

Sept. 22, 1942.

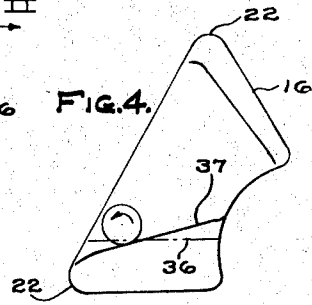
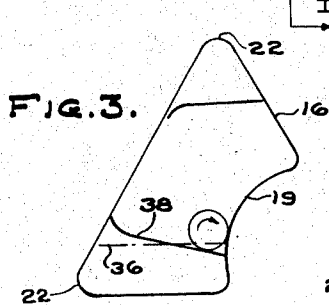
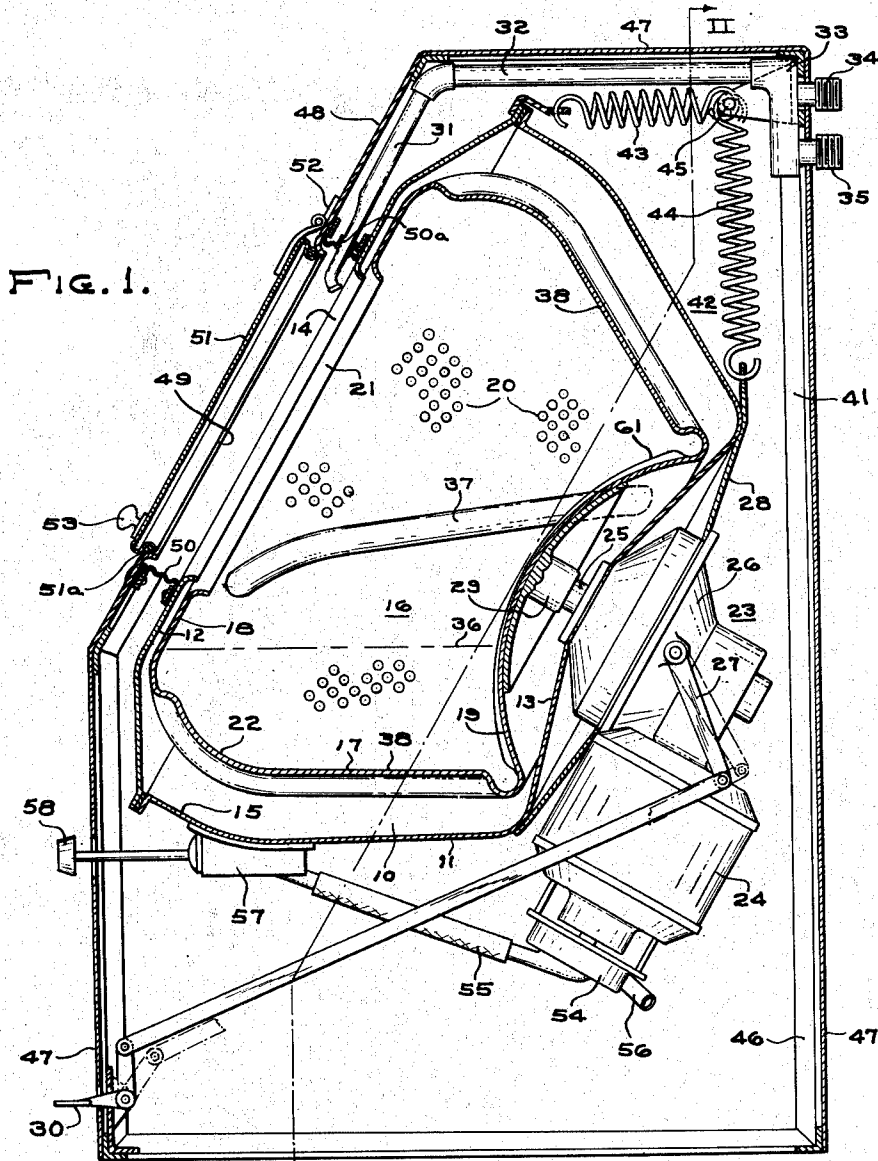
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2,296,257

APPARATUS FOR WASHING FABRICS OR THE LIKE

Filed April 23, 1938

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

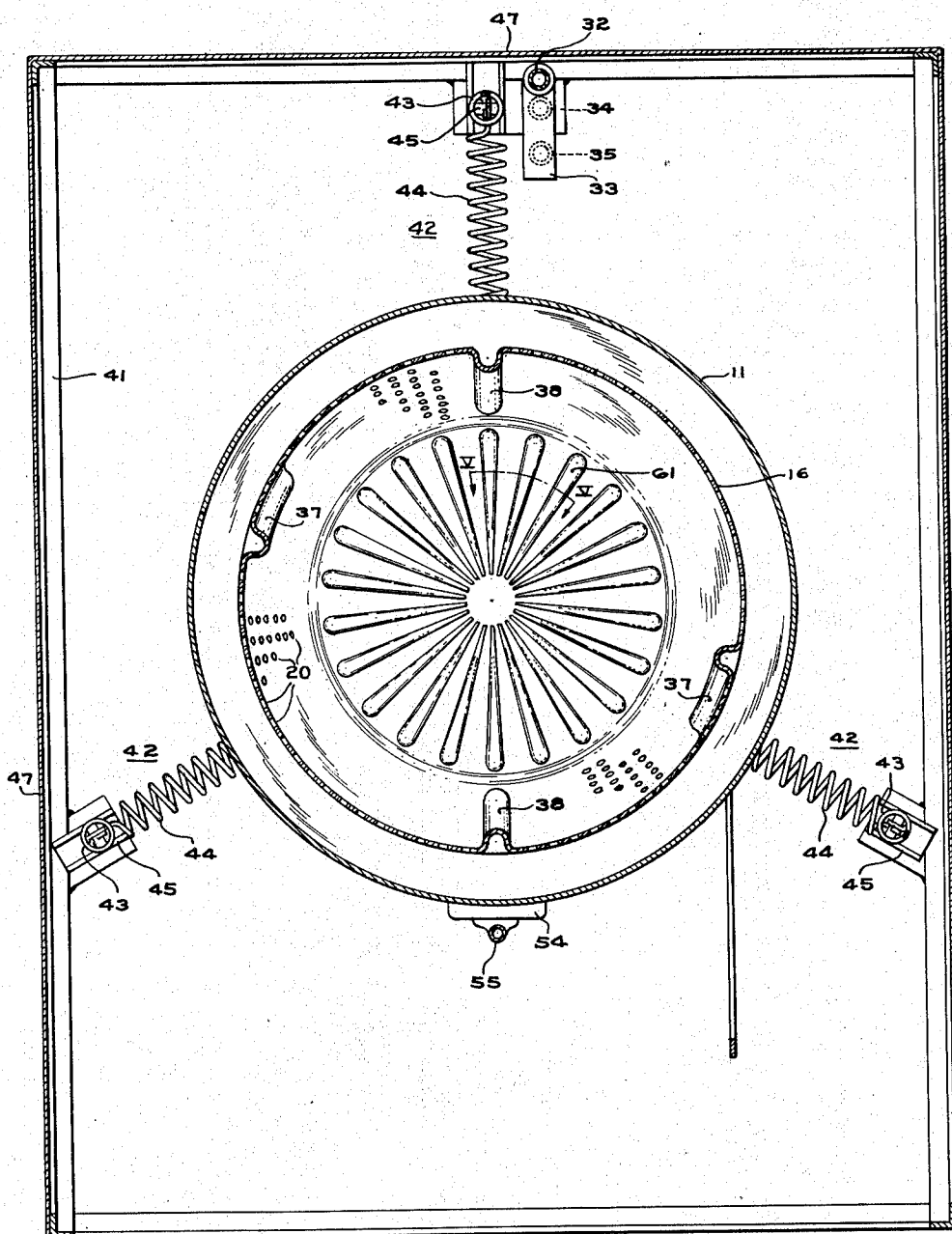


FIG. 2.

WITNESSES:

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FIG. 5.

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APPARATUS FOR WASHING FABRICS OR
THE LIKE

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8 Claims. (Cl. 68—24)

My invention pertains to washing of fabrics or the like and has for an object to provide improved apparatus for effecting this operation.

It is a further object of the invention to provide improved apparatus for agitating fabrics in a cleansing fluid and for subsequently spinning the fluid therefrom, whereby packing and knotting of the fabrics are prevented during the washing cycle so that the fabrics are loose and evenly distributed when the spinning cycle is initiated.

A further object of the invention is to provide improved apparatus for washing fabrics whereby the fabrics are alternately directed from one region of the washing fluid to another region thereof as they are lifted from and immersed in the fluid.

A further object of the invention is to alternately subject the fabrics to a rolling and unrolling action while lifting the fabrics from and immersing the same in a detergent fluid.

A further object of the invention is to provide an improved washing machine that may be readily manufactured and serviced.

It is a further object of the invention to provide an improved washing machine that utilizes a relatively small amount of fluid in effecting the cleansing of a batch of clothes.

A still further object of my invention is to provide improved apparatus of the character set forth having a container that is rotated at relatively low speed in a single direction for agitating the fabrics in a cleansing fluid and which is rotated at relatively high speed for spinning the fluid from fabrics.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings forming a part of this application, in which:

Fig. 1 is a vertical sectional view of a washing machine constructed in accordance with my invention;

Fig. 2 is a sectional view taken along the lines II—II of Fig. 1;

Figs. 3 and 4 are diagrams showing the washing action that is effected by my improved washing apparatus; and,

Fig. 5 is a section of a detail taken along the line V—V of Fig. 2.

Reference will now be had to the drawings wherein I have shown my invention applied to a washer of the domestic type and including a tub or water containing structure 10 of substantially frusto-conical configuration and including side walls 11 and walls 12 and 13 at its large and small

ends, respectively. An access opening 14 is provided in the large end wall 12 at the center thereof. The side wall 11 may be curved inwardly where it joins the end wall 12 as shown at 15.

Disposed within the tub structure 10 is a perforate rotatable basket generally indicated at 16 and substantially of frusto-conical formation. The basket 16 includes a side wall 17 and end walls 18 and 19 at its large and small ends, respectively. The end wall 18 is formed with an access opening 21 aligned, coaxially with the opening 14 in the tub structure 10. The portion 22 of the side wall 17 that is opposite the curved portion 15 of the tub structure 11 is curved as shown so that the inner surface of the basket 16 is defined by well rounded surfaces. A plurality of perforations formed in the basket 16 are shown at 20. It will be understood that substantially the entire side wall 17 and the curved portion 22 thereof are perforate. Preferably, the end wall 19 is curved inwardly for defining a dome within the basket 16, as shown.

The axis of the tub 10 and basket 16 is preferably inclined whereby the access opening 14 is rendered more accessible to the operator for loading and unloading the basket. Furthermore, the inclined basket 16 provides for more even distribution of the fabrics in the basket 16 when the spinning or water extracting operation is initiated. Further reference to this operation will be made hereinafter.

Rotation of the basket 16 in a single direction at relatively low speed during the washing cycle and at relatively high speed during the spinning or extracting cycle is provided by a drive mechanism 23 carried by the tub structure 10.

The drive mechanism 23 includes an electric motor 24 that rotates a shaft 25 of the basket 16 through a speed reducing mechanism, generally indicated by the numeral 26. As the specific form of speed reducing mechanism 26 that is employed forms no part of the present invention, it has not been shown in detail for the sake of brevity and clearness. The mechanism 26 includes suitable gearing (not shown) between the motor 23 and the shaft 25 so that the latter may be driven at relatively high and low speeds. The mechanism 26 may be adjusted by an arm 27 for selecting the speeds at which the shaft 25 operates. It will be assumed that the shaft 25 is rotated at relatively low speed for washing when the arm 27 is in the position shown and that the shaft 25 rotates at high speed for spinning when the arm 27 is adjusted to the position shown in broken lines. The arm 27 may be adjusted to its

different positions in any suitable manner, such as, for example, by a treadle 30, disposed adjacent the bottom of the washer and actuated by the foot of the operator.

The drive mechanism 23, as a unit, is supported by the tub structure 10, preferably by the end wall 13 thereof and by suitable brackets 28, secured to the tub structure 10. The shaft 25 is journaled in the drive mechanism 23 and is keyed or otherwise fixed to a hub 29, the latter being secured to the basket 16 within the curved end wall or dome 19. The shaft 25 preferably defines the sole support for the basket. The attachment of the shaft 25 to the basket 16 within the dome 19 provides a point of support for the basket adjacent its center of gravity so that less "whipping" of the basket due to any unbalanced condition is obtained. Accordingly, the strain on the drive mechanism 23 and the shaft 25 journaled therein caused by whipping of the basket is substantially reduced.

Water may be admitted to the tub 10 in any suitable manner such as, for example, by means of a spout 31 overhanging the tub 10 and disposed so that it discharges water through the openings 14 and 21. A conduit 32 connects the spout 31 to a manifold 33 having suitable inlet connections 34 and 35 that are adaptable for connection to sources of hot and cold water, respectively. The normal level of the water in the tub 11 is indicated by the broken line 36.

In accordance with my invention, improved means is provided within the basket for agitating the fabrics in the washing fluid. A plurality of inwardly-extending vanes 37 and 38 are provided within the basket 16 for engaging the fabrics as the basket is rotated. I have shown four vanes within the basket 16 but it will be understood that a larger or smaller number may be provided if desired. The vanes 37 and 38 are carried by the side wall 17, the vanes 38 being disposed in a radial plane and the vanes 37 being angularly or what may be termed helically disposed. It will be noted that the vanes are so arranged that, as they reach the surface of the water, the point of contact with the water is progressively moving in a horizontal direction. It will be understood that the vanes 38 may also be helically formed within the basket in which case the vanes 37 and 38 would be reversely disposed. In other words, the vanes 37 and 38 would define respective segments of right and left hand helices. The vanes 37 and 38 may be formed in any suitable manner, such as, for example, by depressing the metal forming the basket 16, as shown in Fig. 2. The washing action effected by the vanes 37 and 38 will be described in detail hereinafter.

From the foregoing description it will be apparent that the tub 10, the basket 16 and the drive mechanism 23 define a unit construction. Flexible mounting of the unit within a casing structure 41 may be provided in any suitable manner. As shown, a series of flexible supports 42 are circumferentially spaced around the tub structure 10 and support the same from the casing structure 41. Each series of supports 42 may include a pair of springs 43 and 44, one end of each being connected to the tub structure 10 and the other ends being supported by bracket members 45 secured to the casing 41 as best shown in Fig. 2. The method of flexibly supporting the tub 10 is shown by way of example, and it will be understood that other methods may be em-

ployed, the specific form of flexible mounting used forming no part of the present invention.

The casing structure 41 may include a frame 46 having finishing side panels 47 secured thereto. A portion 48 of the front of the casing 41 is inclined, as shown, and provided with an access opening 49 aligned with the openings 14 and 21, the opening 49 being provided with a closure member 51. The closure member 51 may be hinged to the casing 41, as shown at 52, and provided with a handle 53. The closure 51 may be provided with a flexible gasket 51a which engages the portion 48 of the casing peripherally of the opening 49 whereby a fluid tight seal is defined around the opening. An annular seal or bellows 50 may be provided for closing the space between the tub wall 12 and the portion 48 of the casing while permitting relative movement between the tub and the casing. The bellows 50 is formed of flexible material such as, for example, rubber, and is fixed at its ends to the tub wall 12 and casing portion 48 in any well known manner. The nozzle or spout 31 may pass through a suitable opening formed in the side wall of flexible bellows 50 as shown at 50a.

Fluid may be drained from the tub 10 in any suitable manner. Preferably, a pump 54 that is driven by the motor 24 is provided for removing fluid from the tub 16. A conduit 55 connects the tub 15 with the inlet side of the pump 54 and an outlet 56 is provided for the pump 54, which outlet 56 is connected by a suitable conduit, such as a hose (not shown), to a point of discharge. A valve structure 57 may be provided between the tub 16 and the conduit 55, which valve 57 may be opened and closed by a handle 58 disposed exteriorly of the casing 41.

Operation

The articles or fabrics to be washed and a detergent, such as, for example, soap, are first deposited in the basket 16 through the access opening 49 and water is admitted to the tub 10 through the spout 31. The adjusting arm 27 is placed in the "washing" position as shown, wherein slow rotation of the shaft 25 and basket 16 is effected as the motor 24 is energized. The basket 16 is rotated at relatively slow speed in clockwise direction as viewed in Fig. 2.

The submerged fabrics in the bottom of the basket 16 are engaged alternately by the vanes 37 and 38 as they are rotated. When engaged by the vane 38, the fabrics are moved toward the dome 19 in the basket, as diagrammatically shown in Fig. 3. The movement of the fabrics is effected in a rolling manner by the vane 38 which becomes progressively more inclined as it is moved upwardly. As the fabrics engage the dome or end wall 19 of the basket, they are carried upwardly out of the washing fluid by the vane 38 to an upper region of the basket and then slide over the dome 19 as they descend into the fluid. The fabrics may then be engaged by the helical vane 37 and moved toward the left, as diagrammatically shown in Fig. 4, in an unrolling movement or a movement opposite to that effected by the vane 38. The fabrics are elevated by the vane 37 to an upper portion of the basket 16 adjacent the curved wall 22 and are dropped directly into the fluid. This cycle continues during slow speed rotation of the basket.

The washing action described heretofore may be assisted by a scrubbing action by providing a plurality of vanes or ribs 61 on the surface of the dome 19. The ribs 61 may be radially disposed

on the dome 19 as best shown in Figs. 2 and 5. As described heretofore, the fabrics are elevated during the washing cycle by the vane 36 and dropped on the dome 19. The rotating ribs 61 agitate the fabrics as they slide downwardly over the dome 19 so that soils are removed from the fabrics by a scrubbing action. The ribs 61, furthermore, strengthen the dome 19 whereby a more rigid basket structure is provided.

From the foregoing, it will be apparent that the fabrics are agitated in the fluid so that they are alternately moved from one region of the fluid to a second region thereof in a rolling and unrolling manner. Furthermore, during this operation, the fabrics are elevated from the fluid and then dropped therein. This method of agitating the fabrics in the washing fluid thoroughly removes the soils therefrom and prevents packing or knotting of the fabrics.

After the washing operation is completed, the valve 57 is opened and the washing fluid is translated to a point of discharge by means of the pump 54. The fabrics in a wet condition are tumbled in the basket 16 for a short period and, being in a loose or unrolled condition, are readily distributed around the basket 16 during its acceleration. The latter operation is effected by moving the lever 27 to its high speed position.

Rotation of the basket 16 at high speed is effected for centrifugally extracting fluid from the fabrics as is well understood. Vibration of the basket 16 is reduced, substantially, by the more uniform distribution of the fabrics therein when compared to a machine having a horizontal axis basket. This advantage, I obtain in my inclined axis machine in conjunction with the improved washing action which it provides. Furthermore, the shaft 25 is journaled in a portion of the apparatus above the water line, so that no glands or other provisions are necessary for preventing water from leaking past the shaft journal.

Rinsing of the fabrics is carried out in the same manner as the washing operation described heretofore, and at the same speed, except that clear water is usually employed instead of a detergent fluid. During the rinsing operation, the fabrics are agitated in the water for a period of time during which the detergent present in the fabrics diffuses in the rinse water. The rinse water is then removed from the tub and spinning of the fabrics is effected as described heretofore. The fabrics in a damp condition may then be removed from the basket for further drying.

The basket 16 is preferably closely spaced within the tub 10 and generally follows the configuration of the tub, as shown. Accordingly, the major portion of the fluid in the tub 10 is contained within the basket 16 and in contact with the fabrics, whereby the amount of fluid necessary for a washing operation is reduced to a minimum.

The unitary construction of the tub and driving means for the basket readily permits flexible mounting thereof within the casing 41 so that vibrations originating in the basket 16 and transmitted to the casing 41 are substantially reduced.

From the foregoing description, it will be apparent that the driving mechanism 23 is carried by the tub structure 10 and defines the sole support for the basket 16 which is rotatably carried by the driving mechanism. This feature of the invention obviates the necessity of aligning the basket with the drive mechanism where both of these elements are separately supported. Ac-

cordingly, my improved washer may be readily and economically manufactured and serviced.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In cleaning apparatus, the combination of a rotatable basket of generally frusto-conical formation for containing cleaning fluid and the fabrics to be treated, said basket having its axis of angular movement disposed at such an acute angle from the vertical that its major end portion extends above its minor end portion, said major end portion being provided with an opening for affording insertion of articles to be cleaned, a structure generally of frusto-conical configuration for encompassing the basket, said structure and said basket having side wall portions which diverge at substantially the same angle, and means for actuating the basket about said axis at relatively low frequency during cleaning periods and about said axis at relatively high frequency during fluid-extracting periods.

2. In a washing machine, the combination of a generally frusto-conical fluid container, a generally frusto-conical perforate basket disposed within the container for receiving the articles to be washed, said basket having its axis disposed at an acute angle from the vertical so that the bottom surfaces of the basket and container are disposed substantially in horizontal planes and means for actuating the basket about its axis for effecting the washing of the articles contained therein.

3. In apparatus for cleaning fabrics and for extracting cleaning fluid therefrom, the combination of a tub for containing cleaning fluid, a rotatable perforate basket disposed within the tub, said tub and basket each having end walls connected by a side wall which is substantially circular in cross-section and said tub and basket each having an intermediate portion of large diameter, the circumferential side walls of the tub and basket diverging from the end walls to said intermediate portion of large diameter, said basket having its axis of rotation disposed at an acute angle from the vertical during both cleaning and fluid-extracting periods of operation so that said intermediate portions of large diameter of the tub and basket are disposed upwardly with respect to their respective smaller end portions, and means for rotating the basket in a single direction at relatively low speed for agitating the fabrics therein during cleaning periods and subsequently at relatively high speed for extracting fluid from the fabrics.

4. In a washing machine, the combination of a tub for cleansing fluid and having its axis inclined, said tub being generally of frusto-conical formation with its large end provided with an opening, a perforate basket generally of frusto-conical formation for containing fabrics to be washed disposed substantially in concentric relation within the tub, said basket having an opening in the large end thereof registering with the opening in said tub and having its smaller end extending inwardly of the basket and defining a dome therein, a mechanism for rotating the basket and including a shaft ex-

tending into the tub and secured within the dome of said basket, and a series of vanes extending inwardly from the side wall of the basket, adjacent vanes being so angularly disposed with respect to each other on a development of the side wall of the basket, that the angular positions of the vanes with respect to the surface of the water are reversed as the vanes emerge from the water during rotation of the basket, said vanes effecting movement of the fabrics in the water first toward the large end of the basket wherein they are lifted by the vane and dropped in the fluid and then toward the small end of the basket wherein they are lifted and dropped on said dome before being deposited in the fluid.

5. In apparatus for washing fabrics and for extracting fluid therefrom, the combination of a generally frusto-conical tub for containing cleansing fluid and provided with an access opening in its larger end, a generally frusto-conical basket for the fabrics disposed within the tub, said basket having an access opening in the larger end thereof registering with and adjacent to the opening in the tub, the opposite and smaller end of the basket being dished inwardly to provide a central-convex dome within the basket, said tub and basket having respective side walls arranged substantially parallel, agitating means within the basket, a shaft connected to the dished end of the basket and extending exteriorly of the tub, said shaft and basket having a common axis of rotation inclined at an acute angle to the vertical during both washing and fluid extracting periods and the larger diameter portions of the tub and basket being disposed above the smaller, and means for actuating said shaft at relatively low speed for washing the fabrics in the cleansing fluid and at relatively high speed for extracting fluid therefrom.

6. In a washing machine, the combination of a casing having a front wall embodying a lower portion extending substantially vertical and an upper portion inclined rearwardly and upwardly from said lower portion, said upper portion of the front wall of the casing being provided with an access opening, a tub for containing washing water disposed within the casing and formed separately therefrom, said lower and upper portions of the front wall of the casing being joined in a region at least as high as the lowermost portion of the tub, a basket rotatably disposed within the tub structure for containing the apparel to be washed and having its axis of rotation

disposed at an acute angle from the vertical and substantially normal to the plane of the upper portion of the front wall of the casing, said tub and basket being provided with respective access openings in registry, substantially, with the access opening of the casing, and means for rotating the basket about said axis at relatively low speed for washing the fabrics and at relatively high speed for extracting water therefrom.

7. In cleaning apparatus, the combination of a container for cleaning fluid, a basket disposed within the container and having its axis of rotation disposed at an acute angle from the vertical at all times, said basket having front and back substantially circular end walls and a side wall connecting the end walls, said front wall having an opening therein for the insertion and removal of the fabrics to be cleaned, said side wall diverging from the rear wall toward the front wall, the maximum diameter of the side wall having its lowermost point disposed at an elevation at least as high as the lowermost point of the rear wall, a plurality of vanes circumferentially spaced within the side wall and extending from adjacent the back wall toward the front wall, said vanes being so disposed within the side wall and relative the back wall that they carry the fabrics to an elevated region of the basket during rotation thereof and direct the fabrics upon the lower end wall, and means for rotating the basket about said angularly-disposed axis at relatively low speed for cleaning the fabrics and at relatively high speed about said angularly-disposed axis for centrifuging cleaning fluid from the fabrics.

8. In a washing machine, the combination of a casing for containing wash water and having a front surface which is inclined at an acute angle from the vertical, said casing having an access opening provided in said front surface, a basket of circular cross section disposed within the casing and having its axis of revolution extending in a substantially normal direction with respect to said inclined front surface, said basket having an access opening registering with the access opening in the casing and said basket having its circular side wall spaced from the casing so as to define an uninterrupted intervening passageway for the free circulation of water in the casing and means for rotating said basket about its axis at relatively low speed and in a single direction for washing and at a relatively high speed for drying.

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