FAUCET WITH UNDERBODY

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Abstract

A faucet body (10) is molded from a plastic material and coupled to an underbody that is likewise molded from a plastic material. The unitary faucet body includes a spout portion (12) and a base portion (14). The underbody comprises a manifold (40) including an inlet (48) and an outlet (50). An end body (24) is coupled to the manifold and to the base portion. The end body includes means for coupling the faucet body to the manifold. A valve (96) is coupled to the end body. Alternatively, the faucet spout and base can be molded as a unitary structure using a lost core method, thereby eliminating the need for a separate manifold.

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FIG. 10
FAUCET WITH UNDERBODY

[0001] The present invention relates generally to faucets having an underbody and a faucet body that fits over the underbody and, in particular, to faucets that use a common underbody with multiple faucet body configurations. The faucet body and underbody can be molded together as a unitary structure using lost core methodologies. The invention is further related to faucets that have a reduced number of waterway parts and use the end bodies to hold a cartridge seal and orient the cartridge. In addition, the invention relates to faucet bodies that are molded from plastic and can be mounted on a sink deck without an intervening putty plate.

BACKGROUND AND SUMMARY OF THE INVENTION

[0002] Conventional faucets are made using a brass casting that is machined to provide water inlets and a water outlet. A finishing cover, usually made of chrome plated metal, is used to cover the finished casting and provide a more pleasing appearance. A brass faucet is polished and plated. In some cases, the spout is formed from brass tubing that is plated, bent to the desired shape, and joined to a casting. Unfortunately, casting and machining brass is expensive in terms of time, labor, and material.

[0003] Another disadvantage with conventional faucets is related to the brass composition. Some brass compositions contain lead that can leach out of the brass into the water passing through the faucet. It would be advantageous, therefore, to provide an alternative material that would be cheaper to produce while eliminating the possibility of lead leaching into the drinking water.

[0004] The present invention overcomes these and other disadvantages by providing a faucet body molded from a plastic material and coupled to an underbody that is likewise molded from a plastic material. The use of a molding process is cheaper than casting and machining, and the use of plastic material eliminates the possibility of lead leaching into the drinking water. In preferred embodiments, the plastic faucet body is covered with a metallic coating to provide a more pleasing appearance.

[0005] According to the present invention, a two-handed faucet assembly comprises a unitary faucet body, a manifold, at least one end body, and a valve. The unitary faucet body includes a spout portion and a base portion, wherein the spout portion includes a water passage and the base portion includes at least one hole for receiving the end body. The manifold includes an inlet and an outlet and the end body is coupled to the manifold and to the base portion. The end body further includes means for coupling the faucet body to the manifold. The valve is coupled to the end body.

[0006] According to one aspect of the invention, the manifold includes a first portion coupled to the faucet body base portion and a second portion coupled to the spout portion. The faucet body portion defines a pair of end body-receiving holes and includes an alignment feature disposed adjacent each end body-receiving hole to prevent improper alignment of the end body relative to the manifold.

[0007] According to another aspect of the invention, the end body includes a first retainer nut and a second retainer nut, the first retainer nut retaining the body in the end body-receiving hole. The first and second retainer nuts cooperate to couple the faucet assembly to a sink deck.

[0008] One embodiment of the invention is formed using lost core technology. The faucet includes a spout having a first water passage and a base having a second water passage in fluid communication with the first water passage. The spout and base are molded as a unitary structure around a fusible core that is later removed from the unitary structure, the void left by the fusible core defining the first and second passages.

[0009] Other features and advantages of the invention will become apparent from the following portion of this specification and from the accompanying drawings, which illustrate a presently preferred embodiment incorporating the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a top view of a faucet body for use with the present invention.

[0011] FIG. 2 is a front view of the faucet body of FIG. 1.

[0012] FIG. 3 is a bottom view of the faucet body of FIG. 1.

[0013] FIG. 4 is a section view taken along line 4-4 of FIG. 2.

[0014] FIG. 5 is a section view taken along line 5-5 of FIG. 1.

[0015] FIG. 6 is an end view of an underbody for use with the invention.

[0016] FIG. 7 is a front view, partially broken away, of the underbody of FIG. 6.

[0017] FIG. 8 is a bottom view of the underbody of FIG. 6.

[0018] FIG. 9 is a partial section view taken along line 9-9 of FIG. 7.

[0019] FIG. 10 is a front view, partially broken away, of an assembled faucet incorporating the faucet body and underbody of the present invention.

[0020] FIG. 11 is a side view of an end body.

[0021] FIG. 12 is a section view taken along the longitudinal axis of the end body of FIG. 11.

[0022] FIG. 13 is a top view of the end body of FIG. 11.

[0023] FIG. 14 is an exploded perspective view of a valve for use in the present invention.

[0024] FIG. 15 is a section view taken along the longitudinal axis of the valve of FIG. 14.

[0025] FIG. 16 is a bottom view of the stem of the valve in FIG. 14.

[0026] FIG. 17 illustrates an alternative embodiment of the invention manufactured using a lost core method.

DETAILED DESCRIPTION

[0027] FIGS. 1-5 illustrate a faucet body 10 according to the present invention. The faucet body 10 is preferably
injection molded as a single piece using gas assisted injection molding techniques and then coated or plated as desired to provide a pleasing finish acceptable to consumers. The faucet body 10 includes a spout portion 12 and a base portion 14. As illustrated in FIG. 3, the base portion 14 further includes a perimetal seal-receiving channel 16, a pair of fastener-receiving members 18, and a pair of end body-receiving bores 20. Each of the end body-receiving bores 20 includes a plurality of ribs 22 spaced around the perimeter of their respective bores 20 and projecting inwardly therefrom. Preferably, each bore includes five ribs 22 spaced at 60° intervals around the perimeter, with a gap in the spacing provided at the point closest to the spout portion 12. The ribs 22 provide support and alignment for a hexagonal portion of an end body 24 (FIG. 10), and prevent the end body from rotating in the bore 20.

[0028] As illustrated in FIG. 4, the spout portion 12 includes a water passage 26 and a channel 28 for receiving a pop-up knob 30 (FIG. 10) for operating a drain sub-assembly (not shown). The spout portion 12 includes an outlet 66 and a channel 28 for receiving a pop-up knob 30 (FIG. 10) for operating a drain sub-assembly. The outlet 66 includes a thread extending through the base portion 14 and into the spout portion 12. The water passage 26 continues from the spout portion 12 through the spout portion 12 to the outlet 66.

[0029] A water manifold 40 according to the present invention is illustrated in FIGS. 5-9. The water manifold 40 includes a base 46, a pair of water inlets 48 and a water outlet 50, preferably molded as a unitary piece. The base portion 46 includes a first end 54 and a second end 56, with the first end 54 including a pair of fastener-receiving holes 58 and a central bore 60. Each inlet 48 includes a tubular member 62 extending from the outlet 50. When the water manifold 40 is mounted in the faucet body 10, the tubular members 62 extend to the end body-receiving bores 20 to engage an end body outlet 66, as illustrated in FIG. 10. The manifold outlet 50 includes a tube with a stepped external threads 85 of the end body 24 to engage the underbody water inlet 48. The separation between the upper and lower flanges 80 provides longitudinal stability to the end body 24.

[0032] The upper portion 78 also includes internal threads 84, external threads 85, a capping wall 82 that caps the lower portion 76, and a bowl tie-shaped water inlet 86. The bowl tie-shape is “closed” by a first arcuate member 86a that extends between the two upper arms of the bowl tie and a second arcuate member 86b; that extends between the two lower arms of the bowl tie, thereby forming a pair of generally triangular openings. The bowl tie-shape of the water inlet 86 is defined by upwardly extending sidewalks 88 and includes an bow tie-shaped floor 90 with a pair of triangular holes 94 passing through the capping wall 82 to the tubular lower portion 76. The sidewalks 88 and the floor 90 cooperate to receive and support a resilient bow tie-shaped seal 92 (FIG. 14).

[0033] A valve 96 for use with the end body 24 is illustrated in FIGS. 14-16. The valve 96 includes a stem 98, a housing 100, and a valve disk 102 and is held in position by a nut engaging the internal threads 84. An O-ring 104 can be installed with the valve 96 to provide a watertight seal. The stem 98 includes a splined portion 108 and a base plate 110. The base plate 110 extends radially outwardly from the perimeter of the stem 98 and includes a bow tie-shaped projection 114 depending downwardly from the plate 110. The bow tie-shaped projection 114 is substantially similar in size and configuration to the bow tie-shaped inlet 86 and is disposed on the plate 110 to align with the inlet 86 when the valve 96 is in the closed position. A skirt 116 depends downwardly from the edge of the bow tie-shaped projection 114 in two segments 120, 122 where the edge of the projection 114 coincides with the edge of the plate 110. Each segment 120, 122 includes a break 124, 126, respectively, for receiving the valve disk 102. Preferably, the breaks 124, 126 are not the same size and are not located on a common diameter of the plate 110 to prevent misalignment of the valve disk 102.

[0034] The valve disk 102 is a generally circular plate having a pair of triangular holes 128 and a pair of tabs 132, 134 extending radially from the disk 102. The disk 102 is sized and configured to allow the disk 102 to fit snugly against the skirt segments 120, 122. The tabs 132, 134 fit in the breaks 124, 126, respectively, in the skirt segments 120, 122 to provide for proper alignment of the disk 102 on the stem 98. When the disk 102 is properly installed, the disk triangular holes 128 are disposed outside the bow tie-shape of the projection 114. Thus, when the disk triangular holes 128 are aligned with the inlet triangular holes 94, the valve 96 is in the open position. When the valve stem 98 is rotated 90°, the disk triangular holes 128 are no longer aligned with the inlet triangular holes 94. Instead, the remaining unbroken portion of the disk 102 is aligned with the inlet triangular holes 94, thereby blocking flow of water through the valve 96, and the valve 96 is closed.

[0035] The water manifold 40 is coupled to the end bodies 24 by inserting the end body outlets 66 into the water inlets 48 to form an underbody. The underbody is then assembled with the faucet body 10 by inserting the end bodies 24 in the end body-receiving bores 20 and threading a retaining nut 106 (FIG. 10) onto the external threads 85 of the end body 24 to abut the base portion 14 of the faucet body 10.
Alternatively, the end bodies 24 can be retained in the faucet body 10 by a hub and handle combination, wherein the hub is configured to threadedly engage the external threads 85 of the end body 24. The base 46 of the water manifold 40 is then attached to the faucet body 10 by screws or other fasteners. The retaining nuts, the hexagonal flanges 80, and the screws cooperate to hold the underbody firmly in place in the faucet body 10. Adding the desired handles and hubs to operate and cover the valves completes the faucet assembly. The faucet assembly is mounted to a sink deck by inserting the end bodies 24 through holes in the sink deck and threading retaining nuts 140 (FIG. 10) onto the end bodies 24.

[0006] The resulting faucet assembly is relatively inexpensive to produce and assemble, thereby providing a cost advantage to the manufacturer. In addition, the faucet assembly includes fewer parts than a conventional faucet, thereby reducing the number of parts in inventory for additional cost savings. Moreover, the underbody can provide a common base for use with other faucet body designs, allowing for faster development of new faucet designs and providing a marketing advantage to the manufacturer.

[0007] It will be understood by one of ordinary skill in the art that the fasteners may not be necessary and the underbody can be coupled to the faucet body by just the end bodies. The geometry of the underside of the faucet body can be designed to conform to the shape of the underbody to prevent movement of the underbody once the underbody is in position within the faucet body and prevent the end bodies from separating from the manifold. The retainer nuts would couple the underbody to the faucet.

[0008] In an alternative embodiment of the invention, illustrated in FIG. 17, the entire faucet body 210, including the spout portion 212 and the base portion 214, is molded as a single unit using lost core methodologies. The lost core method includes the step of forming a core member (not shown), from a fusible material that defines the contours of the internal passages of the spout and base. The core member is then positioned in a mold of the faucet body and plastic is injected into the mold. After the plastic solidifies, the faucet body is removed from the mold and the core member is melted from the interior of the faucet body. The void caused by the removal of the core defines the internal passage of the spout and base. Of course, an important consideration in the choice of fusible material is its ability to retain its shape during the molding process, yet melt out of the interior of the plastic faucet body without damaging the faucet body. Several advantages flow from the use of lost core methodologies, such as the reduction in the number of parts, a reduction in the number of assembly steps, and a reduction in inventory costs.

[0009] A faucet with underbody has been described with respect to a presently preferred embodiment. However, it will be understood that various modifications can be made within the scope of the invention as claimed below

1. A two-handed faucet assembly comprising:
   a unitary faucet body having a spout portion and a base portion, the spout portion including a water passage and the base portion including at least one hole for receiving an end body;
   a manifold having in inlet and an outlet;
   at least one end body coupled to the manifold and to the base portion, the end body including means for coupling the faucet body to the manifold; and
   a valve coupled to the end body.
2. The faucet assembly of claim 1 wherein the manifold includes a first portion coupled to the faucet body base portion and a second portion coupled to the spout portion.
3. The faucet assembly of claim 1 wherein the body portion defines a pair of end body-receiving holes and includes an alignment feature disposed adjacent each end body-receiving hole to prevent improper alignment of the at least one end body relative to the manifold.
4. The faucet assembly of claim 3 wherein the at least one end body includes a first retainer nut for retaining the end body in the at least one end body-receiving hole.
5. The faucet assembly of claim 4 wherein the at least one end body includes a second retainer nut, the first and second retainer nuts cooperating to couple the faucet assembly to a sink deck.
6. A two-handed faucet assembly comprising:
   a molded one-piece faucet body having a spout and a base portion with a water passage with an inlet, the base portion including at least one hole for receiving an end body;
   a molded underbody having a base portion, a water inlet and a water outlet, the underbody being coupled to the faucet body with the underbody water outlet engaging the base water passage inlet.
7. The faucet assembly of claim 6 further including at least one end body coupled to the water inlet, wherein the at least one end body includes a first retainer nut for coupling the at least one end body to the faucet body.
8. The faucet assembly of claim 7 wherein the at least one end body includes a second retainer nut, the first and second retainer nuts cooperating to couple the faucet assembly to a sink deck.
9. The faucet assembly of claim 6 wherein the base portion includes a plurality of alignment ribs disposed adjacent the at least one hole, the alignment ribs facilitating proper alignment of the end body relative to the underbody.
10. A faucet assembly comprising:
   a spout having a water passage;
   a base having an underbody, the underbody including a water passage in fluid communication with the spout water passage, the spout and base being molded as a single unit; and
   at least on valve coupled to the base for controlling a flow of water to the spout.
A faucet assembly comprising:
   a spout having a first water passage; and
   a base having a second water passage in fluid communication with the first water passage, the spout and base being formed as a unitary structure using a lost core technique.
A faucet assembly comprising:

a spout having a first water passage; and

a base having a second water passage in fluid communication with the first water passage, the spout and base being a unitary structure molded around a fusible core, wherein the fusible core is removed from the molded unitary structure to provide the first and second passages.