Dec. 24, 1968 M. HERTIG ET AL 3,417,582

COMBINATION WASHING-EXTRACTING MACHINE

Filed April 14, 1967 8 Sheets-Sheet 1

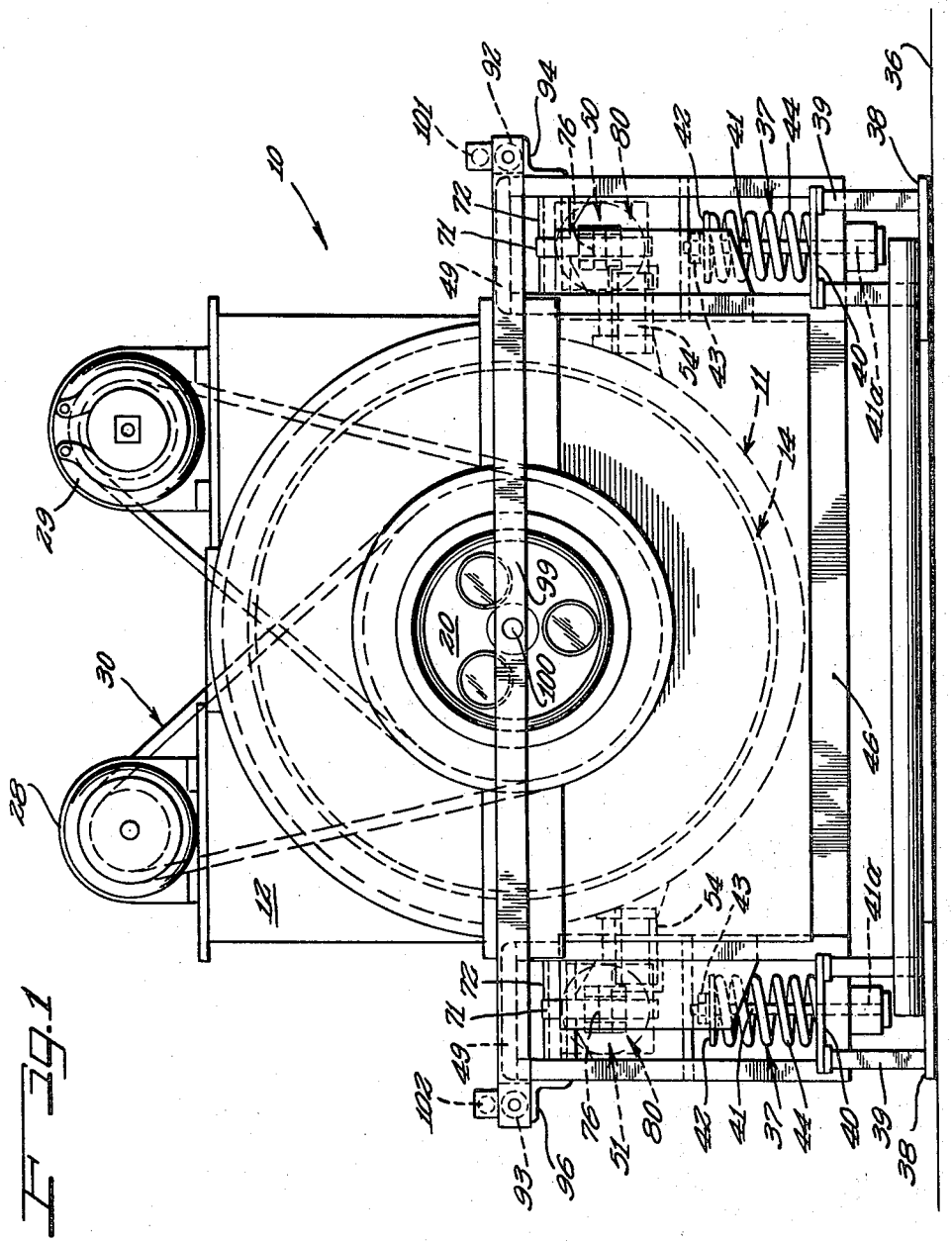

FIG. 1

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COMBINATION WASHING-EXTRACTING MACHINE

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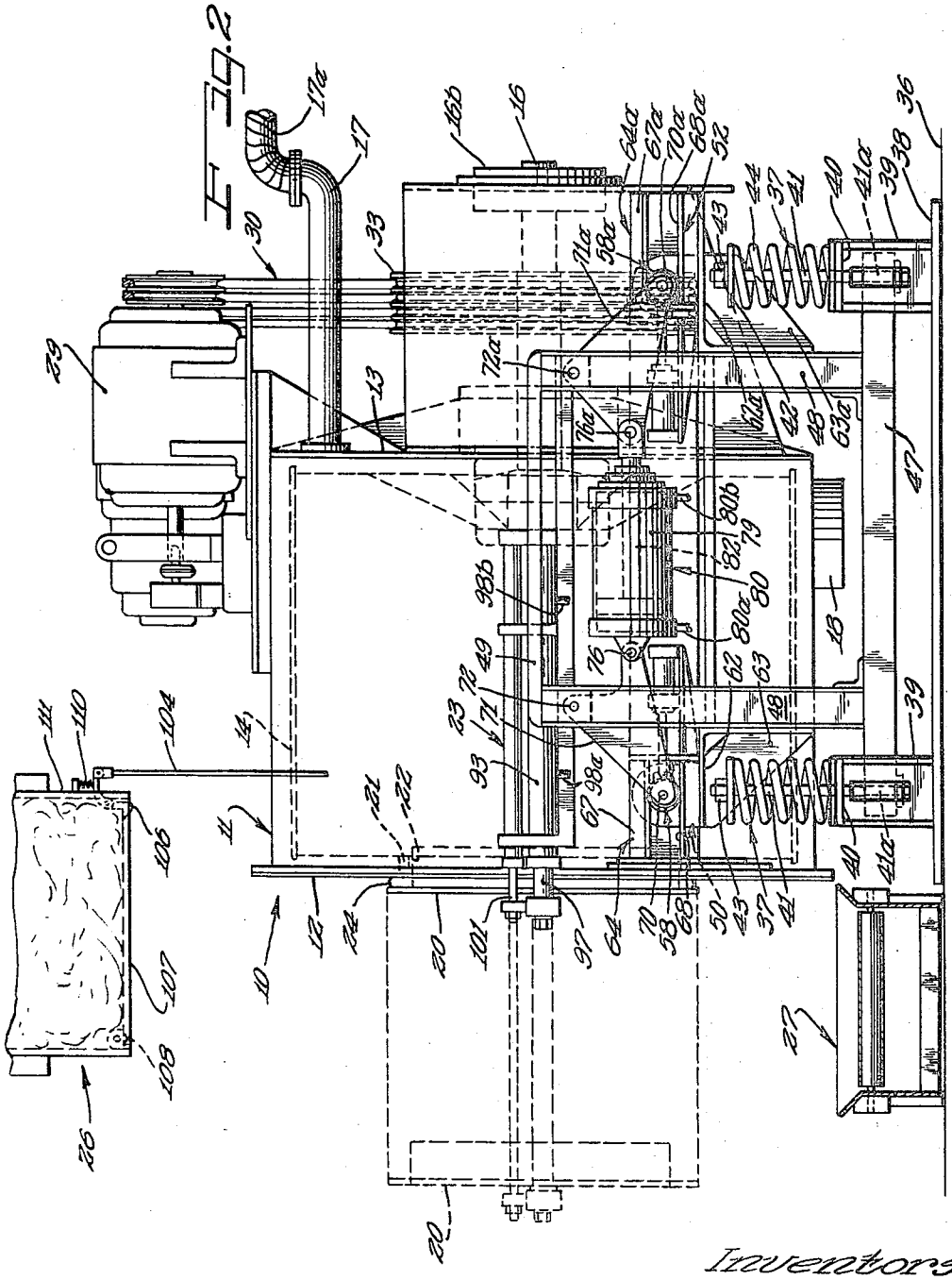
FIG. 2



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COMBINATION WASHING-EXTRACTING MACHINE

Filed April 14, 1967 8 Sheets-Sheet 3

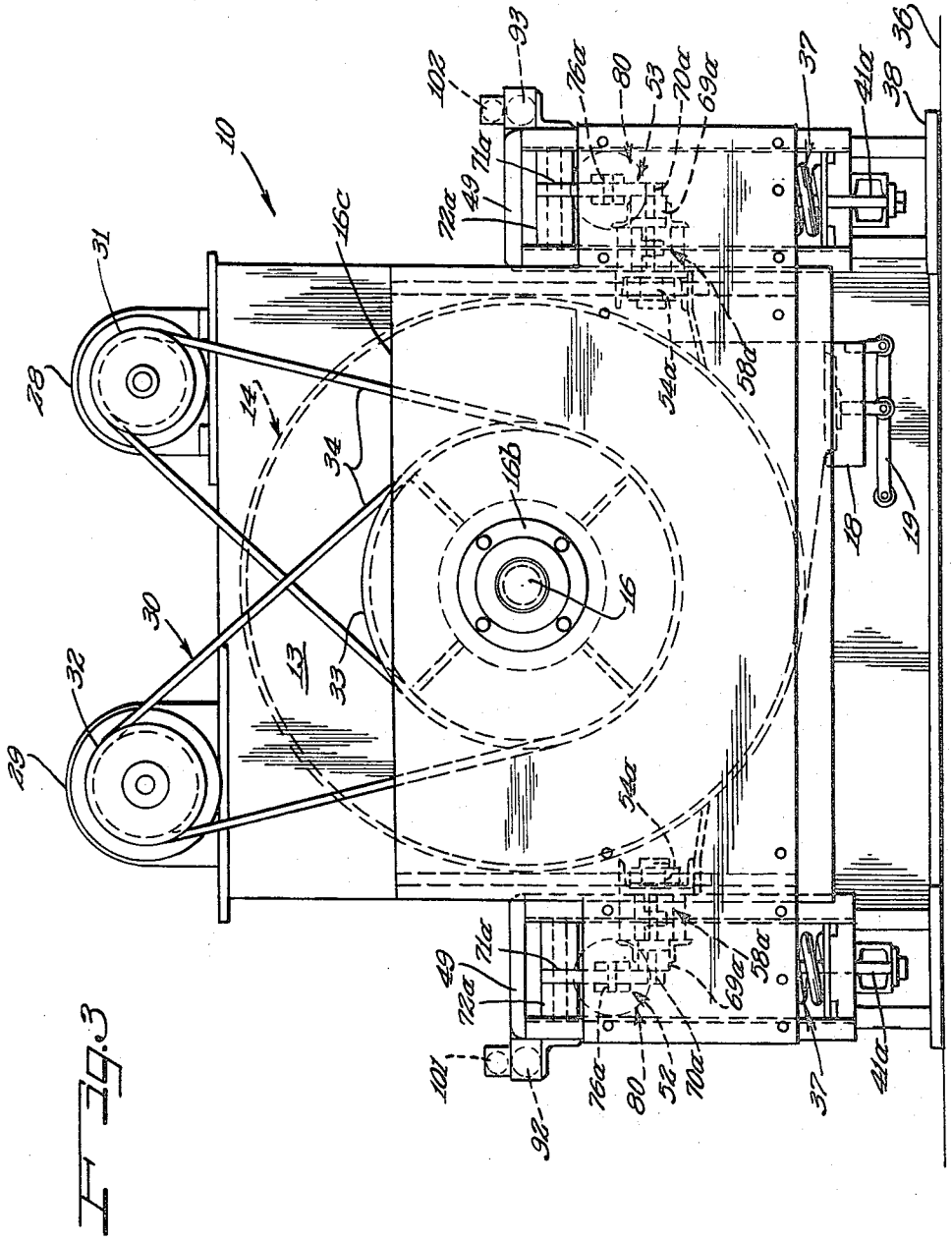


Fig. 3

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COMBINATION WASHING-EXTRACTING MACHINE

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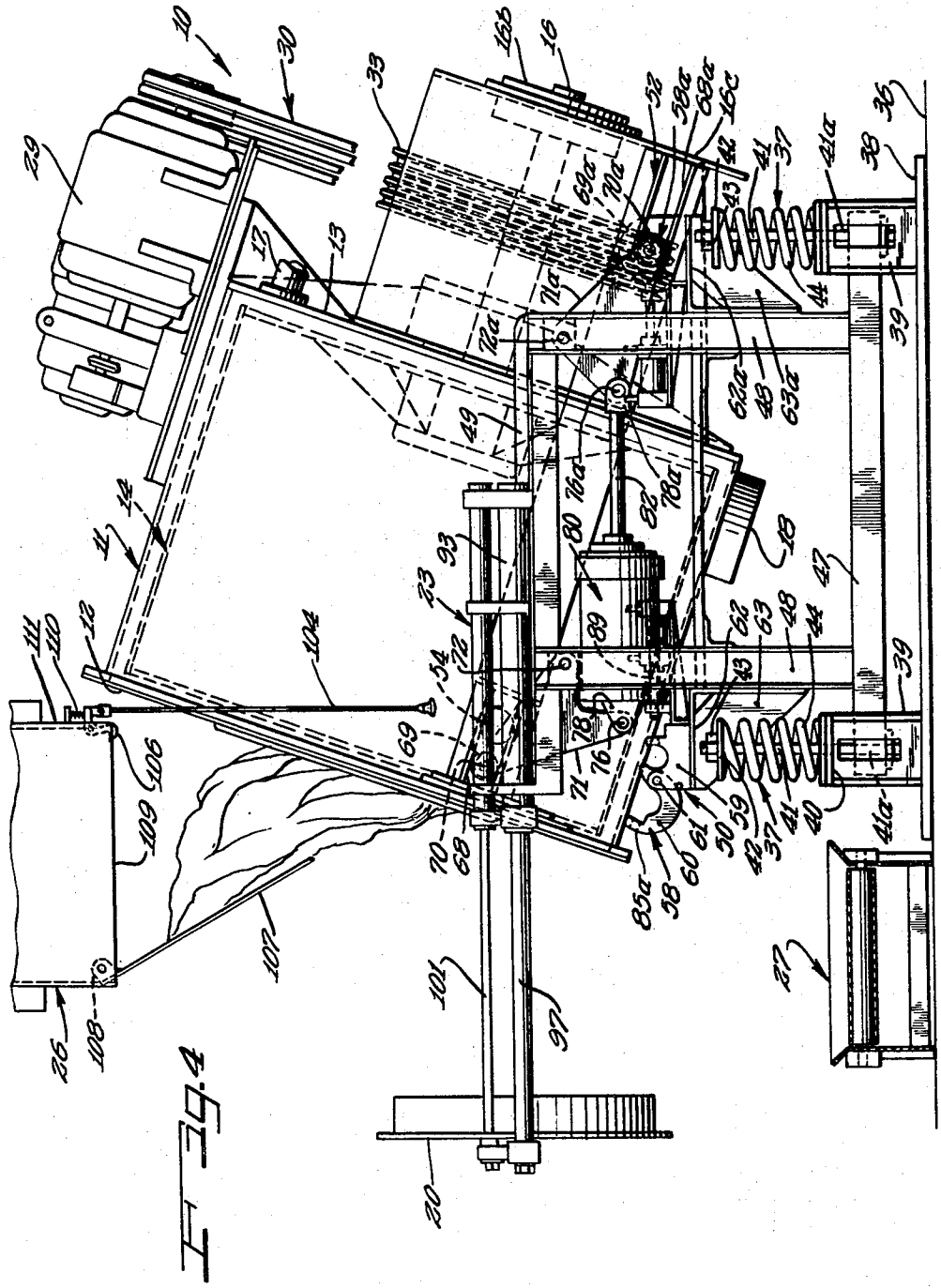

FIG. 4

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COMBINATION WASHING-EXTRACTING MACHINE

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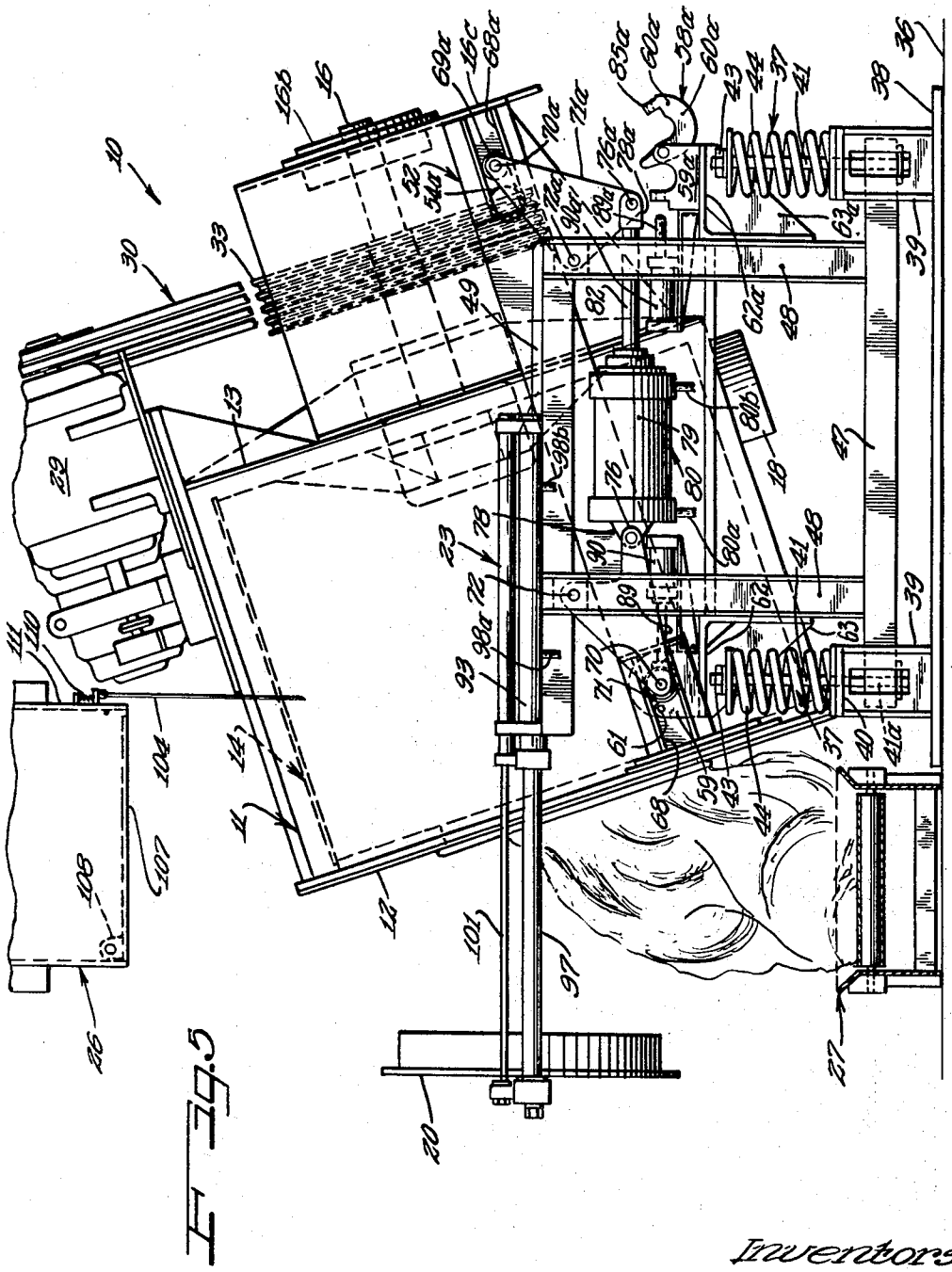

FIG. 5

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COMBINATION WASHING-EXTRACTING MACHINE

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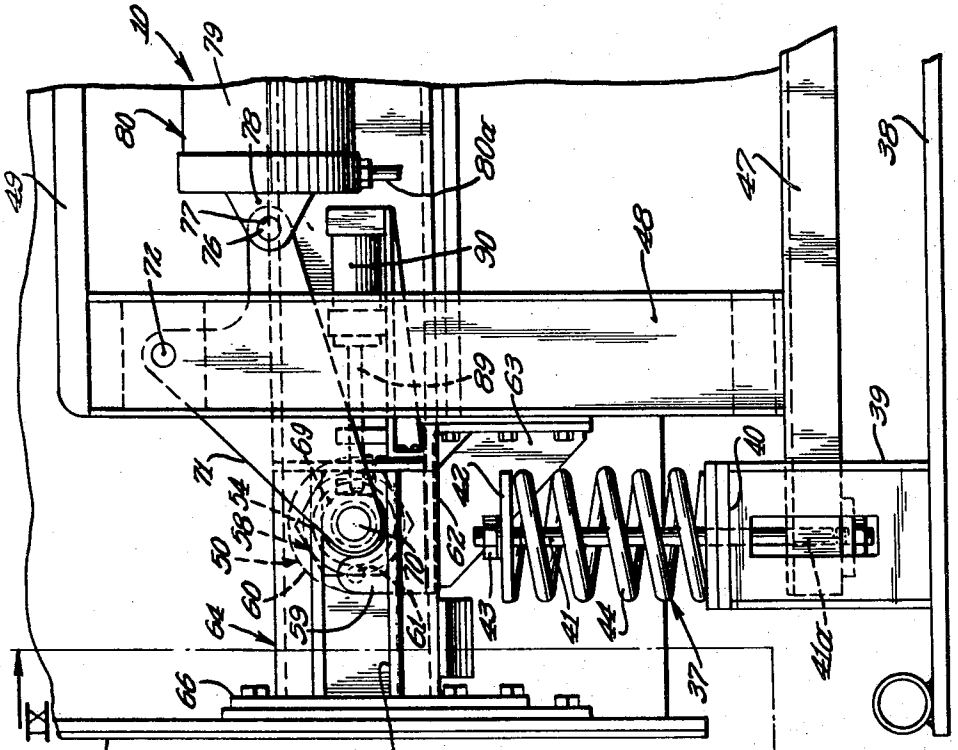

FIG. 10

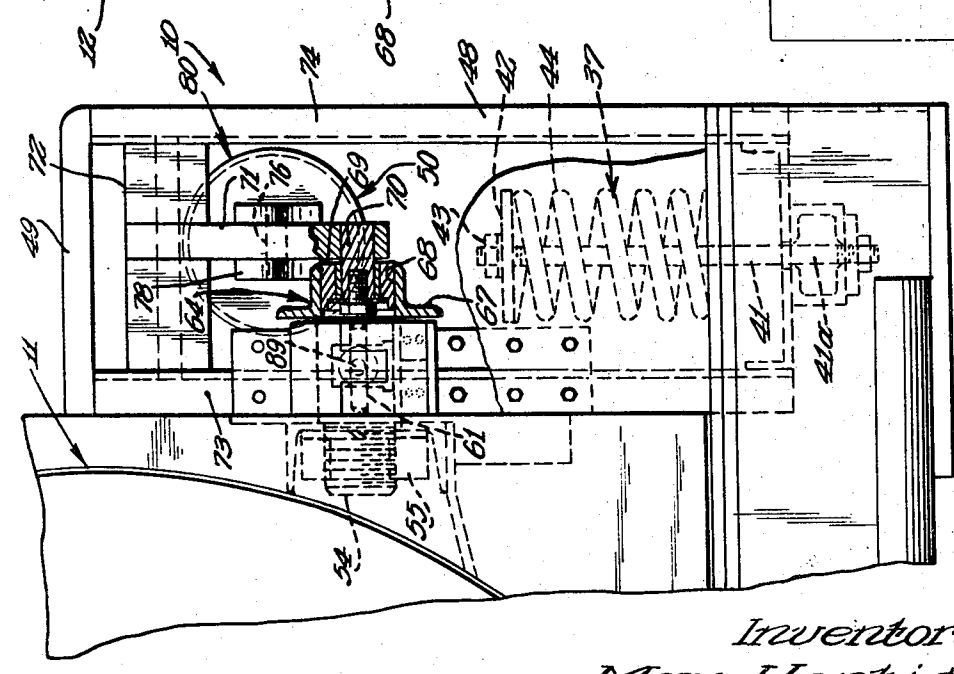

FIG. 9

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COMBINATION WASHING-EXTRACTING MACHINE

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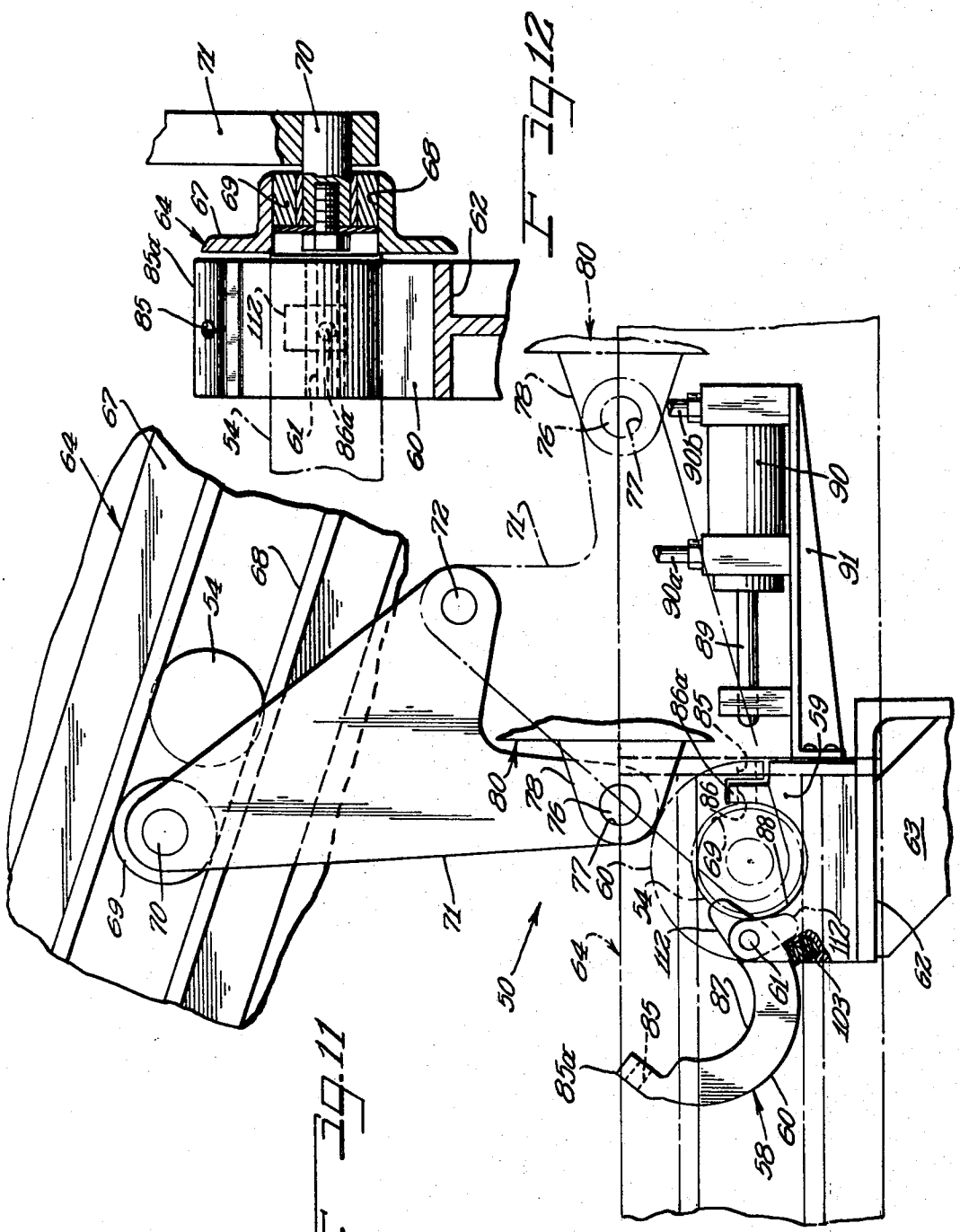

Fig. 12



Fig. 11

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COMBINATION WASHING-EXTRACTING MACHINE

Filed April 14, 1967 8 Sheets-Sheet 8

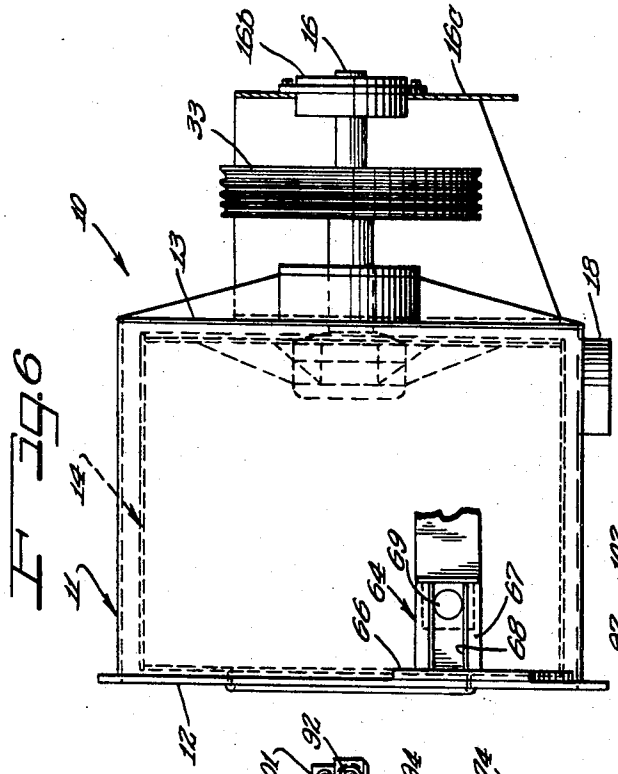

FIG. 6

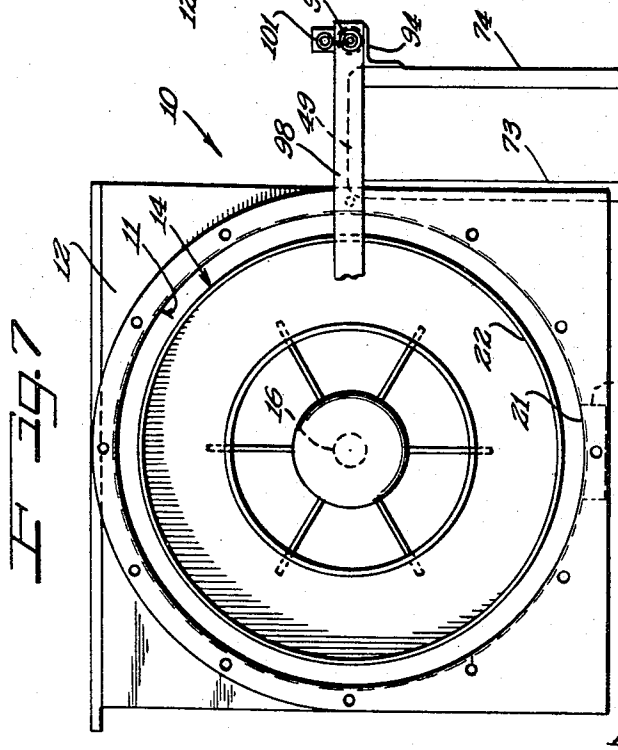

FIG. 7

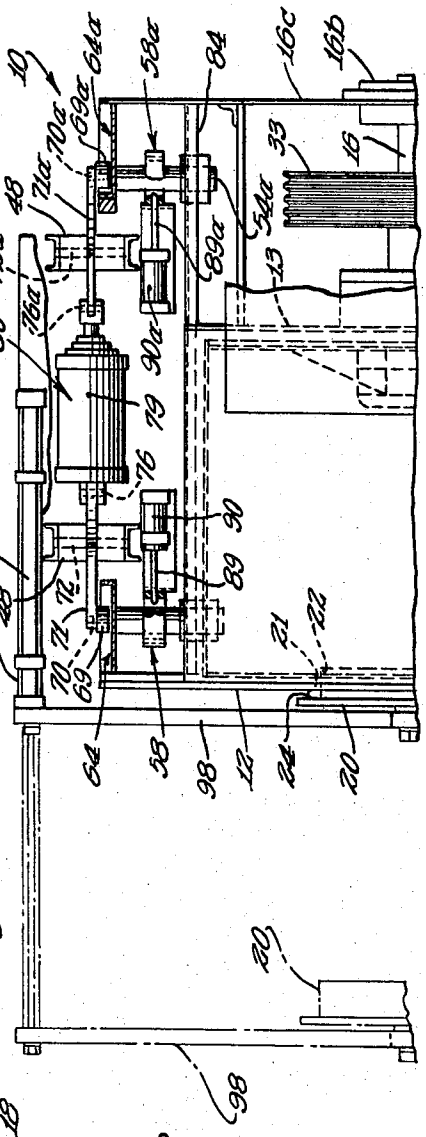

FIG. 8

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United States Patent Office 3,417,582
Patented Dec. 24, 1968



3,417,582

# COMBINATION WASHING-EXTRACTING MACHINE

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Filed Apr. 14, 1967, Ser. No. 631,076
13 Claims. (Cl. 68—24)

## ABSTRACT OF THE DISCLOSURE

A combination washer-extracting laundry machine comprising an imperforate shell and a coaxial perforate washing cylinder mounted for rotation within the shell. The shell is pivotally mounted on a supporting frame for movement between a washing-extracting position at which the axis of the shell is horizontally disposed, a loading position at which a door or front end of the shell is raised to receive laundry material from an overhead storage bin, and an unloading position at which the front end of the shell is lowered to discharge the washing material gravitationally to a conveyor system.

Low and high speed electric motors are mounted on the shell for rotating the washing cylinder at a relatively low speed during a washing operation, and at a relatively high speed during an extracting operation. The shell may be subjected to substantial centrifugal forces during an extracting operation. In order to fasten the shell securely to the mounting frame during an extracting operation to preclude relative movement therebetween, while accommodating movement of the shell relative to the frame during loading and unloading operations, the shell is mounted on the frame by means of front and rear lockable bearing units, each of which comprises a mounting stud connected in fixed assembly to the shell and a releasable bearing lock mounted on the frame. Front and rear guide rail assemblies also interconnect the shell and the frame to pivot the front end of the shell upwardly during a loading operation, and the rear end upwardly during an unloading operation.

The releasable bearing locks each include a pressurized fluid-operated power cylinder for performing a locking function, and a pressurized fluid-operated power cylinder is connected to the guide rail assemblies for pivoting the front and rear ends of the shell.

*Background of the invention*

This invention pertains generally to commercial laundry equipment and more particularly to commercial washing-extracting machines having two-speed washing cylinders, a low speed for use during a washing operation and a high speed for use during an extracting operation.

A recognized economy in the operation of certain prior art commercial washing-extracting machines involves rapid automatic loading and unloading of the machines. One known method involves the loading of laundry material into the machine gravitationally from an overhead storage bin, and unloading the machine gravitationally down to a depository such as a conveyor system for removal of the washed material to another station. In loading the machine the front end of the washing cylinder is tipped upwardly and the laundry material is dropped directly into a door opening formed in the front end of the cylinder. The washing and extracting operations are carried on while the washing cylinder is disposed horizontally, and during an unloading operation the back end of the washing cylinder is tipped upwardly to enable the laundry material to drop out of the door opening onto the conveyor system.



Commercial washing machines of the washing-extracting type, as contrasted with those of the washing only type, are often subjected to substantial vibration due to the high speed of the washing cylinder during an extracting operation and an imbalance of the laundry material within the washing cylinder. As the result of such vibrations it is important that the washing cylinder and its surrounding shell be suitably isolated from the floor or other support surface upon which the machine rests.

Generally the washing cylinder and shell are mounted on a support frame and the frame is supported by the floor with suitable vibration isolators interposed therebetween. In such arrangements it is desirable to clamp or secure the shell and washing cylinder tightly to the mounting frame during the washing and extracting operation (particularly the extracting operation) so that the shell and washing cylinder move together with the mounting frame as a single unit.

However, in order to load and unload the machine gravitationally it is desirable that the shell and washing cylinder be tipped or pivoted upwardly and downwardly as noted hereinabove. Thus, while relative movement between the washing cylinder and mounting frame is desirable during loading and unloading operations, the washing cylinder should be clamped tightly to the mounting frame to preclude relative movement therebetween during a washing and particularly an extracting operation.

The prior art discloses washing machines provided with means for mounting the washing cylinder on a mounting frame to accommodate tipping or pivoting of the washing cylinder for gravitational loading and unloading, but such mounting means are not sufficient for tightly clamping the washing cylinder to the mounting frame to the degree necessary to withstand the substantial vibration generated at relatively high extracting speeds. It will be appreciated that during an extracting operation any looseness between the washing cylinder and the mounting frame as may be occasioned by a less than tight connection therebetween may be highly detrimental to the machine because of the substantial vibratory forces created, particularly with the heavy loads of a commercial machine.

*Summary of the invention*

The present invention involves the provision of means for securely fastening the shell and washing cylinder of a commercial washing-extracting machine to the mounting frame of the machine during washing and extracting operations so that any vibratory forces which may result from an imbalance of the load move the machine as a unit. In addition, however, the shell mounting means is constructed and arranged so as to enable the front end of the washing cylinder to be tipped or pivoted both upwardly and downwardly relative to the back end during loading and unloading operations so that the laundry material may be quickly and easily, and with a minimum of time and effort, gravitationally loaded into and unloaded from the machine.

The shell mounting means comprises independent means for releasably pivotally connecting the front and rear ends of the shell to the mounting frame. More specifically, the shell (and the washing cylinder journaled for rotation within the shell) is mounted on the mounting frame by means of front and rear bearing units disposed in mutually spaced relation along an axis parallel to the axis of the shell.

Each of the bearing units comprises a cylindrical mounting stud and a releasable bearing lock mounted in fixed assembly on the shell and on the mounting frame and movable toward and away from each other into and out of bearing relation. The mounting stud extends horizontally and at right angles to a vertical plane intersecting

the axis of the shell. The bearing lock has a closed position for surrounding and holding the stud in pivotal bearing relation therewith, and a release or open position for enabling the stud to move radially away therefrom and out of bearing relation thereby. Means are provided for changing the position of the bearing lock and power-operated means are provided for independently vertically moving the opposite ends of the shell relative to the mounting frame to raise the front end of the shell relative to the rear end to a loading position when the front bearing unit is unlocked and the rear bearing unit is locked, and to raise the rear end of the shell relative to the front end to an unloading position when the front bearing unit is locked and the rear bearing unit is unlocked.

Each of the bearing units comprises means for retaining its releasable bearing lock in a closed position. Each of the bearing units also features a mounting stud cradle and a lock cap pivotally mounted on the cradle. The cradle and the lock cap both have segmental circularly shaped bearing surfaces for receiving their corresponding mounting stud in bearing engagement.

It is, therefore, an object of the present invention to provide a commercial washing-extracting machine with means for accommodating gravitational loading and unloading of the machine while avoiding detrimental effects due to the substantial vibratory forces which may obtain at high extracting speeds.

Another object of the invention is to provide a commercial washer-extractor comprising a shell having a washing cylinder journaled therein, a mounting frame for supporting the shell and means for mounting the shell on the frame to pivot the front end of the shell upwardly and downwardly during loading and unloading operations while holding the shell tightly to the mounting frame during washing and extracting operations.

Still another object is to provide a shell mounting arrangement comprising front and rear mounting studs secured to the shell and front and rear releasable bearing locks mounted on the frame to receive the mounting studs, whereby the shell is alternatively pivotable about the front and rear mounting studs to move between loading and unloading positions thereof, but is also securely locked to the frame during washing and extracting operations to preclude vibratory movement between the shell and the mounting frame.

Another object is to provide pressurized fluid-operated power cylinder means for locking and unlocking the mounting stud bearing locks and for pivoting the shell into the loading and unloading positions thereof.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings, in which preferred structural embodiments incorporating the principles of the present invention are shown by way of illustrative example only.

*Brief description of the drawings*

FIGURE 1 is a front elevational view of a commercial washing-extracting laundry machine constructed in accordance with the principles of the present invention;

FIGURE 2 is a side elevational view of the machine shown in FIGURE 1 and includes a storage bin situated above the machine and a conveyor system below the machine for gravitationally loading soiled laundry material such as fabrics, garments and the like into the machine and for removing washed laundry material from the machine;

FIGURE 3 is a rear elevational view of the machine shown in FIGURE 1.

FIGURES 4 and 5 are side elevational views similar to FIGURE 2 and illustrate the washing cylinder and the shell in raised and lowered positions during loading and unloading operations respectively.

FIGURE 6 is a side elevational view of the laundry machine with parts removed and other parts shown in section.

FIGURE 7 is a front elevational view of the laundry machine with certain parts including a front plate removed.

FIGURE 8 is a fragmentary top plan view of the machine.

FIGURE 9 is a vertical sectional view taken substantially along lines IX—IX of FIGURE 10.

FIGURE 10 is an enlarged fragmentary side elevational view of the lower portion of the front end of the machine.

FIGURE 11 is an enlarged fragmentary view of a shell mounting bearing lock constructed in accordance with the principles of this invention.

FIGURE 12 is a vertical sectional view looking from the right in FIGURE 11 with parts removed for clarity.

*Description of the preferred embodiment*

Referring to the drawings, a combination washing-extracting machine constructed in accordance with the principles of the present invention is indicated generally at reference numeral **10**. A machine **10** is more particularly characterized as comprising an imperforate cylindrical housing or shell **11** extending on a horizontal axis between rectangularly shaped front and back plates **12** and **13**.

Situated within and disposed coaxially with the shell **11** is a perforated washing cylinder **14** in which soiled material to be laundered is deposited. The washing cylinder **14** is mounted for corotation on a washing cylinder shaft **16**. In order to charge the shell **11** with a supply of laundry liquid such as an admixture of hot water and detergent, a rigid pipe **17** which opens into the shell **11** is mounted on the back plate **13**. A flexible conduit indicated as reference numeral **17***a* may be connected to the pipe **17** for delivering the laundry liquid from a suitable source thereof. The laundry liquid may be drained from the drum **11** through a drain **18** equipped with a suitable control mechanism as indicated at **18** in FIGURE 3.

A removable door **20** through which the laundry material is loaded into and removed from the washing cylinder **14** is mounted on the machine **10**. Suitable ingress and egress openings in registry with one another are provided respectively in the front plate **12** and the washing cylinder **14**. In a closed position of the door **20** as indicated in the solid lines in FIGURE 2, a gasket **24** is interposed between the door and the front plate **12**. An open position of the door is indicated in dashed lines. The door is mounted on a door-mounting assembly indicated generally at reference numeral **23** for movement between the closed and opened positions thereof.

Soiled laundry material is loaded into the machine **10** from a storage bin **26** situated above the front plate **12**, and a conveyor system **27** is situated below the front plate for removing the material from the machine **10** after it has been laundered.

During a washing operation the washing cylinder **14** is rotated at a relatively low speed by means of an electric motor **28** and during an extraction operation the cylinder **14** is rotated by a relatively high speed motor **29**. Both motors are drivingly connected to the cylinder shaft **16** through a multi V-belt drive **30** which comprises a sheave **31** mounted on the low speed motor **28**, and another sheave **32** mounted on the high speed motor **39** and a large sheave **33** keyed to the cylinder shaft **16**.

A pair of bearings **16***a* and **16***b* are provided for rotatably mounting the shaft **16**. Bearing **16***a* is connected in fixed assembly to the back plate **13** and bearing **16***b* is securely mounted to a bearing plate **16***c* which is, in turn securely fastened to the back plate **13**.

During washing and extracting operations, and particularly during the high speeds encountered during extracting operations, the drum **11** is subjected to relatively

high vibratory forces. In order to accommodate such forces without excessive transmission thereof to a floor or other support surface as indicated at **36** on which the machine pin is supported, four vibration dampeners or spring support units indicated at **37** are interposed between the drum **11** and the floor **36**. A pair of base plates **38, 38** extend on either side of the drum **11** and each serves as a support for a pair of the support units **37, 37**.

Each of the support units **37** is more particularly characterized as comprising an inverted U-shaped bracked **39** having a horizontal top plate **40**. A rod **41** extends slidably through the plate **40** and has a spring retainer **42** mounted at the top end thereof by means of a threaded nut **43**. A heavy coil spring **44** is interposed between the plate **40** of the U-shaped bracket **39** and the spring retainer **42**.

The two spring support units **37, 37** disposed on each side of the shell **11** are interconnected by a side rail **47**, while the two support units disposed respectively at the front and rear ends of the drum **11** are connected by an end rail **46**. Extending vertically upwardly from each of the rails **47** is a pair of axially spaced uprights **48**, and a horizontally extending side frame **49** is connected in fixed assembly to the upper ends of the uprights **48** on both sides of the machine **10**. The end rails **46, 46** and the side rails **47, 47** are both connected in fixed assembly with lower ends **41***a* of the rods **41**, as a consequence of which the entire shell mounting frame comprising the uprights **48** are spring-mounted on the four support units **37**.

The shell **11** is, in turn, supported by the four uprights **48**. Interposed between the drum and the upright are four lockable shell bearing units indicated respectively at reference numerals **50–53**. Bearing units **50** and **51** are mounted on the upright **48** situated toward the front plate **12**, whereas bearing units **52** and **53** are mounted on the uprights situated near the rear plate **13**.

The four bearing units **50–53** are substantially identical. Referring to FIGURES 9 and 10, the bearing unit **50** comprises a shell mounting stud **54** securely fastened by suitable means such as a threaded nut **55** to a shaft-mounting bracket **56** connected in fixed assembly by a weld connection or the like to the shell **11**.

The cylindrical stud **54** is carried by a bearing lock **58** which comprises a stud cradle **59** and a lock cap **60** pivotally mounted on the cradle **59** by means of a cap pivot pin **61**. The cradle **62** is securely fastened to an angle iron **62***a* having a web portion **63** which is, in turn, connected in fixed assembly to its corresponding upright **48**.

Secured to the front plate **12** by a plurality of threaded bolts or the like which extend through a flange **66** thereof is a guide rail assembly **64**. Formed in a web portion **67** of the assembly **64** is an axially extending slot **68**. A bearing-mounted roller **69** is disposed within the slot **68** and is mounted for rotation on a shaft **70** secured by a press-fit or the like connection to a pivotable actuating lever **71**.

The lever **71** is mounted for pivotal movement on a shaft **72** which interconnects a pair of spaced vertical plates **73** and **74** which comprise the upright **48**.

Another shaft **76** is mounted on the actuating lever **71** and extends through a bore **77** formed in a bracket **78** which is mounted in turn on a housing **79** of a pressurized fluid-operated power cylinder **80**. Actuation of the cylinder **80**, which may be of the hydraulic or pneumatic type, has the effect of raising the front and rear ends of the shell **11** during loading and unloading operations of the machine **11**. Suitable pressure lines **80***a* and **80***b* are connected to the cylinder housing **79**, the cylinder **80** being of the reverse-acting type.

Power cylinder **80** is more particularly characterized as comprising a piston **81** and a piston rod **82** reciprocably carried within the housing **79**. A shaft **83** is mounted on the outboard end of the piston rod **82** and is connected for pivotal movement with an actuating level **71***a* of the rear lockable bearing unit **52**.

As noted, bearing unit **52** is similar to bearing unit **50** and comprises a bearing lock **58***a* which is similar to bearing lock **58** and which is mounted on an angle iron **62***a* connected in fixed assembly to its respective upright **48**.

Bearing lock **58***a* journals a mounting stud **54***a* (FIGURE 8) mounted in fixed assembly on a vertical plate **84** which is welded or otherwise suitably connected to the bearing plate **16***c* and the shell **11**. A guide rail assembly **64***a* is bolted to the plate **16***c* and comprises a web portion **67***a* having formed therein a slot **68***a* for receiving a roller **69***a* similar to roller **69**. The roller **69***a* is mounted on the actuating lever **71***a* in a manner similar to that by which roller **69** is mounted on the actuating lever **71**.

Referring to FIGURES 11 and 12, a cylinder bore **85** is formed in a head portion **85***a* of the lock cap **60** and a complemental bore **86** is formed in an upright leg **86***a* of the stud cradle so that when the cap **60** is closed, as shown in the dashed lines, to surround the mounting stud **54** the bores **85** and **86** are axially aligned. An inner surface **87** of the cap **60** and an inner surface **88** of the saddle **59** are circularly shaped and machined at close tolerances to snugly grip the mounting stud **54** in the closed position of the lock cap **60**.

In order to lock the cap **60** in a closed position a locking stud **89** is axially aligned with the bores **85** and **86** for insertion thereinto. The stud **89** comprises the piston rod of a pressurized fluid-operated power cylinder **90** mounted on a bracket **91** which is connected in fixed assembly to the stud cradle **59**. The power cylinder **90** is reverse-acting and a pair of pneumatic lines **90***a* and **90***b* are connected at opposite ends of the cylinder **90** for powering the rod **89** into and out of the bores **85** and **86**.

Referring to FIGURES 1, 2 and 8, the door mounting assembly **23** is more particularly characterized as comprising a pair of horizontally extending pressurized fluid-operated power cylinders **92** and **93** situated on opposite sides of the shell **11**. Cylinders **92** and **93** are mounted respectively on a pair of angle irons **94** and **96** securely fixed to the uprights **48**. Each of the cylinders **92** and **93** comprises a telescopically slidable piston rod **97** which is reciprocably movable in response to pressurization of the cylinders through pneumatic lines $98_a$ and $98_b$.

Interconnecting the distal ends of the piston rods **97, 97** is a horizontally extending door carrier **99** fixedly secured to the door **20** at a central portion **100** thereof. To assist in guiding the door **20** between the open and closed positions thereof, a pair of guides **101** and **102** are slidably mounted on the angle irons **94** and **96** in parallel relation to and immediately above the power cylinders **92** and **93**.

*Operation*

In the use of the machine **10** the first operation is to load the washing cylinder **14** with soiled material to be laundered. This involves a pressurization of power cylinders **92** and **93** to move the door **20** from a closed to an open position. The next step involves the pressurization of the power cylinders **90, 90** of the front lockable bearing units **50** and **51** to remove the locking studs or piston rods **89** from the bores **85** and **86** of the lock caps **60** and the stud cradles **59**.

The next step involves the pressurization of power cylinders **80, 80** whereby the piston rods **82, 82** telescope outwardly of the cylinder housing **79, 79**.

Since the lock caps **60, 60** of the rear lockable bearing units **52** and **53** are locked in a closed position, the housings **79, 79** of the power cylinders **80, 80** will move toward the front of the unlocked bearing units **50** and **51** to rotate their respective actuating levers **71, 71** in a clockwise direction as viewed in FIGURE 2. The actu-

ating levers **71, 71**, in turn, rotate their respective rollers **69, 69** upwardly in the slots **68, 68** of their respective guide rail assemblies **64, 64**.

The front end of the shell **11** is thereby tipped or pivoted upwardly to the loading position thereof shown in FIGURE 4. The upward movement of the front mounting studs **54** has the effect of urging their lock caps **60, 60** to an open position as shown in the solid lines of FIGURE 11. A suitable abutment such as the coil spring **103** shown in FIGURE 11 is provided on each of the cradles **59** as a stop for the lock cap **60** in moving to the open position thereof.

After the front end of the drum **11** has been raised to the loading position shown in FIGURE 4 a batch of soiled laundry is loaded into the washing cylinder **14** from the storage bin **26**. For this purpose the bin **26** is equipped with a trip lever **104** which, when pushed upwardly, pivots a latch **106** to release a trap door **107** mounted on hinges **108** at an open bottom end **109** of the bin **26**. The laundry material then falls by gravity from the bottom of the bin and is directed into the openings **21** and **22** of the shell **11** and the washing cylinder **14** by the trap door **107**. The trap door is then raised again to a closed position, during which movement the latch **106** is pivoted to again catch the trap door **107**. The latch **106** is biased to a door-locking position by means of a spring **110** mounted on a side wall **111** of the bin **26**.

After washing cylinder **14** has been loaded the power cylinder **80** is again actuated to lower the front end of the drum **11** back to the horizontal position as illustrated in FIGURE 2. As the mounting studs **54, 54** of the front bearing units **50** and **51** descend, they engage a pair of ears **112, 112** formed on the lock caps **60** of the front bearing locks **58, 58**, and pivot the locking caps **60** around the shaft **61** into closed positions thereof as illustrated in the dashed lines of FIGURE 11 wherein the bores **85** and **86** of the lock caps **60** and the saddles **59** are axially aligned. The power cylinders **90, 90** are then actuated to drive the locking studs **89, 89** into their respective bores and the front mounting studs **54, 54** are then held snugly in their bearing locks **58, 58**.

The two power cylinders **93, 93** of the door mounting assembly **23** are then actuated to move the door **20** from an open to the closed position thereof as shown in the solid lines in FIGURE 2. Laundry liquid and suitable additives may be charged into the shell **11** through the pipe **17** and the machine **10** is then prepared to operate through washing and extracting operations.

It is noted that as the front end of the shell **11** is raised from the horizontal position thereof shown in FIGURE 2 to the loading position thereof shown in FIGURE 3, the rollers **69, 69** of the front bearing units **50** and **51** move longitudinally in their respective slots **68, 68** as the actuating levers **71, 71** are rotated in a clockwise direction. This relative movement between the rollers and the slots occurs because of the change in center-to-center distance between the corresponding rollers **69** of the front and rear bearing units **50–53** as the front end of the shell **11** is raised. The mounting studs **54, 54** of the rear bearing units **52** and **53** remain locked in their respective bearing locks **58, 58** as the front of the shell **11** is raised to a loading position. The shell **11**, of course, rotates or pivots about the rear mounting studs **54*a*, 54*a***.

During a washing operation the washing cylinder **14** is rotated at a relatively low speed by the washing motor **28**. At the end of the wahing operation, motor **28** is de-energized and the extracting motor **29** is energized to spin the washing cylinder **14** at a relatively high speed. During an extracting operation the drain **18** is normally opened to enable the laundry liquid to drain from the shell **11**.

As noted, the present invention is of particular utility in the field of washing and extracting laundry machines of the larger commercial type. Some machines of this type are sufficiently large to handle loads of up to and beyond 850 pounds (dry weight) of laundry material. The weight of wet laundry material is generally approximately three times its dry weight.

Two of the major problems involved in the operation of such large washing and extracting machines, as noted above, involve (*a*) the time and effort involved in loading and unloading the machine with laundry material and (*b*) the substantial vibrations due to centrifugal forces which results from spinning the laundry material at relatively high speeds.

As a result both the tiltability of the shell **11** during loading and unloading operations and the rigid manner in which the shell **11** is mounted on the uprights **48** during extracting operations, the time and effort required in operating the machine through a washing-extracting cycle is substantially reduced and injury to the machine due to vibration is avoided.

At the end of the extracting operaton the rear end of the drum is raised and the laundry material within the washing cylinder **14** is gravitationally unloaded from the machine to fall to the conveyor **27**. Specifically, the power cylinders **93, 93** of the door mounting assembly **23** are again actuated to move the door **20** from the closed to the open position thereof. Then the power cylinders **90*a***, **90*a*** of the rear bearing units **52** and **53** are actuated to unlock the rear bearing locks **58, 58**.

The power cylinders **80, 80** are then actuated by pressurizing connections **80*a*** thereby causing the piston rods **82, 82** to rotate the actuating levers **71*a*, 71*a*** in a counterclockwise direction to raise the rear end of the shell **11**.

Since the bearing locks **58, 58** of the front bearing units **50** and **51** are then in closed positions, the shell **11** rotates about the mounting studs **54, 54** of the front bearing units **50, 51**. As illustrated in FIGURE 5, the rollers **69, 69** of the rear bearing units **52, 53** are moved rearwardly in the slots **68** of the actuating levers $71_a$ as the rear end of the shell **11** is raised to an unloading position.

During the unloading operation, the extracting motor **29** is de-energized and the washer motor **28** is actuated to turn the washer cylinder **14** at a relatively low speed, thereby facilitating discharge of the laundry material therewithin to the conveyor system **27**, as illustrated in FIGURE 5.

After all of the laundry material has been unloaded from the washing cylinder **14** the power cylinders **80, 80** are again actuated to lower the rear end of the shell **11** back to a horizontal position, during which movement the mounting studs $54_a$, $54_a$ pivot the lock cap $60_a$, $60_a$ to their closed positions. Power cylinders $90_a$, $90_a$ are then actuated to lock the mounting studs $54_a$, $54_a$ in the bearing locks $58_a$, $58_a$. The drain **18** may then be closed and the machine **10** is ready to receive another load of laundry material and to undergo another washing-extracting cycle.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably come within the scope of the our contribution to the art.

We claim as our invention:

**1.** A combination washing-extracting machine comprising

an outer imperforate shell and a coaxial perforated washing cylinder journalled therewithin,

motor means for rotating said washing cylinder at washing and extracting speeds,

a mounting frame for supporting said shell,

means for mounting said shell on said frame comprising

front and rear bearing units each comprising a mounting stud and a releasable bearing lock connected in fixed assembly to said shell and to said frame and movable into and out of rotatable bearing rotation with one another,

said mounting stud extending transversely to the axis of said shell and said bearing lock having a closed position for surrounding said stud and for holding said stud in bearing relation therewith and an open position enabling said stud to move out of bearing relation therewith, and

means for individually selectively locking said bearing locks in the closed positions thereof, and

power-operated means for urging the ends of said shell vertically upwardly relative to said frame,

said mounting studs being effective to move their respective bearing locks between the closed and open positions thereof as they are moved into and out of bearing relation therewith.

2. The combination washing-extracting machine as defined in claim 1 wherein each of said bearing units further comprises

a stud cradle, and

a lock cap pivotally mounted on said cradle, said cradle and said lock cap having circularly shaped bearing surfaces for receiving their corresponding mounting stud in bearing engagement.

3. The combination washing-extracting machine as defined in claim 2,

said lock cap being pivotally disposed on said cradle in the closed position of said bearing unit so that said bearing surfaces are in juxtaposition with each other and comprise a substantially circumferentially continuous bearing surface surrounding said mounting stud, and being pivotally disposed in the open position of said bearing unit so that said bearing surfaces are out of juxtaposition with each other to eliminate said circumferentially continuous bearing surface to enable said mounting stud to be moved from said cradle.

4. The combination washing-extracting machine as defined in claim 3 wherein said cradle and said lock cap comprise means forming registered bores in the closed position of said bearing unit and including

a powered locking stud removably insertable into said registered bores for locking said bearing unit in the closed position thereof.

5. The combination washing-extracting machine as defined in claim 3 and comprising

an ear formed on said lock cap and constructed and arranged to overlie said cradle bearing surface in the open position of said bearing unit and to be engaged by its corresponding mounting stud when the stud moves into bearing relation with said cradle to pivot the lock cap into bearing relation with the stud.

6. The combination washing-extracting machine as defined in claim 3 wherein said mounting stud and said bearing lock are connected in fixed assembly to said shell and to said frame respectively.

7. The combination washing-extracting machine as defined in claim 1 wherein said power-operated means comprises

front and rear guide rail assemblies situated in axially spaced relation,



each of said assemblies including a pair of cooperating members comprising a flange and a roller,

one of said members being connected in fixed assembly to said shell and the other member being connected to said frame for vertical movement relative thereto,

said flange having an elongated abutment surface formed thereon extending in substantially parallel relation to the axis of said shell,

said roller engaging said surface for relative longitudinal movement therewith, and

means for vertically moving said other of said members relative to said frame to provide relative longitudinal movement between said cooperating members and to provide corresponding vertical movement to said shell.

8. The combination washing-extracting machine as defined in claim 7 wherein said flange is connected in fixed assembly to said shell and said roller is connected to said mounting frame.

9. The combination washing-extracting machine as defined in claim 7 wherein said vertical moving means comprises

an actuating lever pivotally mounted on said frame, and

a pressurized fluid-operated power cylinder operatively connected to said lever for providing pivotal movement thereto.

10. The combination washing-extracting machine as defined in claim 9 wherein said roller is rotatably mounted on said actuating lever.

11. The combination washing-extracting machine as defined in claim 10 wherein the axis of said roller and the axis of its corresponding mounting stud are axially aligned in the closed position of its corresponding bearing unit.

12. The combination washing-extracting meachine as defined in claim 9,

said power cylinder being operatively connected to the actuating levers of both said front and said rear guide rail assemblies for pivoting said actuating levers alternately.

13. The combination washing-extracting machine as defined in claim 9 wherein said flange is aligned with the distal end of its associated mounting stud so as to prevent axial shifting of the stud and radial movement of said shell relative to said frame when the stud is received in bearing engagement with its corresponding bearing unit.

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