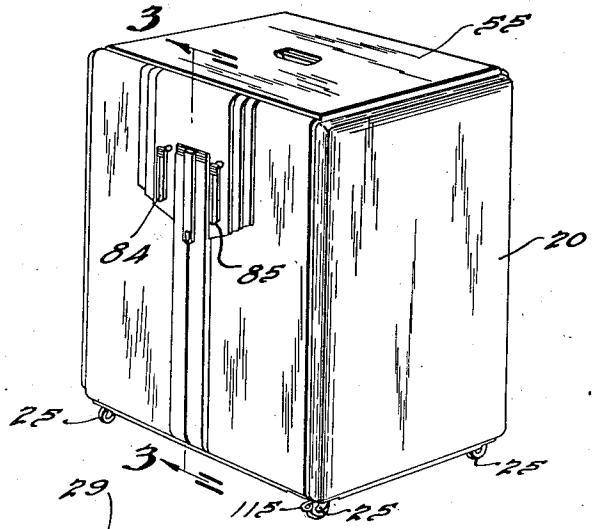
Nov. 27, 1945. A. H. HABERSTUMP 2,389,774

WASHING MACHINE

Original Filed May 19, 1939 5 Sheets-Sheet 1

FIG. 1.



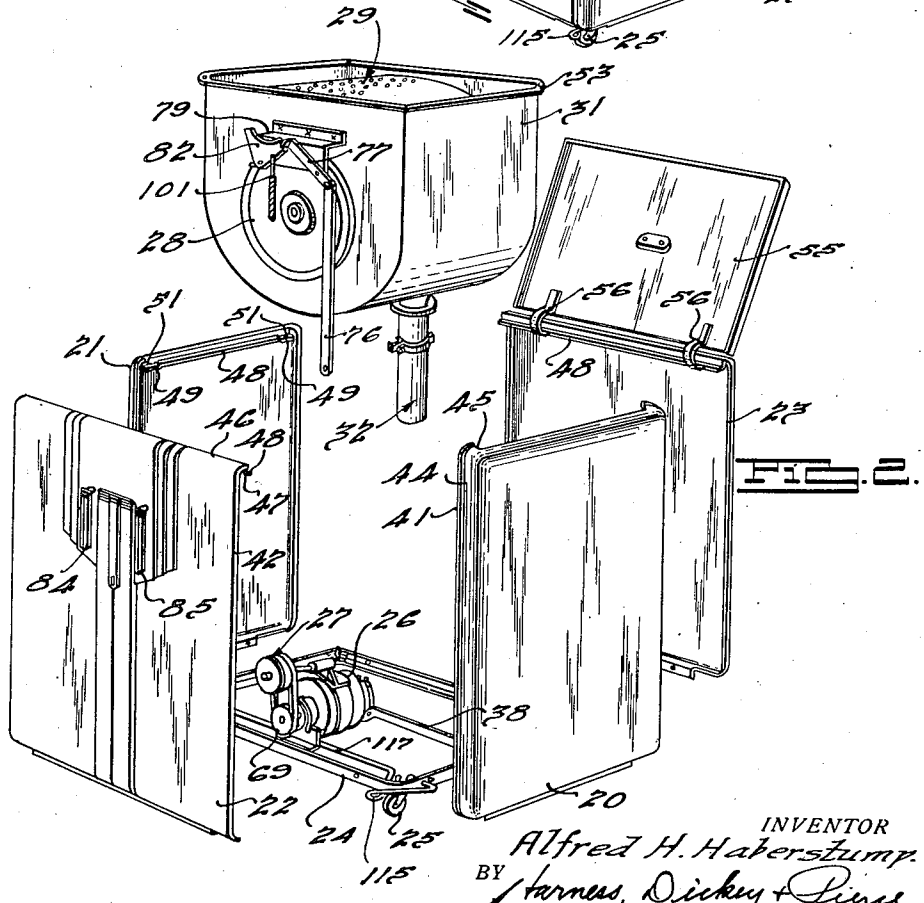


FIG. 2.

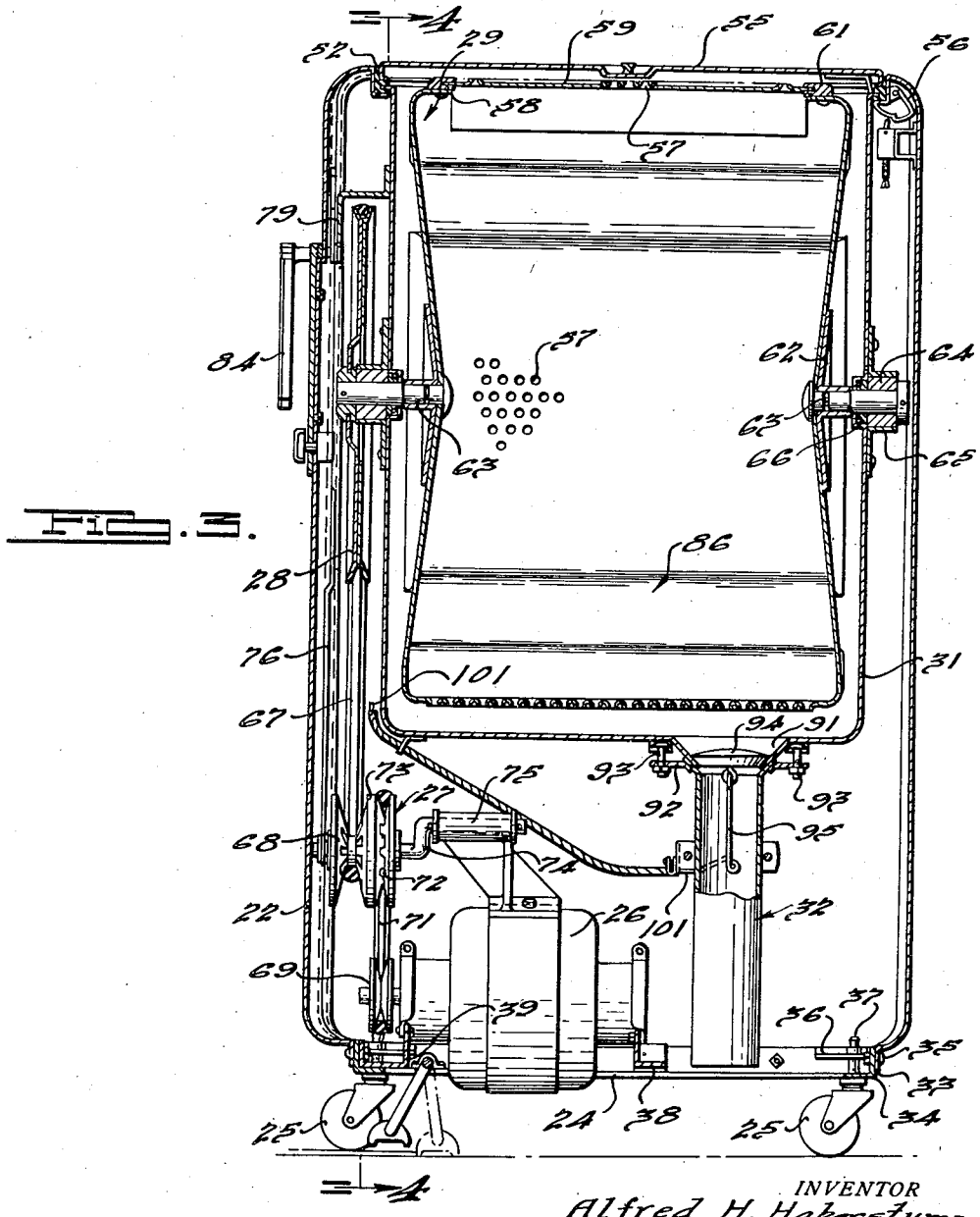
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WASHING MACHINE

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Fig. 3.



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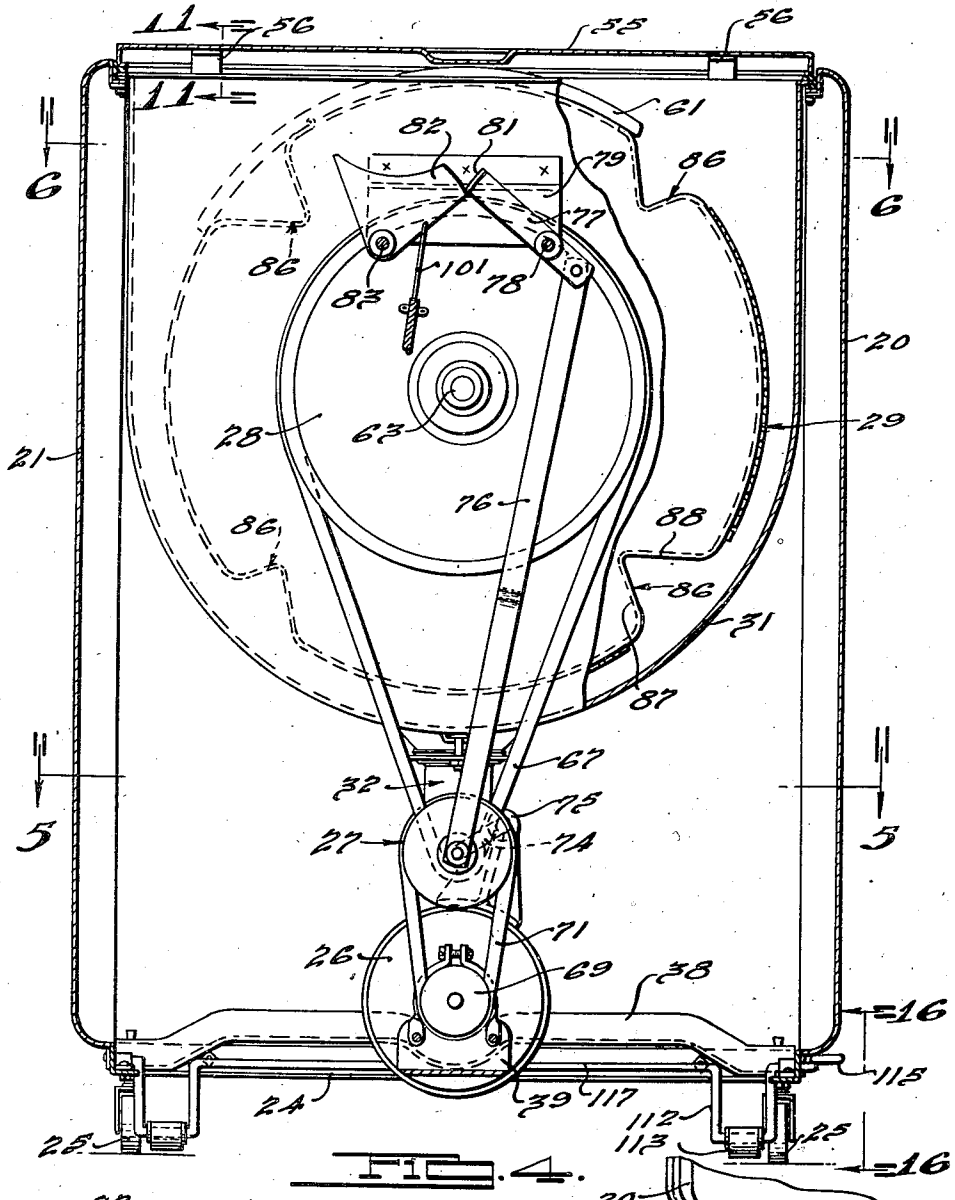


FIG. 4.

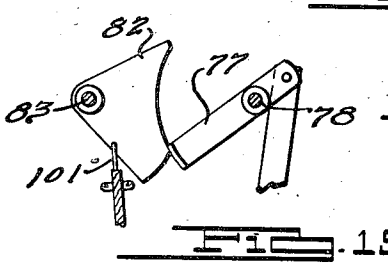


FIG. 15.

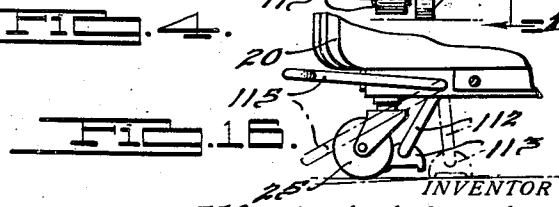


FIG. 16.

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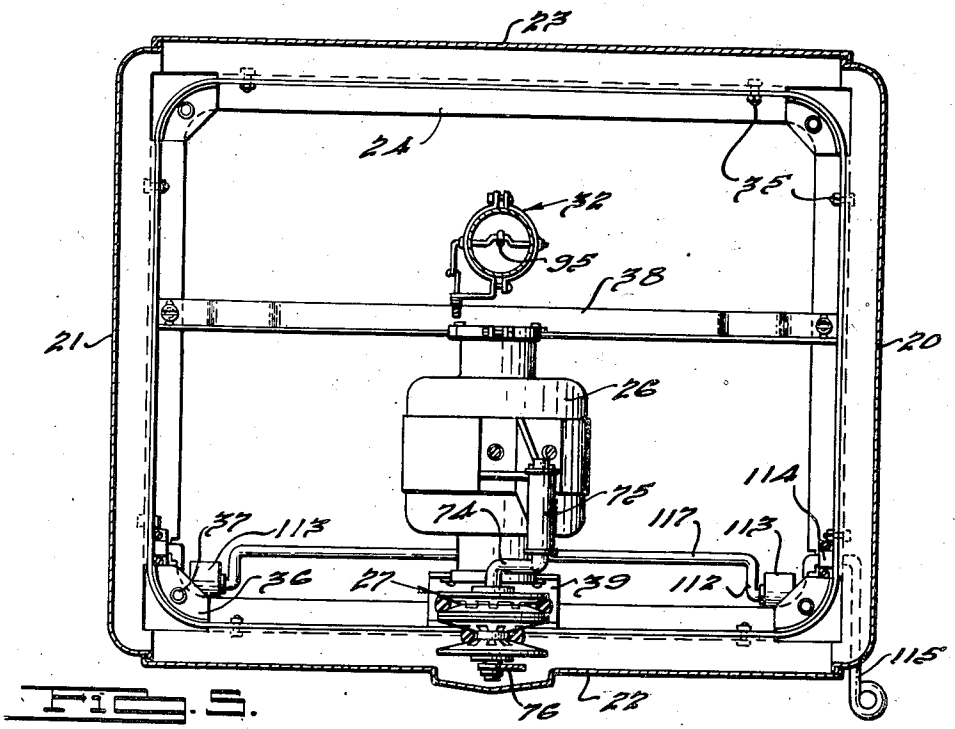


FIG. 5.

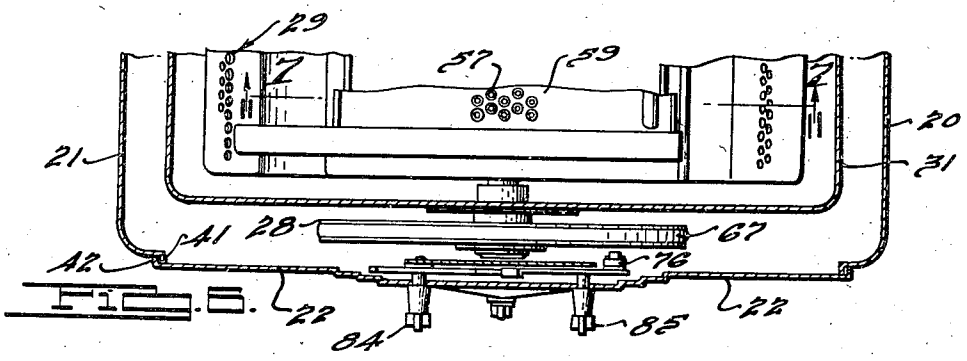


FIG. 6.

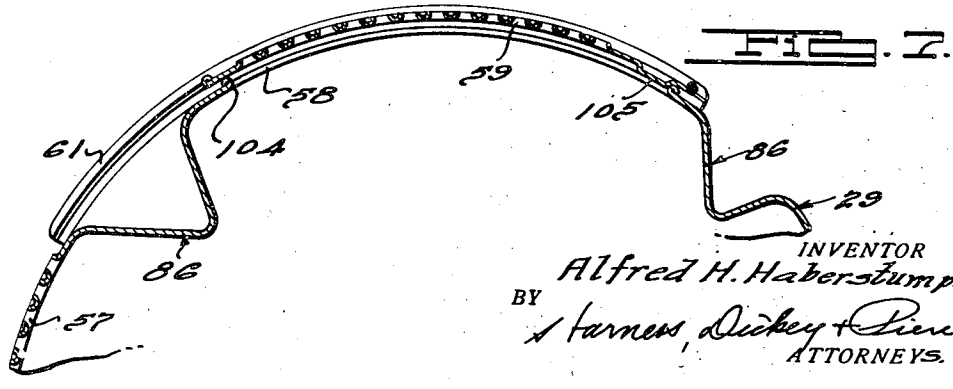


FIG. 7.

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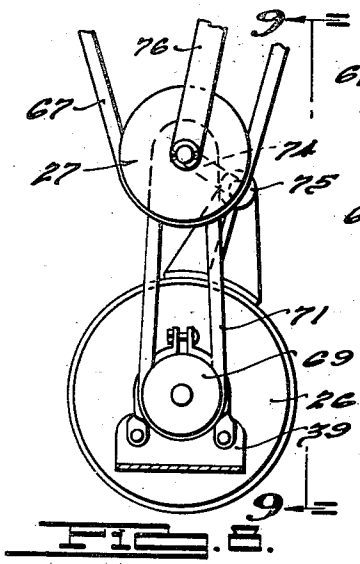


FIG. 8.

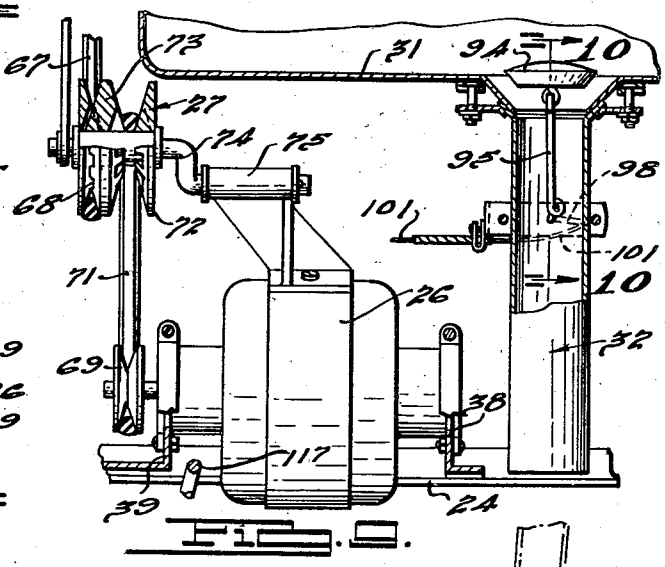


FIG. 9.

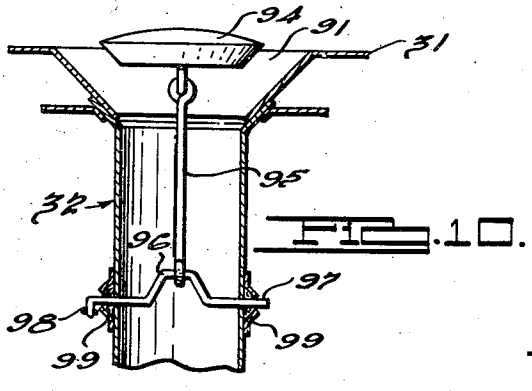


FIG. 10.

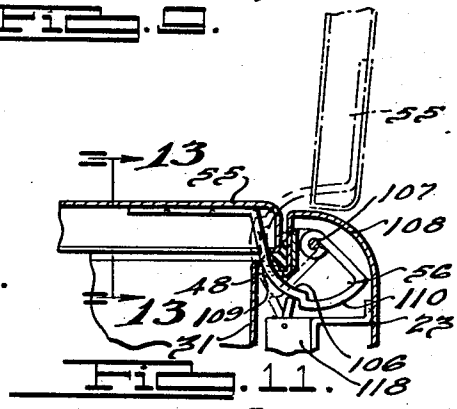


FIG. 11.

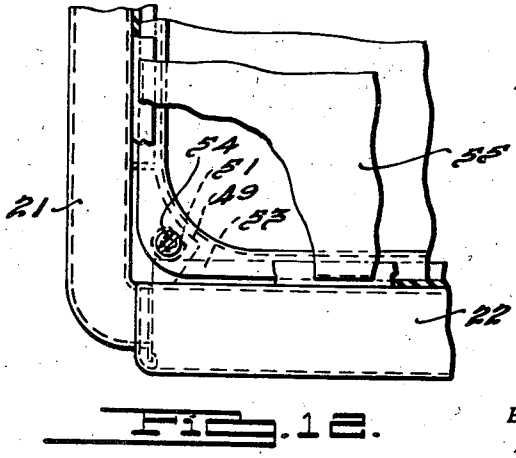


FIG. 12.

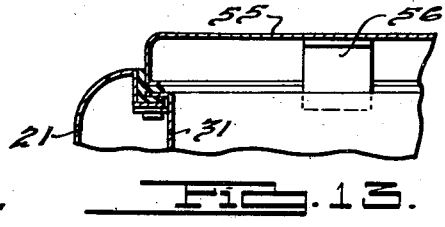


FIG. 13.

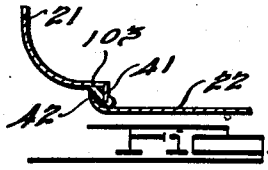


FIG. 14.

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Patented Nov. 27, 1945 2,389,774

UNITED STATES PATENT OFFICE

2,389,774

WASHING MACHINE

Alfred H. Haberstump, Detroit, Mich., assignor to The Murray Corporation of America, Detroit, Mich., a corporation of Delaware

Original application May 19, 1939, Serial No. 274,478. Divided and this application December 31, 1941, Serial No. 425,059

7 Claims. (Cl. 220—10)

This application is a division of application, Serial No. 274,478, filed May 19, 1939, for Washing machine, and now matured into Patent No. 2,323,765, the claims of which are the sole invention of the present applicant.

This invention relates to washing machines, and particularly to a washing machine having a horizontal rotor mounted in a tub which is supported on a cabinet and provided with unique driving and control means.

While various forms of washing machines have been invented and sold in the trade, applicant believes that for simplicity in construction, efficiency in operation and uniqueness of operation and control, the present device is a materially improved product. A base frame is mounted on rollers and supports a driving motor, and locking means for preventing the movement of the frame on the floor. Two side stampings and a front and rear stamping when assembled on the frame form a cabinet forming the support for a tub having a drain outlet closed by a valve. The tub is supported on the inwardly disposed flanges of the side, front and back cabinet panels, while a lid is hinged to the back panel forming a cover for the cabinet which is of box form. A pair of V-belt change speed pulleys having an axially movable central disc forming adjacent sides of the adjacent pair of pulleys are mounted on a crank arm supported by the motor. The pulley on the motor shaft is connected by a belt to one of the V-pulleys on the crank arm while a belt on the other V-pulley of the crank arm is connected to a V-pulley attached to a stub shaft which supports a drum within the tub. The opposite side of the drum is likewise connected by a stub shaft to a bearing on the tub wall.

Two operating handles are provided on the front panel of the cabinet, one operating the drain valve, the other connected to the crank arm of the pair of V-pulleys to change the position of the arm. Cam means are provided between the two levers, so that the valve lever must first be operated before the lever raising the crank arm is operated. Interlocking means is also available to prevent the closing of the drain before the operating mechanism is actuated to lower the crank arm to decrease the driving speed of the rotor. After the drum is again rotating at slow speed the valve lever may be actuated to close the valve, which movement of the cam interlocks the operating handle for the drive means to prevent its actuation until the valve is again opened.

The drum is provided with a plurality of apertures throughout its circumferential face, which is inwardly projected at spaced points to tumble the clothes being washed therewithin. An opening is provided on one portion of the cylindrical surface of the rotor or drum over which a door slides to form a closure. The door is also provided with a plurality of apertures to increase the free flow of water through the clothes within the drum.

The driving mechanism for the drum is unique in that no gears are employed and the change from a low to a high speed for washing and then drying the clothes is produced through the raising of the pair of V-pulleys, which are mounted on the crank arm. When raising the pulleys, the belt from the motor thereto provides a tension in the V-slot while the tension on the belt in the adjacent pulley to the driving drum is reduced so that the upward force causes the central slidable element between the pulleys to shift, thereby decreasing the radius on the pulley driven by the motor belt and increasing the radius of the pulley driving the drum belt. After a high speed operation the lowering of the crank arm applies stress to the belt driving the drum of the rotor while slacking the tension on the motor belt which causes the central element of the pulleys to shift to decrease the radius on the drum belt pulley and increase the radius on the driving belt pulley to thereby reduce the rotation of the drum to low speed operation.

Accordingly, the main objects of my invention are: to provide a washing machine embodying a tub having a rotor journalled in the sides thereof; to mount a tub having a rotor therein on a cabinet attached to a base frame; to construct a washing machine cabinet having an opening in the top and flanged edges for supporting a tub; to drive the rotor of a washing machine through a change-speed mechanism, embodying a pair of pulleys the effective diameters of which are changeable; to interconnect the drive of a motor to that of a washing machine through a pair of V-belts and pulleys, the central portion between which is shiftable to change the ratios thereof through the movement of the pulley axles; to interlock the valve of the drain for the tub with the change-speed mechanism, so that the valve must be open before the mechanism may be changed to drive the rotor from low to high speed; to provide interlocking means between the valve actuating handle and the change-speed actuating handle which prevents the closing of the valve until the speed of the rotor has been changed from high to low speed; to mount a

washing machine in a box-like cabinet having rollers with locking means provided thereon, rendering the rollers inoperative to thereby lock the cabinet in position; and in general, to provide a washing machine which is simple in construction, positive in operation, and economical of manufacture.

Other objects and features of novelty of my invention will be specifically pointed out or will become apparent when referring, for a better understanding of my invention, to the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a perspective view of a washing machine embodying features of my invention;

Fig. 2 is an exploded view of the washing machine illustrated in Fig. 1;

Fig. 3 is an enlarged sectional view of the structure illustrated in Fig. 1, taken on the line 3—3 thereof;

Fig. 4 is a sectional view of the structure illustrated in Fig. 3, taken on the line 4—4 thereof;

Fig. 5 is a sectional view of the structure illustrated in Fig. 4, taken on the line 5—5 thereof;

Fig. 6 is a broken sectional view of the structure illustrated in Fig. 4, taken on the line 6—6 thereof;

Fig. 7 is an enlarged broken sectional view of the structure illustrated in Fig. 6, taken on the line 7—7 thereof;

Fig. 8 is a broken view of the operating mechanism illustrated in Fig. 4, when the rotor of the washing machine is being operated at high speed;

Fig. 9 is a view of the structure illustrated in Fig. 8, as viewed from line 9—9 thereof;

Fig. 10 is an enlarged sectional view of the structure illustrated in Fig. 9, taken on the line 10—10 thereof;

Fig. 11 is an enlarged broken sectional view of the structure illustrated in Fig. 4, taken on the line 11—11 thereof;

Fig. 12 is a top plan view of a corner of the cabinet illustrated in Fig. 1;

Fig. 13 is an enlarged sectional view of the structure illustrated in Fig. 11, taken on the line 13—13 thereof;

Fig. 14 is an enlarged sectional view of the front corner of the cabinet illustrated in Fig. 1;

Fig. 15 is a view of the interlock mechanism illustrated in Fig. 4 with the parts shown in position of high speed rotor operation; and

Fig. 16 is a view of the locking means for the cabinet illustrated in Fig. 3.

In Figs. 1 and 2, I have illustrated a cabinet 20 embodying like side panels 21, front panel 22 and rear panel 23, which are also of like configuration. A base 24, mounted on rollers 25, engages and supports the lower edges of the side, front and rear panels. A motor 26 is also mounted on the base for driving through a pair of change-speed pulleys 27, a V-pulley 28, which drives a rotor 29 within a tub 31. The tub has a drain outlet 32 all of which will be more fully described hereinafter.

The panels 21, 22 and 23 have downwardly extending flanges 33 which engage the vertical flange of an angle element 34 forming the frame of the base and are secured thereto by a plurality of bolts 35. Corner gusset plates 36 form, with the horizontal flange of the angle element 34, a support for the stud 37 on the caster rollers 25. A brace 38 interconnects the sides of the frame 34 and provides support for the motor 26 at one end while a bracket 39 is attached to the front portion of the angle frame 34 providing a support for the opposite end of the motor.

The side panels 21 of the cabinet have frontwardly directed flanges 41 over which inwardly directed flanges 42 at the side of the front panel 22 and rear panel 23 extend to form enclosed finished corner edges. The side panels 21 are first flanged inwardly at 44 to provide shoulders 45 at each corner over which the top flange 46 of the front and back panels 22 and 23 extend, having a downwardly projecting flange 47, which projects downwardly over the inwardly flanged portion 44 of the side panels 21 when the panels 22 and 23 are forced downwardly thereover.

An interlocking relation is provided against the outward spreading of the panels through the outwardly projecting flange 41 on the side panels 21, being disposed within the inwardly projecting flange 42 on the front and back panels, while the front panels are prevented from moving outwardly from the side panels by the flange 47 projecting over the corner extension 45 of the side panel. Inwardly directed flanges 48 are provided slightly below the top edge of the panels forming the cabinet, to provide a supporting edge for the tub 31. On the side panels the flanges 48 at the end extend outwardly at 49 and are provided with an aperture 51, as illustrated more clearly in Fig. 12.

A slotted rubber sealing element 52 is disposed about the outwardly directed flange 53 on the tub 31, which rests upon the flanges 48 of the cabinet and is retained in position by a bolt 54. The top portion of the rubber strip 52 forms a sealing element for the cover 55 which is herein illustrated as being pivoted to the back panel by hinges 56. It is to be understood that this cover may be a separate element which may be bodily removed from the cabinet.

The drum 29 has a plurality of apertures 57 disposed in the cylindrical surface thereof, and is also provided with an opening 58 covered by a slide 59 which is likewise provided with a plurality of apertures 57. The slide is supported in a slot in guide elements 61 which may be made of metal, but preferably is made from a resinous material which is unaffected by moisture. Stub shaft supporting hubs 62 are welded or otherwise secured to the sides of the drum for supporting stub shafts 63 which are journalled in bearing 64, supported in cups 65 riveted or otherwise secured to the sides of the tub and sealed from the interior thereof by a sealing element 66. The stub shaft 63 on the lefthand side of the tub as viewed in Fig. 3, has pinned thereto the V-pulley 28 interconnected by a belt 67 to the outermost V-pulley 68 of the change-speed element 27. A pulley 69 on the motor is interconnected by a V belt 71 to the inner pulley portion 72 of the change-speed pulleys 27.

The change-speed pulleys are of conventional form, the central element 73 being axially shiftable on its shaft to change the effective radius of the groove of the pulley 68 and 72 thereof. The pulleys are mounted on a crank arm 74 for pivotal movement in a sleeve 75 mounted on the motor 26. A link 76 is pivotally secured to the end of the crank arm 74 and to the end of a link 77 secured to a stub shaft 78 which is pivoted on a bracket 79 secured to the side of the tub 31. The opposite end of the link 77 is flanged outwardly at 81 to be disposed in the path of the cam element 82 secured to a stub shaft 83 which is likewise pivotally carried by the bracket 79. A handle 84 is removably keyed to the shaft 83 while a handle 85 is removably keyed to the shaft 78.

the sequence of operation of which is controlled by the cam plate 82. The interlock thus provided prevents the handle 85 from being moved until the handle 84 is moved to produce high speed operation of the rotor while the handle 85 must first be actuated to produce low speed operation before the handle 84 can be moved.

To render the rotor more effective for rolling the clothes through the water when centrifugally drying the clothes, the material forming the cylindrical face of the drum is deflected inwardly at 86 at substantially right angles on the side 87 and at substantially 45 degrees on the side 88. The drum, while rotating in a clockwise direction, carries the clothes, gathered in the pockets formed by the side 57, upwardly from which they are tumbled and rolled down the inner face of the drum through the apertures of which the water is agitated when working or thrown off when drying.

The drain 32 on the bottom of the tub 31 is sealed to the wall of the truncated conical opening 91 by a plate 92 which draws the drain in abutted sealed relation therewith when secured by bolts 93. A valve 94 is mounted in the wall of the conical opening 91 interconnected by a link 95 to a crank 96 on a shaft 97 having a crank arm 98 extending from one side thereof. Suitable means 99 seal the shaft to the walls of the drain 32. An encased wire 101 interconnects the cam plate 82 to the arm 98 of the shaft 97 for actuating the valve 94 to open or closed position. When in closed position, the cam plate 82 is in the position illustrated in Fig. 4 that to intercept the flange 81 on the link 77. By this arrangement, the cam plate must first be operated to open the valve 94 and move out of interlocking relation with the link 77 before the handle 85 may be operated to increase speed on the drum.

The position of the cam plate and link 77 in the high speed operation of the drum is illustrated in Fig. 15. As is well known, through the movement of the handle 85 and, therefore, the crank arm 74, the tension on one belt is increased while that on the other belt is decreased causing the element 73 to shift from one side to the other to change the effective diameters of the pulleys 68 and 72 and thereby change the driving relation of the belts and the speed of operation of the drum. The washing operation is effected at low speed while a speed of three hundred revolutions or more is provided for the centrifugal drying operation.

As illustrated in Fig. 14, a sealing strip of felt, rubber or the like may be provided between the outwardly projecting flange 41 on the side panels 21 and the inwardly directed flange 42 on the front and rear panels 22 and 23, respectively. The strip preferably is provided with a slot into which the flange 41 projects for retaining the strip in fixed relation thereto, while the flanged portion 103 extending outwardly therefrom provides abutment for the end of the flange 42.

The aperture 58 in the circumference of the drum has the edges rolled to provide abutments 104 while an offset 105 in the slide 59 limits the movement of the slide on the guideway 61 between said abutments. The hinge 56, as illustrated in Fig. 11, is of the offset type, having an arcuate portion 106 struck about the pintle 107 which nests under the inwardly disposed portion 108 of the rear panel 23. A slot 109 is provided in the vertically directed flange 48 on the back panel to provide clearance for the arcuate portion of the hinge. A cam 110 is provided on one of the hinges in position to actuate a limit switch 118 when the cover is raised to interrupt the current to the motor 26 and prevent its operation when the drum is exposed.

A shaft 111 extends across the frame near the front end, disposed in slots in the vertical flange of the base element 34, having crank portions 112 in each of which a foot 113 is mounted. Brackets 114 extend over the shaft and are secured to the horizontal flange of the base element 34 by suitable means herein illustrated as by screws. An arm 115 extends forwardly from the shaft in a position to be operated by the pressure of the foot of an operator to swing the crank arms 112 and force the feet 113 against the floor. This raises the front rollers 25 from the floor and prevents the washing machine and cabinet from moving. The position of the feet and rollers are illustrated clearly in Figs. 3, 4 and 16 in solid and broken lines.

The washing machine constructed in this manner is exceedingly efficient in washing clothes without damaging the fabrics during low speed operation and which functions, when the water has been drained from the tub, as a centrifugal drier for the clothes. The cabinet of the machine is unique in that four panels are so interrelated as to be in locked relation when secured at the bottom to the base with a projecting flange at the top on which the tub is secured. The rotor containing the clothes is journalled in both walls of the tub to prevent gyration while the aperture in the rotor is closed by a slide operating in slotted guides of a material which is impervious to moisture. The cabinet is mounted on wheels and suitable means are provided for rendering the wheels inoperative to prevent the movement of the machine on the floor. The drive mechanism for the rotor is not only exceedingly simple, but extremely efficient while eliminating gears ordinarily employed in driving systems. V-belts are connected to a pair of change-speed pulleys, the driving ratios of which are changeable. Through the raising or lowering of the shaft of the pulleys the change in speed of rotation of the drum is obtained. Interlocking means are provided to prevent the driving of the drum at high speed when the drain valve of the tub is closed.

What I claim is:

1. A cabinet including in combination a base frame, side panels having inwardly directed edges which are flanged outwardly supported thereon, front and rear panels interlocked over said edges and flanges at the sides and top and also secured to said frame to form a unit self-supporting construction, and a tub supported on the said panels which comprises the sole support therefor on said base.

2. A washing machine including in combination, a base frame, side panels having inwardly directed edges which are flanged outwardly supported thereon, front and rear panels interlocked over said edges and flanges at the sides and top and also secured to said frame to form a unit self-supporting construction, inwardly directed flanges on said panels, and a tub having an outwardly directed peripheral flange supported on the inwardly directed flanges of said panels and supported solely on said base by said panels.

3. A washing machine including in combination a base frame, side panels having inwardly directed edges which are flanged outwardly supported thereon, front and rear panels interlocked over said edges and flanges at the sides and top

and also secured to said frame to form a unit self-supporting construction, inwardly directed flanges on said panels, a tub having an outwardly directed flange, a slotted sealing strip disposed over the flange of said tub, and means for securing the tub flange on the inwardly directed flanges of said panels with the sealing strip disposed in sealing relation thereto providing an exposed seal for the cover of the cabinet and supporting said tub on said base solely by said panels.

4. A washing machine including, in combination, a base frame, side panels having inwardly directed edges which are flanged outwardly supported thereon, front and rear panels interlocked over said edges and flanges and also secured to said frame to form a unit self-supporting construction, inwardly directed flanges on said panels, a tub having an outwardly directed flange, a slotted sealing strip disposed over the flange of said tub, means for securing the tub flange to the inwardly directed flanges of said panels with a portion of the sealing strip therebetween providing an exposed seal for the cover of the cabinet and supporting said tub on said base solely by said panels, and a cover resting on said exposed portion of the sealing strip for enclosing the tub.

5. In a cabinet, a base, side panels having downwardly extending flanges secured to said base, the sides of said panels being deflected inwardly and flanged outwardly, front and rear panels having the sides directed inwardly and projecting over said flanges of the side panels and further deflected inwardly and downwardly at the top to extend over the top of the inwardly deflected portions of the side panels to be in locked relation therewith, means for securing the bottoms of said panels to said base frame, a cover for the top opening formed by said panels.

6. In a washing machine, a base, side panels having downwardly extending flanges secured to said base, the sides of said panels being deflected inwardly and flanged outwardly, front and rear panels having the sides directed inwardly and projecting over said flanges of the side panels and further deflected inwardly and downwardly at the top to extend over the top of the inwardly deflected portions of the side panels when forced downwardly thereover, means for securing the bottoms of said panels to said base frame, a tub having an outwardly directed flange supported on said panels, and a cover for enclosing said tub.

7. In a washing machine, a base, side panels having downwardly extending flanges secured to said base, the sides of said panels being deflected inwardly and flanged outwardly, front and rear panels having the sides directed inwardly and projecting over said flanges of the side panels and further deflected inwardly and downwardly at the top to extend over the top of the inwardly deflected portions of the side panels when forced downwardly thereover, means for securing the bottoms of said panels to said base frame, inwardly directed flanges on said panels, a tub having an outwardly directed flange supported by said inwardly directed flanges on the panels, and a cover supported by the flange of said tub for enclosing the opening formed by said panels.

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