

March 11, 1958

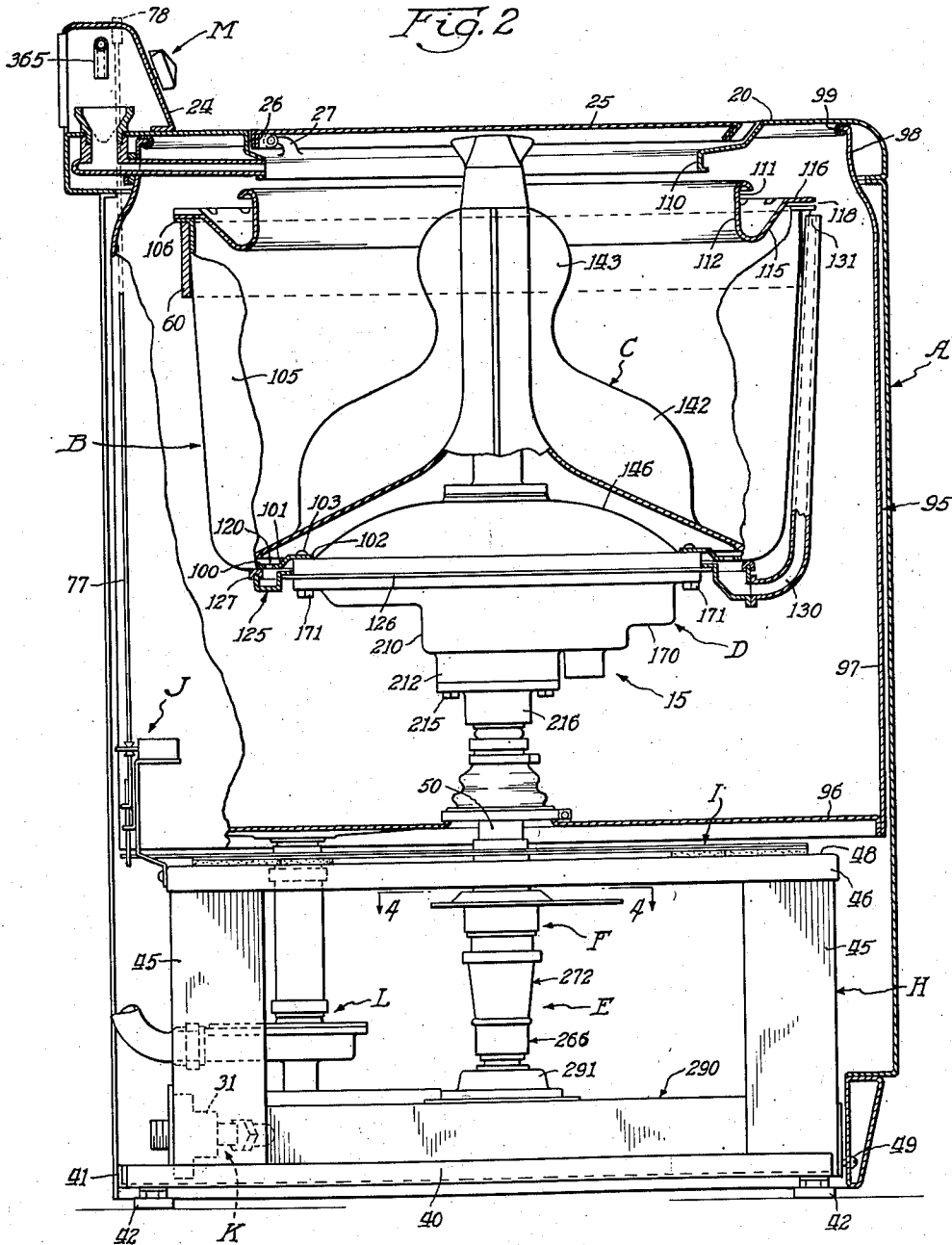
E. J. FREY

2,826,055

WASHING MACHINE DRIVE MECHANISM

Filed July 8, 1952

4 Sheets-Sheet 2



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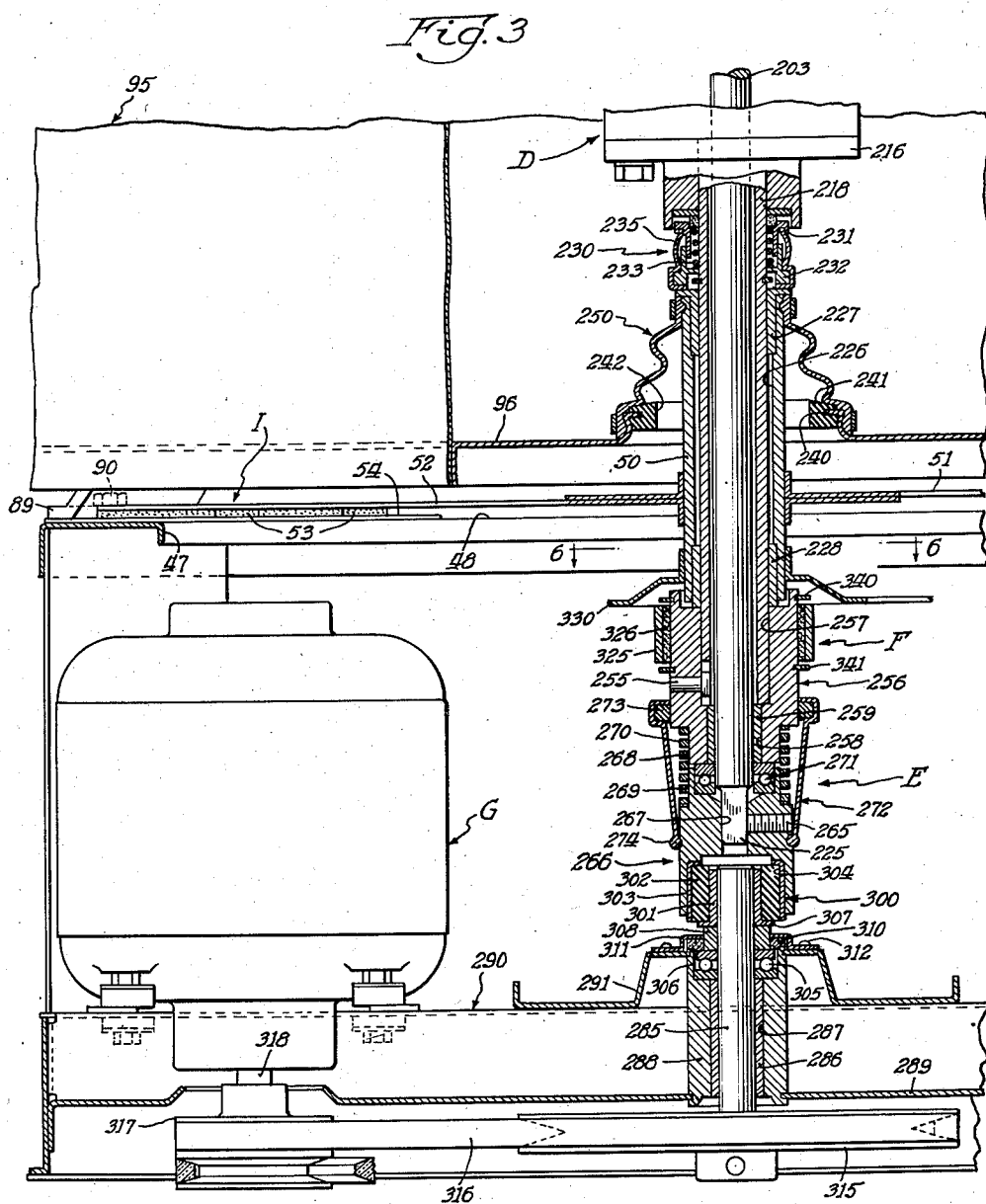
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WASHING MACHINE DRIVE MECHANISM

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4 Sheets-Sheet 3



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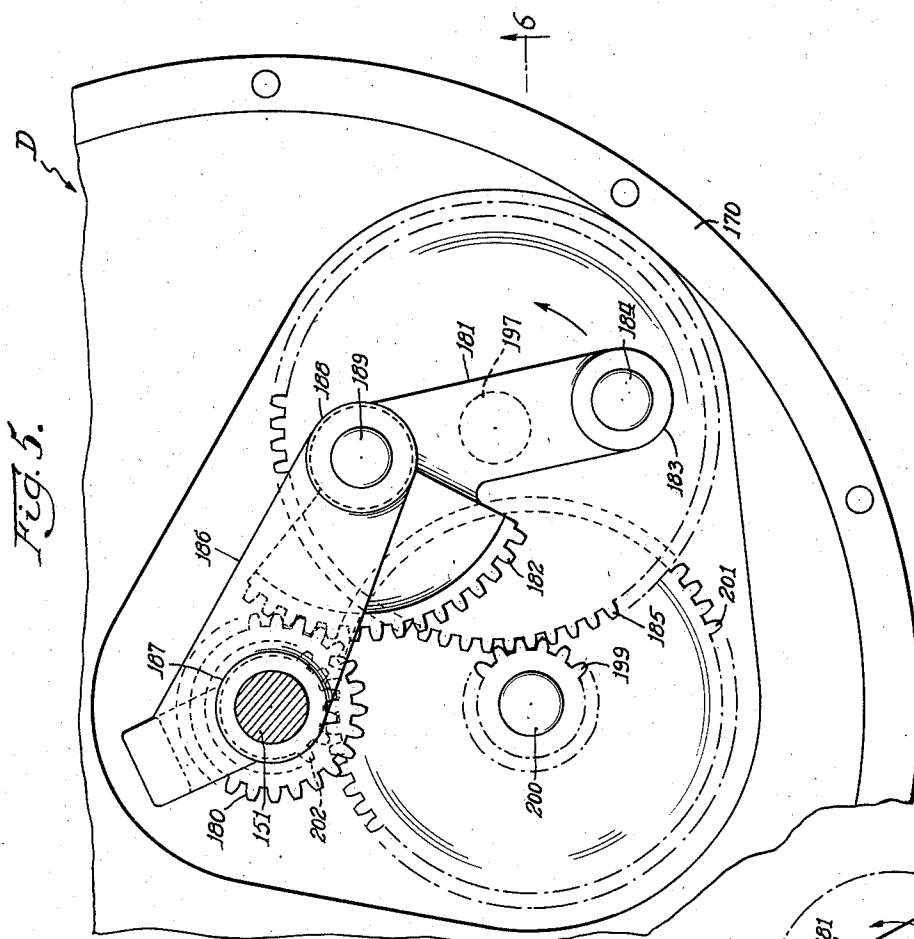
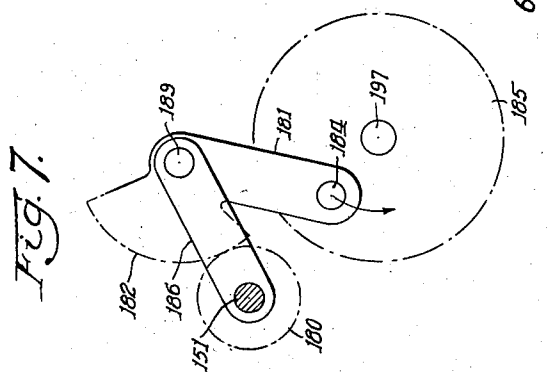
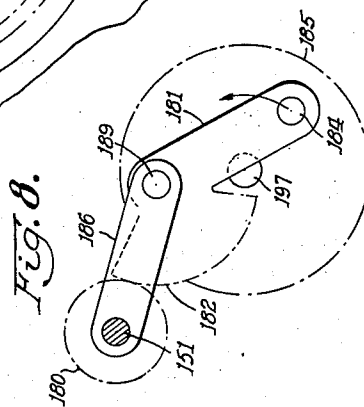
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WASHING MACHINE DRIVE MECHANISM

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4 Sheets-Sheet 4



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2,826,055

WASHING MACHINE DRIVE MECHANISM

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Application July 8, 1952, Serial No. 297,719

2 Claims. (Cl. 68—23)

This invention relates, in general, to improvements in washing machines, and is particularly concerned with a drive mechanism especially adapted to washing machines for both washing and drying of textile fabrics.

Otherwise stated, the instant invention is concerned with a drive mechanism adapted for advantageous incorporation in a domestic or household washing machine which is designed for effective operation in the washing, rinsing and water extraction of clothing or other articles to be cleansed.

More specifically stated, this invention is embodied in a drive mechanism incorporated in an automatic clothes washing machine of the combination washer and extractor type wherein water is centrifugally extracted from the clothes in the same tub in which they are washed.

Automatic washing machines in which the drive mechanism contemplated by this invention may advantageously be employed embody the features prevalent in the general class wherein an oscillatable agitator is mounted within the basket for performing the washing operation upon the clothes, and wherein the basket in which the clothes are washed may be subsequently caused to rotate at a relatively high rate (600 to 615 R. P. M.) of speed, about an upright axis, for the purpose of extracting the water from the clothes. Machines of this type may also be constructed and arranged so as to permit performing a rinsing operation upon the clothes as part of a series of sequential operations, which by way of example, may be as follows: First filling the tub with water, then rinsing the clothes, then performing a water extracting operation upon the clothes, then performing one or more rinsing operations upon the clothes, and finally a water extracting operation upon the clothes.

Such machines may be constructed so as to perform the separate operations by manually operable controls, or wherein the operations are caused to be partially or completely performed automatically in a cyclic manner.

It is the primary purpose of such apparatus as that to which the present invention pertains to reduce the burdensomeness of laundry or cleaning processes and to obviate the necessity of constant attention on the part of the operator to the apparatus in the course of its operation. The machine is entirely automatic to the extent that the operator is enabled to set the controls therefor to instigate the filling and washing operation, leave the same and return at a later period with the clothing or the articles to be cleansed, completely washed, rinsed, and the water extracted from the clothes to leave the same in a semi-dry state.

Accordingly, it is an important object and accomplishment of the invention to provide a drive mechanism for a basket and agitator of a machine of the character indicated, wherein said mechanism is constructed and arranged as to lend itself to advantageous and convenient control by a suitable timing mechanism for performing washing operations in a cyclic manner.

Although the invention contemplates a completely automatic washing machine, it is another important ob-

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ject and accomplishment of the invention to provide a washing machine of the above character but also lending itself to advantageous and convenient manual control for selectively performing the various washing operations as desired by the operator.

In order to advantageously facilitate the aforementioned purposes and objects, it is an important feature of the invention to provide an improved drive mechanism for a machine of the character indicated, adapted to be driven by an electric motor, and where rotation of the motor in one direction causes oscillation of the agitator, and wherein rotation of the motor in the opposite direction causes rotation of the basket for performing a water extracting operation upon the clothes.

A feature of the invention is the provision of a washing machine of the spinner-extraction type which does not require bolting down and imparts smooth and quiet operating characteristics.

Another important object and accomplishment of the invention is to provide an automatic washing machine which is economical to manufacture, simple to operate, substantially free from noise and vibration and yet rugged and reliable in use.

The present invention contemplates improvements in a mechanical movement for washing machines and the like by the provision of a drive mechanism and structure adapted to convert continuous driving motion into an oscillatory driven movement for agitation purposes.

In this connection, it is an object and accomplishment of this invention to provide a mechanism of the above character by which motion is transmitted from a continuously rotating member and is converted into oscillatory movement at a driven member, to thus oscillate a working part of the washing machine or other like mechanisms, together with control means for the oscillated parts.

Another object is to provide for a washing machine of the character hereinbefore described, a drive mechanism which is made up of parts simply and cheaply manufactured and assembled and adapted to be applied to and used with straight shafts to accomplish smooth, quiet and efficient operation to impart an oscillatory movement to an agitator or other driven member from a motor or other continuously rotating driving member.

A still further object and accomplishment of the invention is to so construct and mount the parts of the transmission so that long bearing surfaces are provided for all of the working elements, which bearings are set substantially in line in the direction of application of actuating forces, thus minimizing the possibility of strain or breakage of parts through overloading and substantially uneven or extensive wear of the parts through use.

Yet another object is to construct, arrange and mount the parts of the improved transmission so that the weight of the elements of the transmission can not only be employed in conjunction with counterbalancing of the spinner basket but also so that all operated portions and bearings of the transmission can be readily and efficiently housed within a casing to thus be packed in grease or operated in oil, further contributing to the long life and smooth and quiet operation of the mechanism.

An ancillary object and accomplishment of the invention is to provide a new and improved washing machine having incorporated therein an improved drive mechanism arranged not only to effectively accomplish efficient power transmission to agitate and to spin the basket but also arrange to cooperate with an improved gyration suppression control or counterbalancing means, all of which are adapted to be economically manufactured and which are so designed as to permit the manufacture and assembly thereof in accordance with present day

large scale mass production manufacturing methods of construction and assembly.

The invention seeks, as a final object and accomplishment, to provide for an automatic washing machine of the character indicated an improved drive arrangement adapted for effective cooperation with a counterbalancing mechanism and which is particularly characterized by a design arrangement to more advantageously and satisfactorily perform the functions required of it and adapted to provide a compact unit which will successfully combine the factors of structural simplicity and durability and yet be economical to manufacture.

Additional objects, features and advantages of the invention disclosed herein will be apparent to persons skilled in the art after the construction and operation are understood from the within description.

It is preferred to accomplish the various objects of this invention and to practice the same in substantially the manner as hereinafter more fully described, and as more particularly pointed out in the appended claims.

Embodiments of the invention are illustrated in the accompanying drawings forming a part hereof and wherein:

Fig. 1 is an isometric view of the washing machine cabinet;

Fig. 2 is an elevational view of the washing machine cabinet depicted in Fig. 1 with parts thereof removed and shown in section to more clearly illustrate the construction thereof, this view being taken substantially on the plane of the line 2—2 in Fig. 1;

Fig. 3 is a sectional view of the drive mechanism embodying the features of the present invention;

Fig. 4 is an elevational view of a brake mechanism effective to permit under certain conditions relative rotation of the agitator driving mechanism and the driving mechanism of the basket depicted in Fig. 2, and being taken substantially on the plane of the lines 4—4 in Figs. 2 and 3;

Fig. 5 is a top plan view of the transmission contemplated by this invention with the top cover housing removed to more clearly show the internal disposition of the parts thereof;

Fig. 6 is a sectional view of the transmission depicted in Fig. 5, this view being shown in section to more clearly illustrate the internal construction of the parts disclosed and being taken substantially on the plane of the line 6—6 in Fig. 5;

Fig. 7 is a diagrammatical illustration of the major component parts of the transmission depicted in Fig. 5 but illustrating the parts moved to a different position; and

Fig. 8 is a diagrammatical illustration of the parts disclosed in Figs. 5 and 7 but illustrating the relative disposition of these parts when moved to another position.

The drawings are understood to be more or less of a schematic character for the purpose of illustrating and disclosing a typical or preferred form of the improvements contemplated herein, and in the drawings like reference characters identify the same parts in the several views.

Attention is invited to the drawings, particularly Figs. 1, 2, 3 and 5, wherein the entire drive mechanism with which the present invention is particularly concerned is designated in its entirety by the numeral 15 and shown incorporated in a washing machine comprising, in general, the component part assemblies respectively indicated in their entirety by the letters as follows: A cabinet A exemplifying the external appearance of the automatic washing, rinsing and water extracting machine as shown in Fig. 1 and being hereinafter referred to simply as a "washing machine"; a basket B of the centrifugal extracting type disposed within the cabinet A; an improved agitator C operatively disposed within the basket B and having as a part thereof the housing of the transmission forming a part of the drive mechanism, said housing being carried by the basket for rotation

therewith when the basket is rotated for centrifugal water extracting operations and the bulk, mass and weight of which cooperates with a gyration suppression control means I which includes a control switch J; a reversible electric motor G to drive said agitator and said basket B through the driving mechanism 15; a supporting structure H; water inlet and drain assemblies respectively indicated as at K and L; and a sequential control M as disclosed in a copending patent application of Joseph M. Gartner, Serial No. 262,760, filed December 21, 1951, and entitled "Sequential Controller," and which is adapted to regulate the operation of the various elements in proper sequence to perform the operations involving filling, washing, rinsing and water extraction.

Attention is directed to Fig. 1 wherein there is illustrated the cabinet A which houses the entire mechanism and control system therefor and which comprises a cover 20, a front panel 21, side panels respectively indicated at 22 and 23, and a control panel 24 forming a part of and projecting upwardly from the cover 20 as illustrated in Figs. 1 and 2.

In Figs. 1 and 2 it can be seen that the cover 20 is provided with a hinged lid 25 to form a closure member for an opening 26 through which clothes or other articles to be cleansed may be introduced to the machine. The hinged lid 25 is so disposed with respect to the opening 26 that it will be flush with the surface of the cover 20 when it is in its closed position. One or more metal straps 27 pivotally disposed in the mountings secured to the under side of the cover 20 serve to provide a hinged mounting for the lid 25 with respect to the cover 20. A depression formed in the surface of the hinged lid 25 provides access to a handgrip 28 disposed at one edge of the lid 25 opposite its hinged mounting.

On the left-hand side of the control panel 24 there is disposed a control switch 30 which provides a means for manually selectively presenting the operation of an automatic temperature control mixing valve 31 forming a part of the water inlet assembly K. This mixing valve 31, which will be described in greater detail hereinafter, serves to provide for the introduction of cleaning fluids, in this case, water, at a proper temperature to insure proper cleansing of the articles to be laundered.

On the right-hand side of the control panel 24 there is disposed a control knob 33 which provides a means for manually operating the sequential control M. The length of the washing cycle may be predetermined and set within certain limits by the manual adjustment of the control knob 33 in a manner to be described in detail hereinafter.

It is notable that both the control switch 30 and the control knob 33 are shown as being disposed on the paneled surface 24 so that they provide no obstruction to the operator in the introduction of the articles to be laundered to the machine, or their removal therefrom.

Particular attention is directed to Fig. 1 wherein there is clearly illustrated a recess 35 arranged adjacent the back portions of the washing machine cabinet, this recess being adaptable for convenient receipt of pipes, wiring cables and the like so that the rear portions 36 of the top of the cabinet may be positioned so as to be in engagement with a wall or the like to provide continuity when the washer is disposed in a kitchen and/or laundry cabinet arrangement and yet provide, by means of the recess 35, for accommodation of obstruction running horizontally along the wall which could be supply pipes and/or electrical conduits and the like.

A recessed toe plate 37 is provided in the lower front portions of the cabinet as shown. This also is to provide obvious advantages of utility and giving design considerations to uniformity when the washing machine is disposed in a kitchen and/or laundry cabinet arrangement.

Attention is now directed to Fig. 2 wherein there is clearly shown the structural support H which comprises a base formed of structural angle members as at 40 and 41 to define a substantially square box-like base having

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disposed in the four corners thereof suitable adjustable legs 42 adaptable to provide a levelling means for the washer when placed in operative position on a floor or the like, a super-structure formed of bent steel elements 45 as shown with an encircling cover-like member 46 having a relatively large central aperture 47 and presenting a relatively flat working surface 48 upon which portions of the gyration suppression means I are operatively disposed.

It can be seen in Fig. 2 that the lower portions of the cabinet A are secured to and supported by the angle members 40 and 41 of the base by virtue of suitable securing means as at 49. Thus, it can be seen that the supporting structure H is a self-contained unit and is constructed so as to place the center of gravity in the lower portions of the washing machine which is effective to provide advantageous stabilization of the washing machine in operation thereby to reduce noise and objectionable vibration to the minimum.

Disposed within the cabinet A and mounted on the supporting structure H, by virtue of a plurality of legs as at 39 and which are in engagement with and secured to portions of the working surface 48, is a water-tight outer tub designated in its entirety by the numeral 95 (Fig. 2). It can be seen in Fig. 2 that the outer tub 95 comprises a bottom wall 96 and upstanding side walls as at 97 terminating in an open top 98 providing an annular opening, the periphery of which is disposed within the confines of the cabinet top 20 and the peripheral edge of which is provided with an annular shaped seal 99 adapted to engage portions of the inside surface of the cover 20 in order to prevent water from splashing out of the tub 95 and between the outer surface of the tub 95 and the interior of the cabinet A.

Disposed within the tub 95 and arranged for relative rotation therebetween and spaced from the wall 97 of the tub 95, there is provided the combination washing tub and water extracting basket B. As will best be seen in Fig. 2, the combination washing tub and water extracting basket comprises an imperforate bottom wall 100 having an annular offset 101 projecting inwardly of the tub and terminating in an annular inwardly projecting flange 102, the periphery of which defines a centrally disposed annular opening.

Integrally formed with the cover 20 of the cabinet A and projecting inwardly thereof substantially coaxially with the geometrical axis of rotation of the tub B, there is provided an annular flange 110 adapted to present a relatively smooth surface to define a throat through which the fabrics and other materials to be washed may be introduced to the combination washing tub and water extracting basket B without danger of the fingers of the operator being injured or caught between the adjacent operating parts of the washer.

In order to provide further for the advantageous insertion of the clothes into the combination washing tub and water extracting basket B there is provided an annular flange 111 defining an annular opening 112 forming a continuation of the aforementioned throat for the purpose of directing the passage of the clothes or other material to be washed into the combination washing tub and water extracting basket B to perform washing actions thereon. It is notable that the annular flange 111 is formed so that portions thereof will project downwardly within the confines of the combination tub and basket B to present an oblique wall 115 and thereafter terminate in an annular flange 116 which is formed to define a corrugated-like shape so as to provide between these corrugated formations a series of apertures as at 118 through which fluid may pass.

Obviously, the flanged throat element 111 may be suitably supported by any convenient means to the peripheral flange 106 of the combination washing tub and water extraction basket B. Moreover, it can be seen that the peripheral flange 106 and the corrugated-like formations

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on the flange 116 forming therebetween a series of apertures 118 hereinbefore mentioned and through which water may pass into the outer tub 95 for retention or removal therefrom.

In operation, the rotation of the combination washing tub and water extracting basket B at extremely high speeds during the extraction operation will cause centrifugal forces to move the mass of water outwardly from the geometrical center of rotation and, by virtue of the inclined upstanding annular wall 105 of the combination washing tub and water extracting basket B, the water will tend to flow upwardly through the passage defined by the oblique wall 115 and the adjacent portion of the wall 105, and thereafter, through the apertures 118 formed by the corrugated-like formations on the annular flange 116, whereupon the water will be discharged into the confines of the outer tub 95 for disposal. It is important to understand centrifuge action of the basket B will empty the water disposed therein in a matter of a few seconds thus presenting a substantial saving of time in the wash cycle and yet performing a better job than prior art models employing time consuming pumping operations and the like.

One of the principal features of the washing machine is the provision of novel means associated with and forming a part of the combination washing tub and water extracting basket B for the purpose of completely emptying out the basket during the extracting cycle, thereby to prevent objectionable and undesirable scum and other foreign matter to remain in the basket B during subsequent operations in the washing cycle.

In order to advantageously accomplish the removal of the entrapped objectionable scum containing fluid there are provided a series of apertures, as at 120, disposed beneath the agitation in an annular array adjacent to the offset 101 of the bottom wall 100 of the basket B. Operatively disposed below the aforementioned series of apertures 120 there is provided an annular cup-shaped structure indicated in its entirety by the numeral 125 (Fig. 2) and being supported in the position as shown by welding portions thereof to a flange 126 being secured between the two plates forming the housing of the transmission D (see Fig. 2). An important feature in this construction is that the inner wall of the annular cup-shaped structure 125 has as its central axis the central axis of the tub while the outer wall thereof is eccentric and with the largest space being adjacent the conduit 130. In order to provide a water-tight annular chamber disposed below the annular array of apertures 120, there is provided a seal 127 carried by the cup-like structure 125 and adapted for engagement with outer portions of the bottom wall of the basket B.

Thus, it can be seen that the sediment contained water and other foreign matter may pass through the apertures 120 and into the annular cup-like structure 125 and by virtue of a centrifuge action similar to that hereinbefore described with respect to the emptying of the basket B, the sediment contained water will be caused to flow from the annular cup-shaped structure into the conduit 130 which extends upwardly adjacent the exterior of the wall 105 of the basket B and terminates with an open end 131 and through this conduit 103 and by virtue of the centrifuge action imparted by rotation of the basket B at relatively high speed, the sediment contained water will rise in the conduit 130 and be discharged from the open end 131 thereof and into the confines of the outer tub 95 for disposal with the other water being caused to be extracted from the inner portions of the tub B through apertures 118 formed of the corrugated shaped formations on the flange 116.

It is well known that a relatively heavy mass or weight should be provided in the centrifuge operation of the basket B. In order to overcome normal unbalance conditions in the basket B caused by uneven distribution of the fabrics contained therein, it has been found desirable

to provide centrifugal forces assisted by mass or weight to facilitate the rotation of the basket B coincident, as nearly as possible, with the normal geometrical axis of rotation.

In order to provide the necessary mass or weight, the weighted mass 60 is secured, by any conventional manner, to the exterior of the wall 105 of the basket B in the upper portions thereof adjacent the annular flange 106 (see Fig. 2). It is notable that this weighted mass 60 is of such character as to cooperate with the gyration suppression means I, hereinafter described, the cooperation of these elements being effective to overcome, in normal operations, any unbalanced conditions and cause the centrifuge or basket B to assume a position, during rotation thereof, coincident with the normal geometrical axis of rotation thereby to substantially minimize noise and vibration during operation of the washing machine, particularly during the spinning or extraction periods.

The invention contemplates the novel disposition of the housing of the transmission D as a part of the lower wall 100 of the basket B at the flange 102 by means of the bolts 103. Thus, top plate 146 completes the enclosure of the opening in the basket B defined by the inner marginal edge of the flange 102.

It is notable that the agitator C is mounted on the basket B, as hereinbefore described, for the purpose of imparting an oscillatory movement to accomplish advantageous agitation of the water and the fabrics contained in the basket B.

The cleaning of textiles is effected by a combination of the action of the detergent liquid through the pores or interstices of the fabrics, flexure of the fabrics caused by agitation and the chemical action of the detergent thereon as controlled by the strength and temperature of the detergent liquid. These several actions must be properly coordinated and must be limited so that they will not damage the fabrics, either by tearing or undue wear from violent agitation or by chemical action of the detergent thereon. It is further apparent that the treatment necessary to clean fabrics of different kinds and the violence of the permissible cleaning action vary substantially with the type and soil condition of the fabrics.

The agitator C of the present invention has been given design considerations to provide proper flexure and agitation of the fabrics without danger thereto and to provide an improved washing action, this improved washing action being accomplished by the cooperative efforts of the fishtail-like segment 143 to cause advantageous and effective agitation at the surface of the water, and the balance of the vanes 142 to cause effective agitation of the water adjacent the central and lower portions of the basket B.

Attention is now directed to Figs. 2 and 3 wherein there is clearly disclosed the structural support H which comprises a base formed of structural angle members as at 40 and 41 to define a substantially square box-like base having disposed at the four corners thereof suitable adjustable legs 42 adaptable to provide a leveling means for the washer when placed in operative position on a floor or the like, a super-structure formed of bent steel elements 45 as shown with an encircling cover-like member 46 having a relatively large central aperture 47 and presenting a relatively flat working surface 48 upon which portions of the gyration suppression means I are operatively disposed.

It can be seen in Figs. 2 and 3 that the lower portions of the cabinet A are secured to and supported by the angle members 40 and 41 of the base by virtue of suitable securing means as at 49. Thus, it can be seen that the supporting structure H is a self-contained unit and is constructed so as to place the center of gravity in the lower portions of the washing machine which is effective to provide advantageous stabilization of the washing machine in operation thereby to reduce noise and objectionable vibration to the minimum.

Having thus described, by way of example, a possible adaptation of the washing machine drive mechanism 15 and having described the general environment surrounding the adaptation, the specific construction and function of the parts of said drive mechanism 15 when disposed in an automatic washing machine as hereinbefore disclosed, will now be described in detail.

Transmission D

Particular attention is invited to the transmission D which is arranged to translate an oscillatory motion to the agitator from a constant rotating drive mechanism to be hereinafter described in detail, the structural details of the transmission D being shown to best advantage in Figs. 2, 5, 6, 7 and 8.

In general, it may be stated that power operated washing machines having an agitator as at C operating with an oscillatory movement and in other machines of this character, the rotary movement of the motor or other power unit is customarily translated or transmitted into oscillatory movement by means of gears and racks.

It has been found that when gears and racks and the like are employed to impart an oscillatory movement certain deficiencies in the operation characteristics appear to present themselves, that is to say, the gears and racks cause considerable noise.

Moreover, further attempts have been made to accomplish oscillatory movement by the employment of cranks and links. It has been found that this can be done satisfactorily only if a special shaft is employed, because in washing machines and the like a proper circulation and water action in the washing machine tub is accomplished only when the agitator has an oscillatory movement greater than 180 degrees, for example, from 180 degrees to 220 degrees.

Exhaustive experiments have proven that if the degree of oscillation of the agitator is less than the amount above indicated, a proper circulation and agitation of the water in the machine will not be obtained and consequently an incomplete cleansing action results. This deficiency can only be overcome by operating the machine for an excessively long period which, in most cases, is not feasible particularly when the machines are automatic and controlled by a timer having certain limited range of adjustment to vary the sequential operations found in the washing cycle.

Giving full attention and significance to the aforementioned deficiencies and objections, it is one of the purposes of this invention to provide a mechanical movement for automatic washing machines and the like that will permit the employment of a straight agitator shaft. Moreover, the instant transmission will translate and transmit the desired oscillatory movement through cycles greater than 180 degrees, and will be extremely smooth and quiet in operation and yet be inexpensive to manufacture and assemble.

Since the present invention contemplates the provision of an oscillating agitator as at C disposed within a centrifuge basket as at B, each requiring specific mechanical movements from a single drive source to accomplish their respective purposes, it is desirable that means be provided for efficiently and positively controlling the operation of the oscillated agitator or other elements while not interfering with the continuous operation of the motor G so that it may be employed in connection with driving operations for the other elements.

Specific attention is invited to Figs. 2 and 6 which show that the transmission D is provided with a housing comprising the top plate 146 and the bottom shell 170, the top plate 146 and the bottom shell 170 being secured together at their respective marginal flanges by means of bolts as at 171.

The invention contemplates the novel disposition of the housing of the transmission D as a part of the lower wall 100 of the basket B at the flange 102 by means of

the bolts 103. Thus top plate 146 causes the enclosure of the opening in the basket B defined by the inner marginal edge of the flange 102.

As was described hereinbefore a necessary weight or mass should be given to the centrifuge or basket B in order to provide proper centralizing characteristics in its high speed rotation. It is important to understand that the relatively heavy mass or bulk of the transmission D when disposed in the manner taught by this invention will be effective to contribute to the weight and bulk necessary in the centrifuge or basket B for it to advantageously perform the functions required of it. Thus, it can be seen that the housing of the transmission D is fixedly secured to the centrifuge or basket B and because of this will rotate in its entirety with the centrifuge or basket B in the extracting operations of the washing cycle. This is an advantageous feature of the invention and an important contribution to the art.

The invention contemplates the provision of a transmission having a planetary sector component arranged to produce a satisfactory action, not only from the standpoint of cost and manufacturing, but also one that efficiently fulfills the requirements of compact design and high rate of reduction.

In the exemplary embodiment of the planetary sector components of the transmission D illustrated in Fig. 6, it can be seen that the agitator shaft 151 projects downwardly into the confines of the housing of the transmission.

The planetary sector components comprise a sun gear 180 keyed to the base of the agitator shaft 151, a connecting rod 181, one end of which is provided with sector teeth as at 182 and the other end 183 of which is journaled about a pin 184 carried by a crank gear 185, and a carrier link 186, one end 187 of which is freely journaled on the agitator shaft 151 and the other end 188 of which is journaled on a pin 189 defining the central axis of the planetary sector teeth 182.

Essentially, the planetary sector components consist of the connecting rod 181 with sector teeth 182 cut in one end of it, the sector teeth 182 engaging a sun gear 180 disposed on the base of the agitator shaft 151 and held in engagement with this sun gear by a carrier link 186 which pivots freely upon the agitator shaft and on the center of radius of the sector teeth 182 as defined by the pin 189. Because of the action of the connecting rod 181 produced by the crank gear 185 to which one end 183 is journaled, a planetary action of the sector defined by sector teeth 182 is transmitted to the sun gear 180 otherwise known as the agitator pinion. Thus depending upon the proportions of the sector and sun gears, the angular motion of the agitator shaft 151 will be increased some amount more than the angular motion of the sector. This may be expressed by the following formula:

Revolution of the Agitator =

$$\frac{\text{Radius of Connecting Rod Gear}}{\text{Radius of Agitator Gear}} + 1$$

This would mean that if the radii of the connecting rod gear 182 and the agitator gear 180 were equal, the agitator would move angularly twice as far as the sector. The advantages of this motion will become readily apparent to those who have had experience in sector and rack type transmissions. A short stroke on the connecting rod can be utilized with a resultant short rod, and a large pinion (such as at 180) on the agitator shaft can be specified so that undercutting of the pinion with resultant poor teeth contact is eliminated.

The crank gear 185 is mounted on a stub shaft 197 and forms one member of a speed reduction gear train comprising a pinion 199 in engagement with the crank gear 185 and mounted on the stub shaft 200 which also carries a drive gear 201 in engagement with a pinion 202 pinned to and mounted on a drive shaft 203 forming part of the driving mechanism E to be hereinafter described.

In accordance with the construction contemplated by

this invention, the rotating driving shaft 203 driving through the hereinbefore described gear train comprising the pinion 202, drive gear 201, pinion 199 and crank gear 185, will impart continuous rotation to the crank gear 185 to turn the same in one direction as indicated by the arrows.

The carrier link 186 and the connecting rod 181 by virtue of its eccentric mounting on the crank gear 185 will cause oscillating movement of the planetary gear segment 182 in a defined path between extreme positions illustrated in Figs. 10 and 11 to impart to said agitator gear 180 a driving oscillatory movement effected by the continuously swinging backward and forward of the connecting rod 181 in the defined path through rotation of crank gear 185 between the two extremes of position as best illustrated in Figs. 7 and 8, thereby to impart to the agitator C the desired oscillatory motion in certain of the sequential operations of the washing cycle.

As will be seen best in Figs. 3 and 6, the bottom plate 170 of the transmission housing is provided with an annular boss 210 having a bearing 212 in which the upper portions of the shaft 203 are advantageously journaled.

Removably secured to the boss 210 by means of bolts as at 215, there is provided a cap 216 having a central bore 217 adapted to receive for fixed securement thereto the upper portions of a tubular drive shaft 218 which forms a part of the driving mechanism E, to be hereinafter described in detail, and which is adapted to receive for relative rotation therebetween, the drive shaft 203.

As will be hereinafter described in detail, the drive shaft 203 is effective to drive parts of the transmission thereby to impart an oscillatory motion to the agitator C, while the tubular drive shaft 217 by virtue of its fixed mounting and connection to the housing of the transmission D which is fixedly secured to the bottom portions of the centrifuge or basket B is effective to cause rotation of the entire assembly comprising the transmission D and the centrifuge or basket and including the agitator C, this rotation of the aforementioned elements being accomplished during the water extractions of the washing cycle.

The drive mechanism E

Attention is now directed to the structural details of the driving mechanism E forming an important feature of the present invention and which can be seen best in Fig. 2 and particularly Fig. 3 wherein the driving mechanism is shown in section to more clearly illustrate the internal structure thereof and to show the relative disposition of the various parts.

In accordance with the construction of the present invention depicted in Fig. 3, the agitator drive shaft 203 projects downwardly within the tubular shaft 218 to terminate in a stud 225 of lesser diameter than the shaft 203 but projecting axially outwardly therefrom. As was hereinbefore stated, the tubular shaft 218 is fixedly secured to the cap 216 of the housing of the transmission D. The tubular shaft 218 projects downwardly from the cap 216 and is journaled within the bore 226 of the elongated stationary sleeve 50, hereinbefore described and forming a part of the gyration suppression means I. Thus, it can be seen that, by virtue of bearings 227 and 228 respectively disposed adjacent the upper and lower portions of the elongated stationary sleeve 50, between the tubular shaft 218 and the sleeve 50, so as to permit relative rotation of the shaft 218 with respect to the elongated stationary sleeve 50, the tubular shaft 218 may be rotated to cause rotation of the centrifuge while the elongated sleeve 50 will remain stationary.

Since the construction and operation of the centrifuge B facilitates a relatively fast dumping of the detergent fluid in the extracting operations, this extracting and dumping operation being accomplished in a matter of a few seconds, and because of this, it is obvious that the pump L would not be of sufficient capacity to dispose of such a quantity of water as rapidly as it is being

dumped, therefore, it is necessary for the dumped water to accumulate in the outer tub 95 in the area below the centrifuge until the pump L can disposed of same in its normal pumping operation. Thus, it is apparent that the mechanical elements disposed in this area must of necessity be of water tight construction.

This is advantageously accomplished in the present invention by the provision of a seal indicated in its entirety by the numeral 230 and comprising two segments 231, 232 arranged in telescoping association and provided with spring means 233 arranged to urge the telescoping segments 231 and 232 into operative engagement with adjacent portions of the cap 216 and the bearing 227. A flexible cover 235, preferably made of rubber or the like, is arranged to enclose the joint between the telescoping segments 231 and 232. Thus, it is apparent that this seal is effective to exclude water and other foreign matter from access to the bearings 227 and adjacent working surfaces.

As can be best seen in Fig. 3, the bottom wall 96 of the outer tub 95 at the central regions thereof is provided with a flanged opening 240, said flanged opening being arranged to operatively carry a bumper 241, preferably formed of rubber or the like to define a substantially circular shape having a central through bore 242 arranged to receive and encircle the elongated stationary sleeve 50 and the parts contained therein. It is notable that the bore 242 is of such a diameter as to permit relative transverse movement of the elongated sleeve 50 but must be limited in its diameter so as to operate as a bumper or guide to limit the relative transverse movement of the stationary sleeve 50 in order to prevent peripheral portions of the basket B from engaging or striking the inner walls of the outer tub 95 during rotation of the basket B in extracting operations.

Resiliently carried by upper portions of the elongated stationary sleeve and by portions of the flange 240 there is provided a flexible encircling rubber boot indicated in its entirety by the numeral 250, this boot being effective to prevent water from seeping out of the confines of the outer tub 95 and through the bore 242 to the lower portions of the washing machine.

By virtue of the key 255, a brake drum, generally indicated as at 256 and forming a part of the brake assembly F to be hereinafter described in detail, is disposed at the lower portions of the tubular shaft 218 for rotation in unison therewith. The brake drum 256 is provided with a through bore 257 adapted to receive lower end portions of the tubular shaft 218 and is further provided with a central through bore 258 adapted to receive a sleeve bearing 259 through which the lower portions of the agitator drive shaft 203 are effectively journaled. Thus, it can be seen that the brake drum 256 will rotate with the tubular shaft 218 while the agitator shaft 203 is arranged for relative rotation within the bearing 259 disposed in the through bore 258 of the brake drum 256.

At the lower portions of the agitator drive shaft 203 and removably connected thereto for rotation in unison therewith by virtue of a set screw 265 adapted to engage the projecting portion 225 of the shaft 203, there is provided a clutch hub indicated generally at 266 and having a central through bore 267 adapted to receive said projecting end portion 225 of the agitator drive shaft 203. The peripheral surface 268 of the brake drum 256 and the peripheral surface 269 of the clutch hub 266 together define a coaxially arranged clutching surface having a one-way clutch spring 270 in encircling arrangement therewith so that if the clutch hub 266 is rotating in one direction the spring will tend to grip and wrap itself about the peripheral surfaces 268 and 269 so as to cause rotation in unison of the clutch hub 266 and the brake drum 256.

When the clutch hub 266 is rotated in the opposite direction the spring 270 is effective to unwrap itself from its engagement with the peripheral surfaces 268 and 269 thereby disengaging these two elements whereupon the

clutch hub 266 will continue its rotation and the brake drum 256 will remain stationary. The importance of the operation of this clutch will be discussed more in detail as the description proceeds.

Disposed between the lower end portions of the brake drum 256 and the upper end portions of the clutch hub 266 there is an anti-friction thrust bearing generally indicated by the numeral 271, this bearing also being effective to permit relative rotation between the clutch hub 266 and the brake drum 256.

Thus, it is apparent that the main purpose of the spring clutch 270 is to permit, from a single drive source, the operation of the agitator C independently of the centrifuge or basket B and during the operation of the centrifuge or basket B, the agitator drive mechanism may be neutralized and rotated with the centrifuge.

In order to prevent water and/or objectionable foreign matter from contact with the parts of the spring clutch 70, there is disposed an encircling boot generally indicated by the numeral 272 and preferably made of rubber or the like, the rubber boot 272 being held in its position by means of a ring 273 carried by the periphery of the brake drum 256 for sliding engagement therebetween in order for the boot 272 to rotate with the clutch hub 266 in certain operations while the brake drum 256 may be stationary, and said boot 272 at its lower end portions being provided with a lip 274 adapted to encircle and snugly engage the outer periphery of the clutch hub 266.

As can be seen best in Fig. 3, a stub drive shaft 285 is journaled in a sleeve bearing 286 disposed in a through aperture 287 of a hub 288, the lower portion of which is supported on a plate 289 of a transversely extending structural steel support member 290 (Fig. 3), and the upper portion of the hub 288 being supported by a bent plate support member 291 also carried by the transversely extending structural steel support member 290.

It is notable that the stub drive shaft 285 is rotatable in the sleeve bearing 286 and that, by virtue of the hub 288 being fixed to the plates 291 and 289, the shaft 285 will rotate on a fixed vertical axis. Because the shaft 285 rotates on a fixed vertical axis, and the structure hereinbefore described and located above the shaft 285 is arranged to provide limited transverse or lateral movement, it is obvious that some means must be employed in the connection between the laterally movable elements and the fixed axis drive shaft 285.

This is advantageously accomplished in the present invention by the provision of a flexible coupling indicated in its entirety by the numeral 300 and comprising a sleeve 301 press fitted to the upper portions of the drive shaft 285, a rubber bushing 302 mounted on the sleeve 301, and a cover 303 encircling the rubber bushing 302 and adapted to be received into a counterbore 304 in the lower portions of the clutch hub 266.

In order to prevent axial movement of the shaft 285 with respect to the hub 288 there is provided an anti-friction thrust bearing 305 received into a counterbore 306 in the hub 288. Disposed between the bearing 305 and the lower annular flange 307 of the sleeve 301 there is a spacer collar 308 effective to maintain the adjacent elements in their proper operating position. To prevent foreign matter from entering the bearing 305 and the sleeve bearing 286, there is provided a felt washer seal 310 maintained in its position by an annular metal cap 311 removably secured to the bent plate support 291 by screws as at 312.

Thus, by virtue of the function and operation of the flexible coupling 300, the parts of the washer above the clutch hub 266 are effectively driven by the drive shaft 285 rotating on a fixed vertical axis and yet permitting lateral or transverse movement of the driving elements thereabove with the pivot thereof being the central axis of the flexible coupling 300.

In accordance with the construction of the present

invention and as will be best seen in Fig. 3, the drive shaft 285 has mounted thereon at the lower portions thereof a driven pulley 315 adapted to carry in driving relation therewith a V-belt 316 also in driving relation with a driving pulley 317 carried by the drive shaft 318 of the reversible motor G.

Having thus described the general operative relationship of the parts of the driving mechanism E, the driving path followed in the various operations will now be described in detail.

As was hereinbefore stated, the motor G is of the reversible type and will transmit power in either direction of rotation to the drive shaft 285 by means of the V-belt 316 drive connection therebetween. When the drive shaft 285 is rotating in one direction, that is to say, to drive the agitator C, power will flow through the flexible coupling 300 to cause rotation of the clutch hub 266 which, by virtue of the set screw 265 is connected to the projecting stud end portions 225 of the shaft 203, will cause the shaft 203 to rotate thereby to transmit power through the speed reduction gear train of the transmission D where the power is translated into oscillatory motion by virtue of the linkage interconnected between the gear train and the agitator drive shaft 151, thereby to impart to the agitator the desired oscillatory motion necessary to advantageously cause agitation of the detergent fluid and the fabrics contained in the basket B. The drive path just described is followed during the washing and rinsing operations. Moreover, it is important to understand, that by virtue of the spring clutch arrangement 270 that the brake drum 256 will remain stationary during this operation and direction of rotation of the shaft 285. The stationary position of the brake hub 256 is maintained by virtue of the action of the brake F to be hereinafter described in detail.

After the washing operation is completed, the extracting operations will begin. By operations performed by the sequential control M, current to the motor G will be interrupted momentarily and this motor will be stopped whereupon the motor reversing mechanism will become operative and, thereafter, current is again applied to the motor G to cause the drive shaft 318 to rotate in a direction opposite to that hereinbefore described. Thus, it is apparent that the drive shaft 285 will now be operating in the opposite direction and the rotation in this direction will be effective to cause operation of the spring type clutch mechanism 270 to couple the clutch hub 266 with the brake drum 256 for rotation in unison whereupon, by virtue of the coupling action of the key 255, the tubular shaft 218 will rotate. Because of the fixed connection between the upper portions of the tubular shaft 218 and the cap 216 forming a part of the housing of the transmission D, the entire assembly comprising the transmission D and the centrifuge or basket B will rotate, thereby to perform the extracting operation hereinbefore described, the rotation of the centrifuge or basket B being effective to empty the basket B of the detergent fluid through the apertures 118 defined by the corrugated-like shape of the flange 116 disposed adjacent the top peripheral edge of the centrifuge whereupon the detergent fluid is disposed in the lower portions of the outer tub 95 for accumulation and disposal by means of the operation of the pump L.

Thus it becomes apparent that when the motor is rotated in one direction the driving means E is effective to drive the agitator and when the motor is rotated in the opposite direction the driving means E is effective to rotate the centrifuge for water extracting operations.

The brake mechanism F

Attention is invited to the structural details of the brake mechanism F forming an important feature of the present invention and which can be seen best in Fig. 3 and particularly in Fig. 4 wherein the elements of the brake mechanism are shown in elevation to more clearly

illustrate the construction thereof and to show the relative disposition of the various parts.

In accordance with the construction of the present invention, the brake mechanism F comprises the brake drum 256 hereinbefore described, an annular brake band 325 having suitably secured thereto on the inside surfaces thereof conventional frictional brake band material 326 disposed in frictional engagement with the peripheral surface of the brake drum 256, said brake band having at one end thereof a lip 327 adapted to become engaged, under certain conditions hereinafter to be described in a slot 328 disposed in a latch 329 mounted, by virtue of pivot pin 331, for pivotal movement on a bracket 330 which is fixedly secured to the elongated stationary sleeve 50 (Fig. 3), said latch being provided with a spring 332 having one end engaged with the latch body 329 and the other end thereof being suitably secured to the bracket 330 as at 333, said spring being effective to urge the latch in one direction of pivotal movement, and said latch having fixedly secured thereto an arm 334 of a solenoid 335 adapted, under certain conditions, to overcome the forces of the spring 332 and cause pivotal movement of the latch body 329 in the opposite direction of pivotal movement.

When the motor G is operating in a direction to cause the agitator shaft to rotate in the direction indicated by the arrow 336 (Fig. 4) the relative disposition of the parts will be as indicated. In this condition, it can be seen that the brake band 325 is in operative encircling engagement with the brake drum 256 thereby to prevent the tubular shaft 218 from rotating. This action, by virtue of the connection of the tubular shaft 218 to the housing of the transmission D, will hold the basket B from rotating thereby effective agitating operations may be accomplished. Since the solenoid is not energized the spring 332 will be effective to hold the latch 329 in its latched position as shown.

After the agitation cycle has been completed the sequential control M will be effective to cause reversal of the motor G for the purpose of performing water extracting operations which is accomplished by rotating the basket B. Since the solenoid 335 is properly connected in circuit, the solenoid will become energized to overcome the forces of the spring 332 and move the latch 329 in the direction indicated by the arrow 337 which will cause disengagement of the lip 327 from the slot 328 and permit the brake band to rotate with the brake drum 256 in the direction indicated by the arrow 338. Thus, it can be seen that the tubular shaft 218 is now free to rotate to cause rotation of the basket B. Moreover, it should be understood that the main purpose of this brake is only to prevent relative rotation of the basket B in either direction whenever the agitator C is in operation.

In order to prevent relative axial movement of the brake band 325 with respect to the brake drum 256, there are provided ring collars respectively indicated at 340 and 341 and which are carried by the periphery of the brake drum 256. As was hereinbefore stated, the brake band 325 is free to rotate with the brake drum 256 when the elements of the brake are in their unapplied position and, because of the ring collars 340 and 341, relative axial movement of the brake band 325 with respect to the brake drum 256 is prevented.

When the sequential control calls for operation of the agitator and extracting operations are completed, the solenoid 335 will become deenergized and the motor G will be conditioned for reverse operation, whereupon the forces of the spring 332 will become effective to urge the latch 329 toward its latch position whereupon the brake band 325 rotating with the brake drum 256 in the direction of the arrow 338, will cause engagement of the lip 327 with surface 345 (Fig. 4) of the latch 329 which will be effective to guide the lip 327 home to its position in the slot 328 where it will be maintained until the solenoid 335 is again energized to cause the latch to move in the

direction indicated by the arrow 337. After the lip 327 has been effectively positioned in the slot 328, the brake elements are again in their applied position effective to hold the brake drum 256 from relative rotation in either direction.

Summary of operation

In Fig. 2 there can be seen to best advantage the tub filling mechanism K which forms another important feature of the present invention.

The cleansing fluid, in this case, water, is supplied the basket B under ordinary city main pressure through a temperature control mixing valve 31 which is supported on the supporting means H adjacent the rear portions of the washer (see Fig. 2).

By simply pulling out the timer control knob 33 thereby to permit linear movement in either direction of said knob to any selected position with respect to the washing cycle indicators disposed on the panel 24, whereupon the control knob 33 is pushed inwardly thereby to cause operation of the timer and, thereafter, the washer will then perform all operations of the washing cycle following that point at which the control knob 33 is set by the operator for the start of the cycle. Thus, it can be seen that the washing cycle can be varied from one to ten minutes depending on where the operator sets the control knob 33. The drying and rinsing cycles, however, cannot be shortened except by interrupting the normally continuous cycle of operation. This feature has been found desirable since it takes a certain definite period of time to remove all of the soap or other alkaline solution employed as a detergent in the cleansing medium out of the clothes, and for the reason that the ordinary user of the machine should not, therefore, be given an opportunity to shorten the rinse cycle. It has similarly been found to be unnecessary to provide any adjustment in the water extraction time.

The complete operation of the automatic washing machine representing the illustrated embodiment of the invention and described herein in detail may be briefly summarized as follows:

Clothes or other articles to be laundered are inserted into the basket B of the automatic washing machine through the hinged lid 25 of the cabinet A and a small amount of soap or other suitable detergent is then sprinkled on the top of the clothes or articles to be laundered. The water temperature control switch 30 is now set for the desired water temperature at which the clothes or other articles are to be laundered. The timer control knob 33 is pulled outwardly and moved in its horizontal linear path to the extreme left-hand position (Fig. 1) and when the control knob 22 is pushed inwardly it will set the timing mechanism in motion to perform the various sequential operations of the washing cycle.

As was hereinbefore stated, the instant washer has an adjustable fill from one to six minutes, and since the water valve 31 is set to provide 2 and $\frac{3}{4}$ gallons of water per minute regardless of city main pressures, the amount of water disposed in the tub is controlled by time as distinguished from conventional prior art float mechanisms. It has been found practical for all intentions herein contained to have a fill period of approximately four minutes under average conditions. Accordingly, if the timer control knob 33 is set at 0, the mechanism will become operative to permit filling of the basket B for a period of four minutes and as the timer control knob passes through this four minute cycle, the electrical contacts (not shown) in the timer will be actuated by the engagement of a suitable linear profile to shut off the water supply and simultaneously therewith start the washing phase of the cycle. The motor will be set in a direction of rotation to cause the agitator to oscillate to perform its washing function upon the clothes and/or other articles being laundered.

For all practical intents and purposes herein contained and based upon experience as to the length of

time desirable for the washing phase of the cycle, it has been found that a ten minute period is most practical under average conditions. It is notable that if the timer control knob 33 is set at the 0 position (Fig. 1) and left undisturbed, there will be a four minute fill period followed by a ten minute wash period in which the agitator performs its oscillating motion. However, it is important to understand that, in certain instances, it may be desirable to vary the wash period. This may advantageously be accomplished by setting the timer control knob 33 at 0 (Fig. 1) and permitting this control knob to pass through the four minute fill period, whereupon the knob may be pulled outwardly and reset at any point between numbers 4 and 14 and pushed inwardly whereupon the timer will continue from that point to complete the washing cycle. The apparatus is thereafter adapted to operate without further attention, all of the remaining operations taking place automatically and proceeding to the completion of the last water extraction operation.

After the wash period has been completed the electrical contacts of the sequential control, by virtue of the linear profile, will be set to provide a thirty second pause permitting the motor to completely stop and be set for reverse operation to accomplish water extraction operations in the manner hereinbefore described. When the timer control knob 33 has passed through this thirty second pause, the electrical contacts will be set, to cause rotation of the basket B for water extracting operations. In this operation, the rotation of the combination washing tub and water extracting basket B at extremely high speeds during the extraction operation will cause centrifugal forces to move the mass of water outwardly from the geometrical center of rotation and, by virtue of the inclined upstanding annular wall 105 of the combination washing tub and water extracting basket B, the water will tend to flow upwardly through the passage defined by the oblique wall 115 and the adjacent portion of the wall 105 and thereafter, through the apertures 118 formed by the corrugated-like formations on the annular flange 116, whereupon the water will be discharged into the confines of the outer tub 95 for disposal. It is important to understand that this centrifuge action of the basket B will empty the water disposed therein in a matter of a few seconds thus presenting a substantial saving of time in the wash cycle and yet performing a better job than prior art models employing time consuming pumping operations and the like.

In centrifuge type extractors, it has been found that during the extracting operation the fabrics contained in the basket B, by virtue of their mass and bulk, will sometimes entrap water and other foreign material in the lower portions of the basket B thereby to prevent the desired removal of such entrapped water from the basket B which will cause an undesirable accumulation of such sediment and other foreign matter. In this connection, it is notable that it is desirable to have this objectionable sediment and foreign matter removed to provide a clear rinsing cycle and prevent the sediment laden water from being strained through the fabrics being washed during any of the water extracting cycles.

This is advantageously accomplished in the present invention by the provision of the auxiliary sump adapted to facilitate removal of the entrapped objectionable sediment contained fluid by passing the same through the apertures 120 and into the annular cup-like structure 125 and, by virtue of a centrifuge action similar to that hereinbefore described with respect to the emptying of the basket B, the sediment contained water will be caused to flow from the annular cup-shaped structure into the conduit 130 which extends upwardly adjacent the exterior of the wall 105 of the basket B and terminates with an open end 131 and through this conduit 130 and, by virtue of the centrifuge action imparted by rotation of the basket B at relatively high speed, the sediment contained

water will rise in the conduit 130 and be discharged from the open end 131 thereof and into the confines of the outer tub 95 for disposal with the other water being caused to be extracted from the inner portions of the tub B through apertures 118 formed of the corrugated-shaped formations on the flange 116.

Since the construction and operation of the centrifuge B facilitates a relatively fast dumping of the detergent fluid in the extracting operations, this extracting and dumping operation being accomplished in a matter of a few seconds, and because of this, it is obvious that the pump L would not be of sufficient capacity to dispose of such a quantity of water as rapidly as it is being dumped, therefore, it is necessary for the dumped water to accumulate in the outer tub 95 in the area below the centrifuge until the pump L can dispose of same in its normal pumping operation. It is recalled that the motor will operate in two directions of rotation, that is to say, in one direction when it is desired that the agitator be operated and in another direction when it is desired that the extracting operations be performed. Thus, by virtue of the pump drive arrangement, it can be seen that the pump will operate in both directions of rotation and at all times when the motor G is in operation.

Attention is again referred to Fig. 1 and it is notable that the timer mechanism, for purposes of this description of operation of the washing machine, has now moved to the extract spin position and will continue for one minute to perform the water extraction spin operation as hereinbefore described and after the timer has passed through this minute period the electrical contacts will be set in a manner to provide a thirty second spin rinse of warm water. This spin rinse is effective to remove extraneous scum and other detergent fluid remaining in the basket B after the first water extraction spin operation has been completed.

After the timer has passed through the forementioned thirty second spin rinse, the electrical contacts thereof will be set to shut off the current supply to the motor thereby to stop the spinning of the basket B but, the electrical contacts are now set to permit a three and one-half minute fill period, in which period the basket is again supplied with warm rinse water.

After the timer has passed through this three and one-half minute fill period, the electrical contacts thereof will be set so as to cause reverse rotation of the motor thereby to provide an agitator drive and since the contacts are set for continuous supply of water to the basket B there is provided a four minute agitated overflow rinse which has been found particularly desirable to advantageously clear the clothes and the basket B of all scum, sediment and detergent fluid. It is obvious that if the water supply is continuous as hereinbefore suggested that the water will fill the basket B and thereafter overflow through the apertures 118 and into the outer tub 95 for disposal by the pump L as hereinbefore described.

A one minute agitated rinse period without overflow is provided, this being accomplished by positioning of the electrical contacts so as to cause the water to be shut off at the mixing valve 31. After the one minute agitated rinse without overflow there is provided a thirty second pause in order to permit the motor to be stopped and the controls be set for reverse operation of the motor for the purpose of water extraction operations to follow. After a one minute water extraction spin operation there is provided a one-half minute spin rinse followed by a six min-

ute water extraction period, making a total washing cycle of thirty-two and one-half minutes.

While I have illustrated preferred embodiments of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth but wish to avail myself of all changes within the scope of the appended claims.

I claim:

1. In a combined washing and water extracting machine including an upwardly open receptacle, an upwardly open basket mounted for rotation within the receptacle, and an oscillatable agitator mounted within the basket: mechanism for driving the basket; separate mechanism for driving the agitator including a planetary sector component operable to translate rotative movement of the agitator drive to oscillatory movement; said separate mechanism being enclosed in a housing, said housing being secured to and forming the bottom wall of the basket, a reversibly driven electric motor; mechanical means responsive to rotation of the motor in one direction for actuating the agitator driving mechanism; mechanical means responsive incident to rotation of the motor in the opposite direction, for actuating the basket driving mechanism; in combination with brake means interposed in the basket driving mechanism; spring means for yieldingly maintaining the brake in operative position; and a solenoid connected in the motor circuit and adapted to be energized when the motor is driven in one of its two directions for moving said last-mentioned brake means to its inoperative position.

2. In a washing machine of the type wherein an agitator transmission housing supports a spinner basket and forms a portion of the bottom wall of the basket and wherein a reversible motor is operated in a first direction to oscillate an agitator and in a second direction to spin the basket, the combination therewith of: a transmission disposed in the housing and responsive to operation of the motor means, said transmission comprising a crank gear operatively connected to the motor; a connecting rod formed with a gear sector pivotally mounted to the crank gear; an agitator shaft carrying a spur gear mounted in the housing; means for maintaining the gear sector and the spur gear in engagement so that upon rotation of the motor in the appropriate direction the crank gear will cause the connecting rod and its gear sector to oscillate whereby the spur gear and the agitator shaft are oscillated, and a coil spring clutch responsive to operation of the motor means in said second direction effective to divert power away from the transmission and to the housing whereby the basket is rotated through the housing.

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U. S. DEPARTMENT OF COMMERCE
PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,826,055

March 11, 1958

Edward J. Frey

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 8, line 44, for "rolled" read -- trolled --; column 10, line 41, for "extractions" read -- extraction operations --; column 11, line 3, for "disposed" read -- dispose --; column 13, line 31, for "wil" read -- Will --; column 15, line 52, for "22" read -- 33 --.

Signed and sealed this 20th day of May 1958.

(SEAL)
Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents