United States Patent

Krolzick

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[45] **July 25, 1972**

[54] AGITATOR WITH RECIPROCATING DEVICE

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[73] Assignee: **Whirlpool Corporation,** Benton Harbor, Mich.

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[52] **U.S. Cl.** **68/131**

[51] **Int. Cl.** **D06f**

[58] **Field of Search** 68/131, 132, 133

[56] **References Cited**

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2,429,610 10/1947 Cheney 68/131

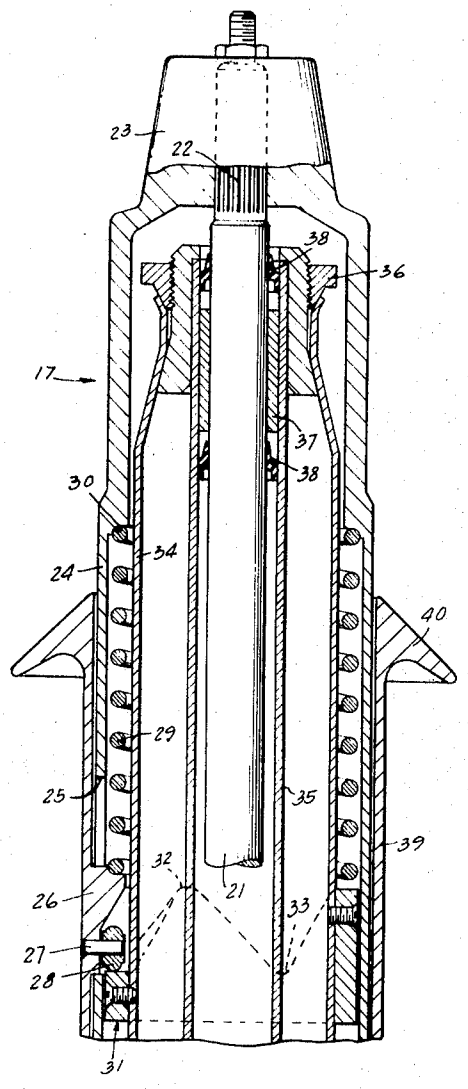
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[57] **ABSTRACT**

A washing machine assembly of the vertical axis type, including an agitator assembly which oscillates about a stationary vertical axis, in combination with a second agitator which is coupled to the main agitator for oscillation therewith, together with means operating between the main agitator and the other agitator to effect a vertical reciprocation of the latter during oscillation.

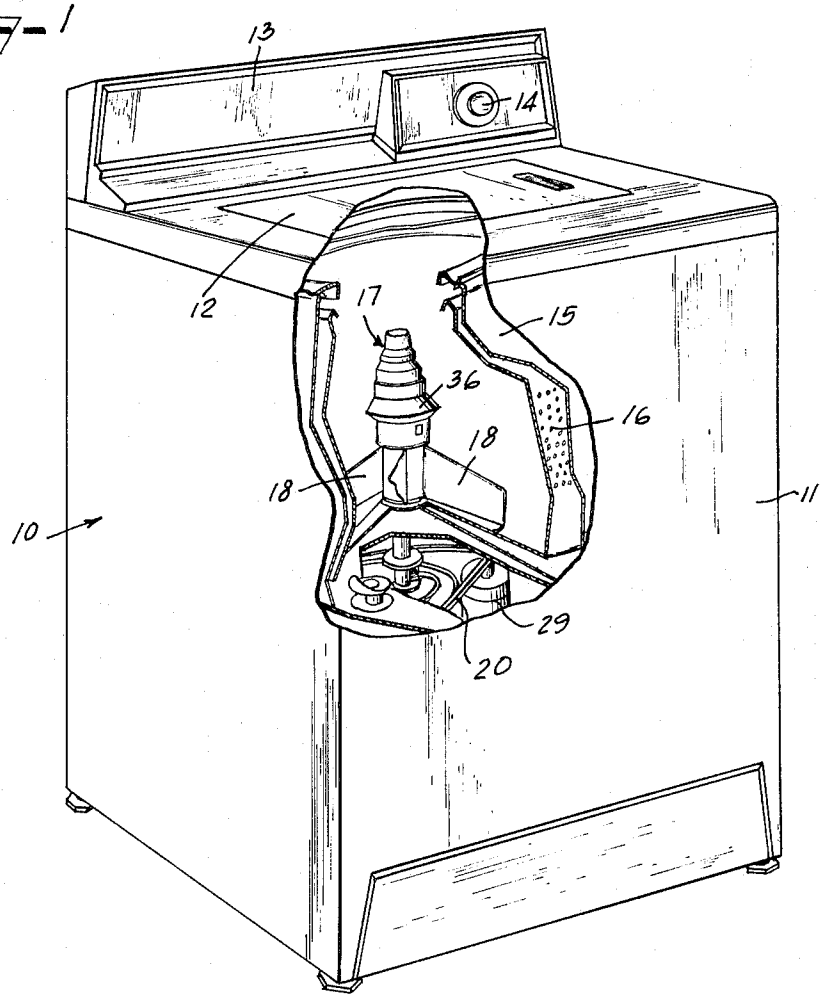
7 Claims, 4 Drawing Figures



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2 Sheets-Sheet 1

Fig. 1



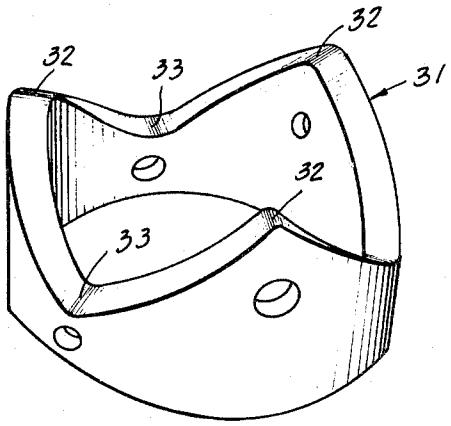


Fig. 3

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Fig. 2

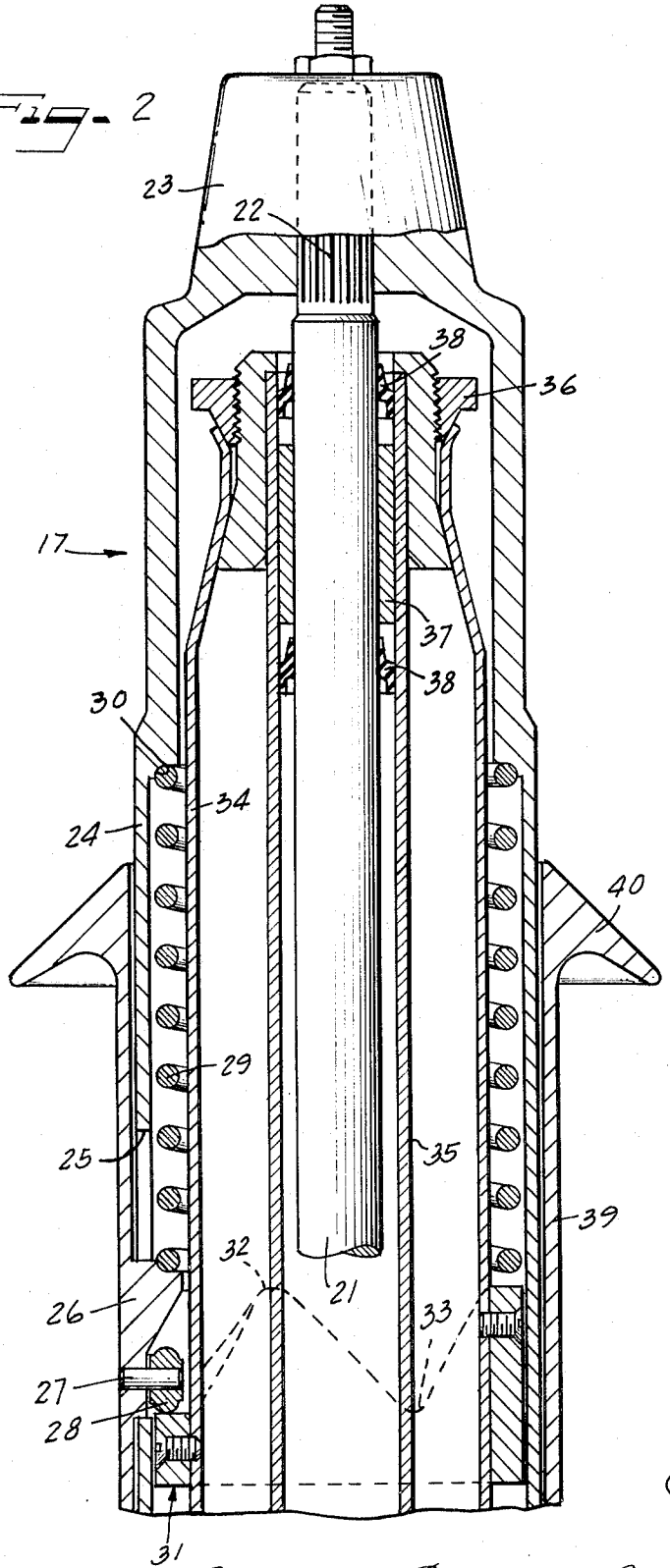
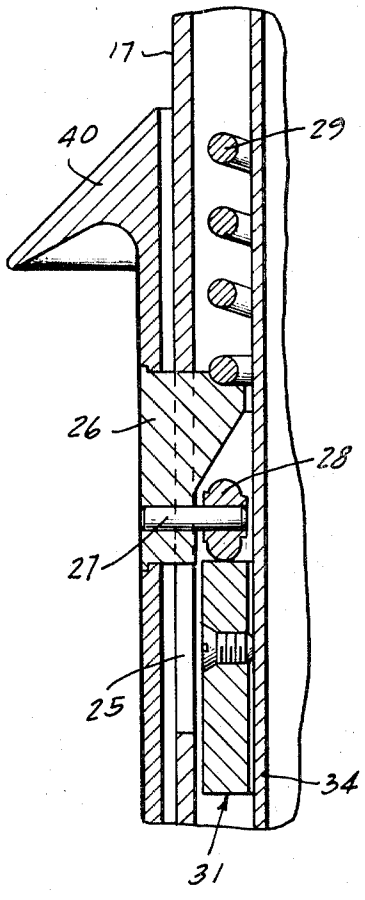


Fig. 4



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AGITATOR WITH RECIPROCATING DEVICE

BACKGROUND OF THE INVENTION

1, Field of the Invention

This invention is in the field of agitator devices for vertical axis washing machines.

2, The Prior Art

There have been numerous different types of agitating structures disclosed in the prior art for washing machines which provide both reciprocatory and rotary movement of an agitator. For example, reference is made to U.S. Pat. No. 1,286,923 which discloses a washing machine mechanism in which an agitator is oscillated, and gravity is employed to effect downward movement of the agitator.

There are still other examples of washing machines which have agitators equipped for both rotary and reciprocating motion, and in which the drive shaft itself is made to both rotate and reciprocate as, for example, in U.S. Pat. No. 2,172,620.

SUMMARY OF THE INVENTION

The present invention provides a simple but nevertheless effective means for securing both oscillation and vertical reciprocation in an agitator element. It is particularly designed for those types of washing machines which include a perforate basket assembly connected to a vertically disposed shaft, with an oscillating agitator being disposed in the perforate basket and having a shaft which is concentric with the shaft which rotates the perforate basket. Drive means are provided to selectively drive the perforate basket continuously as in a wash liquid extraction stage, and to oscillate the agitator vanes during the washing cycle. In accordance with the present invention, a secondary agitator is provided in order to provide vertical movement in the wash liquid during agitation. The preferred form of the invention involves the use of a cam which is rigidly secured to the center post of the basket, and a separate agitator element having cam engaging means arranged to ride on the cam, so that the secondary agitator is both oscillated and vertically reciprocated during the washing cycle.

Through the use of the combined reciprocation and oscillation, an improved washing action is obtained through increased roll-over of the articles being washed. Because of this improved washing action, a larger capacity load can be washed then would be possible with a conventional agitator which provides only rotary oscillation. In addition, the improved agitator assembly of the present invention is simple to incorporate into a standard vertical axis machine with few additional parts being required, and no additional bearing or water sealing means are required.

In the preferred form of the present invention, the secondary agitator means, which is in addition to the standard agitator vanes, may comprise a tubular sleeve which surrounds the standard agitator in the center of a vertical axis machine and carries an agitating element. This secondary agitator means is coupled to the agitator drive shaft for oscillation therewith from the usual drive means and to the basket center post so as to receive reciprocatory motion therefrom.

In one exemplary form of the invention, a cam is secured to the upstanding center post of the perforate basket. A plurality of cam follower assemblies are secured within slots provided in the tubular sleeve and standard agitator, and spring means urge the cam followers into riding engagement with the periphery of the stationary cam. Thus, when the primary agitator is oscillated in the usual manner through an angular arc, the secondary agitator is carried along with the main agitator, but at the same time it is reciprocated by the engagement of the cam followers with the high and low points of the cam surface.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of the invention will be readily apparent from the following description of certain preferred embodiments thereof, taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure, and in which:

FIG. 1 is a view in perspective, partly broken away, illustrating a vertical axis washing machine embodying the improvements of the present invention;

FIG. 2 is a fragmentary cross-sectional view of the interior of the agitator shaft assembly;

FIG. 3 is a view in perspective of the cam which is secured to the center post of the perforate basket; and

FIG. 4 is a fragmentary cross-sectional view similar to FIG. 2 but showing the cam follower at the high point of the cam.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1, reference numeral 10 indicates generally a washing machine of the vertical axis type, including a cabinet 11, a hinged access door 12 for loading and unloading the machine, and a console panel 13 including a control knob 14 which sets the machine for various programmed sequences by means of a timer mechanism all of which is commonplace in automatic washing machines, and therefore the details thereof will not be repeated in this specification.

Within the cabinet 11 is the usual imperforate outer tub 15 within which a perforate basket 16 is mounted for rotation so as to extract washing liquid from the articles being washed by centrifugal force at the completion of a washing cycle. The main agitator has been identified generally at reference numeral 17 in FIG. 1, and includes a plurality of agitator vanes 18 at the base thereof. Also shown in FIG. 1 is a drive motor 19 and a drive belt 20 which, together with a transmission (not shown) form the drive system for the basket 16 and the agitator 17. As is well understood by those familiar with this art, the drive system provides for rotary oscillatory movement of the agitator 17 during the washing cycle and provides for continuous rotation of the perforate basket 16 during extraction of wash liquid following the washing cycle. Again, the details of the drive mechanism have not been specifically illustrated because they are well known in the art and form no part of the instant invention.

Referring now to FIG. 2, an agitator drive shaft 21 is located centrally of the vertically disposed agitator assembly 17 and at its upper end is received by a splined collar 22 which forms part of a drive and support hub 23. Hub 23 is integral with a hollow cylindrical agitator shell 24 to which the agitator vanes 18 are secured.

Medially of the agitator shell 24 are a plurality of vertically disposed slots 25, one of which is visible in FIGS. 2 and 4. The slots 25 are just wide enough to receive a plurality of cam follower support blocks 26 so that when the tubular shell 24 rotates, the cam follower support blocks 26 are carried along with it. Each of the cam follower support blocks 26 includes a pin 27 to which there is mounted a cam follower roller 28. A coiled spring 29 extends between the cam follower blocks 26 and is bottomed against a shoulder 30 formed interiorly of the tubular shell 24. The spring 29 urges the cam follower rollers 28 into engagement with a cam which has been generally illustrated at reference numeral 31 in the drawings.

The configuration of the cam 31 is best illustrated in FIG. 3 of the drawings. It includes a plurality of high points 32 with intermediate low points 33. The cam 31 is fixedly secured to the basket center post 34 which forms an extension of the perforate basket 16, and is concentric with a spin drive tube 35 which provides basket 16 with rotary drive when the laundry appliance is energized to spin the clothes load. Coupling means 36 is provided for transferring rotary motion from spin drive tube 35 to basket 16 by way of the basket center post 34. Conventional bearing and seal means 37 and 38, respectively, are provided between spin drive tube 35 and agitator shaft 21, as is commonly done on vertical axis laundry appliances.

The cam follower blocks 26 are part of a sleeve 39 at the top of which there is provided an agitating element 40 having a downwardly inclined flange portion as illustrated in FIGS. 2

and 4. Sleeve 39 and agitating element 40 form a secondary agitator means whose function is to provide vertical agitation in the wash liquid during washing, resulting in increased roll-over of the articles being washed. Because of this improved washing action, larger capacity loads can be washed than are possible with a conventional agitator which only includes the oscillating vanes 18.

Typically, the main agitator 17 rotates through an angular arc of 195° or so during oscillation. During such rotation, the cam follower rollers 28 ride on the periphery of the cam 31, rising and falling as the rollers alternately engage the high points 32 and the low points 33 of the cam surface. With the arrangement shown, as the main agitator 17 rotates through a single stroke, the sleeve 39 and the agitator element 40 will rise, fall and begin another upward stroke before the main agitator 17 reverses and begins a second stroke. By modifying the design of the cam 31, it is possible to achieve a greater amplitude of vertical reciprocation or a greater number or vertical strokes per rotational stroke of the main agitator 17.

The improved agitator agitator assembly of the present invention is simple, reliable and requires no additional bearing or water sealing means. It can be installed in almost any vertical axis washing machine for only a small additional expense.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a vertical axis washing apparatus having a fabric receiving container which remains substantially stationary during agitation operations, an agitator assembly comprising:
- a drive shaft;
- first agitator means secured to said drive shaft for oscillation therewith;
- second agitator means disposed concentrically with said first agitator means and coupled to said first agitator means for oscillation therewith; and
- means operating between said second agitator means and said fabric receiving container for causing vertical reciprocation of said second agitator means as an incident of oscillation of said agitator assembly.

2. In a vertical axis washing apparatus, an agitator assembly comprising:
- a drive shaft,
- a basket assembly,
- an upstanding center post secured to said basket assembly for rotating the same,
- a first agitator means having a tubular shell concentric with said vertically disposed shaft,
- a single drive means arranged to oscillate said drive shaft,
- a second agitator means coupled to said tubular shell for oscillation therewith, and
- reciprocating means operating between said upstanding center post and said second agitator means for causing vertical reciprocation of said second agitator means during oscillation thereof.

3. The agitator assembly of claim 2 in which said reciprocating means includes a cam secured to said basket center post and a cam follower carried by said second agitator means and positioned to ride on said cam.

4. The agitator assembly of claim 3 in which said tubular shell has a vertical slot therein, and said cam follower is mounted for rotation in a follower support block engaging the vertical walls of said slot.

5. The agitator assembly of claim 3 which includes spring means urging said follower into engagement with the upper surface of said cam.

6. The agitator assembly of claim 2, in which said second agitator means comprises a sleeve carrying an agitating vane, said sleeve being disposed coaxially of said first agitator means.

7. The agitator assembly of claim 4, wherein said cam follower comprises a roller mounted on a shaft which is supported by said follower support block.

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