Jan. 19, 1960 G. B. LONG 2,921,459

COMBINED CLOTHES WASHER AND EXTRACTOR

Filed Feb. 23, 1955 2 Sheets-Sheet 1

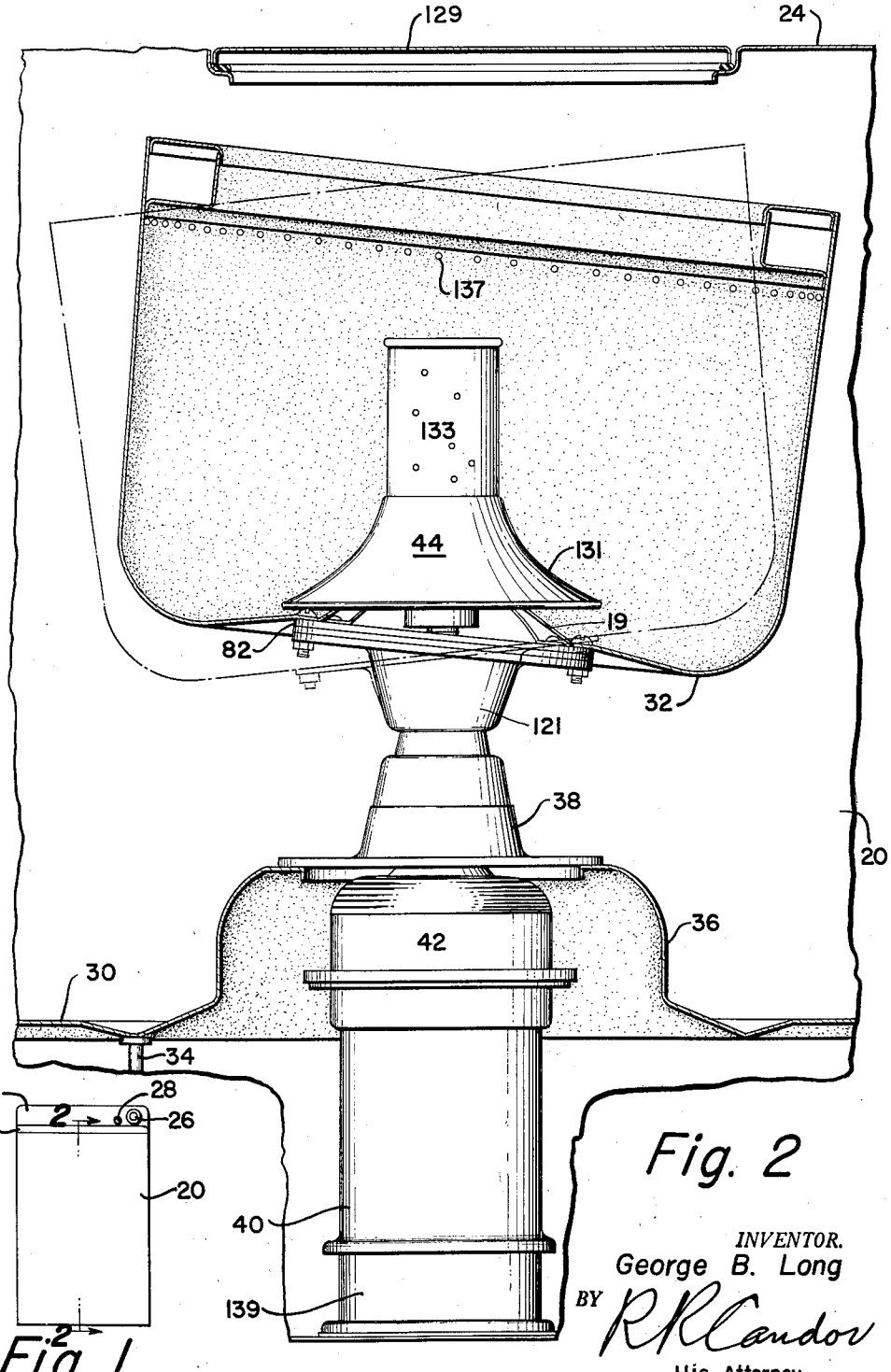



Fig. 2




Fig. 1

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Fig. 3

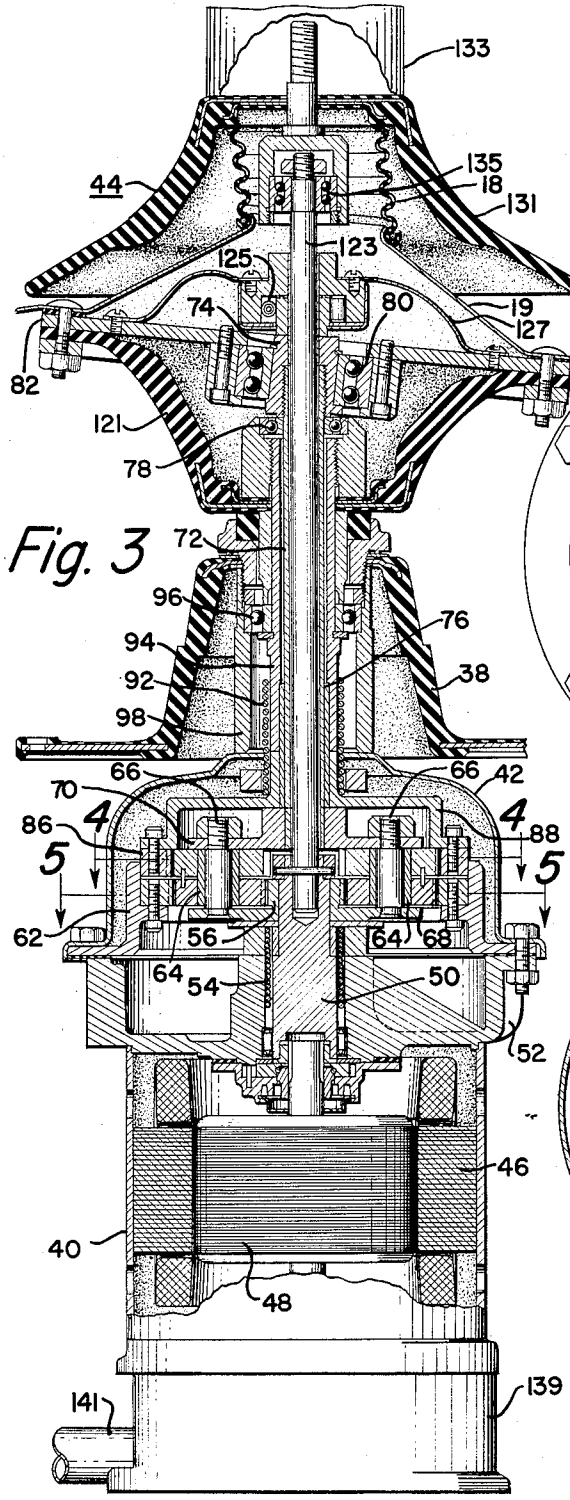



Fig. 5

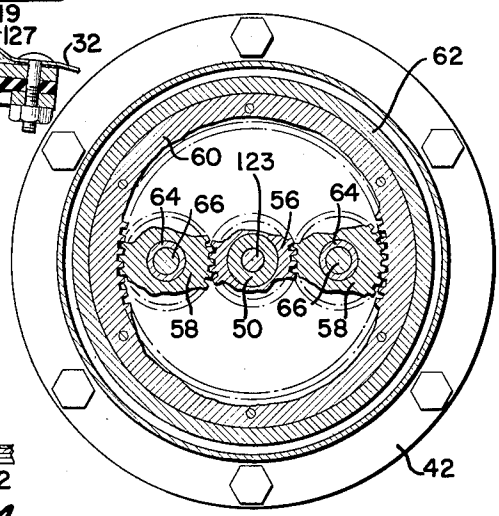
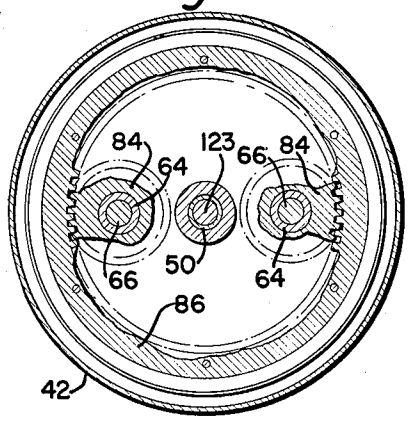



Fig. 4




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2,921,459

# COMBINED CLOTHES WASHER AND EXTRACTOR

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Application February 23, 1955, Serial No. 489,965

6 Claims. (Cl. 68—23)

This invention relates to a domestic appliance and more particularly to a combined washing and extracting machine.

It is an object of this invention to provide a new and improved washing and centrifugal extracting machine.

This and other objects are obtained in the form shown in the drawings in which a tub moves eccentrically relative to an agitator within the tub on an axis intersecting the axis of the driving mechanism to produce a washing action. For extraction the tub is rotated on its axis at a higher speed. This is accomplished by reversing the driving motor and connecting it to the tub through a one way clutch while a second one way clutch disconnects the mechanism for producing the washing action.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a front view of a washing machine embodying one form of my invention;

Figure 2 is a vertical sectional view taken substantially along the line 2—2 of Figure 1;

Figure 3 is a vertical sectional view through the driving mechanism shown in Figure 2;

Figure 4 is a horizontal sectional view taken along the line 4—4 of Figure 3; and

Figure 5 is a horizontal sectional view taken along the line 5—5 of Figure 3.

Referring now to the drawings there is shown in Figure 1 a washing machine cabinet 20 having a top 22 provided with a back splash section 24. On the back splash portion 24 is a dial knob 26 for the automatic timer located behind the back splasher. The back splasher portion is also provided with an overload indicator 28.

Referring now to Figure 2, the interior of the cabinet 20 is provided with a transverse wall 30 providing a bulkhead capable of collecting liquid discharged from the tub 32. This horizontal wall 30 together with the walls of the cabinet 20 form a catch basin which is drained through the outlet pipe 34. The horizontal wall 30 is provided with a raised central portion 36 upon which is mounted a hat shaped resilient mounting member 38 which resiliently supports the drive mechanism. The drive mechanism includes a motor housing 40, a transmission housing 42 and has connections to the tub 32 as well as the agitator 44. The bell shaped agitator 44 has a lower skirt portion 131 of rubber-like material and an upper cylindrical portion 133. Within the motor housing (see Fig. 3) is the stator 46 and rotor 48 of a six pole 1140 r.p.m. reversible motor. The rotor 48 is connected through a spline shaft with a stub shaft 50. This stub shaft 50 is rotatably mounted in the housing member 52. Surrounding this shaft 50 is a one-way wound spring clutch 54 which connects in one direction of the shaft 50 to the pinion 56 rotatably mounted upon the stub shaft 50.



This pinion 56 meshes with two planetary pinions 58 which in turn mesh with a stationary internal ring gear 60 as shown in Figure 5. This ring gear 60 is fastened to the frame member 62 by screws as shown in Figure 3. The pinions 58 are mounted upon the sleeves 64 which in turn are rotatably mounted upon the studs 66 riveted at the lower end to the plate 68. This plate 68 is rotatably mounted upon the pinion 56. The upper ends of the studs 66 are fastened to the upper plate 70. This plate 70 is connected by an inner sleeve 72 to the hub 74. This inner sleeve 72 is rotatably mounted in a lower bearing 76 and an upper bearing 78. The hub 74 is inclined relative to the axis of the sleeve 72 and is provided with an inclined ball bearing 80 connected to a bottom plate 82 upon the bottom of the tub 32. The rotation of the inner sleeve will cause the tub to rotate in an orbital path about the axis of the sleeve 72 upon an axis which is inclined to and which intersects the axis of the inner sleeve 72.

Also rotatably mounted upon the sleeves 64 are a second set of pinions 84 which are keyed to the pinions 58. These pinions 84 are slightly larger than the pinions 58 to provide the reversed movement desired. These pinions 84 mesh with an internal ring gear 86 which is rotatably mounted in the housing 62 and is driven in the reverse direction of rotation. This ring gear 86 is connected to a bell-shaped housing 88. This bell-shaped housing 88 is connected in one direction of rotation by a wound spring clutch 92 to the outer sleeve 94 rotatably mounted in the bearing 96 supported by the housing sleeve 98. This reverse rotation of the ring gear 86 results from the rotation of the sun pinion 56 which rotates the planet pinions 58 which, in turn, revolve by their meshing with the internal ring gear 60 which is fixed to the frame member 62. The planet pinions 58 are pinned and locked to the planet pinions 84. The planet pinions 58 and 84 are freely rotatable on the studs which are riveted to the lower plate 68 which revolves about the central axis. The planet pinions 58 and 84 rotate in the direction opposite the direction of the sun gear. Since the planet pinions 58 and 84 are locked together and the planet pinion 84 is larger in diameter and has more teeth than the planet pinions 58 and since the ring gear 60 with which the smaller planet pinions 58 nest is stationary, the larger planet pinions 84 will force the ring gear 86 to rotate in the opposite direction to the rotation of the sun gear 56 at a speed of 60 r.p.m. The sleeve 94 connects through an inverted bell-shaped rubber connecting member 121 to the plate 82 and the tub 32. The tub 32 has a central upwardly extending conical portion 19 connected by a flexible bellows 18 to the interior of the agitator 44.

There is also provided a central shaft 123 rotatably mounted within the inner sleeve 72 and the plate 70. This inner shaft 123 is pinned to the stub shaft 50. This shaft 123 is provided with an overrunning one-way clutch mechanism 125 connecting through the resilient diaphragm connection 127 with the plate 82 when motor and rotor 48 are reversed.

*Operation*

At the start of the washing operation, the lid 129 is opened and the clothes placed in the tub 32 around the bell-shaped agitator 44 having a lower skirt portion 131 of rubber-like material and a hollow perforated cylindrical portion 133 above the skirt portion 131. Detergent may be inserted into the hollow perforated cylindrical portion 133. The tub is suitably filled with water under the control of the timer 26. After the tub 32 is filled sufficiently, the motor is started to rotate the rotor 48 and the stub shaft 50 in one direction of rotation. In this

particular direction of rotation the wound spring clutch 54 winds upon the stub shaft 50 and the pinion 56 causing a clutching connection therebetween. This rotates the pinion 56 and causes the pinions 58 and 84 to revolve about the stub shaft 50 at a speed of about 300 r.p.m. The studs 66, the top plate 70 and the inner sleeve 72 are forced to rotate at the same speed and thus the hub 74 of the bearing 80 likewise rotate at this speed. This causes a wobbling of the tub 32 in one direction about the axis of the shaft 123 at a rate of about 300 r.p.m.

The pinions 84 are sufficiently larger in diameter than the pinions 58 that the ring gear 86 is rotated in the opposite direction at a speed of 60 r.p.m. In this direction of rotation, the bell-shaped member 88 causes the wrapping and clutching of the wound spring clutch 92 to clutch it to the outer sleeve 94. The rotation of this outer sleeve 94 through its connection with the resilient rubber member 121 rotates the tub 32 in the direction opposite the wobbling of the tub at a speed of about 60 r.p.m. The agitator 44 is mounted upon a bearing 135 upon the upper end of the inner shaft 123 so that it and the tub are free to rotate or remain stationary when the wound spring clutch 92 is unclutched according to the influence of the water and the clothes thereon so that there will be substantially no rubbing action. Since the bellows 18 extends between the agitator 44 and the tub 32, they will rotate together. The wobbling action of the tub 32 relative to the agitator 44 combined with the slow rotation of the tub 32 and the agitator 44 in the reversed direction provides an improved water and clothes agitation for cleaning the clothes.

After the clothes have been agitated for a sufficient period, the motor is reversed so that the rotor 48 and the stub shaft 50 now turn in the reverse direction. This unwraps and declutches the wound clutches 54 and 92. The one-way overrunning clutch 125 which has been declutched during the agitating period now becomes clutched to the shaft 123 providing a connection from the rotor through the stub shaft 50, the inner shaft 123, the one-way clutch 125 and the resilient diaphragm 127 to the tub 32 to cause the tub to rotate upon the bearing 80 at the full motor speed of about 1140 r.p.m. This rotation of the tub 32 on its axis at this speed will cause the water to be centrifuged out of the clothes through the apertures 137 in the upper side wall of the tub 32. The water centrifuged out of the tub 32 is caught in the catch basin provided by the horizontal wall 30 and is discharged through the drain tube 34. Beneath the motor 40 there may be provided a pump 139 connected to the drain tube 34 and provided with a discharge connection 141 for pumping the water drained to a suitable place of disposal.

Rinse water may then be discharged into the tub 32 and the motor operated in a reversed direction to agitate the contents of the tub in the previously described manner. At the termination of this rinse agitation, the motor is reversed to spin the tub 32 to center and extract the rinse water from the clothes.

In accordance with the provisions of Rule 78*a*, reference is made to the following prior filed applications: Serial No. 392,222, filed November 16, 1953; Serial No. 392,223, filed November 16, 1953 which issued on August 6, 1957, as Patent 2,801,549; and Serial No. 439,989, filed June 29, 1954 which issued on December 9, 1958, as Patent 2,863,311.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A washing machine including a tub having an axis, an agitator within said tub rotatably mounted upon an axis at an angle to the axis of said tub, said agitator having a flared skirt, said tub having raised downwardly sloping means concentric with its axis beneath said flared skirt, and means for moving said tub so that its axis moves through an orbital path relative to the axis of said agitator in a first direction about the axis of said agitator and for rotating said tub on its own axis in a reverse direction.

2. A laundry machine including an upright shaft, an agitator concentric with and mounted upon said shaft, a tub separate from but surrounding said agitator, means supporting an angularly mounted bearing upon said shaft for rotatably supporting said tub at an angle relative to said shaft, and drive means connected to said supporting means for rotating said supporting means and angularly mounted bearing relative to said tub to cause said tub to wobble relative to said agitator.

3. A laundry machine including an upright shaft, an agitator rotatably mounted upon and concentric with said shaft, said agitator having a wide flared skirt, a tub separate from but surrounding said agitator, means supporting an angularly mounted bearing upon said shaft for rotatably supporting said tub at an angle relative to said shaft, and drive means connected to said supporting means for rotating said supporting means and angularly mounted bearing relative to said tub to cause said tub to wobble relative to said agitator.

4. A laundry machine including an upright shaft, an agitator concentric with and mounted upon said shaft, a tub separate from but surrounding said agitator, means supporting an angularly mounted bearing upon said shaft for rotatably supporting said tub at an angle relative to said shaft, and oppositely rotating dual drive means separately connected to said tub and supporting means for rotating tub and means supporting said angularly mounted bearing in opposite directions simultaneously for rotating and wobbling said tub in opposite directions and to cause said tub to wobble relative to said agitator.

5. A laundry machine including a drive motor, a sun gear connected to said motor, a ring gear surrounding the sun gear, planet gears meshing with said sun and ring gears, a rotatable bearing support for said planet gears, a second ring gear meshing with said planet gears, a rotatable tub having a flexible connection to said second ring gear, a shaft connected to said bearing support, an angularly mounted bearing fixed to said shaft extending between said shaft and said tub for providing a rotatable wobbling support for said tub, an agitator within said tub, and means for rotatably mounting said agitator relative to said shaft.

6. A washing machine including a tub means, an agitator means within the tub means, said tub means and agitator means having separate axes, said agitator means having a wide flared skirt, said tub having raised downwardly sloping surfaces beneath said flared skirt, and means for moving one of said means in one direction so that its axis is moved through an orbital path relative to the axis of the other of said means and for simultaneously rotating one of said means in the opposite direction, and means for rotating said tub means upon its own axis at a higher rate than said orbital movement.

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