A siphon break for use in a water supply system having a feed hose and a hose forming a water trap which water trap discharges into a washing chamber of an appliance characterized by the siphon break having a housing with an inlet fitting and a wall surrounding the inlet fitting and spaced therefrom by a plurality of integral fins. The housing has a center baffle with an aperture spaced from the end of the fitting with the aperture in alignment therewith. To prevent splashing water from passing through the aperture and from interfering with the flow therethrough, the baffle is provided with a lip facing away from the fitting which lip coacts with the configuration of the baffle to divert or deflect water spray into a path extending parallel to the flow of water through the aperture. To prevent water which strikes the baffle from splashing out of the housing, the siphon break includes a cylindrical cap surrounding the fitting and having two rows of spaced individual baffles which are arranged with one row overlying the spaces between the baffles of other rows to provide a tortuous or labyrinth path for any water spray. Preferably, the fitting is provided with flow straighteners such as internal fins to improve flow and minimize water splashing.

20 Claims, 4 Drawing Figures
SIPHON BREAK AND DIVERTER FOR AN APPLIANCE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is directed to a siphon break particularly useful in an inlet water supply system for a home appliance such as a washing machine.

2. Prior Art

When a home appliance such as a washing machine is connected directly into a potable water supply system of a building, plumbing codes have required the provision of a vacuum or siphon break in the device to prevent cross connection of the water in the washing chamber to the potable supply. The cross connection can be caused by a suction in the potable water system which can cause siphoning of the water in the appliance into the potable water supply. Vacuum or siphon breaks utilize the provision of an air gap in the flow path of the inlet water which comes from the potable water supply. Various types of devices have been utilized in providing a vacuum break, and U.S. Pat. No. 1,954,105 entitled "Faucet Connection," U.S. Pat. No. 3,346,003 entitled "Water Supply Mechanism for Washing Machine," and U.S. Pat. No. 3,578,016 entitled "Antisiphon Fluid Inlet Means," disclose embodiments of such devices. In many instances, a water trap or U-tube arrangement is associated with the outlet of the vacuum break to prevent excess suds from entering and clogging or contaminating the vacuum break. The aforementioned U.S. Pat. No. 3,346,003 is one example of such an arrangement; and U.S. Pat. No. 3,335,584 entitled "Clothes Washer Fluid Distributing and Filling Device" is another example.

In existing designs for vacuum or siphon breaks, particularly those utilized with a water trap, the spray of water across the air gap creates splashing which is undesirable. The provision of a center baffle between the water trap and the water inlet of the siphon break has been suggested to limit the splashing. However, the flow of water from the inlet striking the baffle will cause undesirable splashing and the splashing of the water in the trap against the undersurface of the baffle can disturb the flow characteristics of the water through the aperture of the baffle to create additional splashing.

SUMMARY OF THE INVENTION

The present invention is directed to a vacuum or siphon break having a diverter which prevents undesirable splashing. To accomplish this feature, the siphon break has a housing with a wall surrounding a fitting adapted for connection to a feed hose of the water supply system which wall is spaced from the fitting by positioning means such as support members, the housing has a center baffle disposed in spaced relationship to an end of the inlet fitting and the baffle has an aperture in alignment therewith, the wall has at least one opening adjacent the side of the baffle facing the inlet fitting, and a cap, which surrounds the fitting, having a plurality of individual and spaced baffles arranged in at least two rows with the baffles of one row being disposed over the spaces between the baffles of the other row to present a labyrinth path for the water splashing up from the center baffle. Preferably, the internal passage of the fitting has means for straightening the flow through and the center baffle has an annular lip around the aperture which lip extends away from the fitting to divert or deflect water splashing against the center baffle into a path extending parallel to and codirectional with the flow through the aperture.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a portable automatic washing machine with portions broken away for purposes of illustration which washing machine is an example of a portable appliance for which the siphon break of the present invention is particularly adapted;

FIG. 2 is a plan view of the siphon break of the present invention;

FIG. 3 is an enlarged view of a portion of the water inlet system with the siphon break being in cross section taken on line III—III of FIG. 2; and

FIG. 4 is a perspective view of the cap of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The principles of the present invention are particularly useful for providing a siphon break generally indicated at 7 (FIG. 3) for fluid passage means here shown as a water inlet system generally indicated at 8 for a portable appliance having a washing chamber. While the siphon break or vacuum break of the present invention may be used on various appliances having a washing chamber, it is particularly useful in a portable automatic washing machine generally indicated at 9 and diagrammatically shown in FIG. 1.

The automatic washing machine 9 has a tub 10 which receives a clothes container or spin basket 11. An agitator 12 is disposed in the spin basket 11 and mounted for oscillating movement with respect thereto and for spinning movement with the basket upon the extraction of water from the clothes in the basket. The tub 10, the spin basket 11 and the agitator 12 and the drive mechanism therefore are enclosed in a cabinet 13.

The cabinet 13 is shown as being generally rectangular in form having a front wall 14a, a pair of side walls 14b, 14c, and a back wall 14d which walls are detachably mounted on an upright flange 15 of a base 16 as by screws 17. The screws 17 may be self-tapping screws of conventional form and extend through walls 14b, 14c, and 14d and flange 15 to detachably secure the cabinet 13 to the base 16. The cabinet 13 also includes a top 19 having a hinged lid 20 openable to afford access to the clothes receiving opening 21 in a tub ring 22 extending about the tub and over a corresponding opening in the spin basket 11. The cabinet 13 has a timer dial 23 connected to a timer 24 and mounted on a front wall 14c of the cabinet beneath the top 19. Suitable wiring 25 connects the timer 24 to a motor 26 and other electrically operated devices of the machine. The timer dial 23 and timer 24 may be in any desired location and are shown in this present location for illustrative purposes only.

Supported above the cabinet base 16 on vibration dampening spring and rod assemblies 27 is a base plate 28 forming a support for the tub 10, basket 11 and agitator 12 in a conventional manner. The base plate 28 may be suitably supported on any vibrational dampening spring assembly which provides support for the base plate 28 from the cabinet base 16 and which absorbs vibrations during spinning movement of the spin basket.
The base plate 28 also forms a support for the motor 26 and a drive control mechanism or transmission generally indicated by reference 29 which may also include a clutch and control mechanism, as well as a drive mechanism for oscillately driving the agitator 12 or spinning the spin basket 11 and releasing the agitator to freely spin with the spin basket.

A pump 30 for removing wash or rinse water from the tub 10 at the termination of a washing or rinsing operation is also supported to depend from the base plate 28 and is connected to an adapter or coupler 31 by a drain hose 32 which extends out of an opening 33 in the back wall 14c of the cabinet 13. The adapter or coupler 31 is provided with a drain outlet which is not shown. It should be understood that the motor 26, drive control mechanism 29 and pump 30 may be mounted in any convenient manner between the cabinet base 16 and the base plate 28 and need not necessarily depend from the base plate 28 as shown.

The cabinet 13 also includes means mounting a suitable water inlet valve 34 of a conventional construction. The valve 34 is a portion of the water inlet system and supplies the tub 10 with water received by hose 35 which extends through the opening 33 to the adapter 31 which in turn is illustrated as connected to a source of water such as the faucet 36 of a sink 37. The water inlet valve 34 is connected through a feed hose 38 that extends to the siphon break 7 which is mounted on a flange 39 (FIG. 2) on the side wall 14b and discharges into an outlet hose 40 which terminates in an inlet nozzle 41 adjacent to and part of the tub ring 22. The flange 39 may advantageously be formed of sheet metal.

As best illustrated in FIG. 3, the siphon break 7 has a housing 50 with a cylindrical wall 51 which has a center baffle 52 provided with an opening or aperture 53. The center baffle 52 subdivides the cavity formed by the wall 51 into a first or upper cavity portion 54 and a second or lower cavity portion 55. The baffle 52 has a frusto conical cross sectional configuration to present a frusto conical surface 56 or 57 for each of the cavity portions 54 and 55, respectively. The frusto conical portion 56 provides a shallow funnel for the first cavity portion 54 to ensure draining therefrom the apertures or openings 53. The baffle 52 has a lip 58 which surrounds the aperture or opening 53 and extends into the second cavity portion 55.

The wall 51 adjacent the frusto conical surface 56 is provided with a drain means and air gap vent formed by a pair of apertures or openings 59, which, as illustrated, cut into a portion of the frusto conical surface 56, and each opening 59 is provided with a radially offset, arcuate wall portion 60 adjacent an upper end thereof. The water inlet means of the siphon break includes a fitting 62 which has one end 63 telescopically received in an end 38' of the feed hose 38. To ensure connection of the hose 38 on the end 63, the fitting is provided with an annular rib which coacts with a clamp such as clamp 64. The fitting 62 is supported or positioned within the first cavity portion 54 by support members which are illustrated as three axially extending fins or ribs 65. The ribs 65 space the fitting 62 in a concentric relationship with the inner surface of the wall 51 with an end 66 spaced above the center baffle 52 and in alignment with the aperture 53. To improve the flow of water through the fitting 62, the internal passage 67 is provided with means for straightening the flow which are illustrated as internal ribs or fins 68.

To prevent the escape of water spray caused by water striking the baffle 52 and splashing upwardly, a cap 70 surrounds the fitting 62 and is received in a space between the fitting and the cylindrical wall 51. As best illustrated in FIG. 4, the cap 70 has a cylindrical body portion 71, which is provided with a plurality of segmented individual baffles 72 which are arranged in two circumferentially spaced slots 73 and 74. The baffles of the one row such as 74 are positioned to be in alignment with the spaces between the baffles 72 of the other row 73 to provide a labyrinth path along the exterior surface of the cylindrical portion 71. As illustrated, the cylindrical portion 71 is provided with three circumferentially spaced slots 76 which receive the respective fins 65 when the cap is disposed in a surrounding relationship with respect to the fitting 62, and the baffles 72 of the row 74 are received between the three fins 65 while the baffles in row 73 overlie each of the fins (FIG. 2). In addition to the rows of baffles 72, the cap 70 has a small inwardly extending flange 77 to close the passageway between the hose 38 and the fitting 62. The flange can advantageously have flexible fingers 69 to prevent it from coming apart from the housing after it has been subassembled to the housing. The fingers can also be used to center the cap on the housing.

The housing 50 is provided with mounting means which is illustrated as a pair of parallel and offset flanges 80 and 81. The flange 80 is provided with a projection 83 while flange 81 is provided with a boss 84 which may be provided with a bore to receive a self threading fastener such as a screw 85. As illustrated in FIGS. 2 and 3, the mounting flanges 80 and 81 are disposed on opposite sides of the sheet metal flange 39 with the projection 83 received in an aperture and the threaded fastener or screw 85 firmly attaching the housing to the flange.

In addition to the mounting flanges, the housing 50 is provided with a support flange 86 having a keyhole slot or aperture 87 for grippingly engaging a portion of the feed hose 38 to hold the hose in the desired radius of bend thus preventing the hose of its touching the top 19 as the end 38' of the feed hose is received on the fitting 62. By providing a marking or bump on the feed hose 38 at a predetermined distance from the end thereof, the installation of the feed hose with the desired radius of bend can be assured by placing the mark at the keyhole slot 87 and then inserting the hose telescopically on the fitting 62. It also should be noted that each of the fins such as 65 are provided with cut out portions 89 which provide an abutment surface or stop to limit the distance that the end 38' of the feed hose 38 can be inserted on the fitting 62.

As mentioned before, the outlet of the siphon break 7 is connected to a U-tube or water trap formed from the hose 40. As illustrated, the end 40' of the hose 40 forming the water trap or U-tube is telescopically received on an outer surface of the cylindrical wall 51. To ensure that the hose is telescoped for the desired distance on the wall 51 to ensure the desired water level in the U-tube 40, abutment surfaces or stops are provided on the outer surface of the wall 51 of the housing 50. As illustrated, these abutment surfaces are provided by external ribs such as 91. As with the feed hose
3,856,036

38, the end 40' of the hose 40 is maintained on the wall 51 by a clamp such as clamp 92 and the other end is maintained on the inlet nozzle 41 by a suitable clamp such as clamp 93.

In operation, the opening of the inlet control valve 34 causes a flow of water through the feed hose 38 and the fitting 62. As illustrated, the position of the end 66 of the fitting 62 causes the flow to pass through the orifice 53 in the center baffle 52 as indicated by the arrows 95. When the flow of incoming water strikes water 96 in the U-tube formed by hose 40, splashing will occur as indicated by the arrows 97 and water will tend to climb the inner surface of wall 51. As the splashing water hits the baffle 52, it is diverted or deflected by the surface 57 and the lip 58 into a direction extending substantially parallel to the flow indicated by the arrows 95. Thus, the lip 58 acts as a diverter to prevent splashing of the liquid through the opening 53 and to prevent splashing and upward water flow from interrupting or causing turbulence in the flow through the opening 53 which turbulence could cause undesirable splashing in the first cavity portion 54. Through the provision of cap 70 any water striking the upper surface 56 of the center baffle 52 is presented with a labyrinth path as it attempts to escape out of the upper end of the housing 50. This labyrinth path is provided by cylindrical body portion 71 and the rows of spaced baffles 72 in conjunction with the ribs or fins 65. Thus, the cap 70 substantially prevents water escape from the housing due to splashing while maintaining the required air gap. Additionally, the disclosed structure prevents any foreign material from entering the siphon break and the washing chamber.

As illustrated, the substantially spaced above position of the end 66 of the fitting 62 of the inlet port with respect to the water level in the hose 40 provides the necessary air gap to meet the plumbing code requirements and to prevent a cross connection of the liquid in the hose 40 and tub 10 within the potable water supply. In the event that an obstruction causes a back up of the water in the U-tube hose 40, the position of the openings or apertures 59 provide drain means to prevent a back up of the water level in the siphon break to a level which will allow a cross connection through the inlet fitting 62 in the event that a vacuum existed in fitting 62.

Preferably, the housing 50 along with the center baffle 52, the fins 65, the fitting 62, the mounting flanges 80 and 81, and the support flange 86, is an integrally molded plastic unit. The cap 70 is also an integrally molded plastic unit so that the siphon break with the cap comprises two members which may be easily assembled with minimum labor and costs.

Although various minor modifications might be suggested by those versed in the art, it should be understood that we wish to include within the scope of the patent granted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A siphon break for use in a water inlet system for an appliance comprising a housing having a continuous wall forming a cavity, a center baffle having an aperture disposed in said cavity to form first and second cavity portions in communication with each other through said aperture, said wall having at least one opening therein adjacent to said baffle and communicating to said first cavity portion, water inlet means including a water fitting adapted for connection to a water supply conduit, said fitting having a passage therethrough, means for positioning said fitting in said first cavity portion in both a spaced relationship with said wall and within the outlet means being spaced from the baffle and in alignment with said aperture, said housing adjacent the second cavity portion having means adapted for connection to an outlet hose; and a cap surrounding said fitting and being received in a space between the fitting and wall, said cap having at least two rows of individually, spaced baffles with the baffles of one row being arranged over the spaces between the baffles of the other row to form a labyrinth path therebetween so that water splashing in the first cavity portion is prevented from splashing out of the siphon break.

2. A siphon break according to claim 1, wherein the center baffle has a lip surrounding the aperture and projecting into the second portion to deflect fluid flowing along the baffle toward the opposite cavity.

3. A siphon break according to claim 1, wherein the passage of the fitting has means for straightening the flow therethrough.

4. A siphon break according to claim 1, wherein the means for positioning comprises a plurality of radially extending fins extending from the wall.

5. A siphon break according to claim 4, wherein the center baffle and the housing are integrally formed together, and wherein said cap is provided with recesses for receiving the fins so that the baffles of one row are received between the fins.

6. A siphon break according to claim 5, wherein the center baffle extends from the wall to provide a frusto conical surface which faces the end of the fitting and terminates at the aperture.

7. A siphon break according to claim 6, wherein the center baffle has an annular lip around the aperture, which lip extends into the second cavity portion, said lip and the configuration of the center baffle coacting to deflect water spray in the second cavity portion in a direction extending parallel to a flow of water through said aperture.

8. A siphon break according to claim 1, wherein the outlet means of the housing is adapted to telescopically receive a hose on the outer surface of the wall forming the second cavity portion and wherein the outer surface is provided with at least one abutment surface to indicate and limit the amount of hose telescopically received thereon.

9. A siphon break according to claim 1, wherein said housing includes a flank having means for receiving and supporting a feed hose attached to the fitting of the inlet means.

10. A siphon break according to claim 9, which includes a pair of mounting flanges extending from the housing and lying in spaced parallel planes, one of said flanges being provided with a projection, and the other flange being provided with means for engaging a fastening member so that the housing may be mounted on a sheet of metal with the sheet being parallel to the flanges and being disposed therebetween.

11. In a water supply system for an appliance having a washing chamber, said water supply system having a feed hose extending from a water inlet valve to an inlet
fitting of a siphon break and having a water trap connected between an inlet nozzle to the washing chamber and an outlet of the siphon break, said siphon break having a housing with a continuous wall surrounding the inlet fitting and spaced therefrom by a plurality of support members, a center baffle disposed in spaced relationship to an end of the inlet fitting and having an aperture in alignment therewith, said wall having at least one aperture adjacent a side of the baffle facing the inlet fitting and a cap surrounding the fitting and having a plurality of individual and spaced baffles arranged in at least two rows with the baffles of one row being disposed over the spaces between the baffles of the other row to provide a labyrinth path to prevent water splashing up from the center baffle escaping from the housing of the siphon break.

12. In a water supply system according to claim 11, wherein the center baffle has a frusto conical configuration to provide a frusto conical surface facing the fitting, said center baffle having an annular lip surrounding the aperture and coacting with the configuration of the baffle to deflect splashing water from the water trap into a direction extending parallel to the flow of water through the aperture.

13. In a water supply system according to claim 11, wherein the internal passage of the fitting has means for straightening the flow therethrough.

14. In a water supply system according to claim 11, wherein the housing has means for mounting the siphon break on the appliance and wherein the housing has a flange provided with a keyhole-shaped opening for receiving and engaging the feed hose to prevent collapsing thereof adjacent the fitting.

15. In a water supply system according to claim 14, wherein an end of the water trap is telescopically received on an external surface of the housing of the siphon break adjacent the outlet and wherein the housing is provided with at least one abutment surface to provide a stop on which the hose of the water trap is received to insure a desired level of water therein.

16. In a water supply system according to claim 11, wherein the plurality of support members are fins integrally connecting the fitting to the wall of the housing and said cap is provided with slots for receiving said fins so that one row of baffles is received between the fins as the other row engages the end surface of the fins.

17. An appliance having a washing chamber and utilizing liquid supplied to said washing chamber from an external source through fluid passage means including a liquid supply conduit, a liquid outlet conduit, and a siphon break providing an air gap in said fluid passage means, said siphon break comprising:

a housing having a continuous wall forming a cavity;

an apertured center baffle disposed in the cavity to form upper and lower cavity portions,

said wall having drain means adjacent the center baffle in the upper cavity portion for preventing a back up of liquid through the siphon break,

said second cavity portion being adapted for connection to and fluid communication with the liquid outlet conduit;

a fitting extending into the upper cavity portion and adapted to receive the liquid supply conduit,

said fitting having a passageway therethrough for fluid communication between said liquid supply conduit and said upper cavity portion,

said aperture in the center baffle providing fluid communication between the upper and lower cavity portions and being spaced from the fitting; and

a cap including a cylindrical body portion and at least two vertically-spaced rows of circumferentially-spaced horizontal baffles extending radially outwardly from the cylindrical body portion with the horizontal baffles in one row arranged to cover the spaces between the horizontal baffles of the next row,

said cap being received between the fitting and the wall forming the upper portion of the upper cavity to substantially cover the opening therebetween and present a labyrinth path to a liquid splashing upwardly in the upper cavity adjacent said opening.

18. An appliance as claimed in claim 17 wherein the drain means also provides an air gap vent.

19. An appliance as claimed in claim 17 wherein the wall is substantially cylindrical and the center baffle extends from said wall to define a substantially frusto conical surface facing the end of the fitting in alignment therewith and terminating at the aperture, said fitting disposed concentric with the upper cavity portion.

20. An appliance as claimed in claim 19 wherein the center baffle has an annular lip around the aperture, which lip extends into the lower cavity portion, said lip and the configuration of the center baffle coacting to deflect liquid spray in the lower cavity portion to a path parallel to and co-directional with the flow of liquid through the aperture.

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