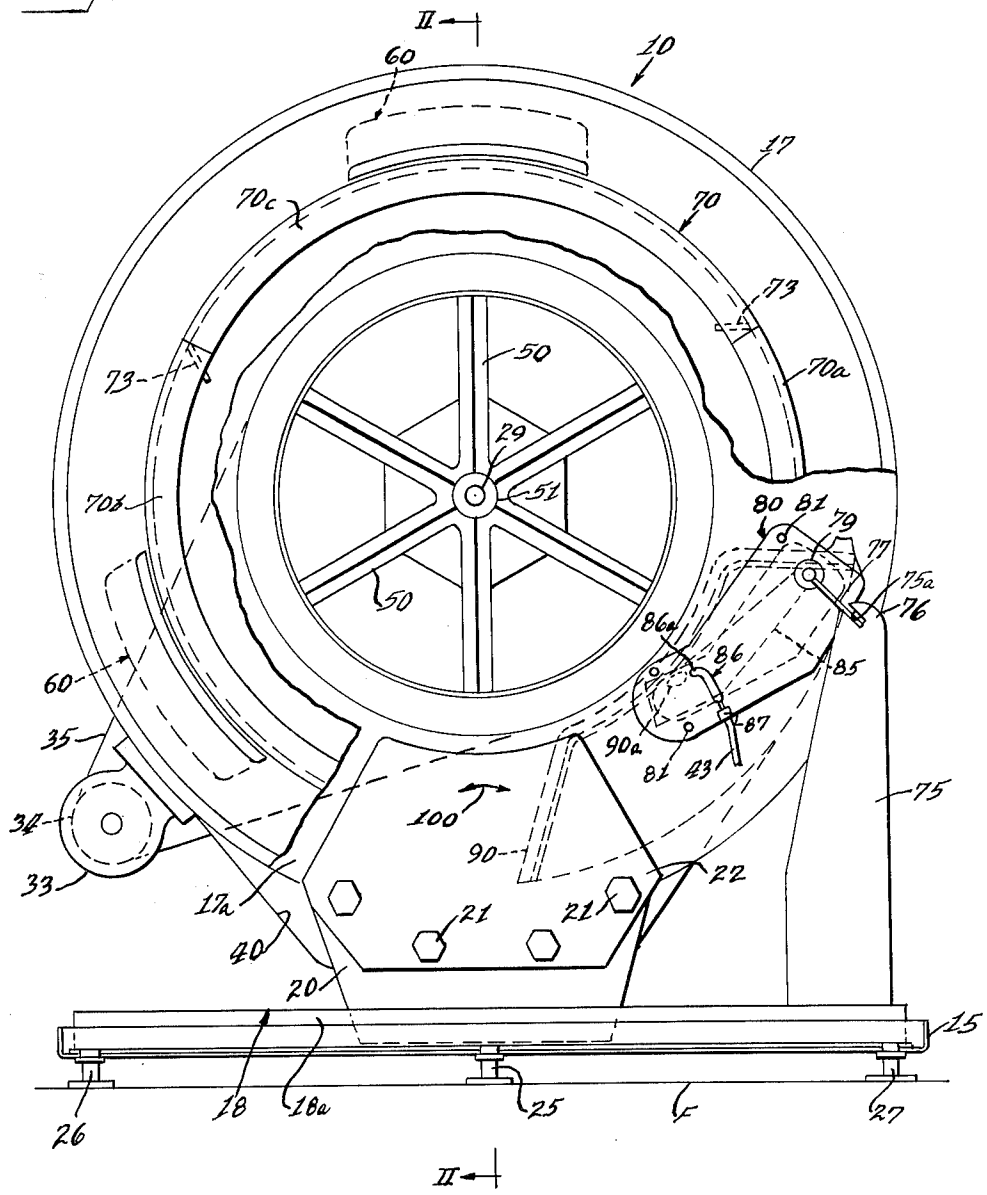
July 26, 1966 C. H. WADE ETAL 3,262,569

CENTRIFUGING APPARATUS AND MOUNTING MEANS THEREFOR

Filed Aug. 17, 1961 2 Sheets-Sheet 1

Fig. 1




INVENTORS
Charles H. Wade
BY Alvin E. Burkall

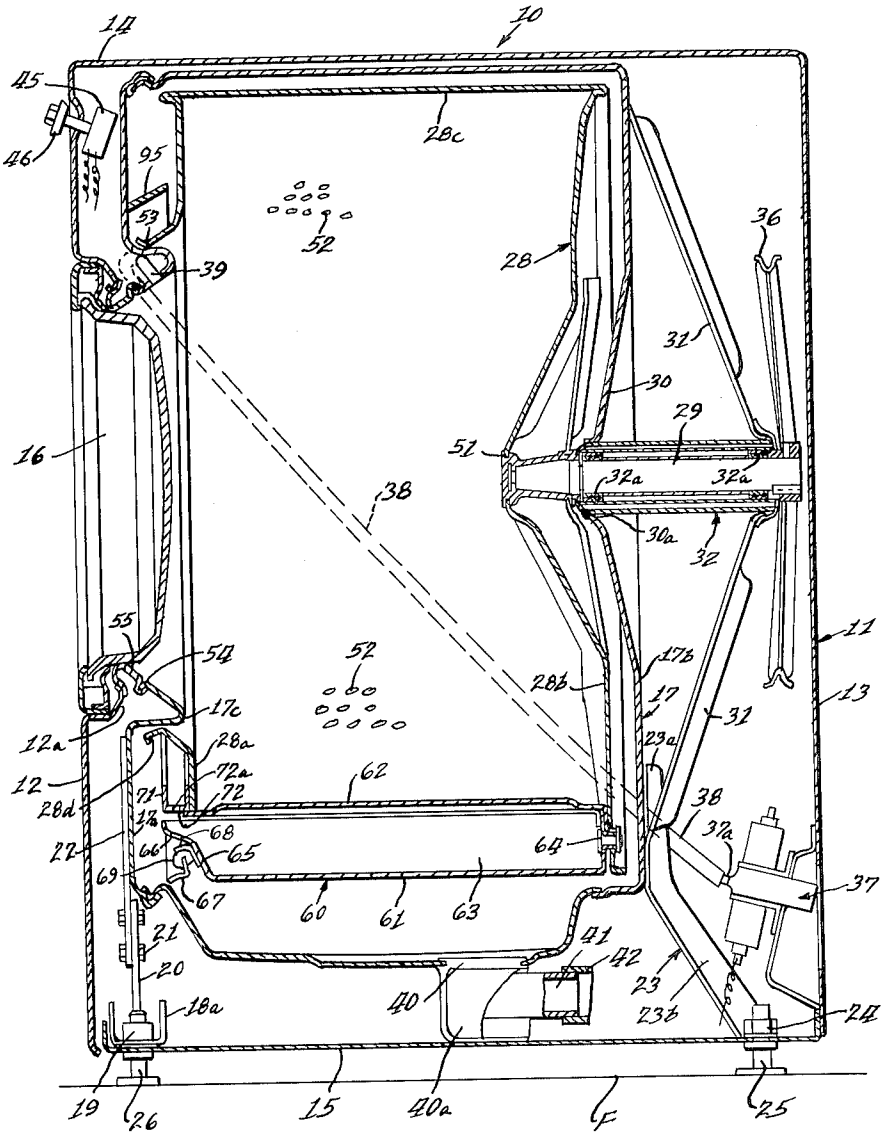
Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

July 26, 1966 C. H. WADE ETAL 3,262,569

CENTRIFUGING APPARATUS AND MOUNTING MEANS THEREFOR

Filed Aug. 17, 1961 2 Sheets-Sheet 2

Fig. 2




INVENTORS
Charles H. Wade
BY Alvin E. Burkall
Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

United States Patent Office

3,262,569

Patented July 26, 1966



3,262,569

# CENTRIFUGING APPARATUS AND MOUNTING MEANS THEREFOR

Charles H. Wade, Benton Harbor, and Alvin E. Burkall, St. Joseph, Mich., assignors to Whirlpool Corporation, St. Joseph, Mich., a corporation of Delaware

Filed Aug. 17, 1961, Ser. No. 132,171

6 Claims. (Cl. 210—144)

The present invention relates broadly to the counterbalancing of unsymmetrically distributed centrifugal forces in a rotating body, and is more particularly concerned with a support arrangement for a horizontal or substantially horizontal axis type drum confined in a casing which mounts the drum for rotation therewithin for limited oscillatory movements about an axis positioned substantially parallel to and located below the horizontal rotational axis of the drum prescribed by its supporting shaft.

It is highly desirable from the viewpoint of a housewife laundry machine operator that a laundry load be completely washed and dried in as short a time as possible. This criterion is applicable whether the load of clothes to be laundered is to be line-dried or machine-dried, and in either case, the length of time required to dry a particular load is substantially directly proportional to the quantum of liquid retained in the material at the completion of a washing cycle.

It is further known that in either an automatic washing machine wherein clothes are washed and centrifuged, or in so-called combination washer-dryers wherein clothes are washed, rinsed, spun dry and tumbled dry with the application of heat energy, that part of the total washing and drying time preceding the tumble dry or line dry portion of the total laundering cycle time is designated as the wash portion of the total cycle and consumes substantially the same amount of actual time for all available machines. Therefore, the most practical substantial time savings can be made by shortening the drying portion of the total cycle.

The customary approach in attempted improvements in machine drying is to increase the drying heat input to the dryer. However, this is somewhat undesirable from the standpoint of the rate of power consumption and the somewhat increased cost of operation, and further, it is even more undesirable by reason of engineering design considerations which are required because of the increased power input to the drying means.

Another approach, and that which is taken by the present invention, is to increase the rotative cylinder speed used during the extraction part of the wash cycle to thereby remove larger amounts of water from the load prior to the beginning of the tumble or line drying of the load. By increasing the spin speed utilized to remove additional water from the load, a power consumption savings of about eight to fifteen times may be accomplished as contrasted with removing this additional water by the high power input drying process.

Assuming properly designed bearing and transmission systems, power input is the primary factor to be considered in gauging the limit of spin speed attainable in driving a mass about its exact center of rotation. An empty laundry receiving cylinder rotated about its bearing axis represents an optimum operating condition, but when a load is introduced into the cylinder and centrifuged, it is quite likely that the load will be distributed in such a manner that the center of mass of the loaded cylinder will not coincide with the cylinder bearing axis. This produces an unbalanced centrifugal force which is directly proportional to the mass of the unbalanced portion of the total rotating mass, the square of the velocity



of such unbalanced mass, and to the radius of the unbalanced mass from the rotational axis of the cylinder.

An unbalanced condition, in addition to affecting the power input necessary to rotate the drum or cylinder, causes serious vibration conditions which are even more pronounced in horizontal machines than in vertical axis machines since the unbalanced force directed substantially opposite the gravitational forces acting on the machine may be sufficiently great to actually lift the machine from its supporting surface. Such violent movement is generally termed in the art as "walking."

Naturally numerous attempts have been made toward a solution of this problem. Some contemporary laundry machines of the horizontal axis type operate at a sufficiently limited spin speed so that the unbalanced loads encountered during normal operation will not produce a sufficient amount of centrifugal force to bodily lift the machine from its support. It has further been proposed to provide control means whereby a spin mechanism will be deactivated in response to excessive motion in the apparatus, so that the drum or cylinder decelerates to a tumbling speed for redistribution of the contents therein. The final spin speed is thus limited to a value such that the total amount of liquid centrifugally extracted from the contents of the drum is much less than is desired. As a consequence, a longer line drying time is required, or an additional supply of heat energy must be supplied if the goods are machine dried.

An even further attempted solution of the mentioned vibration problem is to suspend the entire laundry machine together with an additional mass producing dead weight within the enclosing cabinet on a complex spring system. Such arrangements depend upon isolation of the source of vibration, whereupon the suspended system is allowed to violently vibrate within the cabinet, with the dead weight tending to minimize the effects of the unbalanced centrifugal forces. This approach is unsatisfactory since the size of the enclosing cabinet must be greatly increased to allow for the violent gyratory motions of such a system during operation of the machine, or if the outside dimensions of the cabinet are limited, the dimensions of the inner casing and the drum must be reduced to the extent that the capacity of the machine is considerably reduced.

It is also within the contemplation of the prior art to sense and locate eccentric motions of the rotating body by relatively complex mechanisms which control the addition or subtraction of weights from the rotating components of the machine, to thereby counteract the unsymmetrically disposed centrifugal forces generated by the unbalanced conditions within the drum or cylinder.

In accordance with the principles of the instant invention, a drum is journaled for rotation on a horizontal axis within a casing. A rigid vertical plate member is affixed centrally to the lower front wall of the casing and extends downwardly below the casing. This plate member is rigidly affixed, as by bolting, to a second upstanding rigid plate member that in turn is welded to a rugged channel member that extends transversely across and below the front wall of the casing. A leg or foot member is provided at each end of the channel member. A rigid depending member is affixed centrally as by welding, to the lower portion of the rear wall of the casing. A leg or foot member is provided on the rear depending member to provide a three point suspension for the casing and drum.

The drum is equipped with fluid receiving pockets for counterbalancing the drum during the rotation of unbalanced loads therewithin, and the invention contemplates means for adding fluid to the pockets during oscillations of the casing caused by the unbalanced loads for counter-

balancing the drum during rotation of unbalanced loads therein.

By virtue of accurately and promptly counterbalancing unsymmetrically disposed centrifugal forces by fluid addition to certain of the balance pockets, gyratory motion of the casing with respect to the machine support within the enclosing cabinet is held to a minimum, permitting the use of cabinet structures much reduced in size while maintaining desirable casing and drum sizes as compared with the prior art. In addition, and again markedly contributing to smaller cabinets, the provision of connections between the casing and base structure of some yieldability and yet substantial rigidity serves to confine the casing for oscillatory movements about an axis positioned parallel to and located below the horizontal rotational axis of the drum as prescribed by its supporting shaft.

It is an aim of the present invention to provide new and improved centrifuging apparatus wherein a casing rotatably mounting therewithin a drum is erected upwardly from a supporting base by substantially rigid connections limiting oscillation of the casing resulting from drum rotation with unbalanced loads therein.

Another object of this invention lies in the provision of centrifuging apparatus of the foregoing character having a plurality of liquid balance pockets disposed on the periphery of the drum and to which counterbalancing liquid is added promptly upon detection of an out-of-balance condition.

A further object of the instant invention lies in the provision of laundry extractor apparatus which includes a casing having lower front and rear portions, the lower front portion having attached thereto plate means connecting to a base frame or channel member and the lower rear portion a single dependent leg welded or otherwise secured thereto, the casing being thereby restrained against vibratory movements relative to the base frame and oscillating with respect to the base frame to only a limited degree.

Other objects and advantages of the invention will become more apparent during the course of the following description, particularly when taken in connection with the accompanying drawings.

In the drawings, wherein like numerals designate like parts through the same:

FIGURE 1 is a front elevational view of a laundry machine constructed in accordance with the principles of this invention, but with the outer cabinet removed and with other parts broken away and with further parts removed for clarity; and

FIGURE 2 is a cross-sectional view taken substantially along the line II—II of FIGURE 1, but with portions of the cabinet added and with other operative components of the machine included for the sake of clarity in completing the description of the inventive subject matter.

Referring now to the drawings, there is shown a so-called combination washer-dryer intended for use as a domestic laundry appliance, the machine being designated generally by the numeral **10**. The machine comprises an outer cabinet **11** providing an aesthetically appealing enclosure for the machine, and having front and rear walls **12** and **13**, top and bottom walls **14** and **15**, and opposed side walls (not shown). The front wall **12** is characterized by an access door **16** through which a batch of materials to be laundered may be placed in or withdrawn from a treatment zone formed within the machine.

Forming a part of a substantially rigid mounting of limited yieldability for a casing **17** housed by the cabinet **11** is a support member generally designated by the numeral **18** and taking the form of a rigid channel member **18***a*. Welding techniques form the mode of attachment of a first upright rigid plate member **20** to the supporting channel **18***a*, and secured to the first plate member **20** by attaching means **21** is a second plate member **22** desirably welded to front wall **17***a* of the casing **17** along the lower front portion thereof. The attaching means **21** constitute releasable connection means, such as bolts, rigidly interconnecting the plates **20** and **22**, although it will be appreciated that the two plates may be integrated into a single plate means. In any event, by provision of the connecting plates **20** and **22**, a first rigid connection is provided between the casing **17** and the supporting base or support member **18**.

Constituting a substantially rigid but slightly yieldable rear support for the casing **17** is a single dependent leg member **23** having a first portion **23***a* welded to rear wall **17***b* of the casing **17** along the lower rear portion thereof on generally the vertical centerline of the casing. The dependent leg **23** is further shaped to provide a second portion **23***b* disposed at an angle to the first portion **23***a*.

Legs **26** and **27** are connected to the ends of the channel member **18***a* and a leg **25** is connected to portion **23***b* of leg member **23**. On making these connections a bottom wall or enclosing member **15** is fixedly secured to the channel member **18***a* and leg member **23** by nut members **19** and **24** cooperating with the legs **25**, **26** and **27**. The member **15** does not form a part of the base structure or support of the machine but merely provides a bottom closure member for the machine upon which the outer cabinet members are attached.

The legs **25**, **26** and **27** provide a three-point suspension for the machine **10**. The advantage of only having a single rear leg is especially important when the machine is to be built in or on any installations where rear legs would become inaccessible. With the single rear leg, the machine can be placed in its proper location on the floor F and can be properly leveled in all directions by only adjusting the two front legs or feet **26** and **27**.

The rear leg **25** serves to stabilize the machine **10** on the floor F when the machine is set so that the three legs or feet **25**, **26** and **27** rest on the surface of the floor F. However, the machine **10** would still function properly if the channel member **18***a* were bolted firmly to the floor surface F, such as by bolts in place of the legs **26** and **27**, and the leg member **23** removed. With an installation of this type, the width of the channel member **18***a* would prevent the machine from tipping toward the front or rear, and the casing **17** would still deflect or oscillate relative to the channel member **18***a* when an unbalanced load is rotated in the drum **28**.

While a further description will be undertaken hereinafter when dealing with a disclosure of the counterbalancing means, it should be emphasized at this point that the connections provided by the parts **20** and **22** between the base frame **18** and casing **17** are rigid connections. However, sufficient yieldability exists in such connections so that some very small arcuate movement of the casing **17** relative to the transverse channel **18***a* and its supporting floor surface and about foot **25** may occur. The connections afforded by integration of the plate members **20** and **22** to the support channel **18***a*, and the connection of the leg or bracket member **23** to the casing **17**, are sufficiently rigid to confine the casing **17** for limited oscillatory movements about an axis positioned parallel to and located below the horizontal rotational axis of drum or cylinder **28** as prescribed by its supporting shaft **29**, further reference to which will be shortly made. In the machine exemplified by the instant disclosure, such allowable arcuate movement is of the order of approximately 0.010 inch to each side of its normal centered position, as measured from an approximate sixteen inch lever arm. This limited movement as provided by the described rigid connections between the supporting base **15** and the casing **17** is quite in contrast to the violent gyratory motions of the spring suspended system earlier mentioned, and permits utilization of a cabinet **11** which relatively closely surrounds the casing **17** particularly with respect to the circumference thereof. Accordingly, for a drum and casing combination designed for a particular clothes load, the

cabinet of the instant machine can be of minimum dimensions, in view of the marked reductions in gyrations provided by the described rigid connections. Of course, cabinet size reductions without sacrifice in the clothes load which can be laundered are particularly attractive to the householder, and further permit reductions in the manufacturing cost of the unit.

The rear wall 17*b* of the casing 17 has an embossed central portion 30 centrally apertured at 30*a* and cooperable with a support spider 31 connected in firm assembly with the rear wall 17*b* to rigidly mount a bearing assembly designated generally at 32, and in which is journaled the shaft 29 connected for corotation with a rear wall 28*b* of the drum 28.

The bearing assembly 32 includes an outer housing which engages directly against the rear wall 17*b* of the casing 17 and the support spider 31 of the casing. The bearing assembly includes ball bearing races 32*a* associated with the shaft 29 to provide a rigid bearing mount for the drum 28 within the casing 17. The rigid bearing means thus provided for the drum insures the cooperative relation required between the drum 28 and casing 17, in accordance with the principles of the present invention.

The machine 10 is equipped with an electric drive motor 33 suitably attached to the casing 17 and having a power take-off shaft drivingly connected with suitable transmission means (not shown). In the manner customary in the art, the transmission is provided with take-off shaft means to which is connected a pulley 34 over which is positioned a pulley belt 35 driving a pulley wheel 36 connected in driving relation to the shaft 29.

The machine 10 further includes the usual inlet water mixing valve construction, shown generally at 37, and including the conventional cold and hot water inlets which are connected to the usual source of domestic supply. The mixing valve assembly 37 has an outlet 37*a* connected to a hose or conduit 38 leading to a fresh water inlet 39 carried in the front wall 17*a* of the casing 17. The inlet 39 discharges fresh temperature-conditioned water into the treatment zone for mixture with a suitable additive, which may be a detergent in forming a laundry fluid or for use as a rinsing agent.

As is shown in FIGURE 2, the machine 10 has a sump 40 including a foreign articles trap 40*a* in the bottom of the casing 17, the sump having an outlet 41 connected by means of a conduit 42 to suitable pump and two-way valve means (not shown). As is known, such valve means has an outlet connected to drain and another outlet connected to conduit means 43 (FIGURE 1) for performance of the counterbalancing function.

The laundry machine 10 is of course equipped with heater and blower means to direct heated air into the interior of the drum 28 to reduce the moisture content of the fabrics therein, the moisture-bearing air then being discharged to atmosphere in the manner known to the art. Since such structure is not essential to an understanding of the instant invention, it has been eliminated from the drawings in order to clarify the disclosure.

The machine 10 has a sequential control means shown generally at 45 which is presettable by the operator as at 46, and which is associated by the usual electrical circuitry with all of the operating components of the machine, including the electric drive motor 33, valve means 37, transmission means, and pump means to actuate the machine through a program consisting of washing, rinsing, extracting and drying periods. Thus, in a typical operation, the operator loads a batch of clothes to be laundered through the door 16 into the drum 28, and upon initiation of a preselected program, the casing 17 is charged with a supply of water. Following the washing operation, the laundry fluid is drained through the sump 40 and discharged to drain. The materials within the drum are then subjected to an extraction operation, followed by rinsing and a subsequent extraction operation, which portion of the washing cycle may be repeated as often as may be desired in accordance with the preset program. After the final extraction operation, the machine either continues through a drying period involving operation of the drying system, and including the addition of heat of vaporization to the stream of ventilating air circulated through the treatment zone, or the batch of materials being laundered may be removed from the machine by the operator for line drying.

The drum 28 has formed along its rear wall 28*b* a plurality of radially extending, angularly spaced strengthening ribs 50. At the center of the rear wall 28*b*, the drum is connected as at 51 to the shaft 29. The outer peripheral wall of the drum 28 is formed by a foraminous wrapper 28*c*, and is particularly characterized by a plurality of openings 52, through which liquid may escape from the interior of the drum into the casing 17. The drum has a front wall 28*a* which extends radially inwardly of the outside wrapper 28*c* and terminates in an axially offset outwardly flared mouth or lip 28*d* forming an opening 53 through which materials to be laundered may be charged into the interior of the drum 28. The opening 53 is in registry with the door 16, and also registers with a front opening 54 formed in the front wall 17*a* of the casing 17. In order to minimize leakage, the front wall 17*a* of the casing 17 is particularly characterized by an axially inwardly extending annular rib 17*c*. The rib 17*c* and an inwardly extending flange 12*a* on the outer cabinet front wall 12 are interconnected by a rubber sealing gasket 55, the radially inwardmost portions of the gasket 55 being resilient sealed against the glass surface of the door 16.

At a plurality of circumferentially spaced locations on the periphery of the drum 28 recess means are provided in wrapper 28*c* to accommodate mounting therein liquid balancing receptacles generally indicated by the numeral 60. Each of the receptacles takes the form of a generally trough-shaped try member having a wall 61 spaced radially outwardly of an imperforate wall portion 62 formed on the drum wrapper 28*c* at the recessed area. Each receptacle also includes side and end walls 63 to facilitate connection as at 64 between the rear portions of such walls and the adjoining rear wall 28*b* of the drum or cylinder 28.

The front wall of each receptacle 60 is characterized by an inclined portion 65 terminating in an axially protruding nose 66 which projects beyond the axial extent of the front wall 28*a* of the drum 28. It is to be noted that the spout 66 extends inwardly of an outer front flange 67 formed at the outer extremity of the drum front wall 28*a*. To facilitate mounting of the receptacle 60 in the drum, a bracket member 68 on the receptacle 60 is forced against a resilient gasket 69 fitting over an inwardly extending leg on the flange 67.

Each receptacle or balancing compartment 60 is provided with an inlet segment 70*a*, 70*b* and 70*c*, respectively, the inlet assembly being designated generally by the numeral 70. Each inlet segment in generally U-shaped in configuration, and has an outer leg 71 (FIGURE 2) spaced axially from the wall 28*a* of the cylinder 28 and an arcuate peripheral wall 72 passaged at 72*a* and through which fluid from the corresponding inlet segment is discharged radially outwardly into the spout 66 of the receptacle 60. Three receptacles 60 may be utilized, and in this arrangement each segment 70*a–c* extends through 120° of arc on the front wall 28*a* of the drum. Welding techniques may be utilized to attach the segments to the drum front wall, and as appears in FIGURE 1, each inlet segment 70 has an end wall 73 between the side walls and dividing the inlet assembly or collector ring into three compartments, one for each receptacle 60.

In order to control the introduction of balancing fluid into the receptacles 60 by way of the inlet segments 70*a–c*, there is preferably utilized as a controlling variable a mechanical signal manifested as a relatively small linear movement between the casing 17 and a relatively stationary reference means. This may be accomplished in numerous ways, and illustratively, the relatively stationary

reference means can take the form of a reaction member **75** presenting a plate-like configuration and erected upwardly from the rigid base structure **18** in firm and stationary connection with the support channel **18***a*. Brace means may of course be utilized to further rigidify the stationary plate **75**.

The stationary reaction member **75** is notched at **75***a* at its upper end to provide a claw portion **76** clampingly engaging one end of leaf spring means **77** received at its opposite end in a notched portion provided in pin or shaft means **79** mounted for pivotal movement by a balance housing **80** taking the form of a plate member secured by attaching means **81** to the front wall **17***a* of the casing **17**.

The pivot or shaft means **79** supports thereon for swingable movement a deflector or interrupter member **85** of general paddle-like form. In this regard, it is to be observed from FIGURE 1 that the balance housing **80** supports thereon a nozzle assembly **86** which connects by a coupling member **87** to the conduit means **43** leading through suitable pump and valve means to the sump **40**, as was described. The nozzle assembly **86** has a discharge portion **86***a* received in a suitable aperture in the balance housing **80**, and the nozzle discharge portion **86***a* is pointed or located for registry with an opening **90***a* provided in a splash housing **90** mounted on the casing front wall **17***a* between the casing **17** and drum or cylinder **28**.

In operation, movements of the casing **17** produced as a function of any unsymmetrically disposed load in the rotating drum **28** produce a forced oscillation of the casing about a point above the support channel **18***a* and below the casing **17**. Oscillation of the casing, as for example to the left, causes a slight counterclockwise rotation of the pivot or shaft means **79** by reason of its connection through the leaf spring **77** with the stationary reaction member **75**. Counterclockwise pin rotation lowers the deflector member **85** from blocking relation with the target opening **90***a* in the splash housing **90**, permitting discharge of counterbalancing liquid from the nozzle discharge opening **86***a* through the target hole **90***a*, a collector segment **70** and into a balance tank **60** diametrally opposite the off-balanced load. Of course, the balance housing **80**, nozzle assembly **86** supported thereby and the deflector member **85** are coordinated so that counterbalancing fluid is not directed into a balancing receptacle **60** adjacent the off-balance load.

In the absence of an off-balance condition, the nozzle outlet **86***a* discharges against the deflector member **85** and the water is deflected downwardly into the sump **40**. On the other hand, counterbalancing fluid injected into any of the balancing pockets **60** drains by gravity upon deceleration of the drum **28** at the end of an extraction operation. However, to insure that such draining fluid does not again enter the drum through possible passage through the opening **53**, there is provided on the inside of the front wall **17***a* of the casing **17** a baffle ring **95** extending around the upper half of the rib **17***c*, but spaced radially outwardly thereof.

The water or liquid used for balancing is taken from the machine sump **40** and is fed to the balancing nozzle assembly **86** by the machine pump (not shown) to assure a constant flow pressure independent of the inlet water pressure to the machine **10**. A water level control system can be incorporated into the machine to assure that there will always be enough water in the sump **40** for proper and rapid counterbalancing. The deflector or interrupter member **85** merely diverts the flow from the nozzle assembly **86** back into the sump **40**, unless a large enough unbalanced load is present to cause the deflector member **85** to be pivoted out of the path of fluid emanating from the nozzle assembly **86**, whereby the liquid flow enters the proper inlet segment of the inlet assembly **70** on the front of the drum **28** for discharge through an opening **72***a* into a corresponding receptacle **60**.

As was stated, rotation of unbalanced clothes loads in the drum **28** produces a limited forced oscillation of the casing **17** about a point located generally above the support channel **18***a* and below the casing **17**. Such oscillation is indicated by the arrows **100** applied to FIGURE 1 and may be regarded as taking place about the single dependent leg **23** attached to the lower portion of the rear casing wall **17***b* on generally the vertical centerline of the casing. The single dependent leg **23** in combination with the support channel **18***a* and connecting plates **20** and **22**, the latter of which is attached to the lower portion of the front wall **17***a* of the casing, provided a mount for the casing **17** and drum **28** of sufficient rigidity to prevent large deflections of the casing **17** with respect to the support structure **18**. Since only limited oscillation of the casing takes place, by reason of the rigid connections provided thereto, the casing can be surrounded in relatively close wrapping relation by the cabinet **11**, with only that amount of space being provided to house the required operating parts. Thus, in contrast with the prior art arrangements using complex spring and shock absorbing mounts, there is no need by this invention to provide a large amount of space for gyratory motions. At the same time, however, the rigid connections have sufficient yieldability so that a slight amount of casing movement takes place, sufficient through the pivot pin **79**, leaf spring **77** and stationary reaction member **75** to initiate the counterbalancing function. As was stated, the allowable arcuate movement is of the order of 0.010 inch from the normal centered position of the casing, as measured from an approximate sixteen inch lever arm. Of course the oscillation of the casing **17** under most circumstances is substantially less than the figure given, and it can thereby be seen that the vibration sensing system provided by the parts **75**, **77** and **70** is sufficiently sensitive to detect and amplify almost imperceptible casing movements.

The rigidity and relatively low degree of yieldability of the system provided by the drum **28**, casing **17**, plate members **20** and **22**, channel member **18***a* and rear dependent member **23** results in a natural frequency of vibration of this system that is substantially above the maximum rotative speed of the drum **28**.

It has been stated that a single plate can be used in substitution for the pair of plates **20** and **22** providing the front mount for the casing **17** and with that other systems for sensing casing vibrations and initiating the liquid balancing function can be employed. It is also desirable to provide an acceleration control system that is sensitive to the pivotal movement of the shaft or pin **79** to prevent further acceleration of the drum **28** until the off-balanced load in the drum is counterbalanced. These and other modifications can of course be effected without departing from the novel concepts of this invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

**1.** Laundry extractor apparatus comprising, a casing including a lower front portion and a lower rear portion, a rotatable clothes receiving drum, means mounting said drum for rotation within said casing on a horizontal axis and provided with fluid receiving pockets for counterbalancing said drum during the rotation of unbalanced clothes loads in said drum, rigid base means including a support member extending transversely of said casing below said lower front portion, an upstanding plate member rigidly attached to said support member, a second plate member rigidly attached to said lower front portion of said casing and overlapping said upstanding plate member, connection means rigidly interconnecting said plates, a single dependent leg attached to said lower rear portion of said casing and to said base means to facilitate limited arcuate movement of said casing relative to said base means about an axis positioned parallel to and located below the rotational axis of said drum where such arcuate movement is produced by rotation of unbalanced clothes loads within

said drum, and means for adding fluid to said pockets for counterbalancing said drum in response to said arcuate movement of said casing.

2. Laundry extractor apparatus comprising, a casing including a front portion and a rear portion, a rotatable clothes receiving drum mounted within said casing for rotation on a horizontal axis and provided with fluid receiving pockets for counterbalancing said drum during the rotation of unbalanced clothes loads in said drum, a base frame having a support member extending transversely of said casing below said front portion, means rigidly interconnecting said front portion of said casing and said support member, a single dependent leg attached to said rear portion of said casing and to said base frame to facilitate limited arcuate movement of said casing relative to said support member about an axis parallel and below the rotational axis of said drum when such arcuate movement is produced by rotation of unbalanced clothes loads within said drum, and means for adding fluid to said pockets for counterbalancing said drum in response to said arcuate movement of said casing.

3. In centrifuging apparatus comprised of a supporting base, a casing and a drum rotatably mounted for rotation on a horizontal axis within said casing, the improvement of support means rigidly connecting said casing to said supporting base and permitting limited oscillatory movement of said casing relative to said base during rotation of said drum with an unbalanced load therein about an axis below and parallel to said horizontal axis, said support means comprising a pair of interconnected vertically disposed plates attached to said casing along the lower front portion thereof and to said supporting base generally midway of the opposite sides thereof, and extending to substantial extents from both sides of the middle of said base, and a single leg secured to said casing along the lower rear portion thereof substantially on the vertical centerline of said casing, so that said casing may oscillate to a limited degree about said leg during rotation of an unbalanced load in said drum.

4. Laundry extractor apparatus comprising,

a rigid base frame having a transversely disposed channel member at one end,

a pair of transversely spaced legs connected to said channel member for engaging a supporting surface,

a first upstanding plate member fixedly secured to said channel member between said legs,

and a single leg connected to said base frame at its other end for engaging the supporting surface,

a casing forming a treatment zone for said extractor and having a second plate member disposed vertically, means attaching said first and second plate members together,

a single vertical supporting structure connecting said casing at said other end to said rigid base frame at the vertical center line of the casing,

and a receptacle journaled in said casing for rotation on a horizontal axis,

whereby unbalanced loads in said receptacle will produce limited oscillatory movements in said casing about an axis positioned parallel to and located below the rotational axis of the receptacle.

5. Laundry extractor apparatus comprising,



a rigid base frame having a horizontally extending transversely disposed channel member at one end,

a pair of transversely spaced legs connected to said channel member and extending downwardly therefrom for engaging a supporting surface,

a first substantially flat vertically disposed plate member fixedly secured at its lower end to said channel member between said legs,

and a single leg connected to said base frame at its other end and extending downwardly therefrom for engaging the supporting surface,

a casing forming a treatment zone for said extractor and having a second substantially flat transversely and vertically disposed plate member fixedly secured to one end thereof,

means releasably attaching said first and second plate members together in overlapping relation,

a single vertical substantially rigid leg member connecting said casing at said other end to said rigid base frame at the vertical centerline of the casing,

a rotatable perforated clothes-receiving drum journaled in said casing for rotation on a horizontal axis,

fluid-receiving pockets on said drum for balancing unbalanced loads therein,

and fluid adding means for selectively adding fluid to said pockets,

whereby unbalanced loads in said drum will produce limited oscillatory movements in said casing about an axis positioned parallel to and located below the rotational axis of the drum.

6. Laundry extractor apparatus as defined in claim 5 and further characterized by

control means responsive to said limited oscillatory movements of said casing regulating said fluid adding means to control the addition of fluid to selected pockets on said receptacle.


**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,753,722 | 4/1930 | Schaum | 210—364 X |
| 1,882,968 | 10/1932 | Schenck | 210—364 |
| 2,182,346 | 12/1939 | Miller | 210—364 |
| 2,583,579 | 1/1952 | Lodge | 210—365 |
| 2,717,698 | 9/1955 | Armstrong | 210—363 X |
| 2,760,383 | 8/1956 | DeMoss | 210—363 |
| 2,876,906 | 3/1959 | Lipski | 210—364 |
| 2,886,979 | 5/1959 | Baxter | 210—363 |
| 2,948,401 | 8/1960 | Obermajer | 210—365 |
| 2,974,801 | 3/1961 | Bernstein | 210—364 X |
| 2,978,892 | 4/1961 | Behrens et al. | 210—364 |
| 2,995,918 | 8/1961 | Neidenthal et al. | 68—24 |
| 3,039,613 | 6/1962 | Hubbard | 68—140 |
| 3,075,404 | 1/1963 | Wiedemann | 74—573 |
| 3,080,059 | 3/1963 | Scott et al. | 210—144 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 1,106,055 | 7/1955 | France. |


ROBERT F. BURNETT, *Primary Examiner.*

HERBERT L. MARTIN, *Examiner.*

C. R. REAP, *Assistant Examiner.*