United States Patent

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[54] **LIQUID DISCHARGE DEVICE**

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[52] **U.S. Cl.** **137/562,** 285/179

[51] **Int. Cl.** **F16l 39/00**

[58] **Field of Search** 285/177, 179, 183; 137/562, 137/801

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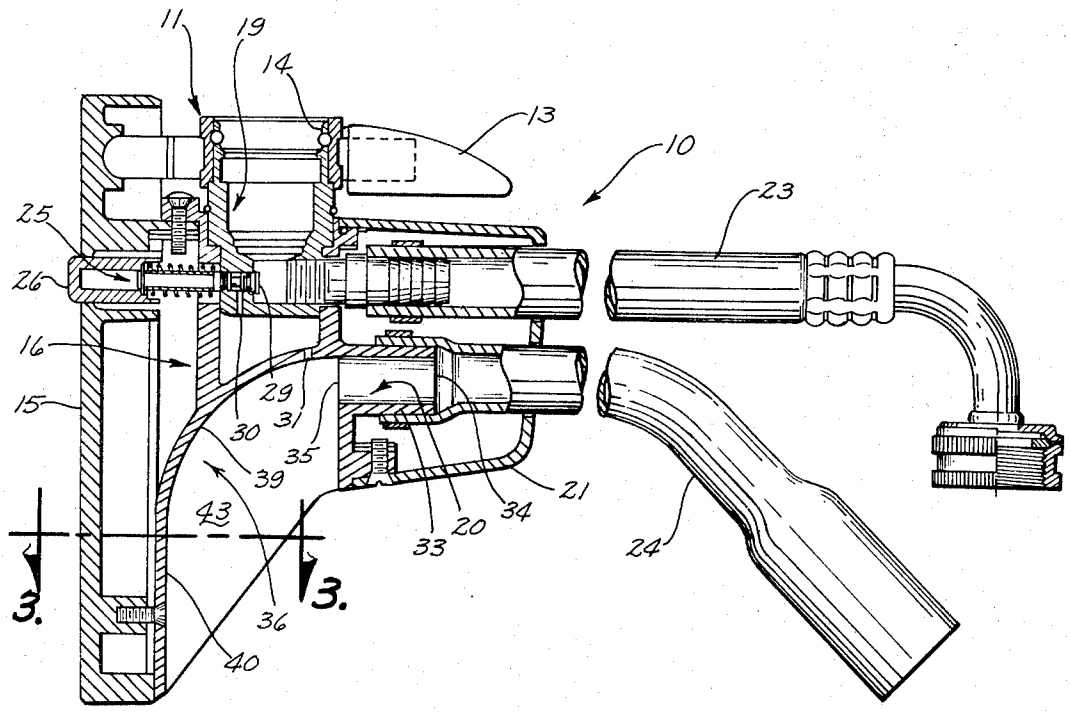
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[57] **ABSTRACT**

A coupler assembly for a portable washing machine includes a fluid deflecting surface adjacent to the outlet of the drain conduit for spreading the fluid into an energy-dissipating flow, such as a fan-like flow pattern, to reduce and substantially eliminate the objectionable splash of the high pressure fluid flow into a sink.

13 Claims, 7 Drawing Figures



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SHEET 1 OF 2

Fig. 1

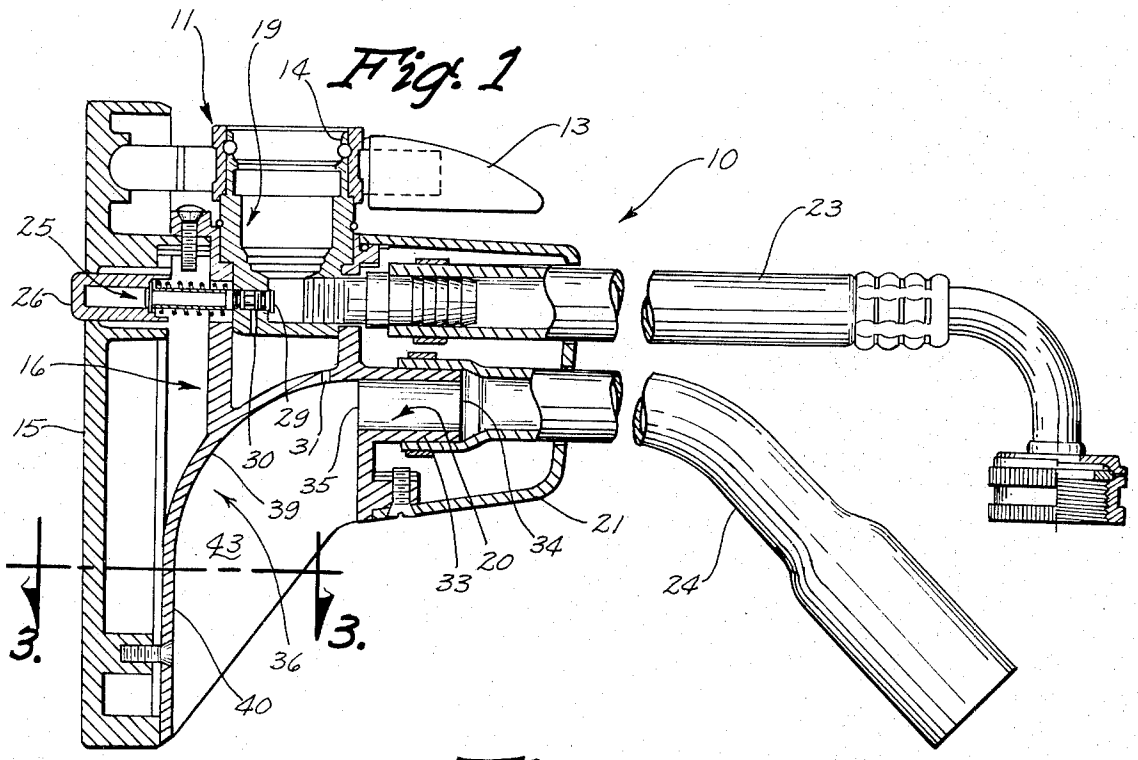


Fig. 2

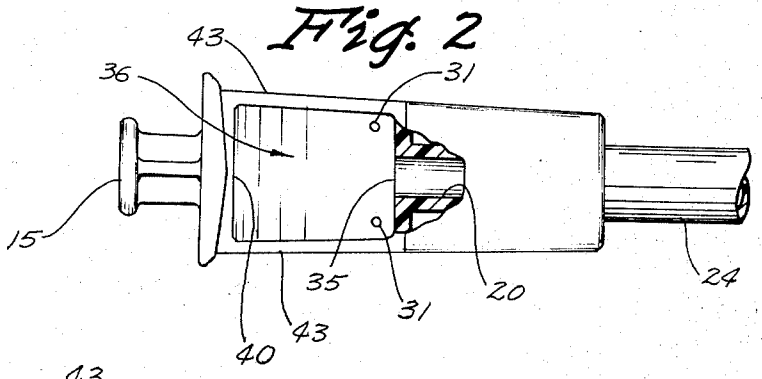
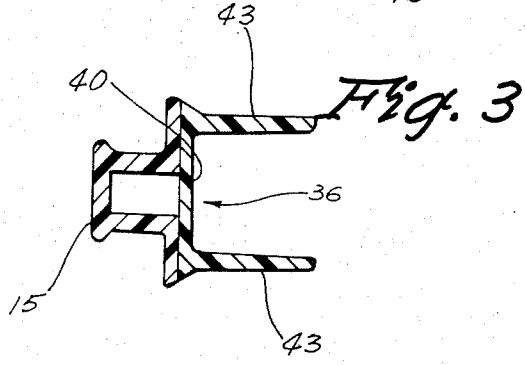


Fig. 3



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Fig. 4

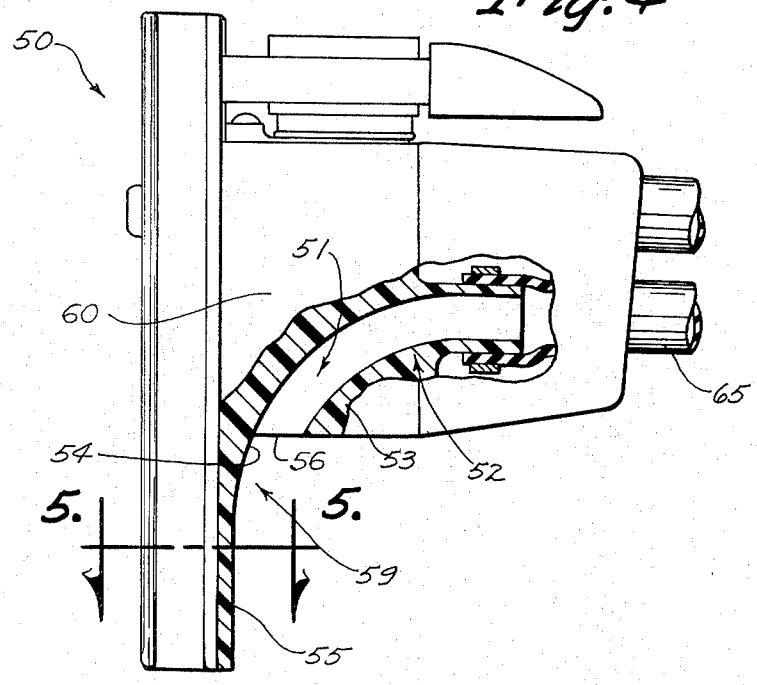


Fig. 5

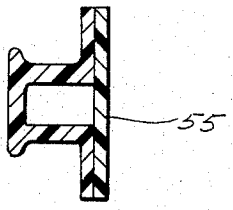


Fig. 6

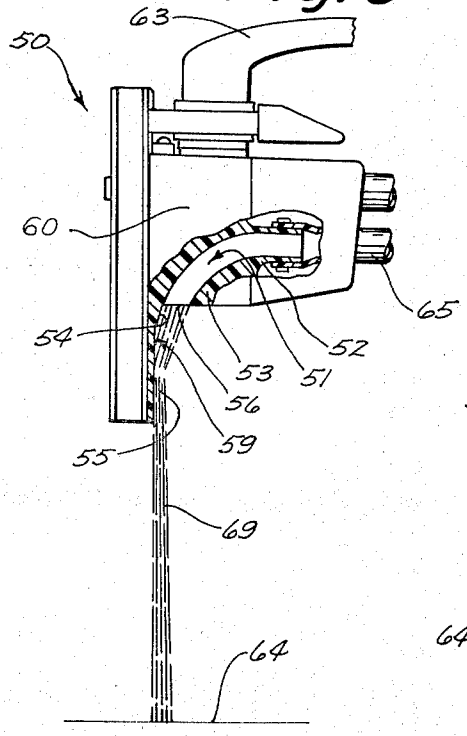
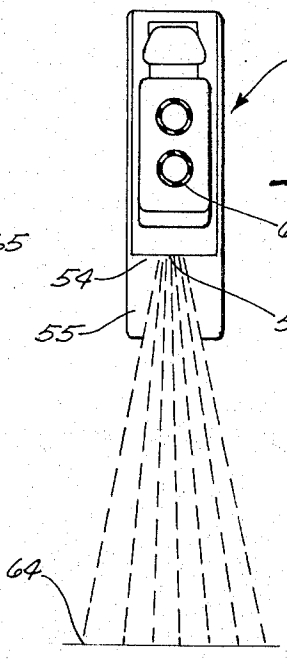


Fig. 7



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LIQUID DISCHARGE DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to fluid handling devices and more particularly to an improved fluid discharge device for directing fluid from a portable washing machine into a receptacle.

2. Description of the Prior Art

A fluid discharge device of the type described in this application is particularly adapted for use with a portable washing machine in combination with a kitchen sink. Such discharge devices are usually supported from a water faucet disposed above the sink and are combined with means to connect the washing machine to the faucet so that water may be transmitted from the faucet to the washing machine.

One problem often created with a discharge device supported above a sink is that the discharge fluid splashes as it strikes the sink since the rate of flow from the device is moderately high in order to drain the washing machine within a reasonable length of time. Various devices have been proposed to minimize the splashing. The most commonly used have been the aerator-type devices that tend to reduce the energy level of the fluid as it leaves the discharge devices. These arrangements, however, have one obvious drawback in the form of a screen-like element that tends to become clogged by the soil or lint particles in the fluid.

The problem of splashing could also be reduced by decreasing the fluid flow but this conflicts with the desirability of maintaining a high discharge rate to conserve cycle time.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an improved fluid discharge device operable for discharging fluid from a washing machine having a high pump-out rate into a receptacle without excessive splashing.

It is a further object of this invention to provide a fluid discharge device for a portable washing machine and having means for reducing the energy of the discharge stream without decreasing the flow rate or without use of flow restricting devices in the discharge conduit.

It is a still further object of the instant invention to provide fluid deflecting means operable for effecting a fan-like flow of fluid from the discharge device of a portable washing machine into a receptacle such as a sink.

The instant invention achieves these objects in a fluid discharge device for a portable washing machine by providing deflecting means juxtaposed to the outlet of a fluid passageway and defined by a housing supported above a receptacle. The deflecting means effectively spreads the effluent from the passageway outlet into an energy-dissipating flow directed into a receptacle such as a sink without excessive splashing.

Operation of the device and further objects and advantages thereof will become evident as the description proceeds and from an examination of the accompanying two sheets of drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings illustrate preferred embodiments of the invention with similar numerals referring to similar parts throughout the several views, wherein:

FIG. 1 is a view of a coupler assembly for a portable dishwashing machine wherein the coupler assembly is partially broken away and sectioned and incorporates the instant invention;

FIG. 2 is a generally bottom view of the coupler assembly of FIG. 1;

FIG. 3 is a sectional view of the coupler assembly of FIG. 1 as taken along lines 3—3 thereof;

FIG. 4 is a view of a coupler assembly partially broken away and incorporating an alternate embodiment of the instant invention;

FIG. 5 is a sectional view of the coupler assembly of FIG. 4 as taken along lines 5—5 thereof;

FIG. 6 is a view of the coupler assembly of FIG. 4 in operation and showing, schematically, flow of fluid therefrom; and

FIG. 7 is another view showing the fluid flow from the coupler assembly of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown a coupler assembly 10 having a quick-connect mechanism 11 including a lever-action handle 13 manually operable to connect the coupler assembly 10 to a water faucet outlet. The connector 14 receives and is releasably connected to the faucet outlet whereby the coupler assembly 10 is supported by the faucet in a position disposed above a sink.

The coupler assembly 10 includes a handle grip 15, a plurality of individual components comprising collectively housing means 16 defining first and second passageways 19 and 20 through the coupler assembly 10 and an enclosure member 21. The first passageway 19 accommodates the flow of water from the faucet to an inlet hose 23 connected in turn to the washing machine while the second passageway 20 conducts used washing liquid from the drain hose 24 of the washing machine. The enclosure member 21 covers the connection of the inlet fill hose 23 and the drain hose 24 to the first and second passageways 19 and 20, respectively. A pressure release mechanism 25 for the first passageway 19 includes a manually operable button 26 for moving a valve 29 to vent the pressure in the inlet passageway 19 through the holes 30 and 31.

The second passageway 20 defined by the housing means 16 in the embodiment of FIG. 1 is in the form of a short length of substantially straight horizontal conduit 33. The inlet 34 of the conduit 33 is connected to the outlet of the washing machine or, more specifically, to the drain hose 24 of the machine. The conduit 33 terminates at a substantially horizontally directed outlet 35. On the downstream side of the conduit outlet 35, the housing means 16 defines fluid control means comprising a fluid deflecting surface 36 in the path of the effluent from the outlet 35 of the passageway 20 for redirecting the fluid into a sink.

The fluid deflecting surface 36 includes an arcuate portion 39 extending from the outlet 35 through an approximately 90° arc and therefore at least partially fac-

ing the effluent from the outlet and further includes a substantially plane vertical portion **40** for redirecting the fluid from the generally horizontal direction of the passageway **20** to a generally downward direction. The fluid deflector surface **36** is generally flat in the direction transverse to the flow as shown best by the section view of FIG. **3** taken with the section view of FIG. **1**. The flat fluid deflecting surface **36** is wider than the conduit **33** and thus permits the effluent to flatten out or to spread out on the surface as it flows from the outlet **35** toward the lowermost portion of the coupler. The arcuate fluid deflector surface **39** and the plane fluid deflector surface **40** thus comprise a smooth unbroken surface extending from the outlet **35** to the lowermost portion of the coupler assembly **10** and are cooperable for gradually redirecting and for spreading the effluent into an energy-dissipating fan-like flow directed into the sink, as will be more fully shown hereinafter, while at least partially retaining some of the characteristics of laminar flow.

FIGS. **1** through **3** also show a pair of sidewalls **43** extending along the arcuate and plane fluid deflecting surfaces **39** and **40** from the passageway outlet **35** to the edge of the coupler **10** to define a generally inverted or downwardly opening channel when the coupler assembly **10** is attached to a faucet as in FIG. **1**. The walls **43** are effective for at least partially retaining the fluid during the flow from the outlet **35** to the end of the fluid deflector surface **36**.

Briefly, the coupler assembly **10** shown in FIG. **1**, and comprising a preferred embodiment of the instant invention, is operable for redirecting fluid from the outlet **35** in a direction disposed ninety degrees to the axis of the passageway **20** and for spreading out the fluid to produce an energy-dissipating non-splashing flow of fluid into the sink.

An alternate embodiment of the instant invention is included in the coupling assembly **50** of FIGS. **4–7**. The coupling assembly **50** is similar to that shown in FIGS. **1–3** except that the second passageway **51** defined by the fluid conduit **52** includes a curved portion **53** for at least partially directing the fluid in a downwardly direction.

As in the embodiment of FIGS. **1–3**, an arcuate fluid deflecting surface portion **54** and a generally plane fluid deflecting surface portion **55** extend from the outlet **56** to the end of the coupling **50** for spreading the effluent from the outlet **56**. The fluid deflecting surface **59** including the arcuate portion **54** and plane portion **55** is flat in the direction transverse to the direction of flow, as indicated in FIG. **5**, and is positioned in the path of the effluent for directing the fluid downwardly and for spreading the fluid into a fan-like energy-dissipating flow into the sink. FIG. **5** also clearly shows the absence of sidewalls along the fluid deflecting surface **59** as compared to the embodiment of FIGS. **1–3**.

The fabrication of the housing means **60** including the arcuate passageway **51** as best shown in FIG. **4** includes use of a special core retractable along an arcuate path. The housing means **16** for the embodiment of FIGS. **1–3** may be formed without use of such an arcuately movable core.

Operation of the invention as embodied in FIGS. **4** and **5** is more completely shown by reference to the views of FIGS. **6** and **7**. These views specifically show the operation of the device of FIGS. **4** and **5** as well as showing the general mode of operation of the embodiment of FIGS. **1** through **3**.

Referring to FIG. **6**, the coupler assembly **50** is shown attached to a faucet **63** above a sink having a bottom wall **64**. As previously indicated, the conduit **52** is connected to the drain hose **65** that is connected in turn to the dishwasher pump outlet. The used washing liquid is pumped through the drain hose **65** and in turn through the passageway **59** under pressure. The fluid is turned partially downwardly by the arcuate portion **53** of the conduit **52** so that the effluent strikes the arcuate deflecting surface **54** and then the plane deflecting surface **55** to effectively change the direction of the fluid flow and to effect a spreading or fanning out of the fluid. The specific pattern of the fluid flow between coupler **50** and the bottom wall **64** of the sink is shown in FIGS. **6** and **7**. The flow is a relatively thin web **69** in FIG. **6** but has an increasing width as in FIG. **7**. It has been found that this flow substantially eliminates excessive splashing out of the sink and onto the adjacent walls and countertop.

The specific fluid flow pattern and operation for the embodiment of FIGS. **1–3** is similar but not identical because the sidewalls **43** tend to retain the fluid in a tighter pattern for a longer period of time. The pattern of liquid between the coupling **10** and the sink has a relatively thin section as in FIG. **6** and exhibits somewhat less fanning-out but may nevertheless be considered as fan-like as compared to the diameter of the fluid conduit.

This invention, as embodied in the coupler assemblies **10** and **50** shown in FIGS. **1** through **3** and FIGS. **4** through **7**, is operable for substantially eliminating objectionable splash by achieving a "soft discharge" of fluid from an outlet **35** or **56** into a receptacle such as a sink. This "soft discharge" is achieved for a high discharge rate by converting the jet of liquid into a fan of moderately fine spray so that its energy is rapidly dissipated due to the eddies set up in the air as the droplets of water move with high velocity from the coupler toward the sink.

In the foregoing drawings and specification, there has been set forth a preferred embodiment of the invention and, although specific terms are employed, these are used in a generic and descriptive sense only and not for purposes of limitation. Changes in form and the proportion of parts as well as the substitution of equivalents are contemplated as circumstances may suggest or render expedient without departing from the spirit or scope of this invention.

I claim:

1. A liquid discharge device for directing liquid from an automatic washing machine drain line into an upwardly open receptacle, the combination comprising: housing means defining a liquid passageway having an inlet connectable with the drain line of said automatic washing machine and having an outlet for liquid discharge; means connected to said housing means for supporting said housing means generally above said receptacle; and liquid deflecting means including an open inverted chute defined at least in part by said housing means and juxtaposed to the outlet of said passageway, said chute comprising a deflecting surface at least partially open to the atmosphere and disposed

effectively at a gradually increasing acute angle to the direction of flow from said outlet for gradually redirecting and spreading the effluent from said passageway outlet into a generally unrestricted energy dissipating flow directed into said receptacle.

2. A liquid discharge device as defined in claim 1 wherein said liquid deflecting surface is generally open toward the atmosphere for substantially the full length thereof for spreading the effluent into a generally fan-like flow directed into said receptacle without otherwise restricting the flow.

3. A liquid discharge device as defined in claim 2 wherein the angle between said liquid deflecting surface and the direction of flow at said passageway outlet gradually increases with increased distance from said outlet to an angle of approximately 90°.

4. A liquid discharge device as defined in claim 2 wherein said liquid deflecting surface comprises an arcuate portion for changing the general direction of flow and a liquid spreading portion for effecting said fan-like flow.

5. A liquid discharge device as defined in claim 2 wherein said liquid deflecting means extends from said outlet and has a transverse width greater than the diameter of said passageway and terminates in a generally flat portion disposed at a substantially right angle to said passageway for effectively redirecting the effluent from said passageway outlet into said receptacle in said fan-like flow.

6. A liquid discharge device as defined in claim 5 wherein sidewall means is associated with said liquid deflecting surface and forms a downwardly open channel-shaped chute for partially confining the liquid flow from the passageway outlet to substantially the end of said liquid deflecting surface.

7. A liquid discharge device for directing liquid from an automatic washing machine drain line into an upwardly open receptacle, the combination comprising: housing means defining a liquid passageway having an inlet connectable with the drain line of said automatic washing machine and having an outlet for liquid discharge; means connected to said housing means for supporting said housing means generally above said receptacle; and liquid deflecting means defined at least in part by said housing means extending from the outlet of said passageway and including an open inverted chute comprising a liquid deflecting surface enlarged transversely to the direction of flow and at least partially open to the atmosphere, said liquid deflecting surface being disposed effectively at a gradually increasing acute angle to the direction of flow from said passageway outlet thereby at least partially facing the effluent from said passageway outlet for gradually redirecting and spreading said effluent into a fan-like flow directed into said receptacle.

8. A liquid discharge device as defined in claim 7 wherein said transversely enlarged surface is generally flat in the transverse direction.

9. A liquid discharge device as defined in claim 8 wherein said passageway is substantially straight and said liquid deflecting surface includes a portion disposed at approximately 90° from the axis of said passageway and is joined to the outlet of said passageway by a smooth arcuate portion.

10. A coupler assembly to connect an automatic washer to a water faucet disposed above a sink, the combination, comprising: housing means defining first and second liquid passageways; means connected to said housing means for connecting said housing means to said faucet, said first passageway including a liquid ingress communicating with said faucet and an egress connectable with said automatic washer for conducting fill water to said washer, said second passageway including an inlet connected with a drain line of said automatic washer and an outlet for discharging used washing liquid pumped from said washer; and liquid control means juxtaposed to the outlet of said second passageway including an open inverted chute defined at least in part by said housing, said chute comprising a liquid deflecting surface generally flat in a direction transverse to the flow and disposed effectively at a gradually increasing acute angle to the direction of flow from said outlet and at least partially open to the atmosphere for gradually redirecting and spreading the effluent from the outlet of said passageway into a fan-like flow directed into said sink in a generally unrestricted energy-dissipating manner.

11. A coupler assembly as defined in claim 10 wherein said liquid control means includes a terminal portion disposed at a substantially right angle to the inlet of said second passageway.

12. A coupler assembly as defined in claim 11 and further including arcuate means between the inlet of said second passageway and the portion of said liquid deflecting surface disposed at a right angle for gradually changing the direction of fluid flow and cooperable with said right angle surface for effecting a generally non-splashing discharge of liquid into said sink.

13. A coupler assembly as defined in claim 12 wherein the means for gradually changing the direction of liquid flow is formed as a smooth curve generally flat in the transverse direction and extending through an arcuate portion of approximately 90°.

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