This invention relates to clothes washing machines, and more particularly, to a liquid distribution means for controlling disposal of liquid employed by the washing operations.

A primary object of our invention is to provide an arrangement in connection with a washing machine by which liquid used in any single washing operation may be saved and re-used, or disposed of to the waste, as desired.

A further object of our invention is to provide a liquid distribution nozzle, by which liquid may be directed in one of two directions at the will of the operator. It is also directed to such a liquid nozzle which may be taken apart for cleaning and reassembled by an inexperienced person, and without the need for tools.

Another object of our invention is directed to the construction of a nozzle for use with a washing machine for selectively returning liquid to the wash basket or discharging it to a waste line, which nozzle is provided with a means for draining leakage liquid.

Still another object of our invention is to provide a nozzle construction permitting return of used washing liquid to the wash basket or disposal thereof to a waste line, which is simple to operate, easy to clean, reliable, relatively inexpensive to manufacture, and which may be furnished in conversion kit form for existing machines.

In accomplishment of the foregoing and other objectives, one of the features of our invention relates to the construction of a liquid distribution means having a body portion connected to an inlet line, such as the discharge hose of a washing machine pump. A nozzle disposed within said body is rotatable to direct, in one rotative position, liquid to the drain; and in a second position, to direct liquid through the nozzle back into the washing basket. The entire nozzle, including its liquid directing end wall can be readily withdrawn from the body for cleaning. A nozzle drain is provided which prevents return of leakage liquid through the nozzle to the clothes basket of the washing machine when it is desired to direct such liquid to the waste.

The features of our invention which we believe to be novel are set forth with particularity in the appended claims. Our invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a side elevation, with portions thereof broken away to illustrate details, of a washing machine embodying our invention;

Fig. 2 is an enlarged perspective view of a liquid distribution nozzle illustrating one of its operating positions; and

Fig. 3 is a similar partial perspective view illustrating the components in another operating position.

Referring to the drawing, we have shown our invention as embodied in an automatic clothes washing machine of the type having an outer enclosing casing I supported on a base pedestal 2 and a top cover 3 provided with an access lid 4 for closing an opening 5 therein. Enclosed within casing I is a rotatable clothes basket 6 having an imperforate bottom wall 7 and an upwardly and outwardly extending side wall 8, terminating at the upper end thereof in an inwardly rolled flange 9. At the portion of basket side wall 8 of maximum diameter, a row of liquid discharge aperture 10 are provided, functioning in the usual manner to discharge liquid from the basket when it is rotated continuously in one direction at a relatively high speed.

Within basket 6 is a suitable washing means, such as an agitator 11 having a plurality of outwardly extending vanes 12 thereon. As is well known in the art, agitator 11 is driven with an oscillatory motion to impart a washing action to clothes and liquid contained within basket 6. A central partition 13 divides the space enclosed by outer casing I into an upper tub forming chamber 14 and a lower mechanism compartment 15. Partition 13 is sealed to the interior walls of the casing in a liquid-tight manner, so that tub 14 is adapted to contain a substantial quantity of washing liquid.

The basket 6 and agitator 11 are driven selectively from means contained within a sealed gear casing 16. Partition 13 is arranged with an enlarged central aperture 17 through which the upper portion of transmission casing 16 extends with a relatively wide tolerance to permit normal gyration of basket 6 during a centrifugal extraction operation. A liquid seal between partition 13 and transmission casing 16 is provided by a flexible corrugated boot 18.

Power for operating basket 6 and agitator 11 is provided by an electric motor or similar driving source 19 supported on a rigid arm 20 secured to transmission casing 16 at 21. Motor 19 drives a bi-directional clutch 22, which functions upon one direction of motor rotation to drive upper sheave 23, and upon reverse rotation to drive a lower sheave 24. Sheave 23 is connected by a belt 25 to an agitator drive pulley 26 forming a part of transmission 16; while lower sheave 24 through belt 27 drives a pulley 28 forming a part of the centrifugal extraction drive mechanism in casing 16. Details of this particular drive and transmission mechanism are not our invention, but are disclosed and claimed in Patent No. 2,639,794 issued to J. W. McNullay assigned to the General Electric Company, assignee of this application. Reference is made to this McNullay patent for a disclosure in greater detail of the construction of bi-directional clutch 22 and the transmission mechanism 16. For the purposes of this application, it is sufficient to point out that upon rotation of motor 19 in one direction, agitator 11 is driven with an oscillatory motion; while upon rotation of motor 19 in the opposite direction, basket 6 is rotated at a relatively high speed for centrifugal extraction.

During normal operation of an automatic washer, such as shown by Fig. 1, clothes to be washed and a charge of washing liquid are placed within basket 6. Upon conclusion of the washing operation, as performed by agitator 11, the entire basket is rotated at a high speed upon which the washing liquid climbs the tapering walls 8 and passes into tub 14 through apertures 10.

Suitable means must be provided, of course, for disposal of used wash liquid extracted from basket 6 into tub 14. For this purpose a suitable pump, such as a centrifugal pump 29 is employed, and is driven directly from a shaft extension 30 from motor 19. The intake for this pump is connected to an opening 31 in tub 14 by a flexible hose or boot 32. In accordance with this particular application, it is contemplated that pump 29 will be effective to produce a discharge head only upon one direction of rotation, such as the direction of rota-
tion of motor 19 corresponding to oscillation of agitator 12. For the construction of such a uni-directional pump, reference is made to Patent 2,570,862, dated October 9, 1951, issued to Rosenkrans et al., and assigned to the General Electric Company, assignee of this application. Also, a different form of such a uni-directional pump is disclosed and claimed in the pending application of Carl R. Sebok, Serial No. 156,802, filed April 19, 1950, now Patent 2,680,409, issued June 8, 1954 and assigned also to the General Electric Company.

As shown by Fig. 1, a pump discharge pipe 33 has connected thereto an elbow 34, which in turn is connected to a short section of pipe 35 anchored to and passing through bottom wall 15 of the tub. A conduit or pipe 36 extends upwardly to our improved water distribution means indicated generally at 37.

The function of this distribution nozzle is to permit the operator to select whether the used liquid discharged into tub 14 is to be returned to basket 6 for re-use in another washing operation, or is to be discharged through a waste line or hose 38 terminating in an angularly formed pipe 39, which conveniently may be hooked over the edge of a tub or discharge pipe leading to the sewer system.

Referring now to Fig. 2, illustrating an enlarged view of the water distribution means 37, we have shown the device in an operative position for discharge of liquid back into basket 6. This device consists of two separate parts which can be assembled together, or removed for cleaning. One of these parts is the body member 40 while the other component is nozzle 41. Referring specifically to the construction of body 40, it is of generally tubular cross section and is formed with an inlet conduit 42 and an outlet pipe 43. For mounting purposes, such as on the casing 1 of a washing machine, we prefer to include as a part of the body member an attaching plate 44 provided with a plurality of holes 45 for reception of attaching means. The nozzle end of the body member, that is the end thereof opposite discharge conduit 43, has on the top thereof an axial slot 46 leading into a transverse slot 47 extending around approximately one-half the circumference of the body member.

The nozzle 41, likewise is of a tubular configuration and of an outside diameter approaching the inside diameter of body 40, whereby an end of the nozzle may slide into the nozzle end of body member 40. To position properly nozzle 41 within body 40, an operating knob 48 is secured to the nozzle, which knob may be moved inwardly in the body through slot 46 and which may be rotated with respect to the body through slot 47. While the outer end of nozzle 41 is open for discharge purposes, we provide an end wall 49 closing the portion of the nozzle which is enclosed within body 40. As clearly shown by Figs. 2 and 3, end wall 49 is arranged with an axially extending portion 50. In transverse alignment with this axially extending portion of end wall 49, an inlet aperture 51 is provided, which is adapted, with the components in the Fig. 2 position, to be aligned with the body inlet 42. This aperture is on the extreme left-hand side as shown. Liquid may enter through the body conduit 42, pass into the nozzle through aperture 51 and be directed by end wall 49 toward the outlet 52 of the nozzle. In the Fig. 2 position, flow to body outlet 43 is prevented by end wall 49.

In Fig. 2 there is shown the positions of the components when knob 48 has been rotated from the full line position of Fig. 2 180 degrees to the the Fig. 3 position. As shown, such movement of knob 48 rotates nozzle 41 substantially 180°, whereupon the nozzle inlet aperture 51 is in alignment with the body inlet opening 42. Furthermore, the axially extending portion 50 of nozzle end wall 49 now directs liquid entering passage 42 to the right whereupon it is discharged through outlet opening 43 into hose 38 as shown by Fig. 1.

It is to be understood that with normal manufacturing tolerances, there is an appreciable clearance between the outside diameter of nozzle 41 and the inside diameter of the body 40. Hence, a slight amount of leakage along the outside of the nozzle must be anticipated. When the nozzle is in the Fig. 2 position, little if any harm is done by leakage of a small amount of liquid toward body outlet 43, since such outlet extends to the drain. However, with the components in the Fig. 3 position, such leakage along the outside of nozzle 41 permits entrance of the leakage liquid through aperture 51, so that under normal circumstances such leakage liquid would be discharged from end 52 of the nozzle and would drip into basket 6. Obviously, this is undesirable since it was intended by the operator that all of the used liquid be discharged and that none of the liquid be returned to basket 6 to contaminate clean clothes which may remain therein.

To obviate this condition, a small aperture 53 is bored through the side wall of nozzle 41 and an aligned aperture 54 is provided in body member 40 with knob 48 in the Fig. 3 position. The nozzle assembly is so oriented with respect to basket 6 that these aligned discharge apertures 53 and 54 direct such leakage liquid back into tub 14 rather than into basket 6.

A typical operational cycle utilizing this invention may take place along the following lines. Clothes, washing liquid, and a suitable detergent are placed in basket 6 and motor 19 is energized to cause oscillation of agitator 11. The washing action continues for the desired length of time, after which the connections to motor 19 are reversed in any convenient manner to cause basket 6 to be rotated at centrifuging speed. All of the water contained within the basket and most of the water contained in the clothes is expelled from the basket through apertures 10 and is collected in tub 14. Preferably pump 29 is so constructed that it produces substantially no liquid discharge head upon rotation of the motor in the centrifuging direction. Therefore, substantially all of the water discharged remains in tub 14 until the direction of rotation of motor 19 is reversed to provide washing action through oscillation of agitator 11. Prior to resuming agitation, the operator can elect either to discharge the used washing liquid through hose 38 to the drain, or to return the washing liquid back to basket 6 for re-use. If the second alternative is chosen, the washed clothes are removed from the basket and set aside to await a subsequent rinsing operation. A second batch of soiled clothes is placed within basket 6 and knob 48 is moved to the Fig. 2 position. As soon as motor 19 is started with rotation in the agitate direction, pump 29 is effective to return the water from tub 14 to basket 6, thus permitting re-use of the hot soapy washing solution. Whenever it is desired to dispose of the washing solution, it is necessary merely for the operator to move knob 48 to its extreme right-hand position, as shown by Fig. 3, and energize the motor for rotation in the agitate direction. The pump is then effective to remove the water from tub 14 and the position of the nozzle member is effective to direct the discharged water through opening 43 to a drain hose 38.

Cleaning of this device may be performed easily at any time, merely by moving knob 48 to an intermediate position, whereupon the entire nozzle may be moved axially from its position within body 40.

While our invention has been described by reference to a particular embodiment thereof, it is to be understood that numerous modifications may be made by those skilled in the art without actually departing from the invention. We, therefore, aim in the appended claims to cover all such equivalent variations as come within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is: 1. In a clothes washing machine, a liquid distributor comprising a body member having a cylindrical portion with inlet and outlet openings therein, a nozzle having a cylindrical portion rotatable within said body cylindrical...
portion and an end wall closing said cylindrical nozzle portion, a manually operable control knob for said nozzle, said body member being transversely slotted and axially slotted from one end thereof to receive said control knob for removably positioning said nozzle within said body member, the engagement of said control knob with the transverse slot in said body member comprising the sole means for retaining said nozzle within said body member, an intermediate portion of said end wall extending in an axial direction, an inlet aperture in said nozzle cylindrical portion and located axially in alignment with the axially extending portion of said end wall, said nozzle inlet aperture being adapted to be aligned with said body inlet opening in one rotative position thereof, whereby liquid flow into said body inlet opening is discharged from the end of said nozzle opposite said end wall, said end wall directing liquid to said body outlet opening when said nozzle is rotated to a second position and preventing flow into said nozzle, and liquid drain means for said nozzle effective when discharge is directed to said body outlet opening to drain any leakage liquid from said nozzle without discharge through said nozzle.

2. In a clothes washer of the type having a wash basket within an outer tub and pump means connected to said tub with an outlet conduit extending therefrom, a liquid distributor for said outlet conduit by which liquid may be returned to said basket or expelled to the waste selectively, said distributor being disposed within said tub and comprising a body member connected to said conduit, an outlet from said body for discharge of waste liquid, a nozzle rotatably positioned within said body member and having an end wall extending axially and transversely and effective in one rotative position to direct liquid from said conduit to said body outlet, an inlet aperture in said nozzle adjacent said end wall adapted to be aligned with said conduit, in which position said end wall directs liquid from said conduit through said nozzle into said basket, a manually operable control member for said nozzle, means defining an axial slot from one end and a connected transverse slot in said body member to receive said control member for removably and rotatably positioning said nozzle within said body member, the engagement of said control knob with said transverse slot in said body member comprising the sole means for retaining said nozzle within said body member and nozzle drain means effective when discharge is through said body outlet for directing leakage liquid from said nozzle into said tub without discharge through said nozzle.

3. In a clothes washing machine, a liquid distributor comprising a body member having a cylindrical portion with inlet and outlet openings therein, a nozzle having a cylindrical portion rotatable within said body cylindrical portion and an end wall closing said cylindrical nozzle portion, a manually operable control knob for said nozzle, said body member being transversely slotted and axially slotted from one end thereof to receive said control knob for removably positioning said nozzle within said body member, the engagement of said control knob with the transverse slot in said body member comprising the sole means for retaining said nozzle within said body member, an intermediate portion of said end wall extending in an axial direction, an inlet aperture in said nozzle cylindrical portion and located axially in alignment with the axially extending portion of said end wall, said nozzle inlet aperture being adapted to be aligned with said body inlet opening in one rotative position thereof, whereby liquid flow into said body inlet opening is discharged from the end of said nozzle opposite said end wall, said end wall directing liquid to said body outlet opening when said nozzle is rotated to a second position and preventing flow into said nozzle, and liquid drain means for said nozzle effective when discharge is directed to said body outlet opening to drain any leakage liquid from said nozzle without discharge through said nozzle.