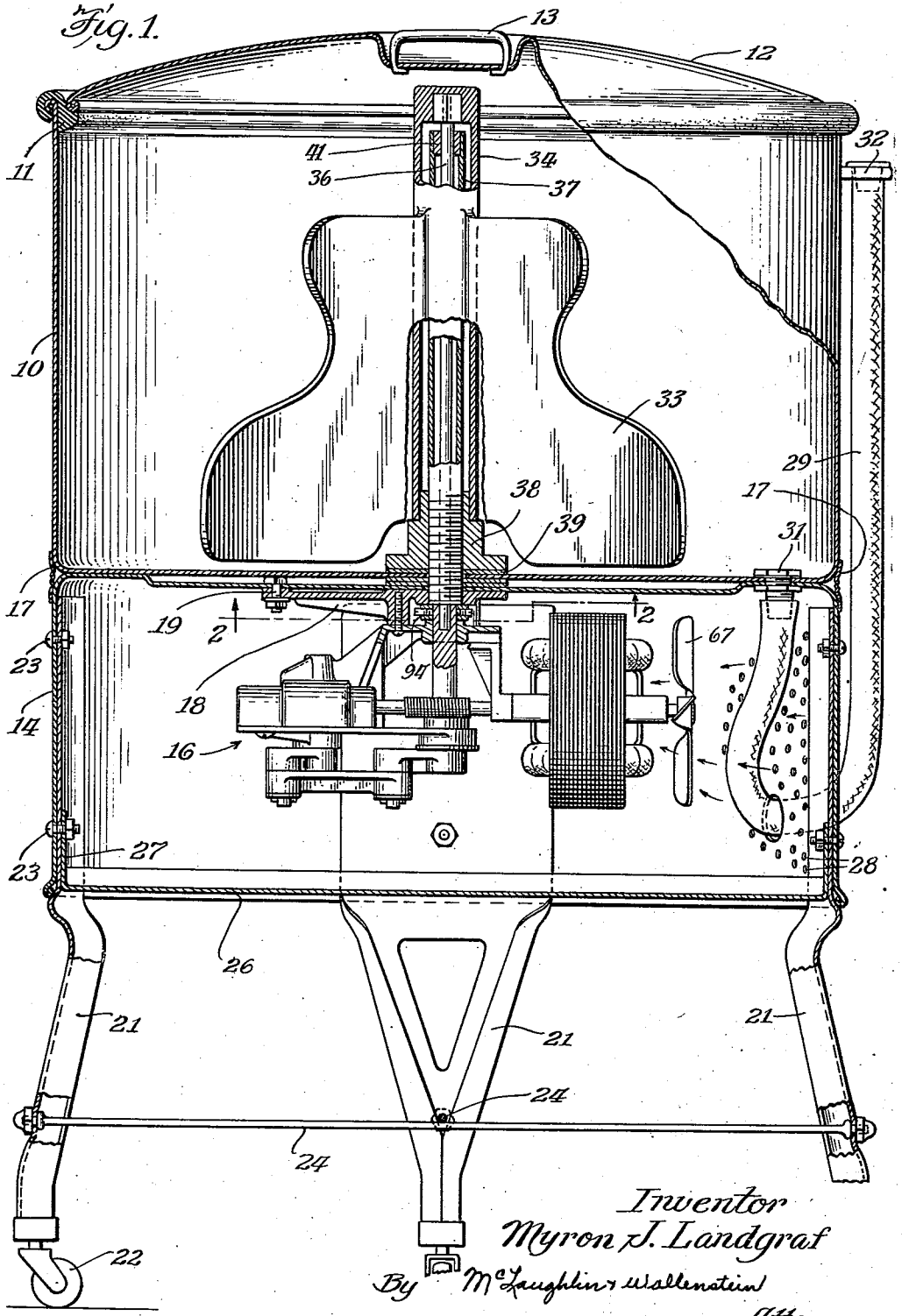
Nov. 25, 1941. M. J. LANDGRAF 2,264,165

WASHING MACHINE

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Fig. 1.



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Fig. 3.

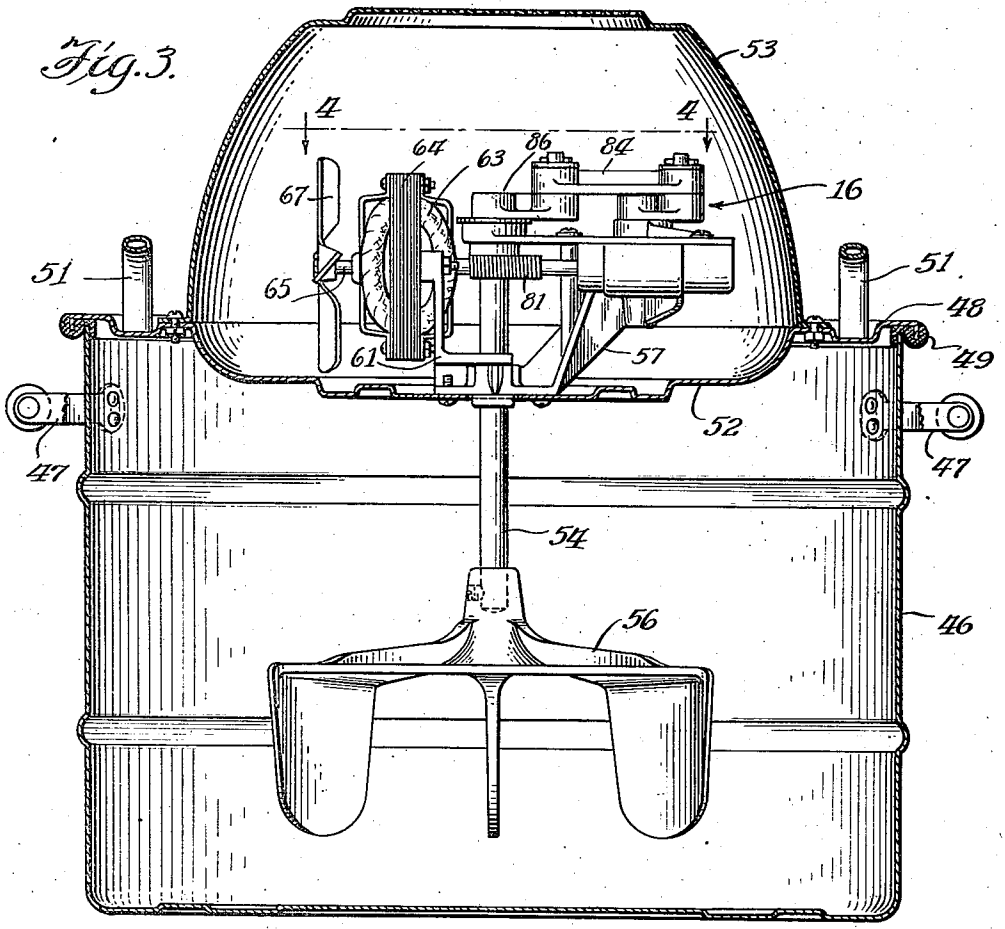


Fig. 2.

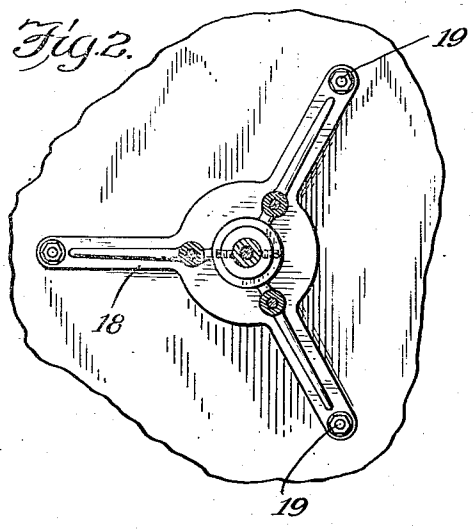
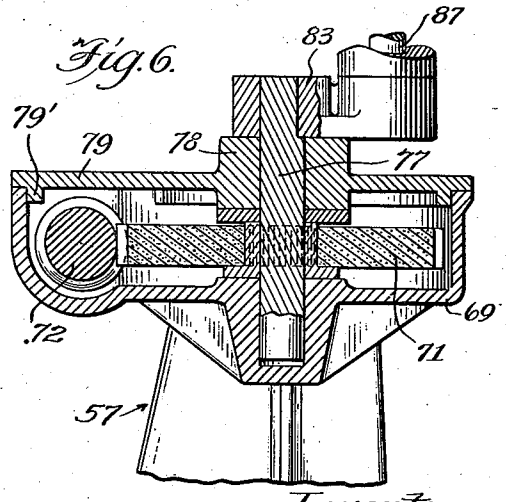


Fig. 6.



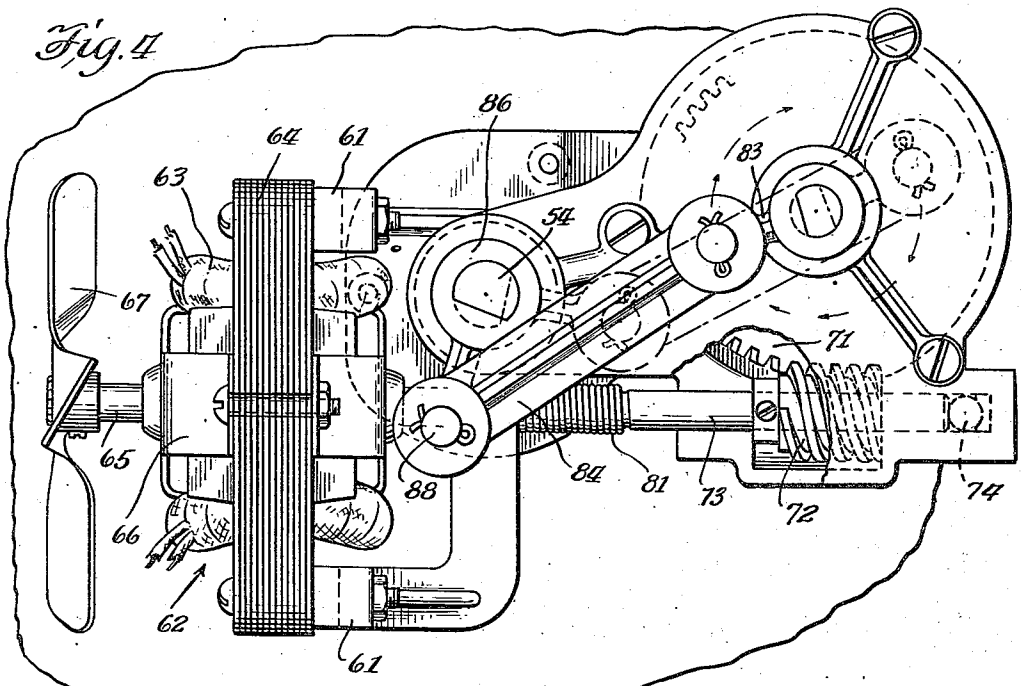
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WASHING MACHINE

Filed June 8, 1938 3 Sheets-Sheet 3

Fig. 4



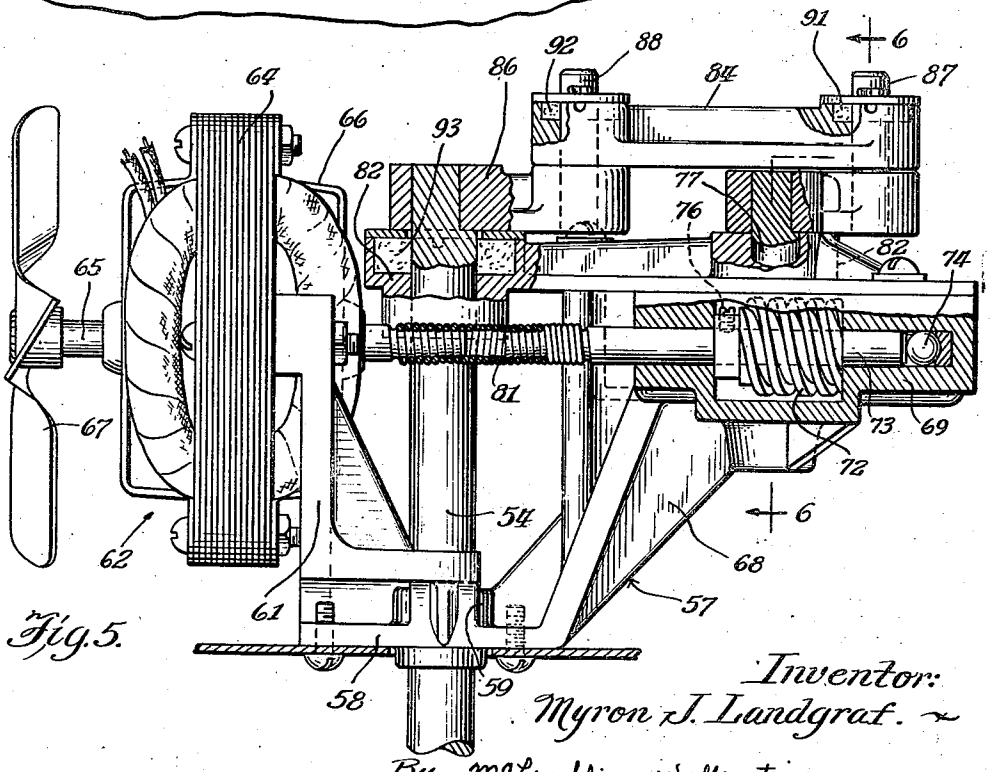


Fig. 5.

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UNITED STATES PATENT OFFICE

2,264,165

WASHING MACHINE

Myron J. Landgraf, Chicago, Ill., assignor to Henry J. Goldblatt, Chicago, Ill.

Application June 8, 1938, Serial No. 212,485

9 Claims. (Cl. 74—75)

My invention relates in general to washing machines. It relates also to an improved agitator drive assembly for washing machines, and washing machines employing such drive assembly.

Machines for washing clothes and the like conventionally take different forms and are made in different sizes to accommodate different amounts of materials to be washed. In the home washer field with which my invention is primarily concerned, washing machines comprise, in their simplest form, a tub for holding water in which clothes are inserted, and an agitator within the tub for performing the washing operation. These machines may be relatively small, in which a so-called table model is often employed; they may be of intermediate size, in which a table model or a stand model is employed; or they may be of a relatively large size, usually a stand model supported on a suitable understructure upon the floor. Many manufacturers produce these various models, and, from time to time, may be required, in accordance with the demands in the trade, to change styles, add different sizes and models to the line.

To reach a suitable volume of trade, particularly in the smaller size washing machines, it is imperative that the price be kept down to a minimum, notwithstanding the fact that the development of a new model may require extensive development costs, design work, the production of new tools, and the like. As a consequence, to reach a market, manufacturers often are compelled to make such savings in materials and workmanship as is possible, with the result that the quality of the product suffers, and the piece of equipment built to reach a certain market, because of slip-shod engineering, manufacture and assembly, may be inadequate for sale on any market.

My invention is directed toward meeting this problem from a novel standpoint and is concerned with such improvements in structure and design that the major portion of the equipment usually requiring special engineering and development of special tools may, with either no change or relatively very simply made changes, be employed in substantially all models built by the manufacturer or which may be built by the manufacturer as the market demands vary.

The principal object of my invention is to meet the problems considered hereinabove, particularly through the utilization of an improved agitator drive assembly which may be incorporated on various types of washing machines.

Another object is the provision of an improved agitator drive mechanism.

A further object is the production of an improved agitator drive assembly which, as a single unit, is adapted for use with various style washers, including the so-called table models and floor models.

In carrying out my invention, I utilize a frame member, preferably cast in a single piece, which serves as a support or mounting for a motor, a gear case, an agitator shaft, and drive mechanism between the gear case and agitator shaft, the frame also being provided with means for attachment either to the bottom of a tub in a floor model, or to a cover member in the table model. The gear case preferably houses a worm and worm gear to effect a single-stage speed reduction, the worm being driven directly from the motor shaft and the worm gear operating the drive connection between the gear case and agitator shaft. This construction provides for very simple means for effecting such changes as may be necessary when the power of the motor is decreased or increased in going from one capacity washer to another, as will be explained in the body of the description which follows.

In the drawings,

Fig. 1 is a vertical sectional view taken through a floor type washer illustrating a preferred embodiment of my invention, some of the parts being shown in elevation;

Fig. 2 is a bottom plan section taken on the line 2—2 of Fig. 1, showing the manner in which the agitator drive assembly is secured to the bottom of the tub;

Fig. 3 is a vertical sectional view taken through a table-type washer equipped with an agitator drive assembly substantially identical with that shown in Fig. 1;

Fig. 4 is a plan view such as would appear from the line 4—4 of Fig. 3, looking in the direction of the arrows, part of the figure being broken away to illustrate a detail;

Fig. 5 is a side elevational view, partly in section, of the agitator drive assembly shown in Fig. 4, the mounting of the assembly to the cover being illustrated; and

Fig. 6 is an irregular sectional view taken on the line 6—6 of Fig. 5, looking in the direction of the arrows.

Except for minor modifications, which will be pointed out hereinafter, the agitator drive assembly shown in connection with Fig. 1 is identical with that shown in connection with Fig. 3, and Figs. 4, 5 and 6 can be taken as illustrating details of Fig. 1 as well as details of Fig. 3. For convenience, the entire structure, comprising the embodiment of Fig. 1, will first be described, followed by a description of the embodiment of Fig. 3, and finally the details of the agitator drive assembly as employed in both the table model and the floor model of the washer.

Referring now first to Fig. 1, the washer there illustrated comprises a tub 10 adapted to hold washing water, and material to be washed. An

annular reinforcing member 11 is beaded around the top edge of the tub 10 and also has a generally inwardly projecting flange portion on which a cover 12 is adapted to rest. This cover is recessed at its center and a handle 13 is supported in the cover at the recessed portion so as to leave a uniformly arcuate top surface with no broken lines to mar its appearance. A generally inverted cup-shaped lower portion 14 is co-extensive in cross sectional area with the tub portion and comprises a housing for the agitator drive assembly generally indicated in the drawings by the reference character 16. This housing portion 14 is suitably secured to the bottom of the tub portion, and an annular style strip 17 is disposed over the jointure between the tub and housing member. A spider 18, shown more particularly in Fig. 2, is secured to the top portion of the housing member 14, the top of the housing portion being dished slightly to provide space for the heads of fastening bolts 19. The agitator drive assembly is secured to the spider 18 by suitable fastening means such as screws.

Legs 21 provided with casters 22 adapted to roll on the floor have an upper angular portion through which they are fastened by means of bolts 23 to the apron portion of the housing member 14. By utilizing an angular construction in this manner, the legs 21 can be formed by suitable operations from sheet metal, thereby maintaining lightness and, at the same time, more than adequate strength. For further reinforcement, however, I utilize tie rods 24 supported between oppositely disposed legs, and, where four legs are employed, as in conventional practice, two such tie rods are employed. In Fig. 1, one of the legs 21 is shown substantially in full elevation. A bottom cover 26 is provided on the housing member 14 to entirely enclose the agitator drive mechanism, an upwardly turned annular integral flange portion 27 lying against the inside wall of the housing member 14 and suitably secured in place. The bottom cover portion 26 and its flange 27 are so shaped as to extend around the leg portions so as to substantially imperforately seal the agitator drive assembly against the admission of dust, dirt and the like, which might otherwise be picked up from the floor.

The agitator drive assembly is preferably provided with cooling means, such as by the employment of a fan blade for air cooling the motor, as will be explained. One portion of the housing member 14 is provided with perforations as shown at 28 for the admission of cooling air. The air is exhausted in part through the same openings 28, and in part through the interstices between the housing member 14 and the bottom cover 26.

For convenience in emptying the tub 12, a hose 29 is provided, this hose being connected to a nipple 31 extending through the bottom of the tub and through the upper portion of the housing member 14. The hose connects to this nipple, extends through an aperture provided for the purpose in the housing member 14, and has its upper end normally supported in a bracket 32 above the waterline. To empty the tub, it is merely necessary to remove the top of the hose from its bracket so as to place the outlet of the hose below the water level.

The tub is provided with an agitator 33 adapted for reciprocation about its axis. It is provided with a hollow axle body 34 formed at

tator drive shaft 36. To effectually seal the tub against leaking at the point where the drive shaft 36 passes through the bottom thereof, a tube 37 is provided extending around the drive shaft and through the bottom of the tub and the top of the housing member 14. In the preferred form, the tube or tubular member 37 is provided with threads at its lower end and has its terminus threaded in the central portion of the spider 18. A large nut 38 is threaded on the tubular member at the top within the tub, and sealing gaskets 39 are provided at each side of the tub bottom so as to form a water-tight connection. Thus the tubular member 37 is sealed in the bottom of the tub, and has its upper end well above the waterline. The agitator drive shaft 36, extending above the tubular member 37, is therefore adapted for connection to the agitator 33 without possibility of admitting water to the inside of the housing member 14 and coming in contact with the agitator drive assembly. If desired, a packing 41 of oiled felt or the like may additionally be employed at the top of the tubular member 37 substantially in the place shown.

In the table model shown in Fig. 3, I provide a tub 46 equipped with side handles 47, and provided with annular corrugations in its sides and bottom, as shown, for reinforcement. A cover 48, having an annular reinforcing bead 49, slides down over the tub, the cover portion being provided with side handles 51, as shown. Spaced inwardly from the handles is a dished portion 52 forming a support for the agitator drive assembly indicated generally by the reference character 16. A dome-shaped housing 53, serving as a cover for the agitator drive assembly, is suitably secured to the cover around the dished portion 52. Suitable apertures are provided in the housing 53 for the introduction of cooling air drawn into and forced out of the housing by the fan blades associated with the motor, as will be explained. A vertically depending agitator shaft 54 extends through an aperture provided in the dished portion 53 of the cover, and carries an agitator 56 at its lower end in such a position as to produce suitable action of the water for washing clothes or other materials contained in the tub.

Referring now particularly to Figs. 4, 5 and 6, the agitator drive assembly comprises preferably a frame piece 57 adapted to support all of the operating parts of the agitator drive assembly so that these parts with the frame 57 comprise a unitary assembly adapted for attachment either to the bottom of a tub, for example, in the floor model shown in Fig. 1, or to the top of a cover member, as shown, for example, in Fig. 3.

Preferably this frame member 57 is a single piece with all of its parts integral, and is suitably formed by casting. I have found that very good results are attained by the utilization of a die casting, the metal employed being preferably a high zinc alloy suitable for die casting, combining adequate strength and suitable lightness to facilitate its being used both for adequate ruggedness where a relatively large size washer is produced, and adequate lightness when it comprises a part of a relatively light weight table model washer.

The frame 57 has a center section 58 comprising a mounting bracket for securing the entire assembly in position, and a journal portion 59 for the agitator shaft. Extending upwardly

versed position) from the center portion 58 are a pair of mounting brackets 61 adapted to directly support a motor 62.

The motor employed is preferably a shaded pole induction motor of the sub-synchronous type, that is a motor normally running at constant speed, but capable of slowing down under an unusual load to below its normal speed without stopping. This form of motor is particularly suitable on relatively small sizes. In place of the shaded pole induction motor, however, I may employ any suitable electric motor such as a suitably designed universal motor capable of operation on either alternating or direct current. Those skilled in the art will understand that the motor may be modified to suit particular conditions. In the form of motor shown, a suitable stator is provided, including a coil 63 and a laminated pole piece 64. The pole piece structure 64 is suitably employed for mounting the motor as a whole to the mounting bracket 61, although obviously a separate frame might be employed, if desired. A rotor, not shown in detail, is employed for driving a motor shaft 65, the motor shaft being supported in suitable bearings carried by a frame piece 66 secured to the pole piece assembly 64. One end of the motor shaft 65 is provided with a propeller 67 for continuously delivering a column of cooling air across the motor.

Substantially at 180 degrees from the mounting bracket 61, the frame member is provided with an upward extension 68 formed to provide an integral gear case 69. The gear case is somewhat irregular in shape, and includes the relatively large central portion for receiving a worm gear 71 and an open portion at the side for receiving a worm 72. Near the portion where the worm 72 is housed, the gear case portion is provided with journals for a drive shaft 73, a ball 74, functioning as a thrust bearing, also being housed at the end of the shaft 73 in an extension of the bearing portion for the shaft. The worm 72 is formed separate from the shaft 73, but is adapted to be secured thereto by means of a screw 76. In the assembly of this portion of the mechanism, therefore, the process employed is to insert the ball 74, place the worm 72 in position, slide the shaft 73 into the position shown in Fig. 5, and tighten the screw 76. When the shaft 73 is driven, therefore, it drives the worm, and the worm, meshing with the worm gear 71, therefore, drives the worm gear.

The worm gear 71 is mounted on a worm gear shaft 77, the lower end of which is journaled in a well-like aperture formed in the gear case portion of the frame member 57. This feature is shown in Fig. 6. The upper part of the shaft 77 is journaled in a boss 78 formed as an integral part of a gear case cover 79. This gear case cover is formed to fit snugly over the gear case, and is provided with an inner flange 79', the position of which is accurately determined so that, when the cover is assembled in place, the shaft 77 will have true alignment in its two bearings.

It will be seen at once that, since the motor is secured on the integral mounting bracket 61 and the shaft 72 is journaled in the integral bearings forming a part of the gear case, the motor shaft 65 and the drive shaft 73 must be connected in such a manner as to prevent excessive side thrust or binding against their respective bearings. To afford adequate tolerance for manufacturing purposes, I provide a flexible connection 81 between these two shafts, preferably in the form of a coiled wire, as particularly illustrated in Fig. 5, secured on threads at the ends of the shafts running in such a direction that the coils of the wire tend to become tightened on the threads when the motor is rotating in its normal direction. I find this arrangement to be very suitable in the connection in which I employ it, but other suitable flexible connections may be utilized, if desired.

As an upper bearing for the agitator shaft shown as shaft 54 in Fig. 5, I provide an extension 82 of the gear case cover 79. This is made possible because, although the frame 57 comprises an integral structure, the gear case cover is finished accurately and also accurately positioned on the gear case portion of the frame, so that, when assembled, the bearing in the portion 82 and the bearing in the boss 59 are directly in line, and the agitator shaft can be supported without binding.

To impart a reciprocating motion to the agitator shaft 54 from the worm wheel shaft 77 which has a constant rotary motion, I provide a series of links, including a drive link 83, a connecting link 84 (Fig. 4), and an agitator link 86. The drive link 83 is secured to the top of shaft 77, a flat portion being provided at one side of the shaft to prevent relative motion between the shaft and link. The link 83 carries an upwardly extending pin 87, while link 86 carries an upwardly extending pin 88. The connecting link 84 has end bosses provided with apertures for receiving the pins 87 and 88, respectively, suitable fastening means, such as the cotter pins shown, being employed to hold the connecting link in position. The agitator link 86 is secured on an upper extension of the agitator shaft 54, a flat portion on one side of the shaft being provided to prevent relative movement between the agitator link and agitator shaft.

The agitator drive mechanism is designed to operate without attention as to lubrication indefinitely during its life or at least over relatively long periods of time. The worm and worm wheel within the gear case are lubricated by inserting a substantial amount of relatively heavy grease before the cover 79 is placed in position. This grease not only lubricates the worm and worm wheel directly, but also, through the relatively small amount of seepage which occurs, maintains the bearings lubricated, such as the bearings for the shaft 73 and the bearings for the shaft 77. The drive arrangement from the worm gear to the agitator shaft is lubricated by a series of felt inserts 91, 92 and 93. In each case, the insert is co-extensive with the recess provided in the moving member around the shaft or pin with which it is associated, and cover means, suitably a simple washer, is provided to protect the felt. When I speak of felt, it is to be understood that I include any felted or similar material capable of acting by absorption as a reservoir for oil or grease. By saturating the felts with a suitable lubricant, I find that ample lubrication is provided over long periods, particularly since the parts do not move relative to each other at high speed.

Thus it will be seen that the agitator drive mechanism, at least so far as its principal parts are concerned, may be identical in the embodiment shown in Figs. 1 and 3. Slight modifications may be desirable, and, in the drawings, I illustrate slightly different means for supporting the agitator shafts 36 and 54, respectively. In the

latter case, where the agitator shaft is extended downwardly, I find that it is suitably supported from its top end, that is, by securing it to the agitator link 86. This is accomplished by any suitable means such as the utilization of a pin, screw, key or the like. In assembly, the agitator shaft is fixed on the agitator link 86, and, after the gear case cover is inserted in position, the shaft 54 is dropped down and inserted through its two bearings. When it is finally in position, the series of links is assembled, and the entire assembly is then ready to be associated with the washer proper.

In the form shown in Fig. 1, the same general construction may be employed between the link 86 and the shaft 36. The shaft 36, however, is made relatively shorter than the shaft 54, and a thrust collar 94 is secured thereto by any suitable means. The shaft 36 may be a one-piece shaft, but preferably I form it in two pieces by utilizing first a relatively short heavy shaft formed with an end opening into which an extension of narrower cross section is inserted, the connection between the two portions being such as to prevent relative rotary movement between them.

Except for the difference in the means for supporting the agitator shaft (which means, however, may be identical in both cases), no other change in the agitator drive assembly need be made. It is understood, of course, that changes may be required in the motor to provide for greater or less power in models of different size, but these changes in the motor may be accomplished without any change whatsoever in the remaining portion of the mechanism. My design, however, contemplates the possibility of making such changes in the motor as will result in change in speed of the driven and driving shafts 73 and 65, but differences in speed of the shaft are easily compensated for by simple changes in the worm and worm gear, no other parts requiring any change whatsoever.

As an example of the simplicity with which required modifications may be made, we may assume that we have a relatively smaller washer requiring the use of a motor of X-horsepower. Assume that this motor is a two-pole sub-synchronous motor of the shaded pole induction type. We shall assume that the washer in which this particular motor is being employed is identical with that shown in Fig. 3. Now let us say that we wish to produce a larger washer constructed in accordance with Fig. 1 and employing a motor having 2X-horsepower. We can, by relatively simple changes in the design of the motor, double the horsepower very simply by utilizing four poles instead of two poles. The use of a four-pole motor, however, will result in the rotor or armature shaft rotating at half the speed of the two pole motor and, if no changes are made, the agitator 33 would then reciprocate at half the speed of the agitator 56. By the simple insertion of a two-tooth worm in place of the single tooth worm 72, the gear reduction would be cut in half, that is to say, only half the reduction in speed would be obtained as obtained in the smaller model, described by way of example, and the shaft 77, and, therefore, the agitator shaft 36 would travel at the same speed as the corresponding shafts in the small model where the two-pole motor was employed.

The example given above is merely illustrative of a case where one motor is twice the horsepower of the other, and each is of the shaded pole induction type. Where the relation between the speeds of two motors is not as one to two, but of some other fraction, modifications may be made in the direction of changing the pitch of the worm, or, for that matter, changing the pitch of the worm and also employing a two-tooth worm or three-tooth worm as the case may be instead of single tooth worm.

It will be seen from the above description that, employing the features of my invention, a manufacturer, without substantial additional engineering design or manufacturing problems, may produce washing machines of different size and different capacities, may add to his line from time to time as the demands of the market warrant, and, without extensive trial, be assured that the product of his manufacture will function adequately in the field in the same way that a previous design of substantially identical type has functioned. The illustrative embodiments are not meant to be limiting, the invention being as broad as defined in the claims which follow.

What I claim and desire to protect by Letters Patent of the United States is:

1. An agitator drive assembly for a washing machine, adapted for operation of an agitator from above or below a tub, said assembly comprising an integral single piece gear case and motor mounting member, an electric motor supported on said member, a worm gear and driving worm housed in the casing portion of said member, a motor shaft having a connection to said worm and connected to said motor to be driven thereby, an agitator shaft journaled in a portion of said member, a worm gear shaft secured to the worm gear to be continuously rotated therewith, said worm gear shaft being parallel to said agitator shaft, a drive link secured to said worm gear shaft, a longer link secured to the agitator shaft, and a connecting link pivotally secured to the first two mentioned links, whereby continuous rotation of said worm gear shaft is translated into oscillatory movement of said agitator shaft.

2. An agitator drive mechanism for a washing machine having a tub adapted to hold washing water and an impeller disposed therein, said agitator drive mechanism comprising an integral frame member adapted to be secured outside the tub, an agitator shaft journaled in said frame member and adapted to be connected to the impeller to drive the same, a mounting bracket forming a part of the integral frame member, a motor having a motor shaft secured to said mounting bracket, a gear case forming a part of the integral frame member, a pair of shafts projecting in planes at right angles to each other from the gear case, one of said shafts being substantially in line with the motor shaft and flexibly connected thereto, and the other being parallel to the agitator shaft, speed reducing gearing in the gear case disposed between said two gear case shafts, and mechanism between the agitator shaft and said gear case shaft parallel thereto for converting rotatory motion thereof into oscillatory motion of the agitator shaft.

3. An agitator drive assembly for a washing machine, said assembly comprising a single piece frame member adapted to support all operating parts of the assembly to produce a unitary device for attachment at the bottom of a tub or on a cover of the washing machine, said single piece member having a central portion of generally U-shape, with means for attachment to a support, and a central journal portion, a pair of mounting brackets on one leg of the U and an integral gear

case on the other leg of the U, a motor mounted on said brackets and having a horizontal drive shaft, a pair of shafts journaled in said gear case, one vertical and the other in line with said motor shaft and connected thereto, speed reducing gears in the gear case and disposed between said pair of shafts, an agitator drive shaft journaled in the journal portion of said central portion of the frame member, and mechanical connections between said vertical shaft and agitator drive shaft for converting rotary motion of the first into oscillatory movement of the second.

4. An agitator drive assembly for a washing machine, said assembly comprising a single piece frame member adapted to support all operating parts of the assembly to produce a unitary device for attachment at the bottom of a tub or on a cover of the washing machine, said single piece member having a central portion of generally U-shape, with means for attachment to a support, and a journal portion, a pair of mounting brackets on one leg of the U and an integral gear case on the other leg of the U, a motor mounted on said brackets and having a horizontal drive shaft, a pair of shafts journaled in said gear case, one vertical and the other in line with said motor shaft and connected thereto, speed reducing gears in the gear case and disposed between said shafts, a vertically disposed agitator drive shaft journaled in the journal portion of said central portion of the frame member, a relatively short crank arm secured to the said vertical shaft, a relatively longer crank arm secured to said agitator drive shaft, said arms mounted to move in the same plane, and a single link connection between said crank arms.

5. An agitator drive assembly for a washing machine, said assembly comprising a single piece frame member adapted to support all operating parts of the assembly to produce a unitary device for attachment at the bottom of a tub or on a cover of the washing machine, said single piece member having a central portion of generally U-shape, with means for attachment to a support, and a journal portion, a pair of mounting brackets on one leg of the U and an integral gear case on the other leg of the U, a motor mounted on said brackets and having a horizontal drive shaft, a pair of shafts journaled in said gear case, one vertical and the other horizontal and in line with said motor shaft, said horizontal shaft and motor shaft being threaded, a coil spring having its ends threaded on said shafts whereby to form a flexible connection between them, speed reducing gears in the gear case and disposed between said shafts, an agitator drive shaft journaled in the journal portion of said central portion of the frame member, and a direct mechanical connection between said vertical shaft and agitator drive shaft, so constructed and arranged as to convert rotary motion of the said vertical shaft into oscillatory movement of the said agitator drive shaft.

6. An agitator drive assembly for a washing machine, said assembly comprising a single piece frame member adapted to support all operating parts of the assembly to produce a unitary device for attachment at the bottom of a tub or on a cover of the washing machine, said single piece member having a central portion of generally U-shape, with means for attachment to a support, and a journal portion, a pair of mounting brackets on one leg of the U and an integral gear case on the other leg of the U, a motor mounted on said brackets and having a horizontal drive shaft, a pair of shafts journaled in said gear case, one vertical and the other horizontal and in line with said motor shaft, said horizontal shaft and motor shaft being threaded, a coil spring having its ends threaded on said shafts whereby to form a flexible connection between them, speed reducing gears in the gear case and disposed between said shafts, a vertically disposed agitator drive shaft journaled in the journal portion of said central portion of the frame member, a relatively short crank arm secured to the said vertical shaft, a relatively longer crank arm secured to said agitator drive shaft, said arms mounted to move in the same plane, and a single link connection between said crank arms.

7. An assembly as defined in claim 6, wherein said motor shaft has a shaft extending in a direction opposite to said drive shaft and carries a fan blade shaped to drive cooling air across the motor and remaining portions of the assembly.

8. An agitator drive assembly for a washing machine, said assembly comprising a single piece frame member adapted to support all operating parts of the assembly to produce a unitary device for attachment at the bottom of a tub or on a cover of the washing machine, said single piece member having a central portion of generally U-shape, with means for attachment to a support, and a journal portion, a pair of mounting brackets on one leg of the U and an integral gear case on the other leg of the U, a motor mounted on said brackets and having a horizontal drive shaft, a pair of shafts journaled in said gear case, one vertical and the other horizontal and in line with said motor shaft and connected thereto, a worm gear journaled in said gear case and integral with said horizontal shaft, a worm wheel integral with said vertical shaft, said worm wheel meshing with said worm gear, an agitator drive shaft journaled in the journal portion of said central portion of the frame member, and a direct mechanical connection between said vertical shaft and agitator drive shaft, for converting rotary motion of the first into oscillatory movement of the second.

9. An agitator drive assembly for a washing machine, said assembly comprising a single piece frame member adapted to support all operating parts of the assembly to produce a unitary device for attachment at the bottom of a tub or on a cover of the washing machine, said single piece member having a central portion of generally U-shape, with means for attachment to a support, and a central journal portion, a pair of mounting brackets on one leg of the U and an integral gear case on the other leg of the U, a motor mounted on said brackets and having a horizontal drive shaft, a pair of shafts journaled in said gear case, one vertical and the other in line with said motor shaft and connected thereto, the connection to said motor shaft comprising a flexible coupling, speed reducing gears in the gear case and disposed between said pair of shafts, an agitator drive shaft journaled in the journal portion of said central portion of the frame member, and mechanical connections between said vertical shaft and agitator drive shaft for converting rotary motion of the first into oscillatory movement of the second.

MYRON J. LANDGRAF.