# United States Patent [19]

**Phillips, Jr.**

[11] **3,771,336**

[45] **Nov. 13, 1973**


[54] **WASHER AGITATOR AND SPIN TUB DRIVE ASSEMBLY**


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[73] Assignee: **James M. Perrier, Sr.**, Harahan, La.



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[21] Appl. No.: **219,760**

[52] **U.S. Cl.** ..... **68/23.7**, 68/12, 68/133, 68/154

[51] **Int. Cl.** ... **D06f 21/00**, D06f 29/00, D06f 33/00

[58] **Field of Search** ..... 68/23.7, 12, 13, 68/133, 154, 174; 259/77



[56] **References Cited**

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*Assistant Examiner*—Arthur O. Henderson
*Attorney*—Harvey B. Jacobson



[57] **ABSTRACT**

A combined oscillating and rotating drive for the center agitator and spin tub, respectively, of a washing machine including an orbital input shaft and connecting and linking rods operative to inversely oscillate the tub and agitator of a washer during the wash cycle and to simultaneously rotate both the agitator and the tub in the same direction during the spin cycle without the use of any gearing.


**6 Claims, 4 Drawing Figures**

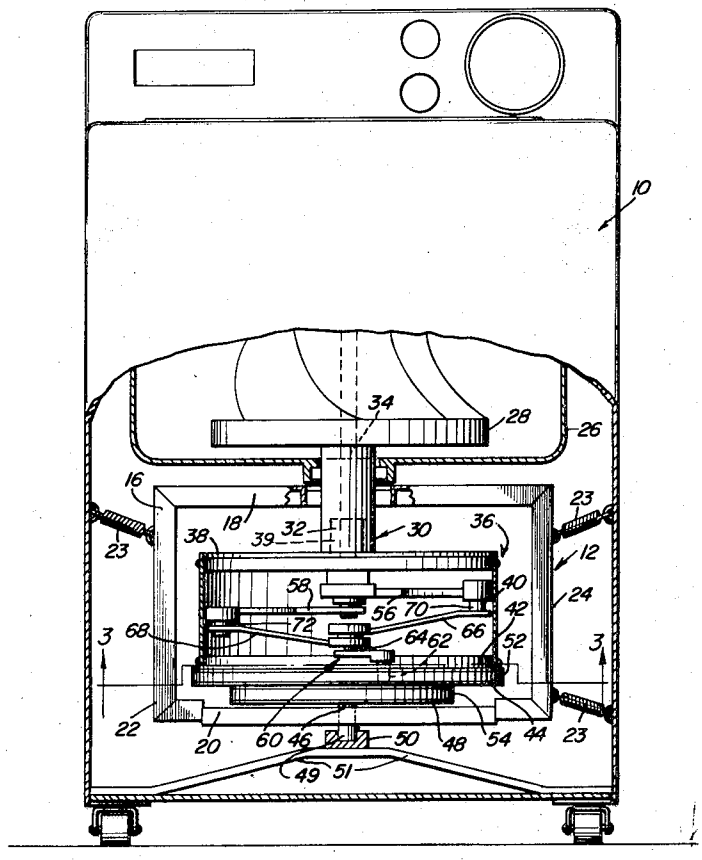


Fig. 1

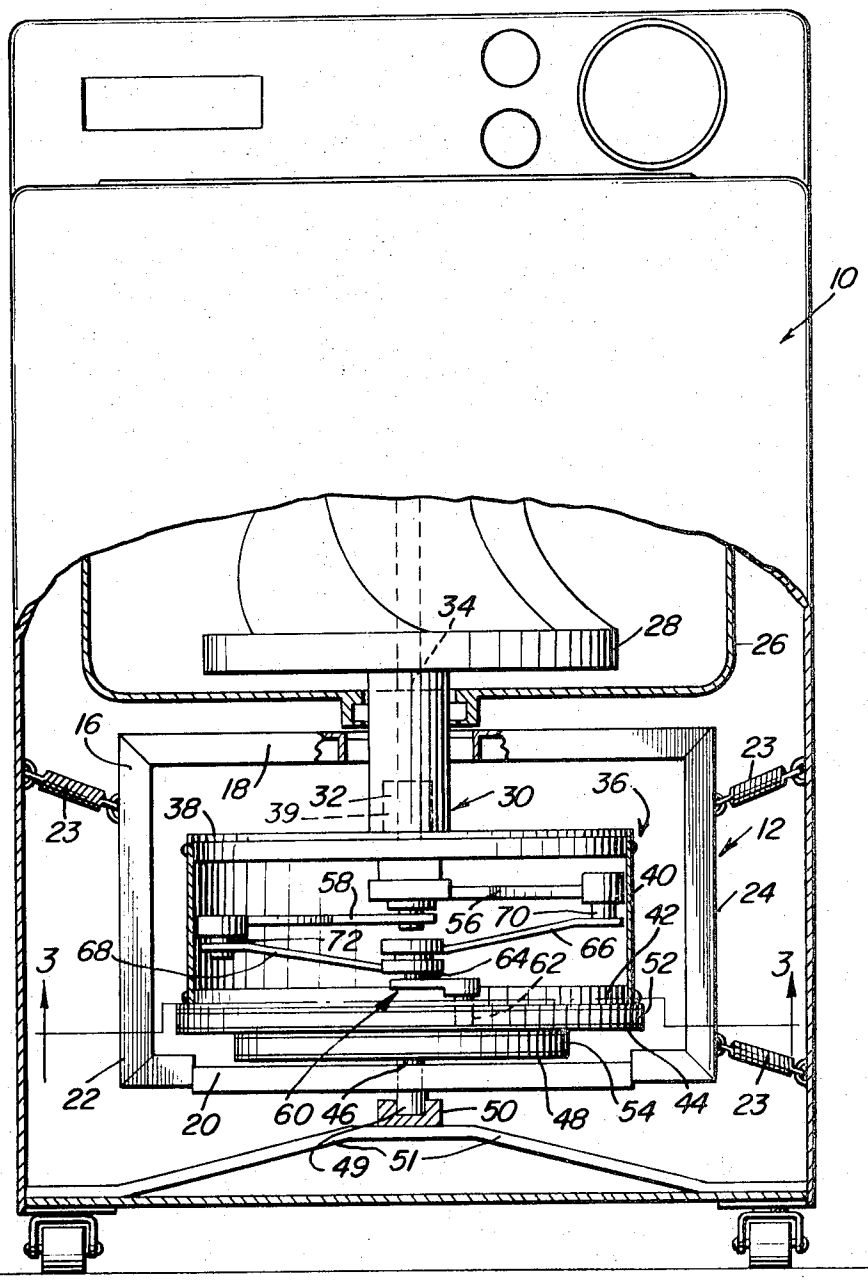

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Fig. 2

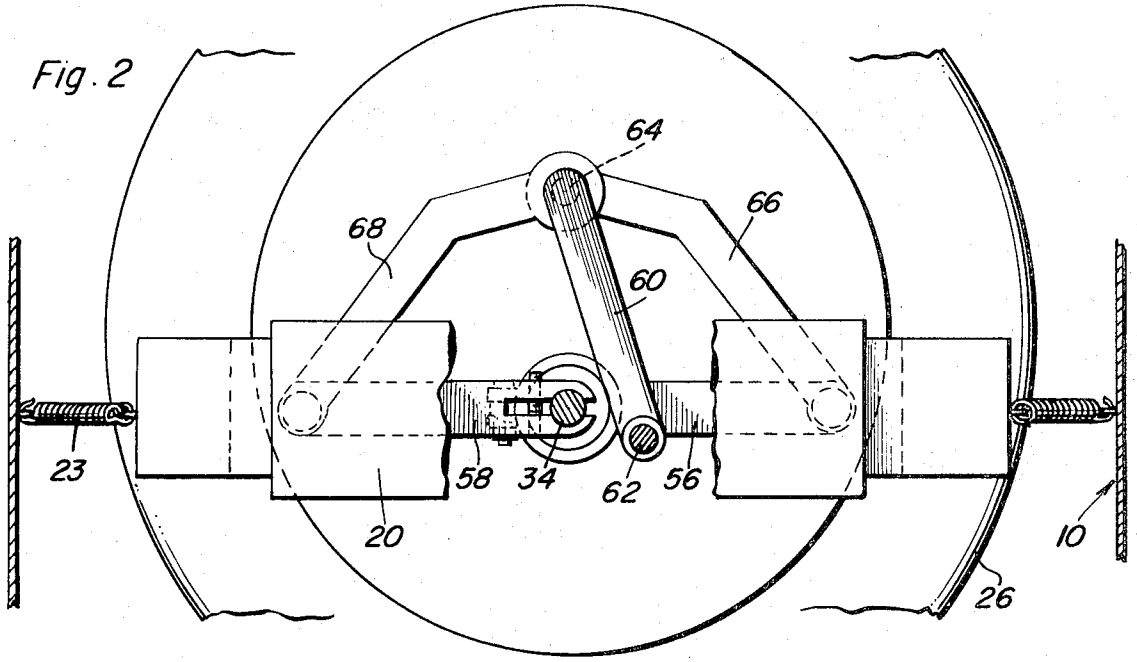
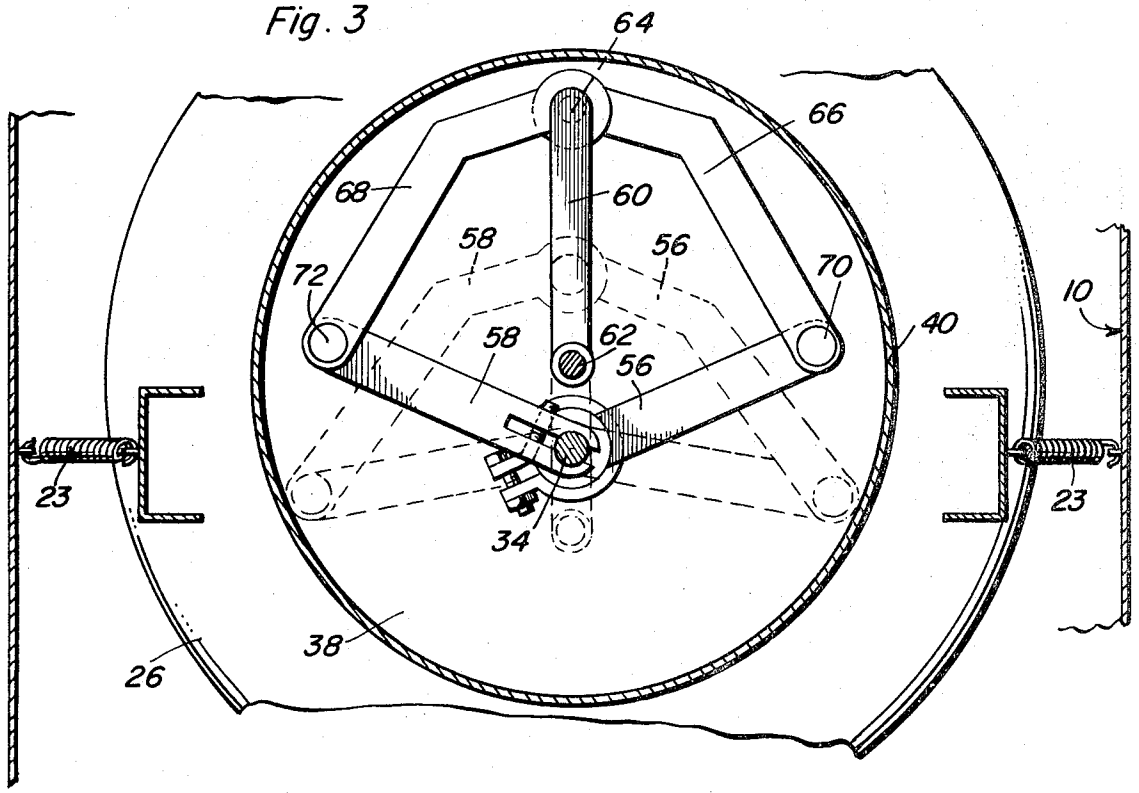

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Fig. 3


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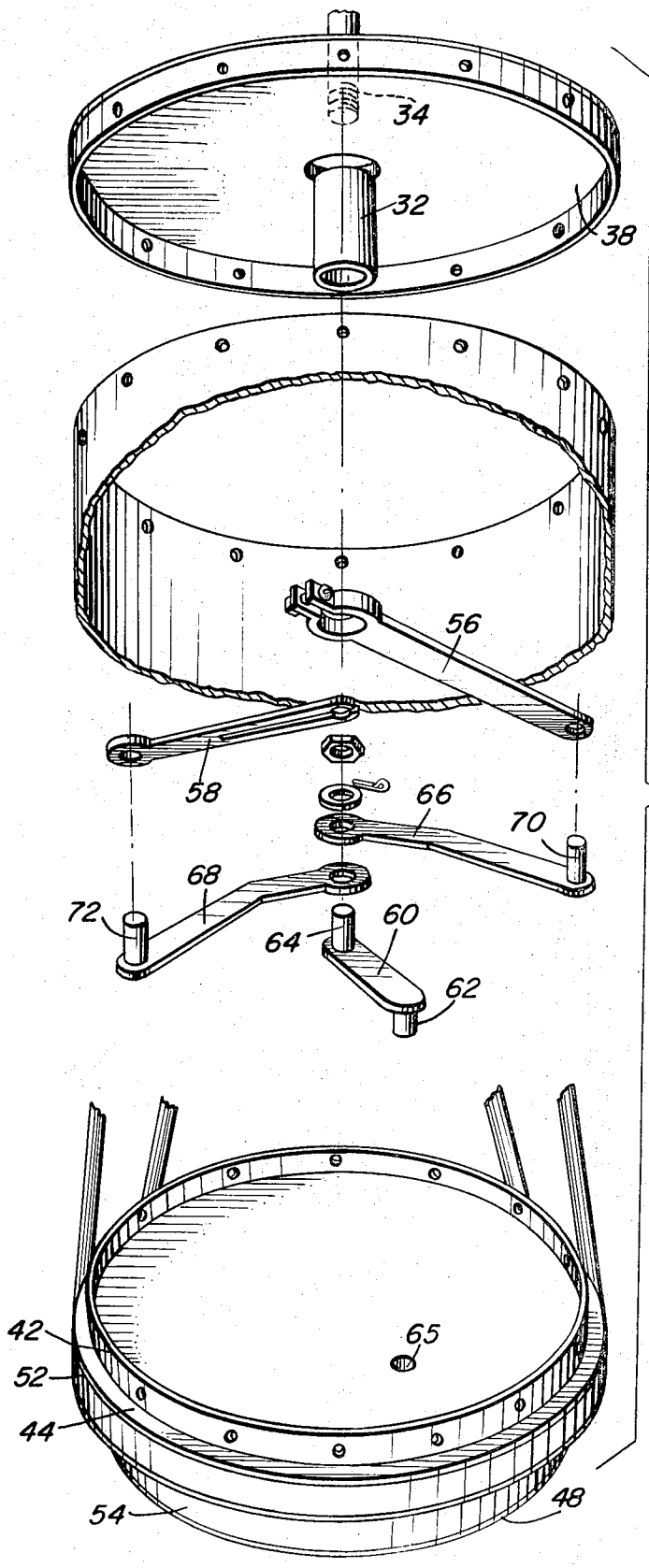



Fig. 4

# WASHER AGITATOR AND SPIN TUB DRIVE ASSEMBLY

The drive assembly of the instant invention is unique in that it is capable of not only causing relative oscillation between an associated washing machine agitator and the tub without the use of gearing but also capable of rotating the tub and agitator units in unison during the spin cycle. It is further an important aspect of this invention that during the agitating or washing cycle the agitator and tub are oscillated inversely relative to the frame or drive supporting components of the washing machine.

It has long been appreciated that washing machines, for the most part, can be manufactured so as to render years of service without requiring repairs if properly used so as to not overload the washing machines. However, when washing machines are intentionally or inadvertently overloaded conventional drive systems incorporating gearing is overstressed with the result that prolonged operation under overloaded conditions can cause failure of the drive gearing.

It is accordingly the main ofject of this invention to provide a novel drive system for the tub and agitator of a washing machine which is capable of not only oscillating the agitator but also rapidly spinning both the agitator and the tub during the spin cycle.

It is another object of this invention to provide a washing machine drive assembly in accordance with the preceding object and which will be capable of, during the wash cycle, inversely oscillating the tub and the agitator of the washing machine for a more complete and turbulent washing action of the clothes within the washer.

Still another object of this invention is to provide a washing machine drive assembly in accordance with the preceding objects that may be readily incorporated into the manufacture of present-day washing machines with minimum modifications being required.

A final object of this invention to be specifically enumerated herein is to provide a novel washing machine tub and agitator drive assembly in accordance with the preceding objects which will conform to conventional forms of manufacture, be of simple construction and automatic in operation so as to provide a device that will be economically feasible, long lasting and relatively trouble free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a front elevational view of a washing machine incorporating the drive assembly of the instant invention and with portions of the washing machine being broken away and illustrated in vertical section in order to illustrate the manner in which the drive assembly is drivingly connected to the tub and agitator portions of the washing machine;

FIG. 2 is an enlarged bottom plan view of the washing machine drive assembly with portions thereof being broken away and illustrated in horizontal section;

FIG. 3 is a horizontal sectional view taken substantially upon the plane indicated by the section line 3—3 of FIG. 1 and with the drive components of the drive assembly in different relative positions than those illustrated in FIG. 2; and

FIG. 4 is an exploded perspective view of the drive assembly.



Referring now more specifically to the drawings the numeral 10 generally designates a washing machine cabinet having a support structure 12 disposed therein. The support structure 12 includes a generally rectangular frame 16 including upper and lower horizontal portions 18 and 20 and opposite side vertical portions 22 and 24, the support structure being partially supported from the cabinet 10 by means of springs 23. A conventional form of tub 26 is journaled from the support structure 12 and has a conventional agitator 28 disposed therein.

A conventional sleeve and through shaft assembly referred to in general by the reference numeral 30 is journaled from the support structure 12 and the tub 26 is carried by the outer sleeve portion 32 of the assembly 30 while the agitator 28 is carried by the inner shaft portion 34 of the assembly 30. The assembly 30 may be of any conventional form such as that illustrated in FIG. 5 of U. S. Pat. No. 2,751,773, dated June 26, 1956.

The drive assembly of the instant invention is referred to in general by the reference numeral 36 and includes an upper transmission cover plate 38 and Bendix hub 39 drivingly connected to the sleeve portion 32 in one direction of rotation of the transmission. A cylindrical transmission side wall 40 has the cover plate 38 removably secured thereto and the lower end of the transmission is removably closed by means of a bottom plate defining large diameter driven pulley wheel 44 secured to the lower end of the cylindrical side wall 40 by means of an integral mounting ring 42. A stub shaft 46 is carried by and projects upwardly from the lower horizontal portion 20 and is aligned with the shaft 34. A small diameter pulley 48 is journaled on the shaft 46 and supports the pulley wheel 44. The lower horizontal portion 20 includes a depending stub shaft 49 rotatably received in a bearing 50 carried by cross bracing 51 in the lower end of the cabinet 10.

A pair of belts 52 and 54 are trained about the pulleys 44 and 48, respectively, and also about corresponding pulleys carried by a drive shaft (not shown) driven by or comprising a part of a reversible electric motor.

An upper crank arm 56 has its inner end secured to the sleeve portion 32 and a lower crank arm 58 has its inner end secured to the lower end of the shaft 34 which projects downwardly below the lower end of the sleeve portion 32. A tie rod 60 including a downwardly directed pivot pin portion 62 on one end and an upwardly directed pivot pin portion 64 on the other end is provided and the pivot pin portion 62 is journaled in an offset bore 65 formed in the pulley wheel 44. The pivot pin portion 64 has one pair of overlapped ends of a pair of connecting rods 66 and 68 journaled thereon and the other pair of ends of the connecting rods 66 and 68 are provided with upwardly directed pivot pin portions 70 and 72 on which the outer ends of the connecting rods 56 and 58 are journaled.

With attention now invited more specifically to FIGS. 2 and 3 of the drawings, it will be seen that upon the aforementioned motor driving the pulley wheel 44 in a clockwise direction as viewed from below, the pivot pin portion 62 will orbit about the shaft portion 34 causing

the pivot pin portion **64** to oscillate generally radially of the shaft portion **34** with the result that the crank arms **56** and **58** will be oscillated between the solid line positions in FIG. **3** and the phantom line positions in FIG. **3**. This of course will cause simultaneous inverse oscillation of the tub **26** and agitator **28**. On the other hand,when the aforementioned drive shaft drives the pulley or pulley wheel **48** in the opposite direction of rotation, the entire drive assembly will be rotated as in integral unit thus causing both the tub **26** and agitator **28** to spin simultaneously in the same direction. In rotating the tub **26** and agitator **28** as a single unit the sleeve portion **32** and the shaft portion **34** are locked together for simultaneous rotation by means of the Bendix spring structure disclosed in the aforementioned prior U. S. Pat. No. 2,751,773. However, upon input to the pulley wheel **44** to rotate the shaft **48** in the opposite direction, the Bendix spring structure frees the sleeve portion **32** and shaft portion **34** for simultaneous inverse oscillation.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

**1.** In combination with a support having a washer tub journaled therefrom for rotation about an upstanding axis with an agitator disposed within said tub and supported for rotation with said tub and also oscillation relative to said tub about said axis, a drive assembly carried by said support and including rotary torque input means, said drive assembly including means drivingly connecting said rotary torque input means to said tub and agitator for selectively rotating said tub and agitator as a unit and inversely oscillating said tub and agitator relative to said support.

**2.** In combination with a support having a washer tub journaled therefrom for rotation about an upstanding axis with an agitator disposed within said tub and supported for rotation with said tub and also oscillation relative to said tub about said axis, a drive assembly carried by said support and including rotary torque input means, said drive assembly including means drivingly connecting said rotary torque input means to said tub and agitator for selectively rotating said tub and agitator as a unit and inversely oscillating said tub and agitator relative to said support, said rotary torque input



means including a pair of driven pulley wheels, said drive assembly including means for inversely oscillating said tub and agitator in response to rotation of one of said pulley wheels in one direction and to drive said tub and agitator as a unit in response to rotation of the other pulley wheel in the other direction.

**3.** In combination with a support having a washer tub journaled therefrom for rotation about an upstanding axis with an agitator disposed within said tub and supported for rotation with said tub and oscillation relative to said tub about said axis, a drive assembly carried by said support, said drive assembly including a first rotary input member supported for rotation about said axis and drivingly connected to said tub a drive link having one end journaled for rotation relative to said first rotary input member about a second axis generally paralleling the first-mentioned axis, spaced laterally from the latter and fixed in position relative to said first rotary input member, a pair of crank arms angularly disposed relative to each other and including a first set of ends secured to said tub and agitator for angular displacement therewith, and a pair of connecting rods having a first pair of corresponding ends pivotally connected to the free ends of said crank arms and a second pair of ends pivotally connected to the other end of said link.

**4.** The combination of claim **3** wherein said crank arms, connecting rods and drive link are spaced longitudinally of said axis with said connecting rods disposed between said drive link and said crank arms.

**5.** The combination of claim **3** wherein said first rotary input member comprises a first pulley wheel and said drive assembly includes a second rotary input member comprising a second pulley wheel supported for rotation in unison with said first pulley wheel about the first-mentioned axis, whereby a pair of endless belts may be utilized to drive said rotary input members at different speeds and in opposite directions from the same motor shaft.

**6.** The combination of claim **1** wherein said rotary input torque means includes a torque input member supported for rotation about said axis, first means connecting the torque input member to said tub and agitator for their simultaneous rotation in one direction as a unit upon rotation of said torque input member in a first direction and second means connecting the torque input member to the tub and agitator for their inverse oscillation relative to the support upon rotation of the torque input member in the opposite direction.

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UNITED STATES PATENT AND TRADEMARK OFFICE

# CERTIFICATE OF CORRECTION

PATENT NO. : 3,771,336

DATED : November 13, 1973

INVENTOR(S) : Robert E. Phillips Jr.



It is certified that error appears in the above—identified patent and that said Letters Patent is hereby corrected as shown below:

Add sheet 3 of 3 to letters Patent as per attached sheet.

This certificate will apply to the Grant only.

Signed and Sealed this

*Twenty-sixth* Day of *January 1982*

[SEAL]

*Attest:*

*Attesting Officer*

GERALD J. MOSSINGHOFF

*Commissioner of Patents and Trademarks*

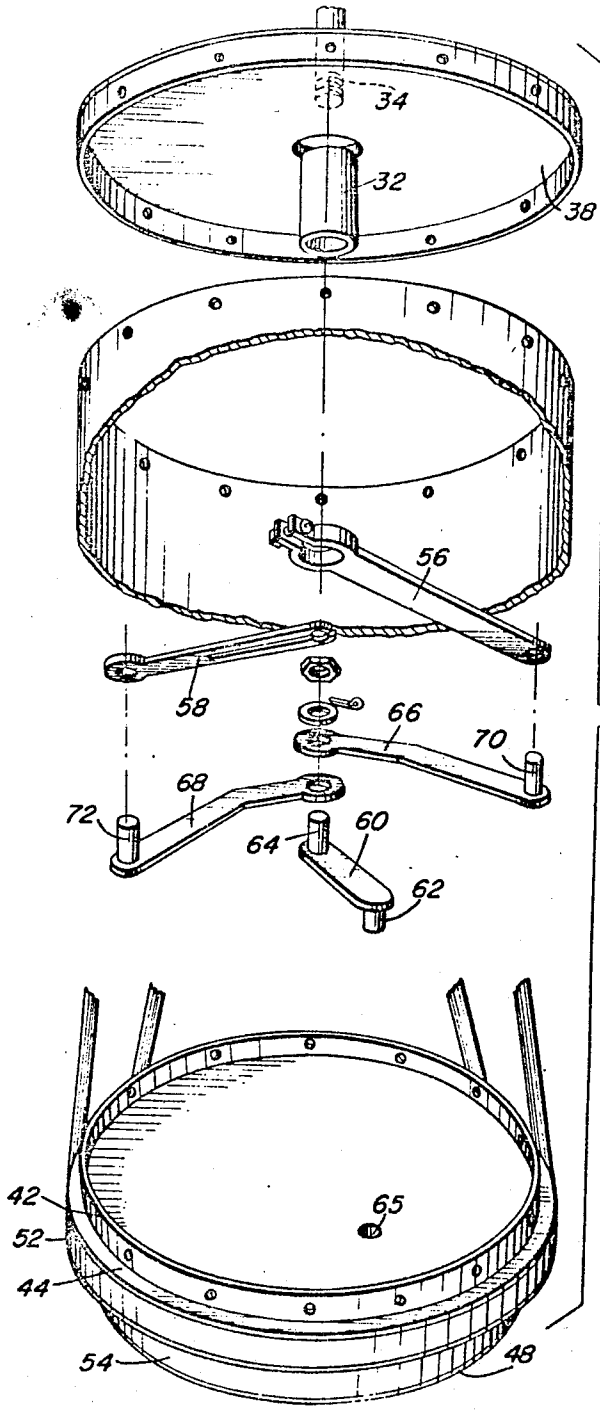



Fig. 4