Since belt **24** has a predetermined width, it can be seen that movement of plate **29** relative to plate **27** will cause the belt **24** to seat in groove **32** at a distance from the center of shaft **26** which is determined by the distance of plate **29** from plate **27**. The linear speed of belt **24** is constant, assuming the speed of motor **22** to be substantially constant, and therefore the rotational speed of the adjustable sheave assembly **25** is dependent on the effective sheave diameter provided by the cooperation of plates **27** and **29**. When the sheave plates **29** and **27** are in the position shown in the figures, assembly **25** is rotating at a relatively low speed. If plate **29** is moved to the left, as viewed in Figure 3, then belt **24** will move in radially toward shaft **26** as groove **32** widens, and will cause a greater rotational speed of assembly **25** for a given rotational speed of pulley **23** by motor **22**.

A second belt **36** is driven in groove **35** formed by the cooperation of sheave plates **29** and **28**. When adjustable plate **29** is in the position shown so that groove **35** is quite wide, belt **36** has to move in radially toward shaft **26** a substantial amount before it seats on the surfaces **33** and **34** of plates **29** and **28** respectively. This means that for a given rotational speed of the adjustable sheave assembly (as imparted to it by belt **24**), belt **35** will be travelling at a relatively low rate of linear speed. If plate **29** is moved to the left so that belt **36** is forced outwardly in groove **35**, then for a given rotational speed of the sheave assembly a relatively higher linear speed of belt **36** is provided. Thus, by controlling the position of plate **29**, an infinite variety of speeds between the two limits of position of the plates may be provided, with the arrangement shown in Figure 3 providing the lowest output speed to belt **36** since belt **24** is causing the lowest rate of rotation of assembly **25** and rotation of assembly **25** is causing the lowest linear speed of belt **36**. The highest rate of speed will be provided when plate **29** is moved as far as possible to the left; belt **24** then moves inwardly as far as possible to provide the highest rotational speed of the assembly **25** for a given linear speed of belt **24**, and the output linear speed of belt **36** is the highest possible for a given rotation speed of assembly **25**.

Belt **36** passes over a sheave **37** which forms part of a unitary assembly with a sheave, or pulley, **38** driving a belt **39**. Belt **39** drives a sheave, or pulley, **40** positioned substantially coaxial with basket **10**.

Returning now to the adjustable sheave assembly **25**, and with particular reference to Figure 2, it will be observed that the assembly is mounted on an arm **41** which is pivotably secured on a pin **42** within a bracket **43** fastened to the base **2** of the machine. A spring **44** has one end **45** secured to the machine base and has its other end **46** secured to arm **41** so as to bias it to the left. A second arm **47** is also secured to sheave assembly **25**, and and at its outer end **48** there is secured a chain member **49**. At its other end (Figure 4) chain member **49** is secured to a pulley **50** operated through a small electric motor and gear train assembly **51**. It will be seen that when pulley **50** is caused to rotate by assembly **51** it will wind up chain **49** and, through arm **47**, will move the entire adjustable sheave assembly to the right causing arm **41** to pivot to the right as viewed in Figure 2. Since belt **24** cannot, for practical purposes, stretch, it will be apparent that belt **24** will move inwardly within groove **32** forcing sheave **29** to the left (as viewed in Figure 3) to effect an increase in the speed transmitted to pulley **40** and basket **10**. When motor and gear train assembly **51** is shut off, the spring **44** overcomes the motor and pulls the adjustable sheave **25** back to the position shown in the figures to reduce the speed.

The assembly of sheaves 37 and 38 is movably mounted on a linkage arrangement 52 pivotably secured on a pin 53 mounted on a bracket 54 fastened to the base. The linkage arrangement includes two arms 55 and 56 which are pivotably secured together with a pin 57. A spring 58 secured at one end 59 to the base 2 of the machine is secured at its other end 60 to the assembly of sheaves 37 and 38 so as to bias them downwardly and to the right as viewed in Figure 2 in order to effect a belt tensioning function for belts 36 and 39.

The proportioning of the various parts of the drive assembly above described is such as to provide an appropriate range of speeds. For instance, when the parts are in the position shown, a tumbling speed of approximately 47 r.p.m. is provided to the basket 10, where the basket has the standard diameter of 26 inches, while in the other extreme position a centrifuging speed well in excess of 200 r.p.m. (for instance, approximately 300 r.p.m.) is provided to the basket. Also, the dimensions of the auxiliary motor 51 and the pulley 50 are such that acceleration is relatively slow in the speed range which extends from tumble up to the minimum centrifuging, or plaster, speed.

The usual components of domestic laundry machines are, of course, incorporated in the illustrated machine. Thus, to heat the clothes during the drying portion of the cycle, and also to warm the wash water during the washing portion of the cycle when desired, there is provided in the machine a heater assembly including two heaters 61 and 62. These heaters are mounted within the upper portion of tub 11 so that when energized they heat the basket 10. The heating elements are preferably of the sheathed type in which a resistance wire is maintained in spaced relation with the sheath by a highly compressed granulated heat-conducting electrically-insulating compound such as magnesium oxide. When the heaters are energized during the washing cycle, they heat the water by first heating the basket. Then, as the basket dips into the wash water at the bottom of the tub, it in turn heats the water. In other words, the rotating basket serves as an active heat transfer means between the heating element and the water or other washing liquid. When the heaters are energized during the drying cycle the heat transferred to the clothes basket is then passed on to the clothes to cause vapor migration out of the clothes. Since the outer cylindrical wall of the basket is perforated by a great many small spaced openings 63 (Figure 3), some of the heat from the heating elements passes directly to the clothes by radiation.

The means whereby the water is admitted to and discharged from tub 11 during operation of the machine is shown in Figure 2. The water supply means includes connections 64 and 65 through which hot and cold water is supplied to the machine for the washing operation. A valve controlled by a solenoid 66 admits hot water to the machine, and a valve controlled by an opposed solenoid 67 admits cold water to the machine. The hot and cold water valves under the control of the solenoids 66 and 67 discharge through a common outlet conduit 68, through a suitable air gap, and into a funnel 69 to a sump 70 formed at the bottom of tub 11. The connection may be made through a suitable conduit 71, a portion of which is shown adjacent the sump in Figure 2. The air gap provided by the funnel 69 makes it impossible for the water to be syphoned from the machine and to contaminate the incoming water supply line. A pressure actuated sensing device, or water level control, 72 controls both solenoids 66 and 67 to maintain the proper water level in the machine during the washing operation; sensing device 72 is connected to the interior of tub 11 by a suitable line 73.

The illustrated machine is of the type which uses cold water during the drying cycle for condensing the moisture extracted from the clothes. The condenser water is admitted to the machine through an additional solenoid-actuated valve controlled by a solenoid 74, which is energized during the drying operation so that the valve passes water at a slow rate sufficient to condense from the air the moisture vaporized from the clothes. As shown, the condenser water valve discharges into a conduit 76. From this conduit the water flows through an appropriate air gap (not shown) and then through another conduit (not shown) to the inlet 77 of a vent trap 78 which is of the type commonly provided in connection with machines of this type in order to seal up the tub and basket from atmosphere during heat drying of the clothes while leaving the tub vented to atmosphere at other times. An appropriate construction for vent trap 78 is, for instance, fully described and claimed in Patent 2,800,008—Raczynski, issued on July 23, 1957, and assigned to the General Electric Company, owner of the present invention. From the vent trap 78, the condenser water flows into the tub 11 through an opening 79, and then flows in a thin sheet down the lower left wall 80 to the tub (Figure 2) so as to cool a substantial portion of the area of the side wall and provide a large cool surface for condensing the moisture extracted from the clothes.

The wash and rinse water used during the washing portion of the operation, and the condenser water and the moisture extracted from the clothes during the drying operation, are discharged from the machine through the sump 70 mounted at the bottom of the tub. A suitable discharge hose 81 (Figure 4) leads from the sump to a motor driven drain pump 82 which may, as shown, be driven directly from motor 22 and which discharges through an outlet opening 83 to a conduit 84 (Figure 2). Conduit 84 leads to a drain valve 85 which is normally controlled by an appropriate solenoid (not shown). Since pump 82 is continually operated, the draining of water from sump 70 is controlled by the drain valve upon suitable energization of its associated solenoid.

Referring now to Figures 3 and 5, pulley 40 is rotatably mounted on the end 86 of shaft 17 in rotatable coaxial relation to basket 10. A switch 87 is secured to the pulley 40 and includes a pair of electric contacts 87*a* and 87*b* connected respectively through conductors 88 and 88*a* to slip rings 89 and 89*a*. The slip rings are electrically connected to stationary brushes 90 and 90*a* mounted on the rear tub wall 19. As pulley 40 is rotated in a clockwise direction, a button 91 of switch 87 is engaged by an arm member 92, which is rigidly secured to shaft end 86 so as to rotate therewith, to close the contacts 87*a* and 87*b* of the switch.

Clockwise rotation of the pulley 40 will cause a driving projection 92*a* to engage arm 92 thereby to rotate the arm. The arm in turn transmits the rotary movement to shaft 17 and basket 10 thereby to effect the desired rotation of the basket.

It will be noted that unbalances on the right side of the basket (Figure 2) will cause the arm 92 to have a tendency to move ahead of the projection 92*a* which is transmitting the rotary force to the arm. To phrase it differently, any such unbalances therewithin give the basket a torque which tends to accelerate it ahead of the driving projection 92*a*. This phenomenon occurs as a result of gravity long before the rotation has built up to even centrifuging speed, i.e., well before any harmful vibrations have been caused by the unbalance. Structures similar to that described herein for sensing and utilizing this phenomenon for unbalance prevention are described and claimed in my application Serial No. 752,727, filed concurrently herewith and also assigned to the General Electric Company.

When arm 92 moves ahead of projection 92*a* in the direction of rotation, it releases button 91 of switch 87 to break the electrical connection between contacts 87*a* and 87*b*. Referring now to Figure 5, it can be seen that the motor 51 is controlled through two alternative circuits. In the first, the control extends from con-

ductors 96 and 97, which are connected across a suitable source of power, through the usual control mechanism 98 provided in connection with automatic domestic laundry machines of this type, and then through lines 99 and 100 to auxiliary motor 51. Thus, when this circuit is effective at the times determined by the control 98, the auxiliary motor 51 is entirely operated by control mechanism 98. At suitable times during the cycle, as will be described herebelow, the control for the accelerating device 51 is transferred, so that after passing through the control 98 from the conductors 96 and 97, the control circuit passes from a conductor 101 through brush 90 and slip ring 89 to contact 87*a*, then to contact 87*b*, slip ring 89*a*, brush 90*a*, and a conductor 102 back to the auxiliary motor 51. Thus, when the last described circuit is effective to control motor 51, the separation of contacts 87*a* and 87*b* deenergizes the auxiliary motor 51.

The separation of contacts 87*a* and 87*b* occurs whenever an unbalance of a predetermined magnitude occurs within the basket 10 on the downwardly moving side thereof (the right side in Figure 2) so as to cause arm 92 to move ahead of driving projection 92*a*. A stop member 103 may be provided on pulley 40 so as to limit the amount which the arm 92 can move ahead of the pulley. As long as the motor 51 is de-energized by separation of the contacts, the spring 44 is effective to decelerate the basket 10 by moving adjustable sheave 25 to the left as viewed in Figure 2. Otherwise, when the pulley is in driving relationship to the arm 92 so as to cause depression of button 91 and engagement of contacts 87*a* and 87*b*, auxiliary motor 51 is energized to pull adjustable sheave 25 to the right to cause acceleration of the drum.

In operation of the machine, the control 98 initially provides for energization of the valve solenoids 66 and 67 to fill tub 11 to the level determined by level contorl 72 in the usual manner. The basket, meanwhile, is being rotated by motor 22 through the belt drive, energization of motor 22 being provided throughout the cycle as controlled by control 98 in the usual manner. After an appropriate amount of washing action is provided by the rotating basket, control 98 causes the drain valve 85 to be opened and thereby permits the pump 82 to drain the water out of tub 11. At this time, the spin operation may be provided by energization of motor and gear train assembly 51 to cause the adjustable sheave assembly 25 to be moved to the right, as viewed in Figures 2 and 3, to provide a high speed spin. However, it is contemplated that a spin operation will not normally be provided after wash in horizontal axis washing machines of the type shown, and that, after the water has been drained, either or both solenoids 66 and 67 will be re-energized to provide a rinse for the clothes. As before, the water is shut off by control 72 at an appropriate level, with the tumbling action continuing with the water in the tub for a predetermined amount of time before drain valve 85 is again opened to permit pump 82 to drain the water. This may be repeated as many times as desired to give a predetermined number of rinses to insure that all the cleaning agent which is normally used during the wash step of the operation is removed from the clothes. Also, of course, spin operations may be provided if so desired after the rinses. However, as stated, it is contemplated that a spin operation is generally provided only subsequent to the last rinse.

I shall now describe the operation of my invention which utilizes the cooperation of the unbalance sensing construction wtih the auxiliary motor 51 and the spring 44 in order to eliminate the unbalances within basket 10 by the time plaster speed is reached. When a high speed spin operation is to be provided, control 98 completes the circuit to the motor and gear assembly 51 through conductors 101 and 102 and, consequently, through contacts 87*a* and 87*b*. As a result the motor and gear assembly 51 starts winding up chain 49 so as to cause the movable sheave assembly 25 to start a relatively slow motion to the right as viewed in Fig. 2. This action continues as long as there is no "clump" of clothes in the basket causing an unbalance sufficient to move arm 92 ahead of drive projection 92*a*. However, if at any time during the speed increase from tumble to plaster speed the unbalance within the basket should become sufficient to move arm 92 ahead of the projection 92*a*, the energizing circuit to the auxiliary motor 51 will be opened by the separation of contacts 87*a* and 87*b*, and spring 44 will pull sheave assembly 25 to the left, as viewed in Figure 2, to decelerate the drum. This deceleration of the drum is effective to cause a redistribution of the clothes, so that the unbalance which caused the separation of the arm 92 from the drive projection 92*a* is destroyed. When the redistribution has provided a substantially balanced load, pulley 40 again catches up to and remains with the arm 92, contacts 87*a* and 87*b* engage, and re-energization of motor 51 is once again completed in order to resume acceleration of the basket toward spin speed.

Redistribution of the clothes so as to eliminate the unbalance is generally effected with a relatively small amount of deceleration, so that after an acceleration and a deceleration as a result of an unbalance, the speed at that point is generally substantially higher than the starting speed before deceleration. In other words, with rare exceptions, generally at the end of a fluctuation in speed as a result of an unbalance, the speed is higher than at the beginning of that fluctuation. As a result, even if unbalances occur several times, the general effect of the fluctuations will be always upward until, finally, plaster speed is reached. Once the basket reaches plaster speed without any substantial unbalance being present as a result of the action described, the drive is then free to accelerate the basket without interruption up to full spin speed. It can readily be seen that the substantial removal of unbalances during the period of acceleration from tumble to the minimum centrifuging speed, or plaster speed, is automatically achieved by providing sensing means (preferably of the type using the force of gravity described above) to disclose the presence of the unbalances and cause a corrective action to take place before the minimum centrifuging speed is reached.

While in accordance with the patent statutes, I have described what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and I therefore aim by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A laundry machine including a basket rotatable on a non-vertical axis, drive means for rotating said basket at clothes tumbling speed and at clothes centrifuging speed, said drive means including means for accelerating said basket slowly from tumbling speed toward the minimum centrifuging speed at which all the clothes are plastered about said basket and for decelerating back toward tumbling speed, control means enabling said accelerating and decelerating means to accelerate said basket from tumbling speed to centrifuging speed, and means sensitive to the rotational torque exerted by said basket as a result of the force of gravity acting on load unbalances in said basket, said sensitive means during the sensing of unbalances of a predetermined magnitude precluding acceleration of said basket by said accelerating and decelerating means and causing deceleration of said basket back toward tumbling speed, whereby the speed of said basket undergoes a fluctuable increase until it reaches centrifuging speed with the clothes in a balanced condition within said basket.

2. The machine defined in claim 1 wherein said basket is rotatable on a horizontal axis.

3. A laundry machine including a basket rotatable on a non-vertical axis, drive means for rotating said basket at clothes tumbling speed and at clothes centrifuging speed, said drive means including means for accelerating said basket slowly from tumbling speed toward the minimum centrifuging speed at which all the clothes are plastered about said basket and for decelerating back toward the tumbling speed, control means enabling said accelerating and decelerating means to accelerate said basket from tumbling speed to centrifuging speed, means sensitive to the rotational torque exerted by said basket as the result of the force of gravity acting on load unbalances in said basket, a pair of electrical contacts movable to an open position and to a closed position, said contacts being connected in controlling relation to said control means, said sensitive means moving said contacts to one of said positions during the sensing of a predetermined magnitude of unbalance and moving said contacts to the other of said positions when the unbalance sensed is below said predetermined magnitude, said contacts in said one position enabling said accelerating and decelerating means to decelerate the basket and in said other position causing said control means to be operative to cause said basket to accelerate, whereby the speed of said basket undergoes a fluctuable increase until it reaches centrifuging speed with the clothes in a balanced condition within said basket.

4. A laundry machine including a basket rotatable on a nonvertical axis, drive means for rotating said basket at clothes tumbling speed and at clothes centrifuging speed, said drive means including electrically operated means for accelerating said basket slowly from tumbling speed toward the minimum centrifuging speed at which all the clothes are plastered about said basket, control means for providing energization of said electrically operated means to accelerate said basket from tumbling speed to centrifuging speed, means sensitive to the rotational torque exerted by said basket as a result of the force of gravity acting on load unbalances in said basket, a pair of electrical contacts respectively connected with said drive means and with said basket and movable to an open position and to a closed position, said contacts being connected in series with said electrically operated means, said sensitive means controlling said contacts and causing said contacts to move to said open position during the sensing of unbalances of a predetermined magnitude and to move to closed position when the unbalance sensed by said sensitive means is below said predetermined magnitude, and means for decelerating said basket back toward tumbling speed when said contacts are open, whereby the speed of said basket undergoes a fluctuable increase until it reaches centrifuging speed with the clothes in a balanced condition within said basket.

5. The apparatus defined in claim 4 wherein said drive means comprises a variable speed belt arrangement including a sheave assembly movable to vary the speed, said accelerating means comprising an electric gear motor arranged to move said sheave assembly slowly in the direction to accelerate said basket when said gear motor is energized, said decelerating means comprising a spring acting on said sheave assembly in opposition to said gear motor to return said sheave assembly toward its low speed position when said gear motor is not energized.

6. A laundry machine including a basket rotatable on a nonvertical axis, drive means for rotating said basket at clothes tumbling speed and at clothes centrifuging speed, said drive means including a belt driven pulley member positioned to rotate substantially coaxially with said basket, a drive member secured on said pulley, a shaft secured coaxially to said basket, an arm member secured to said shaft, said arm member being engageable by said drive member from behind relative to the direction of rotation of said drive member thereby to cause rotation of said basket upon rotation of said coaxial pulley member, said drive means further comprising a variable speed belt arrangement including a sheave assembly movable to vary the speed, an electric gear motor effective when energized to move said sheave assembly slowly in the direction to cause acceleration of said basket, spring means secured to said sheave assembly acting in opposition to said gear motor to return said sheave assembly toward its low speed position thereby to decelerate said basket upon de-energization of said motor, control means for providing energization of said gear motor thereby to cause acceleration of said basket from tumbling speed to centrifuging speed, first and second contact members connected in series with said gear motor, said contact members being positioned to be moved into engagement when said drive member is in driving relation to said arm member, said contact members being separated when said arm member is moved angularly ahead of said drive member, said arm member moving angularly ahead of said drive member in response to a predetermined torque resulting from the force of gravity acting on clothes distributed in unbalanced relationship within said basket thereby to separate said contacts and cause deceleration of said basket, whereby the speed of said basket undergoes a fluctuable increase until it reaches centrifuging speed with the clothes in a balanced condition within said basket.

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