

Nov. 14, 1933.

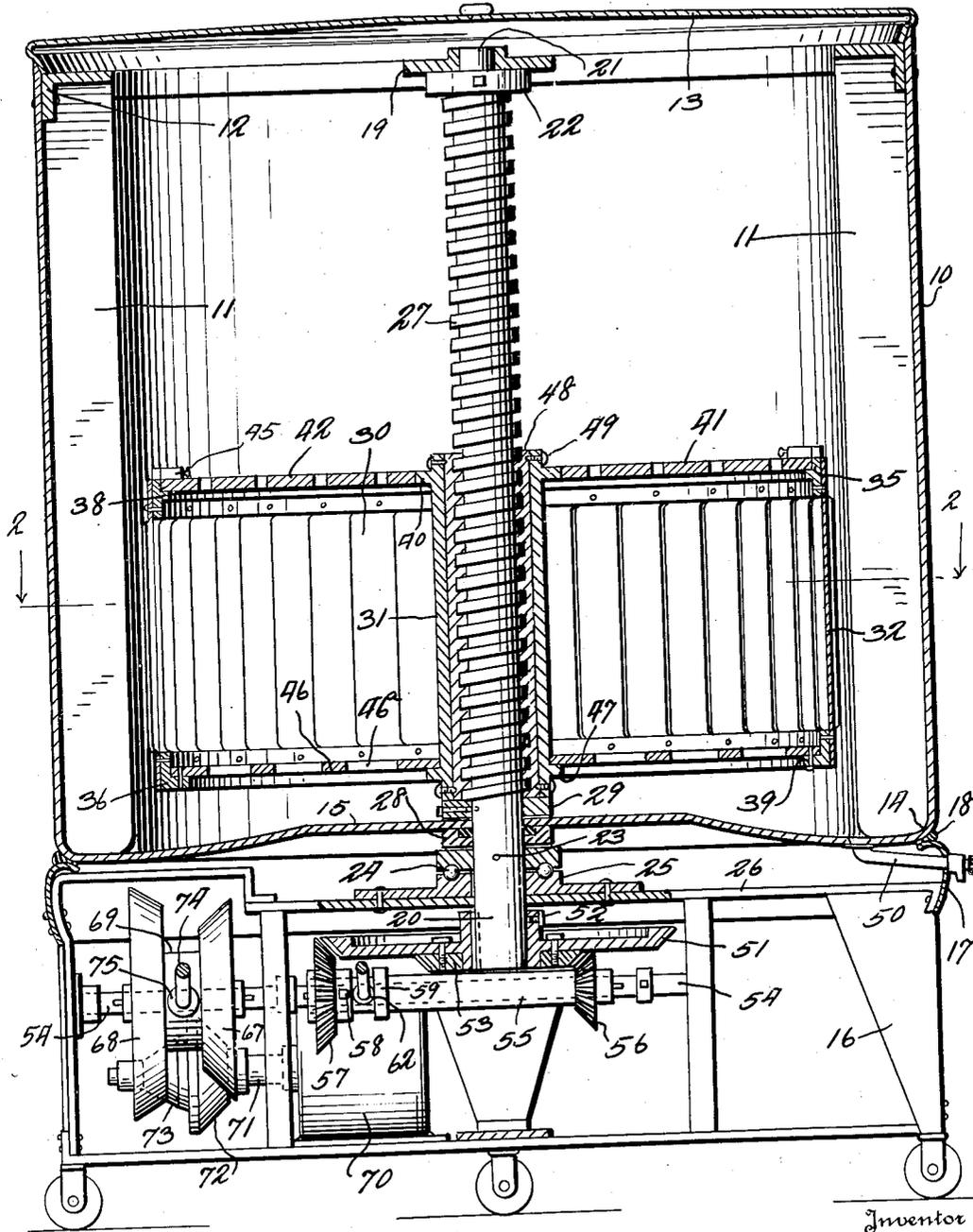
G. W. DAVIS

1,935,145

WASHER, SPINNER, AND DRIER

Filed March 15, 1933

3 Sheets-Sheet 1



Inventor

G. W. Davis

By *Watson E. Coleman*
Attorney

FIG. 1

Nov. 14, 1933.

G. W. DAVIS

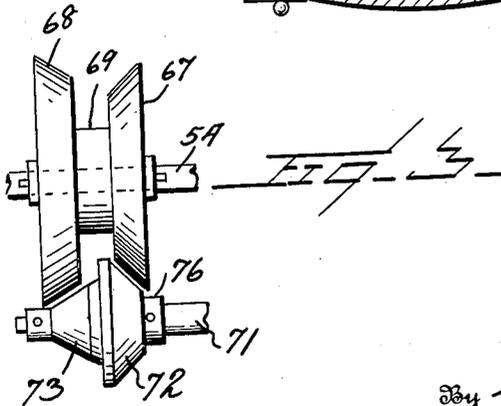
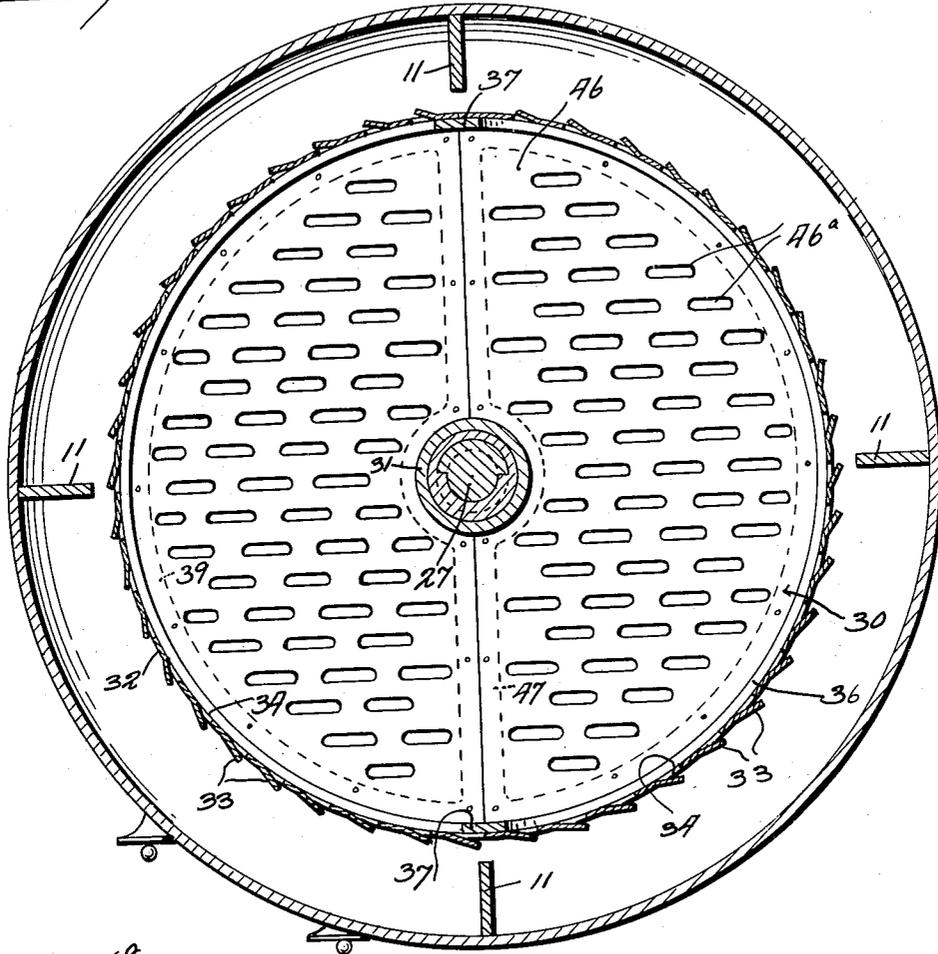
1,935,145

WASHER, SPINNER, AND DRIER

Filed March 15, 1933

3 Sheets-Sheet 2

FIG. 2



Inventor

G. W. Davis

By *Watson E. Coleman*
Attorney

Nov. 14, 1933.

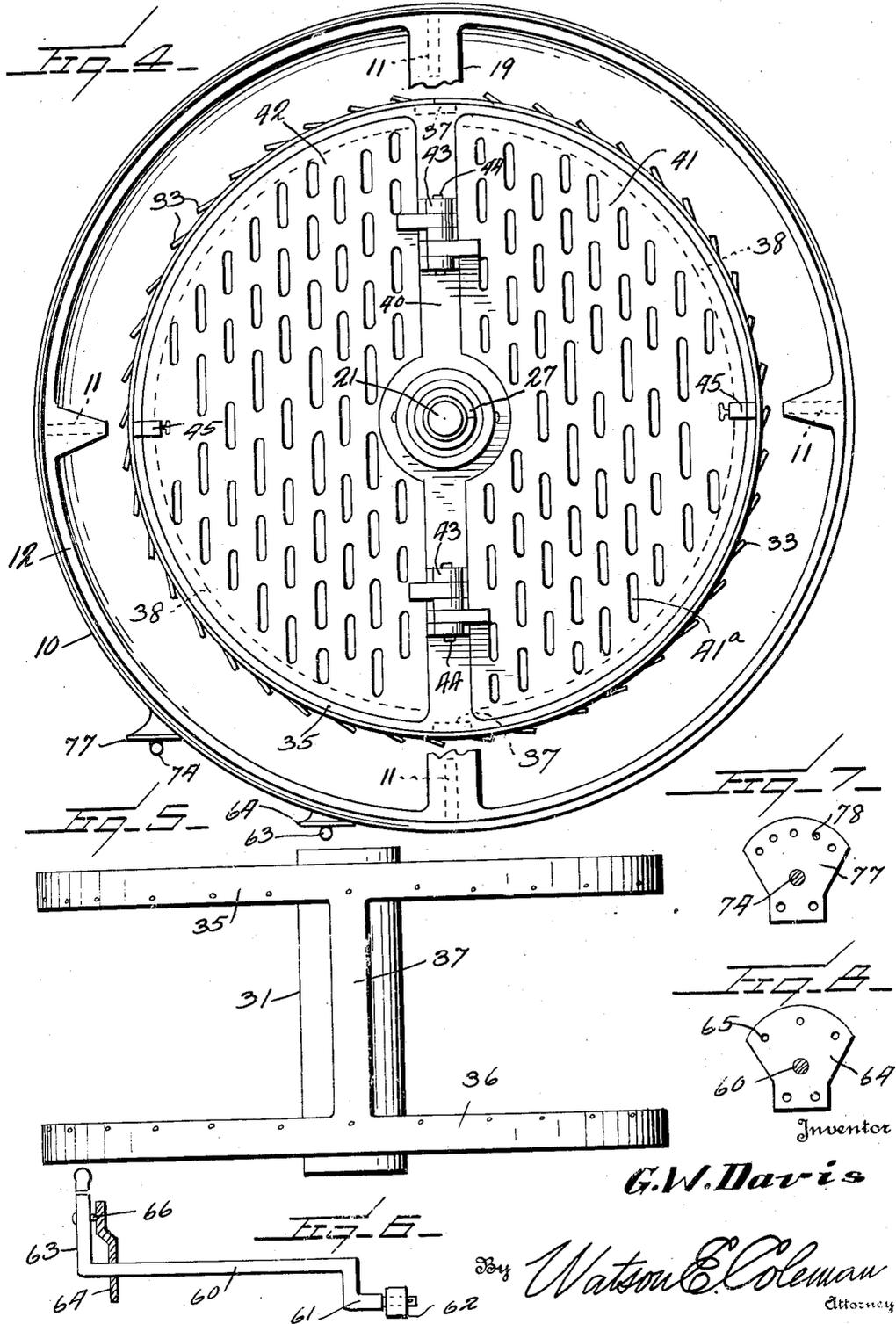
G. W. DAVIS

1,935,145

WASHER, SPINNER, AND DRIER

Filed March 15, 1933

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

1,935,145

WASHER, SPINNER, AND DRIER

George W. Davis, Gibson City, Ill., assignor of
one-half to Elvia E. Willett, Bloomington, Ill.

Application March 15, 1933. Serial No. 660,962

4 Claims. (Cl. 68—18)

This invention relates to laundry apparatus and particularly to a combined washer, spinner and drier. The general object of the invention is to provide a single machine wherein laundry may be washed, the water discharged from the cleaned clothes by the centrifugal action, and the clothes spun dry and one of the objects of the invention is to provide a washing machine of this character having therein a rotatable clothes receptacle adapted to be rotated by power within the tub and in a lowered position entirely immersed in the water, the machine being so constructed that under these circumstances, water will be drawn into the clothes receptacle and ejected forcibly therefrom and the machine being further so constructed that the clothes receptacle may be raised by power and held raised while rotating in the opposite direction to that first stated so that the water in the clothes may be ejected by centrifugal force to thus spin the clothes dry.

A further object is to provide a machine of this character in which the clothes receptacle is mounted upon a screw which constitutes the shaft for the clothes receptacle so that upon a rotation of the screw under power in one direction, the receptacle will be lowered into the water in the tub and when lowered, rotated, and upon a reverse rotation of the screw under the action of power, the receptacle will be raised in the upper portion of the tub and out of the water and be rotated to spin the clothes dry.

A further object is to provide manually operable means whereby the screw shaft may be rotated in one direction or the other and whereby it may be driven at various speeds.

Other objects will appear in the course of the following description.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical sectional view through a machine constructed in accordance with this invention;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is an elevation of the driving and driven friction pulleys;

Figure 4 is a top plan view of the machine with the cover removed;

Figure 5 is an elevation of the frame for supporting the top and bottom of the clothes receptacle;

Figure 6 is a sectional view through one of the clutch lever supports showing the clutch lever in elevation;

Figure 7 is an elevation of the support for the speed controlling clutch lever;

Figure 8 is an elevation of the support for the direction controlling clutch lever.

Referring to these drawings, 10 designates a preferably metallic tub or tank having the longitudinally extending blades 11 which also constitute reinforcing elements of a tub. These blades 11 at their upper ends are formed with triangular heads 12 riveted or bolted to the side wall of the tub as shown in Figure 1.

Adapted to close the upper end of the tub is the cover 13 preferably of sheet metal. The bottom of the tub is rounded at its corners as at 14 and upwardly and inwardly extended so that the center 15 of the tub bottom is above the level of the rounded corner portions 14. The tub 10 is supported upon a supporting frame designated generally 16 and having the upwardly extending supporting portions 17 which are turned inward at their margins and a rubber ring 18 is disposed between this inwardly turned margin of the annular portion 17 and the corners 14 of the tub. The supporting frame 16 may be constructed in any suitable manner and is provided preferably with casters.

Extending diametrically across the top of the receptacle from two diametrically opposed blades 11 is the transverse web 19 having a bearing opening 20 at its middle. Disposed through the center of the tub is a shaft 20, the upper end of this shaft extending into the bearing opening as at 21 and being provided below this bearing opening with a collar 22, held to the shaft by means of a set screw or equivalent means. This shaft passes through the bottom 15 of the tub and carries upon it the upper step bearing element 23 which rests upon anti-friction rollers 24 carried upon the lower step bearing element 25 which is riveted, bolted or otherwise attached to the supporting plate 26. The upper portion of the shaft from a point above the bottom is screw-threaded at 27. The lower end of the shaft is connected to driving means as will be later explained.

Surrounding the shaft just below the bottom 15 is a marine gland 28 which is so constructed as to prevent any leakage of water from the tub around the shaft. Any suitable means for this purpose may be used.

Disposed just above the bottom 15 but spaced therefrom and mounted upon the shaft is a collar 29 which is held in place by a set screw or the like means.

Surrounding the shaft 20 and rotatable therewith and also vertically movable upon the shaft is a cage which is designated generally 30. This

cage is composed of a central annular sleeve 31, an outer wall 32 having openings 34 and vanes 33 extending outward from each opening and arranged tangentially of the circular wall 32 as shown in Figure 2. The outer wall 32 is attached at its upper and lower margins to annular frames 35 and 36 which are connected at diametrically opposite points by the vertical webs 37 as shown in Figure 5. Each annular frame 35 is provided with a medially disposed inwardly projecting flange 38 as shown in Figure 1, while the frame 36 is provided with the inwardly projecting flange 39. Forming part of the sleeve 31 and extending diametrically across the closed receptacle or cage is a bar or web 40 as shown in Figure 4 to which are hinged the two approximately semi-circular top sections 41 and 42. These sections each have lugs extending across the bar 40 and hinged to the ears 43 of this bar by means of pivot bolts 44. Latches 45 are adapted to hold the two semi-circular sections 41 and 42 against their seats 38. The bottom of the cage is formed by the two semi-circular sections 46 which are riveted, bolted or otherwise attached to the flange 39 and to a cross bar 47 shown in dotted lines in Figure 2 and forming part of the sleeve 31. Disposed within this sleeve 31 is an interior sleeve 48 which is interiorly screw-threaded to fit the screw-threads 27. This interior sleeve may be held in place by means of the screws 49 or in any other suitable manner.

It will be seen that with this construction, when the shaft 20 is rotated in one direction, the sleeves 48 and 31 with the closed receptacle or cage will move upward until the further movement is stopped by the collar 22 and that then the cage will rotate with the shaft, whereas upon a rotation of the shaft 20 in the other direction, the cage will move downward upon the shaft until it reaches the stop collar 29 and then the cage will rotate with the shaft. The tub is provided with any suitable drainage means such as the drain pipe 50 provided with any suitable drain valve.

For the purpose of driving the shaft 20 and driving it in either direction and at different speeds, I mount upon the lower end of the shaft 20 the relatively large beveled gear wheel 51 as shown in Figure 1. This is illustrated as held upon the shaft by a key and by a set screw 52. Mounted upon this gear wheel 51 is a second beveled gear wheel 53 of smaller diameter than the beveled gear 51. Extending transversely below the lower end of the shaft 20 is a shaft 54 and slidingly mounted upon this shaft but splined thereto is a sleeve 55. This sleeve carries at one end the beveled gear wheel 56 which engages with the beveled gear wheel 53. The other end of the sleeve carries upon it the beveled gear wheel 57 shown as held to the sleeve by means of the set screw 58 which is adapted to engage with the beveled gear wheel 51. Inward of this beveled gear wheel 57 there is disposed the collar 59 and between the collar of the beveled gear wheel 57 and the collar 59, the end of a shifting lever is disposed such as shown in Figure 6, this lever 60 being cranked at its inner end as at 61 and carrying the roller 62, the outer end of the lever having an upwardly extending handle 63, this handle operating over a disk 64 shown in Figure 8 provided with three recesses 65, the lever having a pin 66 engageable in any one of these recesses, the plate 64 being sufficiently elastic to permit the lever to be shifted, causing an engagement of the lever with the disk when-

ever a recess 65 is disposed opposite the pin 66. It will thus be seen that the lever 63 may be disposed in a vertical position, in which case the gears 56 and 57 are disengaged from the gears 53 and 51 respectively and no power is transmitted to the washing machinery or the lever may be shifted to engage either one of the gears 56 or 57 with the gears 53 and 51 respectively. When the gear 56 is engaged with the gear 53, a relatively high speed is communicated to the shaft 27 and when the gear wheel 57 is engaged with the gear wheel 51, the shaft 20 will be rotated at a relatively slow speed. The relatively slow speed is used when the clothes are being washed, that is, when the shaft is being rotated in such a direction as to cause the receptacle or cage to be lowered to the bottom of the tub while the high speed is used when it is desired to raise the cage to its highest position and discharge the water from the clothes and cage.

The shaft 54 carries upon it a beveled friction wheel 67 and a larger friction wheel 68 as shown most clearly in Figure 3, these beveled wheels being separated from each other by means of the collar 69 and being splined upon the shaft 54 and held in place by any suitable means. A motor which is preferably a relatively slow speed electric motor and designated 70 has a shaft 71 which carries upon it, as shown in Figure 3, the two beveled friction wheels 72 and 73. The beveled friction wheel 72 coacts with the friction wheel 67 while the friction wheel 73 coacts with the friction wheel 68.

The beveled wheels 67 and 68 with the intermediate collar 69 are shiftable longitudinally upon the shaft 74 by means of the lever 74 which is of the same character as the lever 60 and is provided with the roller 75 engaging against the inner faces of the wheels 67 and 68 to shift them. Thus these wheels 67 and 68 may be shifted to a neutral position and neither of them be engaged with the driving friction wheels or in a position where the wheel 72 will drive the wheel 67. The friction wheels 72 and 73 may be constructed in any suitable manner but I have shown them as provided with the hubs 76 pinned or held by set screws to the shaft 71. All of these wheels will preferably be faced with leather or like friction facing material. The handle extremity of the lever 74 operates over a plate or disk 77 shown in Figure 7 provided with a plurality of openings 78. The middle opening in this plate 77 will hold the lever 74 in a neutral position and there are two recesses on each side which will permit the friction wheels to be brought into very close contact or relatively light contact or compensate for wear. I do not wish to be limited, of course, to the means for holding the lever 74 or the lever 60 as other means might be provided for this purpose.

The operation of the mechanism will be obvious from what has gone before. Initially, the cage 30 is disposed at the bottom of the tub and filled with clothes the cage remaining at the bottom of the tub during the washing operation. It will be understood, of course, that the cage might be raised to the top of the tub, then the power shut off and the cage filled with clothes but when the washing commences, the cage is lowered to the bottom of the tub, the whole lower portion of the tub being filled with water or other cleansing liquid.

The cage is rotated in a counter-clockwise direction with reference to Figures 2 and 4, and this causes the water within the tub to be forced

in through the openings 34 by the vanes 33 and ejected through the openings 46a and 41a in the bottom and top of the cage. The water in the tub is held from rotation by means of the blades 11 and thus the water is forcibly directed into the interior of the cage, washes the clothes therein and is discharged outward through the perforations in the top and bottom of the cage. When the clothes have been sufficiently washed in this manner, the lever 60 is operated to shift the gear 57 out of its engagement with the gear 51 and shift the gear 56 into engagement with the gear 53. This causes reverse rotation of the shaft 20 which causes the cage to be raised and move upward until it reaches the stop collar 22. Inasmuch as the cage can go no further, it then rotates with the shaft 20 and at a relatively high speed, which speed may be determined, of course, by shifting one or the other of the friction wheels 67 or 68 into engagement with the corresponding friction wheels 72 or 73. This high rotation of the cage acts to discharge the water by centrifugal force and to spin the clothes dry. The cage might be rotated at a relatively slow speed when it is first raised and then rotated at a higher speed when it is desired to spin the clothes dry. It will also be obvious that the shaft 20 when the cage is lowered may be rotated at two different speeds, if desired.

While I have illustrated certain details of construction and arrangements of parts, I do not wish to be limited thereto as obviously minor changes might be made therein without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:—

1. A washing, spinning and drying machine, including a tub, a shaft extending vertically through the tub and exteriorly screw-threaded, a cage having end walls mounted on the shaft and having a central sleeve extending entirely through the cage and having screw-threaded engagement with the shaft throughout its entire screw-threaded portion, the tub having a height at least twice the height of the cage, the cage having apertures on its peripheral walls, and through its ends, means for rotating the shaft in opposite directions, and stop collars limiting the vertical movement of the cage on the shaft, the rotation of the shaft in one direction causing the cage to rise until it reaches the upper stop collar and then rotate with the shaft and the rotation of the shaft in the opposite direction causing the cage to lower until it reaches the other stop collar and then causing the cage to rotate with the shaft.

2. A washing, spinning and drying machine of the character described including a tub and a lid for the tub, a cross bar extending across the top of the tub, a vertical shaft mounted at its upper end on the cross bar and extending through the bottom of the tub, a thrust bearing carried by the bottom of the tub and supporting the shaft, that portion of the shaft within the tub being screw-threaded, and provided with stop collars at opposite ends of the

screw-threaded portion, the peripheral walls of the tub having interior vertically extending blades, a cage disposed within the tub and having screw-threaded engagement with the shaft, the cage having peripheral openings provided with tangential vanes, the top and bottom of the cage being perforated, a motor disposed below the tub, a driven shaft, means for driving the driven shaft from the motor including speed changing devices, and selective means on the driven shaft for driving the vertical screw-threaded shaft and cage in either one of two different directions.

3. A washing, spinning and drying machine including a tub having interior vertical blades on its peripheral walls and having a cover, a vertical shaft extending through the tub, means for operatively supporting the upper end of the shaft, the lower end of the shaft extending through the bottom of the tub, that portion of the shaft within the tub being screw-threaded, stop collars mounted at the upper and lower ends of the screw-threaded portion of the shaft, a cage mounted within the tub and having a central sleeve having screw-threaded engagement with the shaft, the cage being less than half the height of the tub, a pair of beveled gear wheels mounted on the lower end of the shaft below the tub, a driven shaft extending at right angles below the vertical shaft, beveled gear wheels mounted upon the driven shaft and opposed to each other, manually operable means for bringing either one of said gear wheels into engagement with either one of the beveled gear wheels on the vertical shaft or into a neutral position, a motor, and means for driving the driven shaft from the motor including a pair of friction wheels mounted upon the driven shaft and having different diameters, a pair of friction wheels mounted on the motor shaft and having different diameters, and manually operable means for bringing either one of the friction wheels on one shaft into or out of engagement with the corresponding friction wheels on the other shaft.

4. In a machine of the character described, a tub, a vertical shaft extending through the tub, that portion of the shaft between the bottom and the top of the tub being screw-threaded, limiting collars carried at the ends of the screw-threaded portion of the shaft, and a cage disposed concentrically to the shaft and having a height less than half the height of the tub, the cage comprising an annular frame having a central sleeve and radiating cross bars connecting the frame to the sleeve, an interiorly screw-threaded sleeve disposed within and connected to the first named sleeve for unitary movement and mating with the screw-threaded shaft, a perforated bottom attached to said frame, and a perforated top formed in two sections and hinged to the cross bars of the frame, and means disposed below the tub for driving the shaft in either of two directions and at any one of a plurality of speeds.

GEORGE W. DAVIS.