June 9, 1964 A. MILLER ETAL 3,136,718

CENTRIFUGAL LAUNDRY EXTRACTORS

Filed April 27, 1960 6 Sheets-Sheet 1

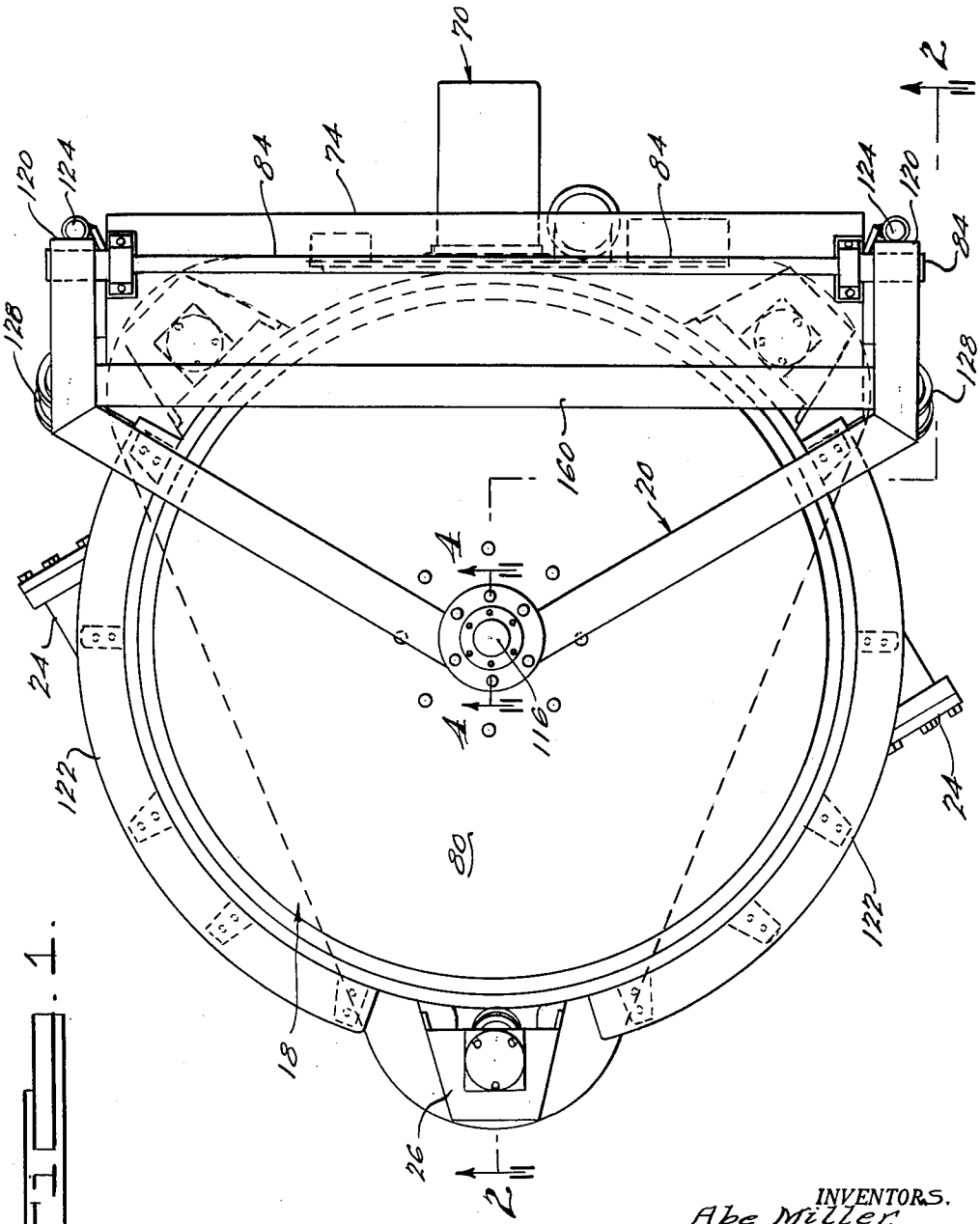


FIG. 1.

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CENTRIFUGAL LAUNDRY EXTRACTORS

Filed April 27, 1960 6 Sheets-Sheet 2

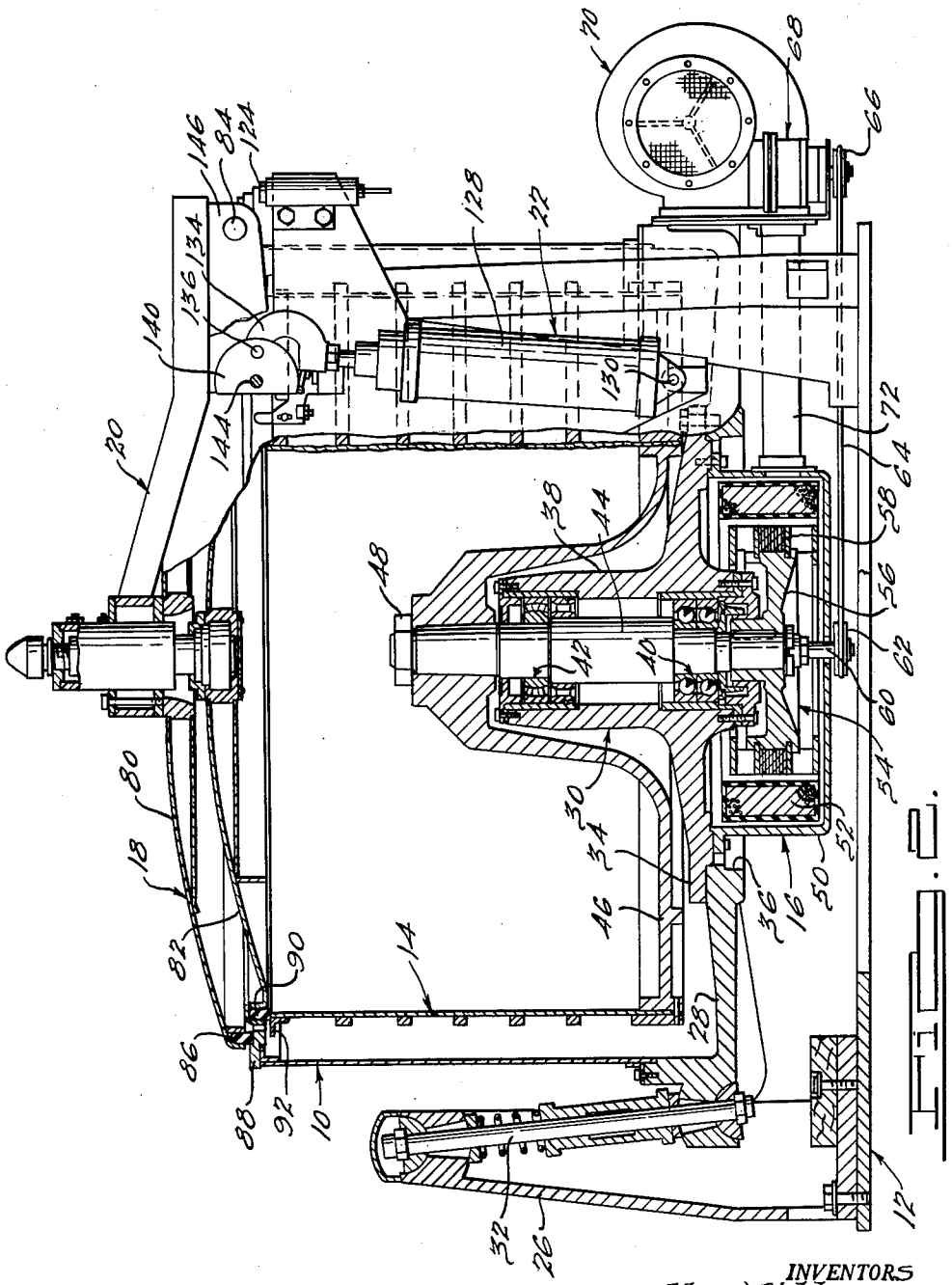


Fig. 2.

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CENTRIFUGAL LAUNDRY EXTRACTORS

Filed April 27, 1960 6 Sheets-Sheet 3

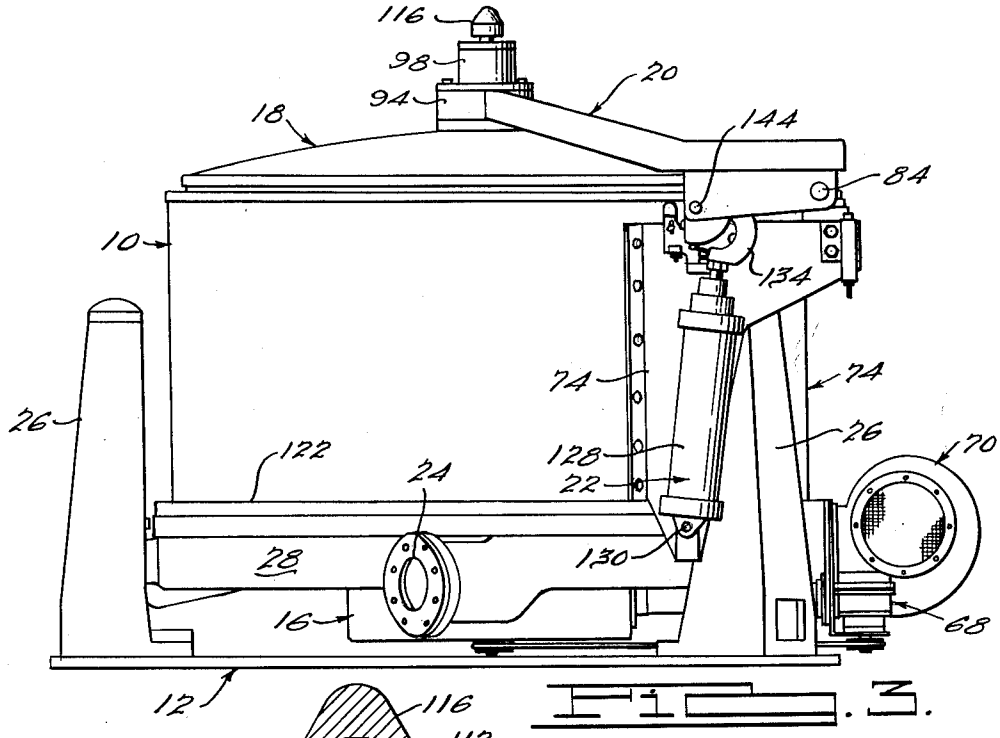


FIG. 3.

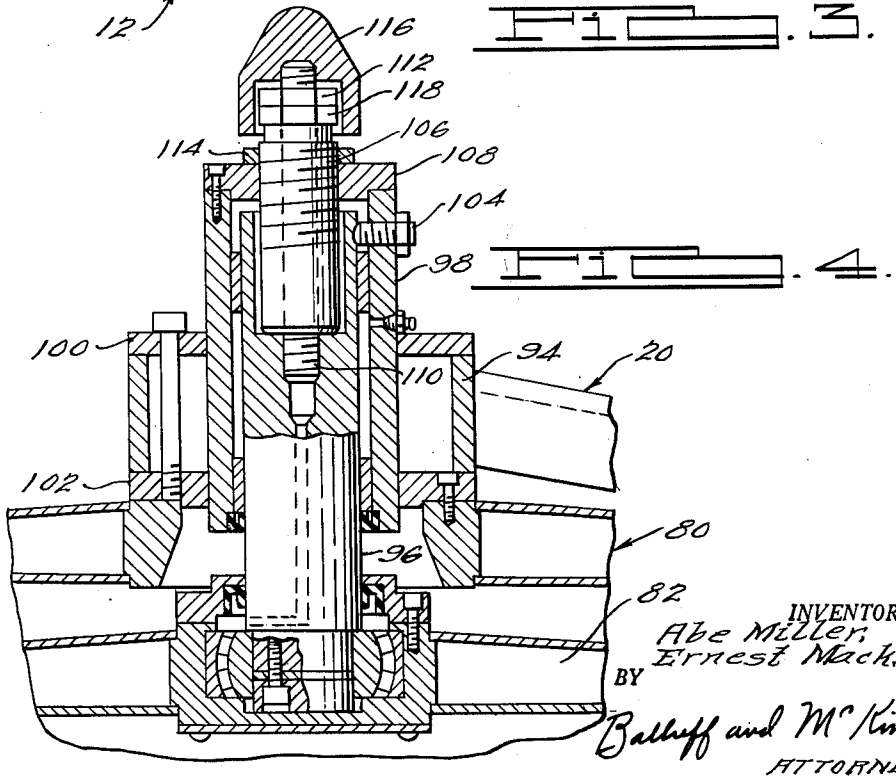


FIG. 4.

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CENTRIFUGAL LAUNDRY EXTRACTORS

Filed April 27, 1960 6 Sheets-Sheet 4

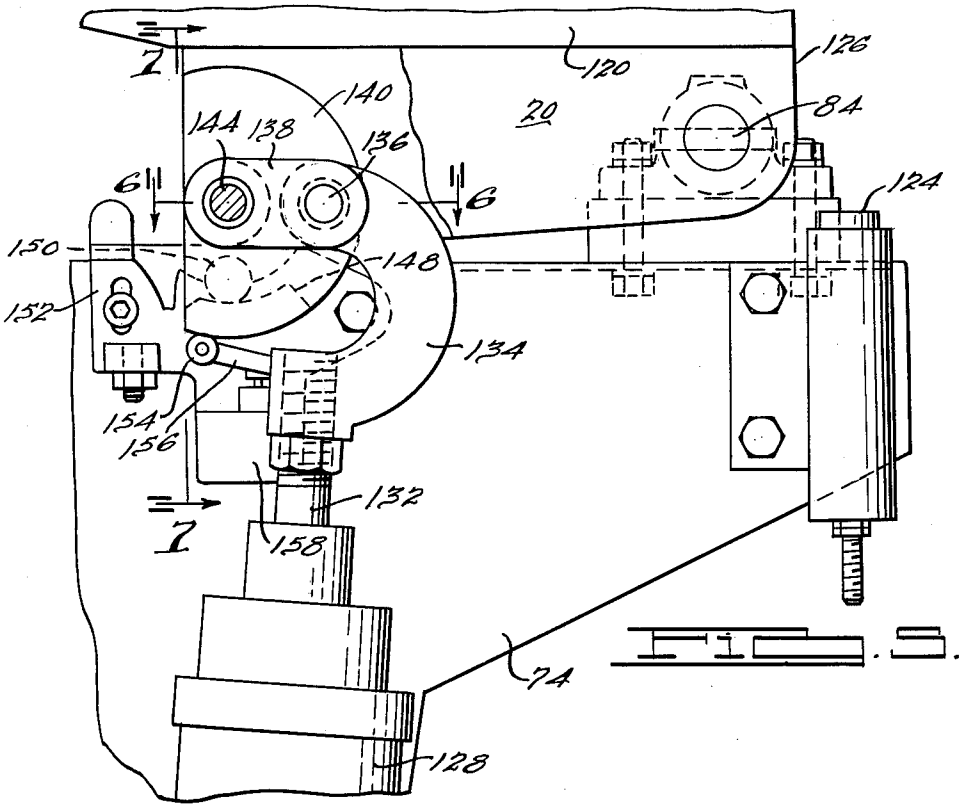
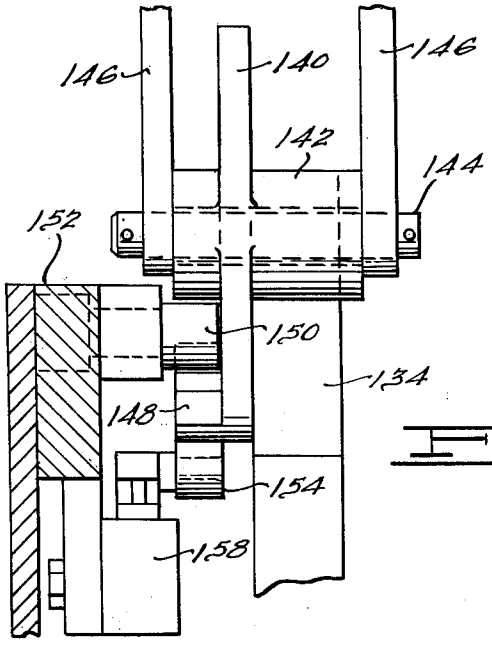


Fig. 5.



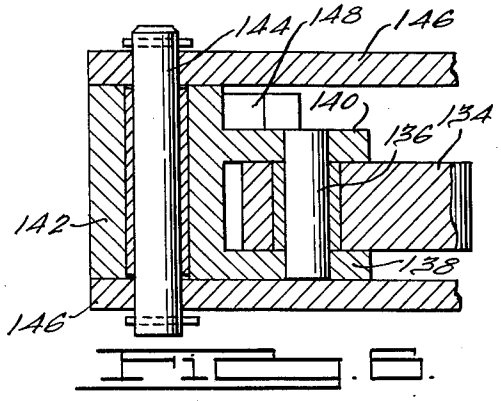


Fig. 6.

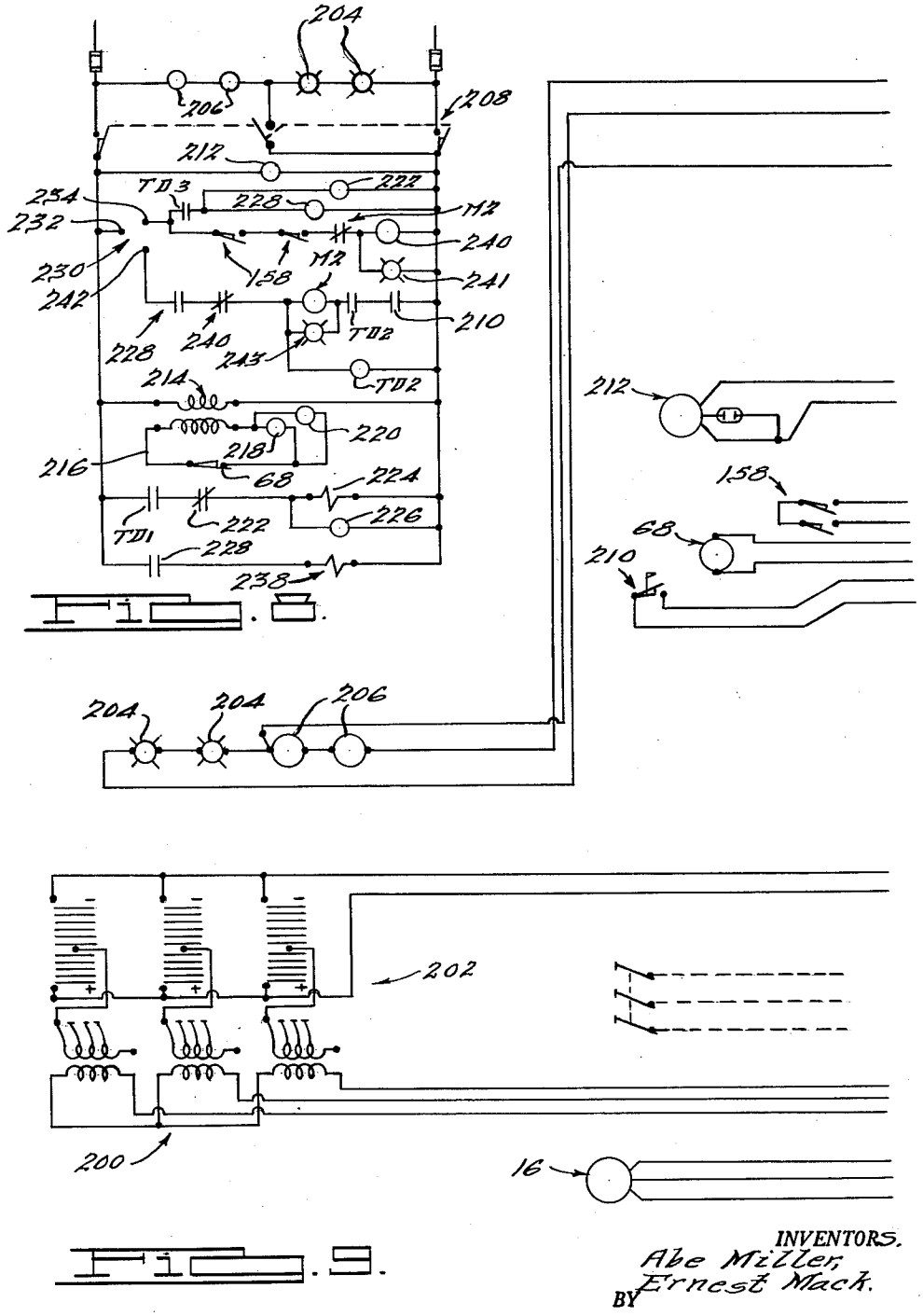
Fig. 7.

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CENTRIFUGAL LAUNDRY EXTRACTORS

Filed April 27, 1960 6 Sheets-Sheet 5



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CENTRIFUGAL LAUNDRY EXTRACTORS

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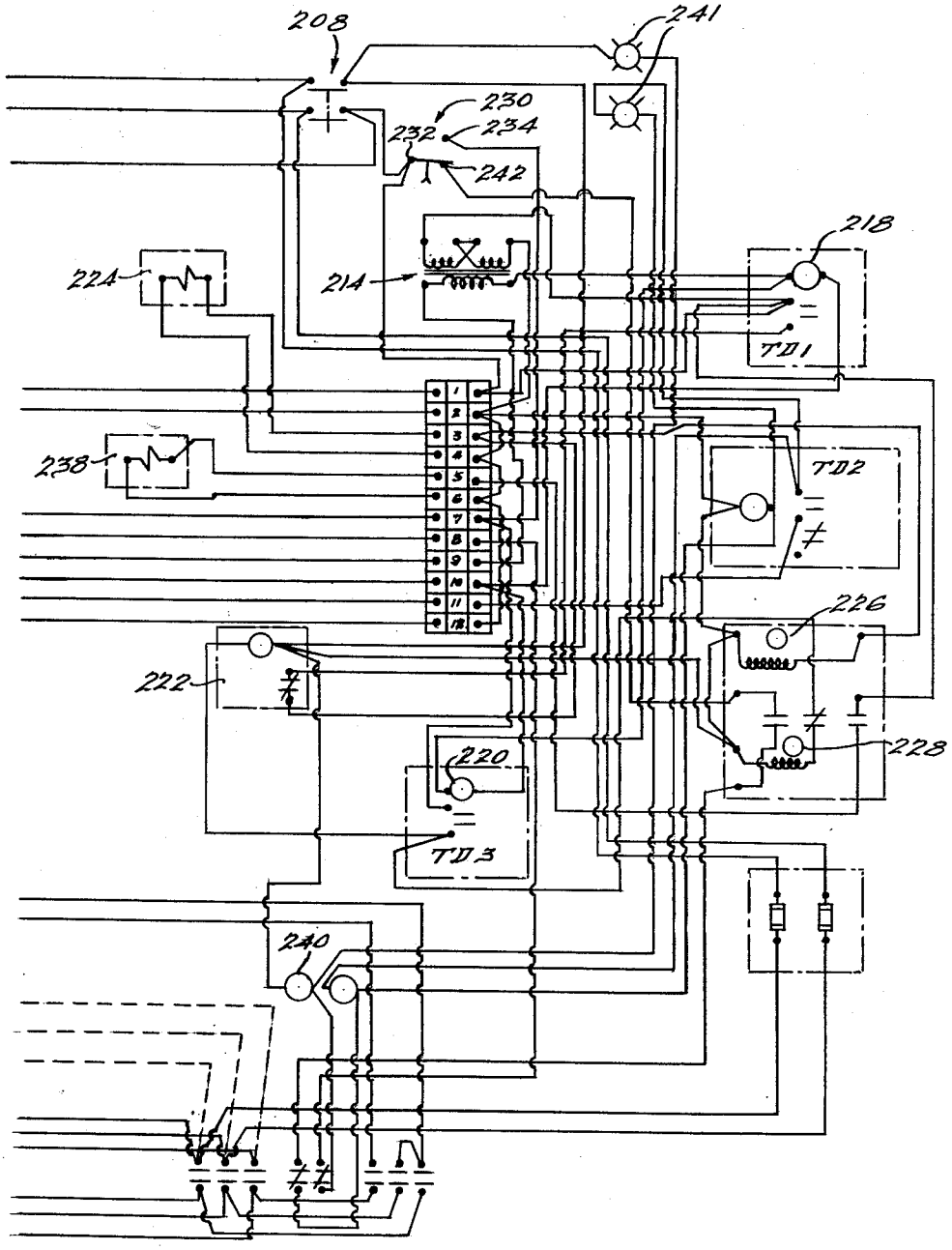


FIG. 10.

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United States Patent Office 3,136,718 Patented June 9, 1964

3,136,718

CENTRIFUGAL LAUNDRY EXTRACTORS

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Filed Apr. 27, 1960, Ser. No. 24,926
3 Claims. (Cl. 210—146)

This invention relates to commercial laundry machines and has particular reference to centrifugal laundry extractors adapted for handling loads of the order of four hundred to five hundred pounds dry weight or more. Size and efficiency of centrifugal laundry extractors are of great importance to commercial laundries. The construction herein disclosed provides an efficient, more compact, better balanced machine which makes possible the extraction of substantially more laundry in a given time than is possible with conventional equipment of the same capacity.

A principal object of the invention therefore is to provide a novel and more efficient commercial laundry machine.

Another object of the invention is to provide a new and improved centrifugal laundry extractor of the vertical axis type which is particularly adapted for commercial use.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are six sheets, which by way of illustration show a preferred embodiment of the invention and what I now consider to be the best mode of applying the principles thereof. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

FIG. 1 is a plan view of an extractor embodying the invention;

FIG. 2 is a vertical sectional view taken generally along the staggered line 2—2 of FIG. 1;

FIG. 3 is a side elevational view;

FIG. 4 is an enlarged fragmentary sectional view of the cover mounting, taken along the line 4—4 of FIG. 1;

FIG. 5 is an enlarged fragmentary elevational view illustrating the mounting of the arm which supports and moves the cover and the locking means therefor;

FIG. 6 is an enlarged fragmentary sectional view taken along the line 6—6 of FIG. 5;

FIG. 7 is a fragmentary sectional view taken along the line 7—7 of FIG. 5;

FIG. 8 is a diagram of the control circuit;

FIG. 9 is a part of the diagram of the operating circuit for the machine; and

FIG. 10 is a wiring diagram of the balance of the operating circuit.

As illustrated in FIGS. 1, 2 and 3, a commercial laundry machine embodying the invention consists in general of a cylindrical shell 10 floatingly supported upon a base 12, a perforated cylindrical laundry container 14 rotatably mounted within the shell 10, a motor 16 mounted on the bottom of the shell for rotating the container for centrifugally discharging water from laundry in the container, a double or composite cover 18, a pivoted arm 20 which carries the cover 18, and a power-operated means 22 reacting on the arm 20 for moving the same thereby to move the cover 18 to open or close the container 14.

The shell 10 is open at its upper end and is provided with a pair of discharge outlets 24 for draining water therefrom. The supporting base 12 is provided with three standards 26 which provide part of a means for floatingly supporting the shell 10 and the parts carried thereby. The shell 10 includes a curb base 28 and a central section 30 removably secured to curb base 28 which form the bottom of the shell. A series of links 32 extend between the standards 26 and the curb base 28, the end of each link 32 being swiveled to the upper end of a standard 26 and to a peripheral portion of the curb base 28 for floatingly supporting the shell 10, thereby to minimize the transmission of vibration from the shell 10 to the supporting base 12. The supporting base 12 is preferably secured to the floor on which it is supported.

The removable section 30 forms a central hub and includes an annular portion 34 which is removably bolted to the curb base 28 for closing the circular opening 36 therein. An integral sleeve-like portion 38 of the hub 30 provides a rigid support for spaced bearings 40 and 42 in which a drive shaft 44 is journaled, the bearings 40 and 42 taking the radial and axial thrust loads of the shaft 44. The upper end of the shaft 44 projects above the hub 30 and has fixedly mounted thereon the bottom 46 of the container or extractor basket 14 whereby the container 14 is supported by the shaft 44 so as to rotate therewith about a fixed axis within shell 10. Suitable sealing means are provided between the shaft 44 and the upper end of the sleeve portion 38 of the hub 30 so as to prevent the entrance of water or other liguids into the shaft bearings. The bottom 46 of the container 14 when assembled with the upper end of the shaft 44 as illustrated in FIG. 2 is imperforate. The side walls of the container 14, however, are perforate whereby rotation of the container 14 will centrifugally discharge water from the wet laundry therein against the inner wall of the shell 10, and such water will drain to the bottom of the shell and be discharged through the outlets 24.

A nut 48 is secured on the threaded upper end of the shaft 44 and secures the container 14 to the shaft 44, and upon removal of the nut 48 permits the removal of the container 14 upwardly through the upper open end of the shell 10. The motor 16 is removably bolted to the underside of the annular flange 34 of the hub 30 so that after removal of the bolts which secure the hub 30 to the curb base 28, the hub 30 and the motor 16 may be removed as a unit upwardly through the upper open end of the shell 10, after the wiring and other parts connected to the motor have been first disconnected.

The motor 16 for the centrifugal extractor is a 15 horsepower, 850 r.p.m. induction motor and is constructed and adapted so as to bring the container up to a speed of approximately 850 r.p.m. and to rotate it at such speed for extracting purposes. The motor 16 includes a cup-shaped housing 50 removably bolted to the underside of the flange 34 and supporting an annular stator 52 which carries the field windings. The armature 54 includes a rotor spider 56 fixedly but removably secured to the lower end of the shaft 44 and carrying the stack of annular laminations 58 in operative relation with respect to the stator 52 whereby the shaft 44 and the container 14 may be rotated when the motor 16 is energized.

The motor 16 is relatively flat, that is, its axial length is about one-third of its diameter, the motor in question having an over-all axial length of about nine inches and a diameter of about twenty-seven inches, excluding the mounting flange on the upper end of the motor casing 50. This makes it possible to support the shell 10 at an elevation no higher than that possible where the motor is conventionally mounted at one side of the shell 10, and does not increase the over-all height of the machine. The integration of the motor 16 with the bottom of the shell 10 and the shaft 44 eliminates the unbalance inherent in conventional machines where the motor is mounted at one side of the shell, eliminates the side thrust on the drive shaft inherently present in conventional machines where such shaft is driven through a belt and pulley drive, and contributes to a very low center of gravity for the

suspended mass of the shell 10 and the parts carried thereby, thus contributing to the stability of the machine and reducing the tendency thereof to vibrate when rotating at high speed for extraction purposes.

The mass of the shell 10 and of the parts carried thereby is greatly in excess of the wet weight of the load of laundry to be extracted. The shell 10 and the parts carried thereby are preferably made so that the mass thereof is uniformly distributed about the axis of the shaft 44 so that when the container 14 is run empty it will be substantially balanced and will run with very little, if any, vibration.

The laundry to be extracted is disposed in slings, bags or baskets and preferably disposed in the container 14 so as to efficiently utilize the space therein and distribute the load about the axis of shaft 44 so as to minimize the vibration and unbalance when the container 14 is running under load. As the weight of the load in the container 14 is a small percentage of the total weight of the rotating mass, including the clothes, the container 14 and the parts which rotate therewith, the vibration at full load and speed is not significant if the clothes are fairly well distributed about the container 14. The floating suspension of the shell provided by the links 32 and the standards 26 minimizes the transmission to the base 12 of any vibration attending the operation of the machine. While the mass of the armature 54 is not as great as that of the container 14 and the load therein, the mass of the armature supported on the lower end of the shaft 14 does contribute, along with the spacing of the bearings 40 and 42, to minimize the effects of an unbalanced load in the container 14.

Suitable provisions are incorporated in the machine whereby the bearings 40 and 42 may be adequately lubricated. The shaft 44 may be provided on its lower end with an extension 60 which extends downwardly through an opening in the housing 50 and is provided with a pulley 62 which drives a belt 64. The belt 64 drives a pulley 66 mounted on the shaft of a centrifugal switch indicated generally at 68 and conventionally referred to as a zero speed switch. The switch 68 is included in the circuitry for the machine and functions to prevent the opening of the cover 18 when the container 14 is rotating. Suitable seals are provided between the shaft 44 and the hub 30 so as to prevent the escape of grease or lubricant from the bearings into the motor 16.

An electric motor driven blower indicated generally at 70 is arranged to pump air through a duct 72 into the motor housing 50 to assist in the dissipation of the heat generated in the motor, and the housing is provided with suitable openings which permit the escape of such air therefrom after it has passed over the parts of the motor. The motor blower unit 70 is suitably mounted upon the lower portion of a bracket indicated generally at 74, which in turn is bolted to the shell 10 at one side thereof.

The double cover 18 consists of an outer non-rotatable cover 80, and an inner cover 82 freely rotatable relative to the outer cover 80 and carried by the U-shaped arm 20 pivotally mounted on the bracket 74 by means of the hinge pin or shaft 84. The outer cover 80 comprises a cylindrical closure and includes a peripheral gasket 86 adapted to seat upon the upper surface of an annular rim 88 forming a part of the shell 10 and defining the opening in the upper end thereof. The inner cover 82 comprises a cylindrical closure and includes a peripheral gasket 90 adapted to seat on the rim of the container 14 provided by an annular member 92 affixed to the upper end thereof. The upper open end of the container 14 approximates that of the shell 10 so as to provide unrestricted access to the space within the container 14. The outer and inner covers 80 and 82 are carried by the pivot arm 20 so that when the arm moves the covers to the position illustrated in FIGS. 2 and 3, the inner cover 82 will seat on the rim 92 of the container 14 and close the same simultaneously with the seating of the outer cover 80 on the rim 88 of the shell 10.

The covers 80 and 82 are apertured adjacent their centers so as to permit ingress of air into the shell 10 and the container 14 during rotation of the latter so as to permit the unrestricted flow of water extracted from the laundry in the container 14 through the outlets 24 of the shell 10 which are arranged tangentially so that the rotation of the container 14 tends to pump the water from the shell 10 through the outlets 24. It will be understood that suitable conduits are connected to the outlets 24 for receiving the water discharged therefrom and for conducting the water to a suitable drain.

The covers 80 and 82 are spaced apart so that the normal clearance between the sealing faces of gaskets 86 and 90 is somewhat greater than the normal clearance between the annular members 88 and 92, thus insuring that the inner cover 82 will seat on and seal the container 14 when the outer cover 80 is seated on the rim of the shell 10. The inner cover 82 is freely rotatably carried by the arm 20 and will, when closing the container 14, rotate therewith; while the outer cover 80 will be stationary. It is important to close the inner container 14 so as to prevent any of the laundry from getting out of the container 14 during the extracting operation.

As shown in FIGS. 1 and 4, the arm 20 is roughly in the shape of a U or V and at its center includes an integral ring 94 which is fixed to the outer cover 80 at its center as shown in FIG. 4. The inner cover 82 is swiveled and freely rotatable on the end of a spindle 96 adjustably mounted within sleeve 98 carried by the collars 100 and 102 between which the ring 94 is secured. A set-screw 104 carried by the sleeve 98 serves to lock the spindle 96 in its adjusted position. A bushing 106 threaded in the cap 108 for the sleeve 98 functions as an adjustable stop for the spindle 96. A threaded stem 110 secured to spindle 96 and freely extending through the bushing 106 has a nut 112 threaded on the upper end thereof for securing the spindle 96 with respect to the bushing 106. A nut 114 threadedly secured to the threaded bushing 106 serves to lock the same in its adjusted position. Upon removal of the cap 116 and loosening of the nut 114 and the setscrew 104, the bushing 106 may be threaded downwardly or upwardly in the cap 108 by means of a wrench applied to the hex portion 118 of the bushing for adjusting the position of the inner cover 82 with respect to the outer cover 80 so that when the arm 20 moves the cover assembly 18 to its closed position, the inner cover 82 will seat on the rim of the container 14 slightly ahead of or simultaneously with the seating of the cover 80 on the rim of the shell 10.

While the covers 80 and 82 are substantially rigid, they and their rubber-like sealing gaskets will give somewhat, so as to accommodate a situation in which the normal spacing of the covers is different than the spacing of the rims on the container 14 and shell 10, under the pressure exerted by the arm 20 in holding the cover assembly 18 in its closed position.

The shaft 84 is carried by the bracket 74 and extends therebeyond so as to provide trunnions on which the ends 120 of the arm 20 are pivoted. The arm 20 is adapted to swing about the shaft 84 in an arc of approximately 90° in a clockwise direction from the position illustrated in FIGS. 2, 3 and 5 so as to move the cover 18 to its open position and thereby expose the upper open end of the shell 10 and the container 14 to permit the charging of the latter with laundry or the removal of laundry therefrom. A step 122 extends partly around the shell 10 and provides a support for an operator to stand on while laundry is being charged into or removed from the cylinder 14 when the cover 18 is open. Spring pressed stops 124 are positioned on the bracket 74 adjacent the shaft 84 so as to engage the ends 126 of the arm 20 when it moves to its open position for limiting the opening travel of the arm 20.

The power operated means 22, such as a pair of air cylinders 128, are arranged to react on the ends 120 of the arm 20 for moving the same to open or close the

cover 18. Each of the air cylinders 128 is pivoted at 130 to the bracket 74 and at its other end the piston rod 132 thereof is provided with a clevis 134 carrying a cross pin 136, the ends of which are disposed in openings in arm 138 and disc 140 of a locking member 142 which is journaled on a pin 144 carried by the sides 146 of the channel-shaped arm 20. The disc portion 140 of the member 142 is provided with a laterally projecting locking abutment and cam 148 which as illustrated in FIGS. 5 and 7 projects beneath a pin 150 for locking the arm 20 in position where the inner cover 82 is locked and clamped against the rim of the container 14 and the outer cover 80 is locked against the rim of the shell 10. The pin 150 projects laterally from a plate 152 which is suitably affixed to the bracket 74. The connection between each air cylinder 128 and arm 20 and the locking mechanism associated therewith as just described is the same so that power is applied to both ends of arm 20 to pivot the same and both ends of arm 20 are locked in their closed position to lock the double cover 18 closed.

On the closing stroke of the cylinders 128 which closes the cover 18, the piston rods 132 and clevises 134 reacting on the arm 20 in the structure just described pull the arm 20 in a counterclockwise direction far enough to enable each cam 148 to pass below its cooperating pin 150 to the position as illustrated in FIGS. 5 and 7, for clamping or locking the cover 18 in its closed position. Upon the opening stroke of the air cylinders 128, the upward thrust of the piston rods 132 and the clevises 134 will rotate the members 142 in a counterclockwise direction so that each cam 148 will clear its locking pin 150. After each cam 148 has cleared its locking pin 150, the upward thrust of the piston rods 132 and the clevises 134 reacting on the members 142 through the pins 136 will react on the arm 20 through the pins 142 and thus pivot the arm 20 about the shaft 84 until the clockwise movement of the arm 20 is arrested by engagement with the resilient stops 124.

A roller 154 on the free end of a switch actuating arm 156 is engaged and moved by the periphery of each disc 140 when the power cylinders 128 move the arm 20 to close the cover 18 so as to close normally open switches 158 in the motor circuit. When the discs 140 move counterclockwise on the opening stroke of the power cylinders 128, the periphery of the discs 140 releases the arms 156 so as to permit the opening of the switches 158 and thus prevent the rotation of the extractor basket 14 at all times except when the cover 18 is locked in its closed position as shown in FIGS. 5 and 7.

Each end of the arm 20 has a power cylinder 128, a locking mechanism, and a motor control switch 158 associated therewith as illustrated in FIGS. 5, 6 and 7, except that on the opposite side of the machine some of the parts will be reversely arranged. A cross arm 160 may be employed to interconnect the ends 120 of the arm 20 to brace the same. The arm 20 when it swings to open the cover 18 elevates the cover above the openings in the shell 10 and the container 14 so as to provide free access thereto, the cover 18 in its open position being substantially vertically disposed and positioned entirely to one side of the opening in the upper end of the basket 14.

Air under pressure is supplied to both sides of the piston of each of the air cylinders 128, and the air pressure supplied to each cylinder 128 is so controlled by a valve as to bleed air from one side or the other thereof in order to effect the opening or closing movement of the air cylinder, such bleeding being controlled so that the cover will move at an appropriate speed in view of the weight thereof.

In the open position of the cover 18, the arm 20 may be so positioned that the weight of the cover 18 will tend to hold the arm 20 open, although as noted the air pressure on both sides of the piston of the cylinders 128 will prevent any accidental closing movement of the cover 18.

From the foregoing it will be evident that when the arm 20 closes the cover 18, the locking mechanism which includes the cams 148 and the locking pins 150 and the associated parts will automatically lock the cover 18 in its closed position without attention from the operator, and at the same time will close the switches 158 so as to permit the energization of the motor 16, assuming that the motor circuit is otherwise conditioned to initiate the starting of the motor 16.

It is commercially feasible to operate a commercial laundry extractor embodying the construction herein disclosed to extract a 500 lb. load (dry weight) of laundry in accordance with the following cycle:

	Seconds
Loading	85
Lid closing	20
Accelerating	90
Extracting	300
Deceleration	50
Lid opening	20
Unloading	75
Total cycle	[1] 640

[1] Or 10 minutes, 40 seconds.

The loading and unloading times will depend to some extent upon the way the laundry is packaged or bundled and the efficiency of the means employed for loading and unloading, as well as the efficiency of the operator. The accelerating and extracting times will depend to some extent upon the load, the degree of extraction required, and the characteristics of the laundry being extracted. The decelerating time will also depend to some extent upon the load and the power input to the motor for braking purposes.

The foregoing is one example of a cycle which is practical in a machine embodying the construction herein disclosed, and it is to be understood that the machine may be operated so that the total cycle time or any portion thereof may be considerably different from that above given. However, in commercial laundries total cycle time for extracting a given load to a given extent is of considerable importance, and with a machine embodying the construction herein disclosed and having a 54-inch extractor basket, it is feasible and practical to obtain five cycles per hour with a given load as compared with an average of about three for conventional machines of the same size. The substantial reduction in cycle time or increased output is achieved primarily because of the more rapid acceleration feasible when employing the rotary flat motor construction as illustrated in which the armature is directly mounted on the lower end of the drive shaft, and the greatly reduced decelerating time made feasible by the application of D.C. current to the motor to convert the same into a brake, as compared with the mechanical brake conventionally used. The integrated motor construction in addition eliminates the maintenance and service problems inherent in using belt drives and mechanical brakes as conventionally employed in extractors of this type.

FIGS. 8, 9 and 10 illustrate a suitable wiring diagram for the extractor, FIG. 8 essentially illustrating the control box diagram while FIGS. 9 and 10 are continuations of each other and illustrate the complete wiring diagram including an arrangement under which D.C. current is supplied to the field of the motor 16 so as to convert the same into a brake for decelerating and stopping the extractor basket after the supply of A.C. current to the motor has been shut off.

Assuming that the cover 18 is open and line voltage is being supplied to switch 208, the 250-watt 220-volt bulbs 204 will be energized and consume sufficient current to prevent rotation of the motors 206 which drive fans for supplying cooling air to the transformer 200. When the off-on selector switch 208 is manually closed, current by-passes the bulbs 204 and the motors 206 rotate

at full speed, thereby closing the normally open vane-operated switch 210, the vane for closing such switch being actuated by the blowers driven by the motors 206. The closing of the switch 208 closes the circuit through the motor 212 which forms a part of the motor blower unit 70 and drives the blower thereof for circulating cooling air over the motor 16.

The closing of the switch 208 also energizes the transformer 214, thereby energizing the 12-volt circuit indicated generally at 216 which includes the normally closed zero speed switch 68, the coil 218 of normally open time delay switch TD–1, and the coil 220 of normally open time delay switch TD–3. The energization of coil 218 of switch TD–1 closes this switch, closing the circuit through the normally closed contacts of the control relay 222, the solenoid 224, and also the holding coil of the unlatching relay 226.

The energization of the coil 220 closes the normally open contacts of the switch TD–3 thereby energizing the coil of latch relay 228 when the timer 230 is closed to bridge the contacts 232 and 234 thereof. The timer 230 is a conventional adjustable timer switch which is set to select the time of rotation of the extractor basket 14.

The coil of latching relay 228 will not be energized until TD–3 times out. When switch TD–3 closes, the latching relay 228 closes both sets of its contacts, energizing the solenoid 238 and the coil of normally closed relay 222, thus opening the contacts of relay 222. Solenoid 238 controls the normally closed air bleed valve on one side of each of the air cylinders 128 so as to open such valve and bleed air therefrom, thereby activating the air cylinders 128 to close the cover 18. The closing of the cover 18 will close the normally open limit switches 158, thereby energizing the holding coil of the normally closed relay 240 and the windings of motor 16 in series therewith and light 241. The energization of the motor 16 initiates the acceleration of the extractor basket and through the belt drive 64 opens the zero speed switch 68 thus deenergizing the coils 218 and 220 of time delay switches TD–1 and TD–3.

At the end of the time for which it is set, the timer 230 opens the bridge across contacts 232 and 234, thereby opening the circuits controlled thereby, shutting off the A.C. supply to the extractor motor 16, and bridges the contacts 232 and 242, thus closing the circuit through the holding coil of time delay switch TD–2. After a time delay controlled by the holding coil for switch TD-2, the contacts thereof close; and since the vane switch 210 is closed and the contacts of relay 240 are normally closed, current will flow through coil M2 and to the transformer 200, and direct current will flow from the rectifier 202 to all three states of motor 16, thus converting the motor into a brake which will then bring the extractor basket 14 to a stop. Light 243 will be energized during braking. Transformer 200 of the rectifier 202 includes provisions whereby reduced current of different voltages may be supplied to the rectifier.

When the motor 16 and the extractor basket 14 come to a full stop, the zero speed switch 68 closes, thus energizing the holding coils 218 and 220 of time delay relays TD–1 and TD–3. However, the closing of the contacts of TD–3 has no effect because the circuit through the timer is open between contacts 232 and 234, but the contacts of TD–1 are closed. When the contacts of TD–1 close, the coil of the solenoid 224 and of unlatching relay 226 will be energized since the contacts of relay 222 closed when the timer switch opens between contacts 232 and 234. Energization of the coil of relay 226 will open the contacts 228 in the circuit which includes the contacts of relay 240, thus opening the circuit through transformer 200 and discontinuing the direct current supply to the motor 16.

The solenoid 224 controls the air valve which bleeds air from one side of each of the cylinders 128 so as to actuate the same to shift the cover 18 to its open position. Both sides of the air cylinders 128 are independently connected to a source of air pressure so that when the air bleed valves for the air cylinders are closed, air under pressure is supplied to both sides of each of the pistons of the cylinders 128. This will serve to lock the cover 18 in its open position.

The specific wiring diagram illustrated for controlling the operation of the extractor is given by way of example, and we contemplate that other control circuit arrangements may be employed.

This application is a continuation-in-part of our earlier filed application Serial No. 804,505, filed April 6, 1959, relating to centrifugal laundry extractors, now abandoned.

While we have illustrated and described a preferred embodiment of our invention, it is understood that this is capable of modification, and we therefore do not wish to be limited to the precise details set forth but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. A laundry extractor for commercial use comprising an outer shell having provisions for draining water therefrom, said shell being open at one end and closed at the other end except for said drainage provisions, means floatingly supporting said shell with said open end at the top and the drain provisions at the bottom, a perforated laundry container disposed within said shell and having an upper open end the diameter of which approximates the diameter of the container and the open end of said shell, vertically spaced bearings mounted on the bottom of said shell, a vertical shaft journaled in said bearings and projecting below said shell and bearings, a relatively flat electric motor removably mounted on the bottom of said shell on the underside thereof so as to be removable from the underside of said shell and including an armature on the lower end of said shaft below said bearings, said motor being constructed so that the axial length of the stator and armature elements thereof is less than 50% of the outside diameter of the motor, said container being mounted on the upper end of said shaft whereby it may be rotated within said shell for centrifugally discharging water from laundry within said container, a movable outer cover adapted to seat on said shell for closing the same, an inner cover rotatably carried by the outer cover and adapted to seat on the rim at the open end of said container so as to rotate therewith, when the outer cover is moved to seat on said shell, for closing the open end of the container, a bracket secured to said shell, means for supplying a form of electric current to said motor different than the form of electric current used to energize said motor to rotate said container for converting said motor into a brake for braking said container to a stop, a movable arm carried by said bracket, said outer cover being mounted on said arm, and power operated means reacting on said arm and bracket for moving said outer and inner covers to open said container and elevate such covers above the openings in said shell and container.

2. Commercial laundry handling equipment comprising an outer shell having provisions for draining water therefrom, said shell being open at one end and closed at the other end except for said drainage provisions, means floatingly supporting said shell with said open end at the top and the drain provisions at the bottom, a perforated laundry container disposed within said shell and having an upper open end the diameter of which approximates the diameter of the container and the open end of said shell, means supporting said container for rotation about a vertical axis and including bearings mounted on said shell, a vertical shaft journaled in said bearings, a relatively flat alternating current motor mounted on the underside of said shell so as to be removable from the underside of said shell and including an armature on said shaft below said bearings whereby said container may

be rotated within said shell, said motor being constructed so that the axial length to the stator and armature elements thereof is less than 50% of the outside diameter of the motor, a movable outer cover adapted to seat on said shell for closing the same, an inner cover rotatably carried by the outer cover and adapted to seat on the rim at the open end of said container so as to rotate therewith, when the outer cover is moved to seat on said shell, for closing the open end of the container, a bracket secured to said shell, a movable arm carried by said bracket, said outer cover being mounted on said arm whereby said covers may be elevated above the openings in said shell and container for opening the latter, rectification means for supplying direct current to said motor for braking said container to a stop, power operated means reacting on said arm and bracket for moving said outer and inner covers to open or close said container, and automatic locking means associated with said arm and actuated by said power means for locking said outer cover seated on said shell upon seating of said outer cover on said shell.

3. Commercial laundry handling equipment comprising an outer shell having provisions for draining water therefrom, said shell being open at one end, closed at the other end except for said drainage provisions, and including a removable central hub forming part of the bottom of said shell, a base having upright standards disposed around said shell, means floatingly supporting said shell on said standards with said open end at the top and the drain provisions at the bottom, a perforated laundry container disposed within said shell and having an upper open end the diameter of which approximates the diameter of the container and the open end of said shell, means supporting said container for rotation within said shell about a vertical axis and including spaced bearings mounted within said hub, a vertical shaft journaled in

said bearings, said container being mounted on the upper end of said shaft, a relatively flat electric motor mounted on the bottom of said hub and including an armature mounted on said shaft below said bearings whereby said container may be rotated within said shell, said motor being constructed so that the axial length of the stator and armature elements thereof is less than 50% of the outside diameter of the motor, a movable outer cover adapted to seat on said shell for closing the same, an inner cover rotatably carried by the outer cover and adapted to seat on the rim at the open end of said container so as to rotate therewith, when the outer cover is moved to seat on said shell, for closing the open end of the container, a bracket secured to said shell, a movable arm carried by said bracket, said outer cover being mounted on said arm, means for supplying a form of electric current to said motor different than the form of electric current used to energize said motor to rotate said container for converting said motor into a brake for braking said container to a stop, and power operated means reacting on said arm and bracket for moving said outer and inner covers to expose or close the open ends of said shell and said container.

References Cited in the file of this patent

UNITED STATES PATENTS

1,815,934	Stephens et al.	July 28, 1931
1,958,123	Barrett et al.	May 8, 1934
2,588,963	Chapin	Mar. 11, 1952
2,752,044	Olcott	June 26, 1956
2,867,329	Miller	Jan. 6, 1959
2,907,464	Ellis	Oct. 6, 1959
2,922,097	Choudhury	Jan. 19, 1960

FOREIGN PATENTS

538,062	Germany	Nov. 10, 1931