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(71) **Applicant**: **WATERTEC (MALAYSIA) SDN BHD** [MY/MY]; Lot 6, Jalan Halba, 16/16 Section 16, 40200 Shah Alam, Selangor Darul Ehsan (MY).

(72) **Inventor**: **LOW, Han Sin**; 66, Jalan Semarak Api, Sierramas Resort Homes, 47000 Sungai Buloh, Selangor Darul Ehsan (MY).

(74) **Agent**: **APPANAN, Naidu**; F-3-16, IOI Boulevard, Jalan Kenari 5, Bandar Puchong Jaya, 47170 Puchong, Selangor Darul Ehsan (MY).

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(54) **Title**: CLAMPING DEVICE FOR MOUNTING A FAUCET HEAD

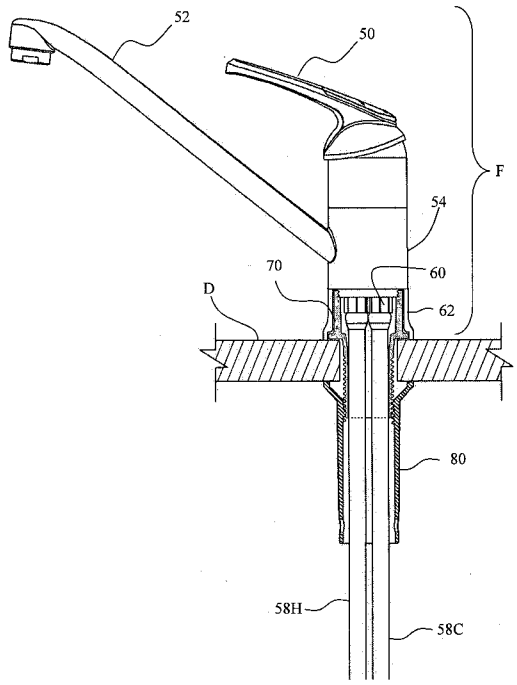


Figure 3

(57) **Abstract**: A clamping device for mounting a faucet head (F) on a mounting surface (D) consisting of a hollow tubular shank (70) and a mating hollow tubular clamping nut (80). The hollow tubular shank (70) is attachable to the faucet head (F) and has shank-threading on its external surface and serves as a conduit for the two water inlet hoses (58H, 58C) to the mixer cartridge (56) of the faucet head (F). The lower end (70L) of the tubular shank (70) is dimensioned to extend through a receiving hole in the mounting structure (D) and matingly engages the hollow tubular clamping nut (80) which has complementary nut-threading on its internal surface in a clamping fashion to mount the faucet head (F) on the mounting surface (D). The tubular clamping nut (80) is an elongate structure and sized to comfortably fit into a faucet installer's palm so that it can be easily gripped and twisted by hand for the mating action with the tubular shank (70) without the need for the use of tools.

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CLAMPING DEVICE FOR MOUNTING A FAUCET HEAD

FIELD OF THE INVENTION

The present invention relates to a clamping device and more particularly to a clamping device for mounting a faucet head to a mounting structure.

BACKGROUND OF THE INVENTION

A faucet for a sink structure may conventionally be mounted to the sink deck either before to or after the sink structure has been installed in the desired location. If the faucet is mounted to the sink deck before the installation of the sink structure in the desired location, it is relatively easy to then mount the faucet to the sink deck as the space beneath the sink deck can be openly accessed for the clamping of the faucet in place via the conventional mounting hole of the sink deck. However, in most cases the sink structure is installed first in the desired location and then only the faucet to the sink. In such instances, the area under the sink deck will be severely limited due mainly to the presence of the downwardly-protruding sink bowl. The problem is compounded if the sink deck is low or the sink bowl is deep, or a combination thereof, in which case there will be little clearance between the ground and the underside of the sink bowl for the faucet installer to work in. Also, lighting from below, if provided, is often obscured by the installer's body. This problem is further compounded if the sink is installed within a sink cabinet as the presence of the cabinet will severely restrict access to the underside of the sink deck. In such cases, the prevailing practice requires that the faucet installer work in a cramped, confined area beneath the sink deck and make all the necessary connections from this area. Moreover, in most cases the faucet is naturally located at the distal end of the sink deck away from the user and proximate to the wall against which the sink deck is installed, so there will be very little space for the faucet mounting. The problem becomes greater if the sink deck abuts two side walls and the faucet is located at the corner of the sink deck proximate the sink walls. Faucet installation is also particularly difficult in the

case of a two bowl sink as the faucet is normally located between the sinks bowls and mounting of the faucet therefore requires access to the very narrow space between the vertical walls under the sink deck of the adjacent sink bowls. The situation is even more difficult when the sink is to be removed which requires the faucet to be dismounted first. This is because the area beneath the sink normally has other plumbing fittings and fixtures and often also acts as a storage place for various kitchen and bathroom accessories.

Conventionally, a faucet is mounted to a sink deck as shown in Figure 1. The faucet, generally indicated at 1, in this case a mixer faucet for dispensing hot or cold or mixed hot and cold water, to be mounted to a sink deck D, typically comprises a handle 2 for working the faucet 1, a spout 3 for dispensing water, and a tubular manifold 4 to which is attached the spout 3 and which houses a mixer cartridge for mixing the hot and cold water piped into it by way of two flexible water inlet hoses 5H and 5C that are screwed to the bottom side 4' (see Figure 2, where the location of the sink deck D is not shown but indicated by the bracket and likewise indicated by reference sign D) of the tubular manifold 4 and are in functional relation with the mixer cartridge therein. To mount the faucet 1 to the sink deck D, firstly the bottom side 4' of the tubular manifold 4 is placed in registry with and over the mounting hole of the sink deck D. The bottom side 4' of the tubular manifold 4 has a threaded stud 6 attached to it, via a receiving female opening, which now protrudes downward through the mounting hole. The hot 5H and cold 5C water inlet hoses are normally pre-attached via screw connections to the bottom side 4' of the tubular manifold 4 and will be in functional relation with the mixer cartridge therein. To fix the faucet 1 to the sink deck D, a fixing nut 7, normally made of brass, is tightened onto a backing washer 8 along the threaded stud 6. In this way, the sink deck D is relatively sandwiched between the tubular manifold 4 of the faucet 1 and the backing washer 8. The backing washer 8 may be of plastic or metal.

This traditional method of mounting the faucet 1 to a sink deck D has obvious disadvantages. Since the bottom side 4' of the tubular manifold 4 abutting the sink deck D has a relatively small circumference, mainly for aesthetic purposes so that the faucet 1 has a small and attractive general circumference, and it has to accommodate the hot 5H and

cold 5C water inlet hoses and the threaded stud 6, the space for the fixing nut 7 is very limited, and therefore only a small-sized fixing nut 7 can be employed. This increases the difficulty in working the fixing nut 7, and this, combined with the confines of space, usually makes it necessary to use a socket spanner or long screwdriver to apply the necessary torque to the fixing nut 7. Also, the small size of the fixing nut 7 reduces the effectiveness with which backing washer 8 can be firmly held against the underside of the sink deck D. This may lead to the whole visible upper portion of the faucet 1 to be loose. This is particularly so with modern-day high rise spouts, where the discharge of the spout is a substantial distance above the sink, where stability is of a concern. Therefore, for a tight clamp the fixing nut 7 has to be tightened to a high degree. Due to the small size of the fixing nut 7, a very high pressure becomes exerted on the backing washer 8 and this may lead to damage to the backing washer 8. Even if a tight clamp is achieved and the whole visible upper portion of the faucet 1 is held firmly in place when the faucet is initially installed, the fixing nut 7 may become loose over time due to the high pressure it exerts on the backing washer 8 and correspondingly result in the visible upper portion of the faucet 1 becoming loose. More crucially there is a tendency for the water inlet hoses 5H and 5C to leak if the clamping is not secure. The water inlet hoses 5H and 5C are special hoses which are complicated in make and costly to manufacture.

Another disadvantage of the traditional setup is that the hot 5H and cold 5C water inlet hoses may not be very securely attached to bottom side 4' of the tubular manifold 4 as the method of attachment, which is by way of screw connection, is prone to becoming loose after attachment when the hoses are subjected to unintended stresses and strains when handled by the faucet installer when they connect the other ends of the hoses to the hot and cold water sources. This may lead to troublesome and costly leakages.

There is therefore a need in the art and industry for an effective and economical means by which a faucet can be easily and securely mounted to a sink deck from the underside of the sink deck. There is also a need in the art for a superior means of securing the hot 5H and cold 5C water inlet hoses to bottom side 4' of the tubular manifold 4 that firm and long lasting.

SUMMARY OF THE INVENTION

The present invention provides a clamping device for firmly mounting a faucet head to a mounting structure such as a sink deck and which requires little time and effort by the installer working from the limited area underneath the mounting structure or sink deck.

The clamping device of the present invention essentially comprises a hollow tubular shank and a mating hollow tubular clamping nut. The hollow tubular shank has shank-threading and its hollow interior is a conduit for at least one water inlet hose to the faucet head that is to be installed on a mounting structure such as a sink deck. The lower end of the tubular shank is designed for extending through a pre-bored receiving hole in the mounting structure while its upper end is attachable to the faucet head. The tubular shank further has an abutment part for abutting the top surface of the mounting structure. The abutment part or outwardly-extending lip also prevents the tubular shank from falling through the receiving hole of the mounting structure. The hollow tubular clamping nut has nut-threading that is complementary to the tubular shank's shank-threading. This permits a mating engagement between the tubular shank and tubular clamping nut to clamp the mounting structure in a relative position between them. In this way, the faucet head which may be pre-attached to the tubular shank just prior to installation is firmly mounted onto the mounting structure. The clamping nut is elongate in shape so that it can be gripped and twisted by hand to facilitate fastening of the clamping device to the mounting structure and thereby mounting of the faucet head.

According to a preferred embodiment of the invention, the shank-threading of the tubular shank is an external treading while the complementary nut-threading of the clamping nut is an internal threading. Therefore in mating engagement, the tubular shank is the male part while the clamping nut is the female part that twistingly runs up the tubular shank to complete the clamping action. For facilitating gripping of the clamping nut by the faucet installer, the outer gripping surface of the clamping nut has vertical traction ribs or a rubber friction coating.

According to a less favored but workable embodiment of the invention, the shank-threading of the tubular shank is an internal treading while the complementary nut-threading of the clamping nut is an external threading. Therefore in mating engagement, the tubular shank is the female part while the clamping nut is the male part that likewise twistingly runs up the tubular shank to complete the clamping action.

The tubular shank, at its upper end, may be removably attachable to the faucet head or permanently attached thereto. Therefore, the tubular shank may be made and sold as an integral part of the faucet head, with the water inlet hose or hoses pre-installed, or, preferably, as a separate piece that is removably attachable to the faucet head when the faucet head is being installed on the mounting structure.

When the faucet head is being mounted and secured in place and therefore the clamping nut is being tightened, while in mating engagement with the tubular shank, and comes into contact with the underside of the mounting structure; for enhanced frictional engagement between the clamping nut and the mounting structure the top abutting surface of the clamping nut has traction structures such as notches or ribs. Also, in order that the load is spread out when the upper edge of the clamping nut abuts the underside of the mounting structure when the nut is tightened, the upper end of the clamping nut has a larger circumference than the body of nut.

For situations where it is difficult to work the clamping nut directly by hand, such as in very confined spaces, the clamping nut has at least one pair of opposing coaxial orifices that are sized to snugly receive a complimentary cross bar member therethrough. With the cross bar member slotted in place, twisting of the key piece would work the clamping nut. The at least one pair of opposing coaxial orifices are naturally preferably located to the lower end of the clamping nut. The at least one pair of opposing coaxial orifices may be of any shape such as circular or square and the complimentary cross bar member is likewise correspondingly cylindrical or cuboid shaped respectively. Instead of this orifices and cross bar arrangement, the lower end of the tubular clamping nut may instead have at least one handle peg, and preferably two opposing co-planar handle pegs, for facilitating twisting operation of the clamping nut without the need for direct gripping of

the clamping nut body. The at least one handle peg is likewise suitably located to the lower end of the clamping nut.

To prevent dirt or vermin from entering the hollow interior of the clamping nut once the faucet head is installed, there is provided an end cap which preferably snap-fits to the bottom end of the clamping nut. The end cap has an opening for passage of the water inlet hose.

According to one embodiment of the invention the faucet is a mixer faucet and there are two water inlet hoses attached to the mixer cartridge in the faucet head for delivering hot and cold water to the mixer cartridge. In this embodiment the two water inlet hoses are held firmly together by a crimped double-ring metal clip at the point of attachment to the mixer cartridge. According to another embodiment of the invention there is an auxiliary outlet hose from the mixer cartridge of the mixer faucet that attaches to an auxiliary fluid dispenser for channeling water to the fluid dispenser. In this embodiment, the two water inlet hoses and the auxiliary outlet hose are held firmly together by a crimped triple-ring metal clip the point of attachment to the mixer cartridge. The fluid dispenser may be a faucet side spray.

The tubular shank and clamping nut of the present invention may be made of any suitable material such as plastic. Advantageously it is made of PERT (Polyethylene of Raised Temperature) plastic.

There has thus been broadly outlined the features of the invention in order that the detailed description thereof of the preferred embodiments that follows may be better understood, and in order that the present contribution to the art may be better appreciated. Before explaining the preferred embodiments of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention. The drawings are merely illustrative in nature and should not be construed as limiting the invention in any way.

Figure 1 illustrates a faucet head attached to a mounting structure using the conventional clamping means.

Figure 2 illustrates a blown-up view of the relevant parts of the conventional clamping means shown in Figure 1 that are required for mounting a faucet head, with the bracket D indicating the location of the mounting structure which is not shown in the drawing.

Figure 3 illustrates a faucet head attached to a mounting structure using the clamping device of the present invention.

Figure 4 illustrates a blown-up view of the relevant parts of the clamping device of the present invention shown in Figure 1 which are required for mounting a faucet head, with the bracket D indicating the location of the mounting structure which is not shown in the drawing..

Figure 5 illustrates a blown-up isometric view of the clamping device and faucet head of the present invention.

Figure 6 illustrates a blown-up side view of the clamping device and faucet head of the present invention.

Figure 7 illustrates in isolation the clamping nut of the clamping device of the present invention.

Figure 8 illustrates in isolation the clamping nut of the clamping device of the present invention to highlight the handle pegs that facilitate twisting the clamping nut.

Figure 9 illustrates a close-up isometric view of the water inlet hoses that are attached to the mixer cartridge to highlight the crimped double-ring metal clip of the present invention.

Figure 10 illustrates the crimped double-ring metal clip in isolation.

In describing the preferred embodiments of the invention, specific terminology will be resorted to for the sake of clarity. However, it is not intended that the invention be limited to the specific terms so selected and it is to be understood that each specific term includes all technical equivalents that operate in a similar manner to accomplish a similar purpose. Combination of the various embodiments of the present invention as described herein may also be used depending on specific facility requirements.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figures 3 and 4, there is shown a preferred embodiment of the clamping device of the present invention, where in Figure 3 the clamping device is shown in use to mount a faucet head, generally indicated and encompassed by the bracket at F, to a mounting structure D. Here, the term "faucet head" is used loosely and generally refers to the part of the faucet assembly above the mounting structure D and may also simply be termed faucet or faucet assembly. Also, for illustration purposes only the type of faucet used in this example is a mixer faucet for dispensing hot or cold or mixed hot and cold water. The device of the present invention can be used for mounting any type of faucet. Apart from a faucet head F, the clamping device of the present invention may be used to mount any other suitable construct, to any suitable mounting structure D which may include, but it not limited to, a sink deck or a wall.

The faucet head F comprises handle 50 for working the faucet, spout 52 for dispensing water, and tubular manifold 54 to which is attached the spout 52 and which houses a mixer cartridge 56 (see Figures 5, 6 and 8) for mixing the hot and cold water piped into it by way of two flexible water inlet hoses 58H and 58C that are attached to the bottom side of the mixer cartridge 56 and are in functional relation with the mixer cartridge 56 therein. At their points of attachment to the bottom side of the mixer cartridge 56, the two water inlet hoses 58H and 58C are held very securely together by a crimped double-ring metal clip 60 (see Figures 9 and 10) which is a metal piece that is crimped in the middle section between the two water inlet hoses 58H and 58C and which thereby has a distinct 8-shaped profile when viewed from above. This 8-shaped crimped double-ring metal clip 60 is new to the art with respect to securing water inlet hoses to mixer cartridges. The employment of the 8-shaped crimped double-ring metal clip 60 for securing the water inlet hoses 58H and 58C results in a very secure, reliable and long lasting connection that is not prone to becoming loose when subjected to unintended stresses and strains during the connection of the hoses to the hot and cold water sources. The danger of leakages is therefore effectively mitigated by the use of the crimped double-ring metal clip 60. The tubular manifold 54 sits on or is attached to a tubular spacer member 62 (see Figures 3 and 4) which accommodates the attachment ends of the two water inlet hoses 58H and 58C and their crimped double-ring metal clip 60 and also houses the upper end of one part of the clamping device of the present invention disclosed below.

The clamping device of the present invention itself consists of two distinct parts, a hollow tubular shank 70 and a mating hollow tubular clamping nut 80. The hollow tubular shank 70 has shank-threading on its external surface and its hollow interior serves as a conduit for the two water inlet hoses 58H and 58C to the mixer cartridge 56 of the faucet head F. The lower end 70L of the tubular shank 70 is dimensioned for snugly extending through a ready receiving hole in the mounting structure D. The upper end 70U of the tubular shank 70 is adapted to be removably attachable and in functional relation with the mixer cartridge 56 and the tubular spacer member 62 of the faucet head F. As disclosed above, this upper portion 70U of the tubular shank 70 is housed within the tubular spacer member 62. The tubular shank 70 has an abutment part 70A, which is advantageously in

the form of an outwardly-extending lip, which abuts the top surface of the mounting structure D when the clamping device of the present invention is in use.

The other part of the clamping device, the hollow tubular clamping nut 80, seen clearly in Figure 7 in isolation, has nut-threading on its internal surface that is complementary to the shank-threading of the hollow tubular shank 70. The tubular clamping nut 80 is an extended or elongate structure and advantageously sized to comfortably fit into a faucet installer's palm so that it can be easily gripped and twisted by hand. For better gripping of the tubular clamping nut 80, its outer surface has a plurality of vertical ribs 80R. Other forms of grip-enhancing methods may also be used such a rubber friction coating, grooves or notches.

In use of the present clamping device to mount a faucet head F to a mounting structure D, firstly the two flexible water inlet hoses 58H and 58C are threaded through the tubular clamping nut 80 part of the clamping device, the hollow tubular shank 70 part of the clamping device and the tubular spacer member 62 of the faucet head F assembly, and secured to the mixer cartridge 56 housed in the tubular manifold 54 of the faucet head F assembly. The tubular shank 70 is secured to the faucet head F and its lower end 70L that has the external threads is then lowered into and passed through the receiving hole in the mounting structure D until the abutment part 70A of the tubular shank 70 rests on and abuts the top surface of the mounting structure D. The tubular manifold 54 of the faucet head F rests on the tubular manifold 54 and the lower end of the tubular manifold 54 rests on the and abuts the top surface of the mounting structure D. To now clamp the faucet head F in place, the tubular clamping nut 80 is simply held by the installer, without the need for the use of any tool, and brought into registry with the downwardly-protruding hollow tubular shank 70 and hand twisted for mating connection therewith. The tubular clamping nut 80 will run up the hollow tubular shank 70 until it about the underside of the mounting structure D. The tubular clamping nut 80 is then hand-tightened to the desired degree to firmly mount the faucet head F on the mounting structure.

In the most preferred embodiment of the present invention, the upper end 80E (see Figure 7) of the clamping nut 80 has a larger circumference than the body of clamping nut 80 so

that the force exerted by the clamping nut 80 on the underside of the mounting structure D is better spread. Also, in this most preferred embodiment the top abutting surface 80T of the clamping nut 80 has traction formations such as notches or ribs.

The most preferred embodiments of the present invention also take into account the situations where it is difficult or impossible for the faucet installer to grasp the tubular clamping nut 80 to work it whether for tightening it for faucet installation or for loosening it for faucet removal or other reasons. This may happen in the case of a compact two bowl sink where the faucet sits between the sinks bowls, in which case there is little space between the vertical walls of the sink bowls where the tubular clamping nut 80 will be located. To overcome this common problem, according to the first of two most preferred embodiments of the invention, the lower end of the tubular clamping nut 80 has a pair of opposing coaxial orifices 80H that are designed to receive a complimentary cross bar member (not shown). The cross bar member has a length greater than the distance between the pair of opposing coaxial orifices 80H so that when inserted through both the orifices, the ends of the cross bar member extend horizontally outward. With this cross bar in place, the faucet installer just has to use his fingers, and not whole palm, to twist the cross bar member and thereby the tubular clamping nut 80 in the required direction. The opposing coaxial orifices 80H may advantageously be circular and the complimentary cross bar member cylindrical, and more advantageously square and the complimentary cross bar member cuboid shaped so that the cross bar member cannot roll while in the opposing coaxial orifices 80H. Alternatively, with reference to Figure 8, according to the second of the two most preferred embodiments of the invention, and in order to avoid the need for a separate cross bar, the lower end of the tubular clamping nut 80 has two opposing co-planar handle pegs 80P attached that serve as handles for facilitating twisting with fingers to work the clamping nut 80. The co-planar handle pegs 80P in the drawing are shown in exaggerated length for illustration purposes. In actuality, they may be shorter in length so as not to face any obstruction when twisted is a confined space.

Since once the faucet assembly is installed normally the hollow tubular clamping nut 80 will be in a dark and damp environment such as in a sink cabinet for an extended period

of time, there may be a tendency for dirt or vermin to enter hollow interior of the tubular clamping nut 80 via its bottom which is open except for the water inlet hoses running therethrough. To prevent dirt or vermin such as spiders from taking up residence in the tubular clamping nut 80 housing, the present invention in a preferred embodiment provides an end cap (not shown) which can be fitted to the open bottom end of the tubular clamping nut 80 such as in a snap-fit fashion. Naturally, such an end cap will have opening for passage of the water inlet hoses.

INDUSTRIAL APPLICABILITY

The apparatuses of the present invention find ready industrial application in the plumbing and sanitary fitting industry. It allows quicker and hassle-free mounting of faucets to sink decks and other mounting surfaces.

Those skilled in the art will appreciate that various modifications may be made to the present invention without departing from the inventive concept behind the invention. The embodiments of the invention described herein are only meant to facilitate understanding of the invention and should not be construed as limiting the invention to those embodiments only. Those skilled in the art will appreciate that the embodiments of the invention described herein are susceptible to variations and modifications other than those specifically described. It is to be understood that the invention includes all such variations and modifications that fall within the scope of the inventive concept behind the invention.

CLAIMS

1. A clamping device for mounting a faucet head to a mounting structure, comprising:

a hollow tubular shank (70) with shank-threading and being a conduit for at least one water inlet hose (58H, 58C) to a faucet head (F); the lower end (70L) of said tubular shank (70) dimensioned for extending through a receiving hole of said mounting structure (D), the upper end (70U) of said tubular shank being attachable to said faucet head (F), and said tubular shank (70) having an abutment part (70A) for abutting the top surface of said mounting structure (D) when said tubular shank (70) extends through the receiving hole of said mounting structure (D);

a hollow tubular clamping nut (80) with nut-threading complementary to said shank-threading of said tubular shank's (70) for mating engagement with said tubular shank (70) to relatively clamp said mounting structure (D) between said tubular shank (70) and said clamping nut (80) for the mounting of said faucet head (F); said clamping nut (80) being a conduit for said at least one water inlet hose (58H, 58C);

wherein said clamping nut (80) is elongate to permit firm gripping and twisting by hand to facilitate fastening of said clamping device to said mounting structure (D) for mounting said faucet head (F) to said mounting structure (D).

2. The clamping device according to claim 1, wherein said shank-threading of said tubular shank (70) is external threading and said nut-threading of said clamping nut (80) is internal threading.

3. The clamping device according to claim 1, wherein said shank-threading of said tubular shank (70) is internal threading and said nut-threading of said clamping nut (80) is external threading.

4. The clamping device according to claim 1, wherein said upper end (70U) of said tubular shank (70) is removably attachable to said faucet head (F),

5. The clamping device according to claim 1, wherein said upper end (70U) of said tubular shank (70) is fixedly attached to said faucet head (F),

6. The clamping device according to claim 1, wherein the top abutting surface (80T) of said clamping nut (80) has traction structures for enhanced frictional engagement when said clamping nut (80) is tightened against the underside of said mounting structure (D) when mounting the faucet head (F).

7. The clamping device according to claim 1, wherein the upper end (80E) of said clamping nut (80) has a larger circumference than the body of said clamping nut (80) for better load distribution when said clamping nut (80) is tightened against the underside of said mounting structure (D) when mounting said faucet head (F).

8. The clamping device according to claim 1, wherein said clamping nut (80) has at least one pair of opposing coaxial orifices (80H), said at least one pair of opposing coaxial orifices (80H) designed to receive a complimentary cross bar member dimensioned to be slotted therethrough for facilitating twisting operation of said clamping nut (80) without need for direct gripping of said clamping nut body.

9. The clamping device according to claim 8, wherein said at least one pair of opposing coaxial orifices (80H) are located to the lower end of said clamping nut (80).

10. The clamping device according to claim 8, wherein said at least one pair of opposing coaxial orifices (80H) are circular shaped and said complimentary cross bar member is correspondingly cylindrical shaped.

11. The clamping device according to claim 8, wherein said at least one pair of opposing coaxial orifices (80H) are square shaped and said complimentary cross bar member is correspondingly cuboid shaped.

12. The clamping device according to claim 1, wherein said clamping nut (80) has at least one handle peg (80P) for facilitating twisting operation of said clamping nut (80) without need for direct gripping of said clamping nut body.

13. The clamping device according to claim 12, wherein said at least one handle peg (80P) is located to the lower end of said clamping nut (80).

14. The clamping device according to claim 12, wherein there are two opposing co-planar handle pegs (80P).

15. The clamping device according to claim 1, wherein there is provided an end cap for said clamping nut (80) for covering the open bottom of said clamping nut (80) to prevent entry of dirt or vermin into the hollow interior of said clamping nut (80), said bottom cap having opening for passage of said at least one water inlet hose (58H, 58C).

16. The clamping device according to claim 15, wherein said bottom cap is removably attachable to said open bottom of said clamping nut in a snap-fit relationship.

17. The clamping device according to claim 1, wherein there are two water inlet hoses (58H, 58C) attached to a mixer cartridge (56) in said faucet head (F) for delivering hot and cold water to said mixer cartridge (56).

18. The clamping device according to claim 17, wherein said two water inlet hoses (58H, 58C) are held together by a crimped double-ring metal clip (60) at the point of attachment to said mixer cartridge (56).

19. The clamping device according to claim 17, wherein there is an auxiliary outlet hose from said mixer cartridge (56) to an auxiliary fluid dispenser and coupled thereto in functional relation.

20. The clamping device according to claim 19, wherein said two water inlet hoses (58H, 58C) and said auxiliary outlet hose are held together by a crimped triple-ring metal clip (60) at the point of attachment to said mixer cartridge (56).

21. The clamping device according to claim 19, wherein said auxiliary fluid dispenser is a faucet side spray.

22. The clamping device according to claim 1, wherein said tubular shank (70) and clamping nut (80) are made of PERT plastic.

23. The clamping device according to claim 2, wherein said clamping nut (80) has vertical traction ribs (80R) on its outer surface.

24. The clamping device according to claim 2, wherein said clamping nut (80) has a rubber friction coating on its outer surface.

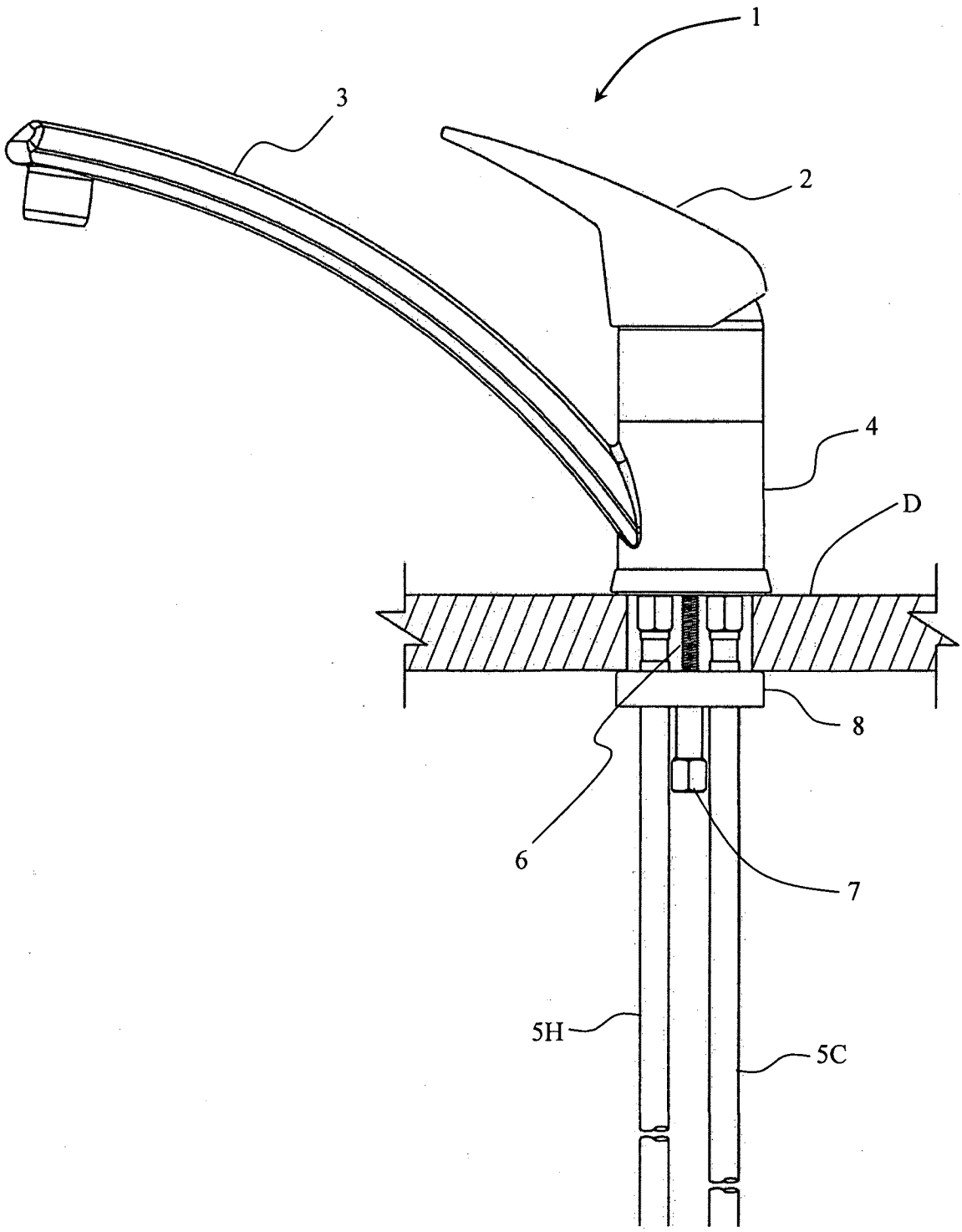


Figure 1
(Prior Art)

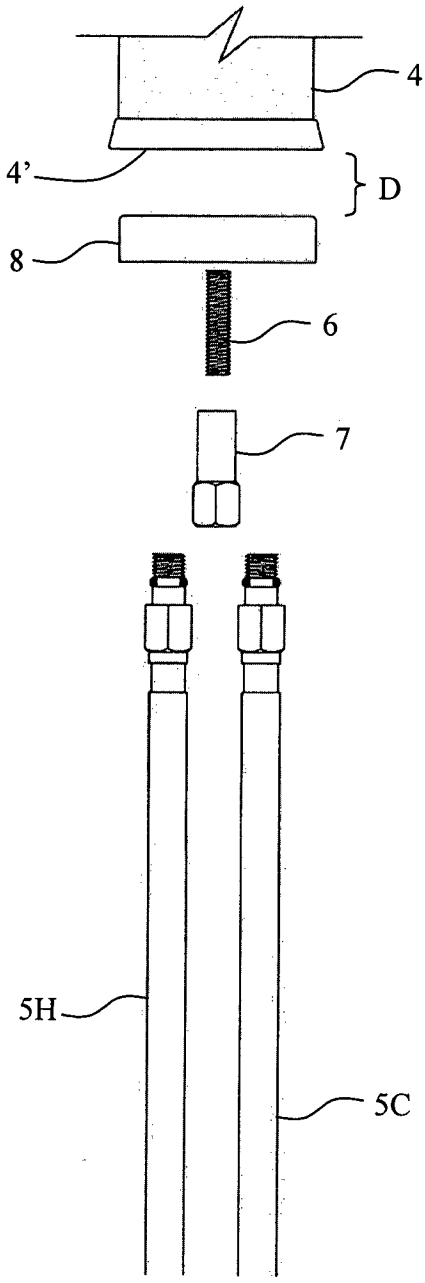


Figure 2
(Prior Art)

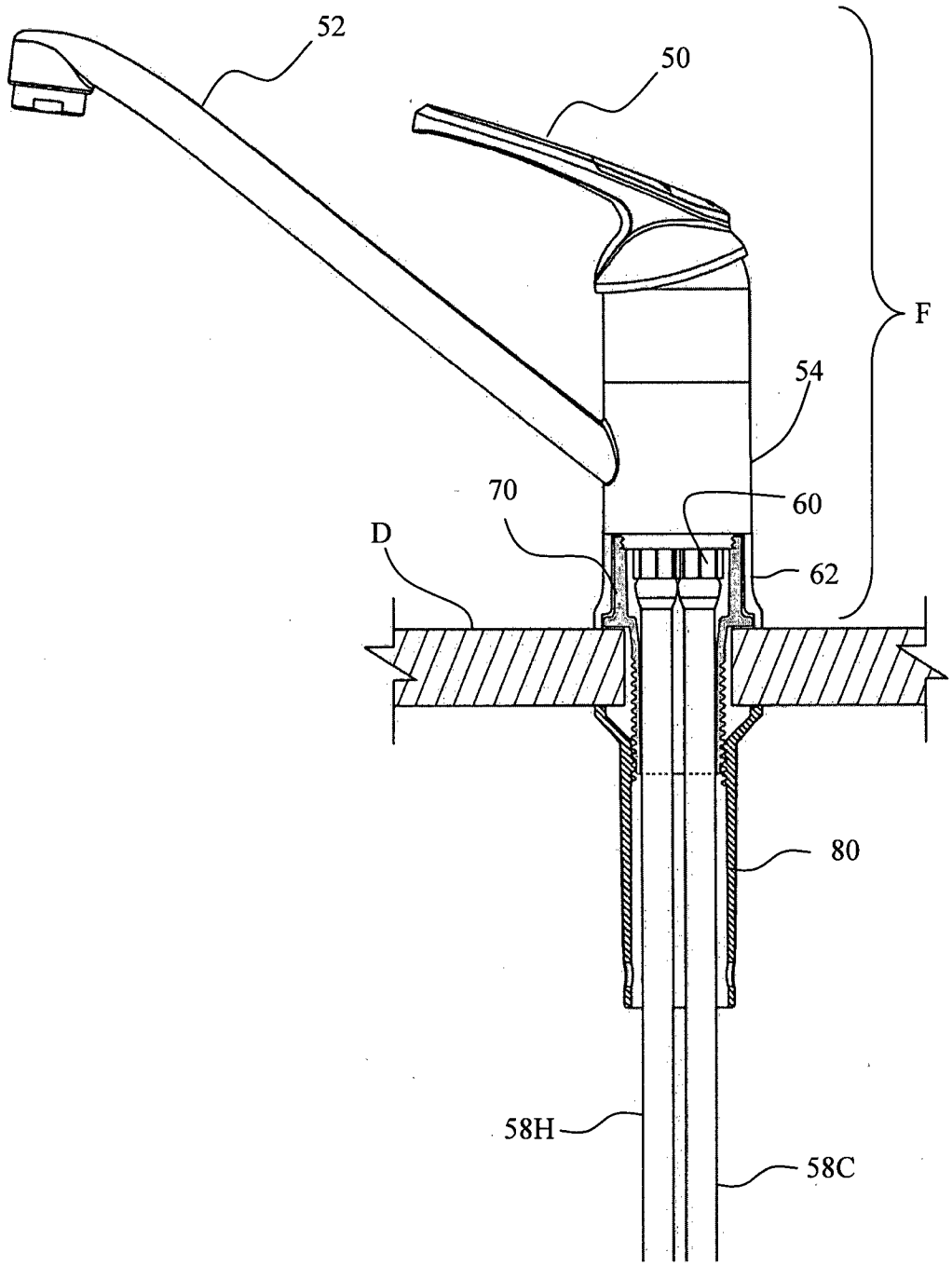


Figure 3

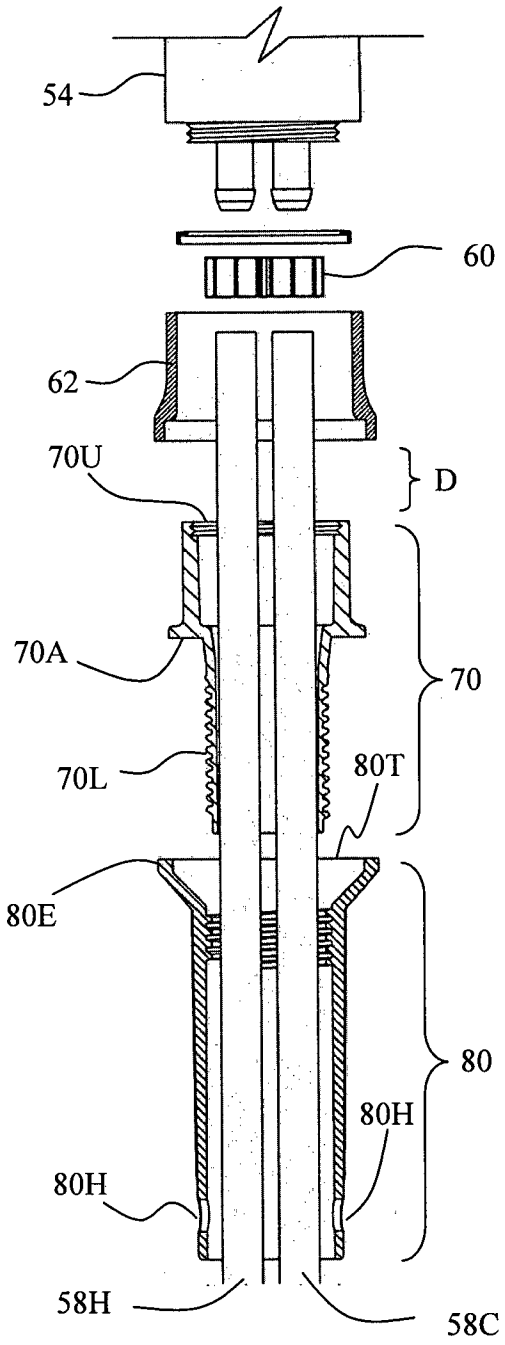


Figure 4

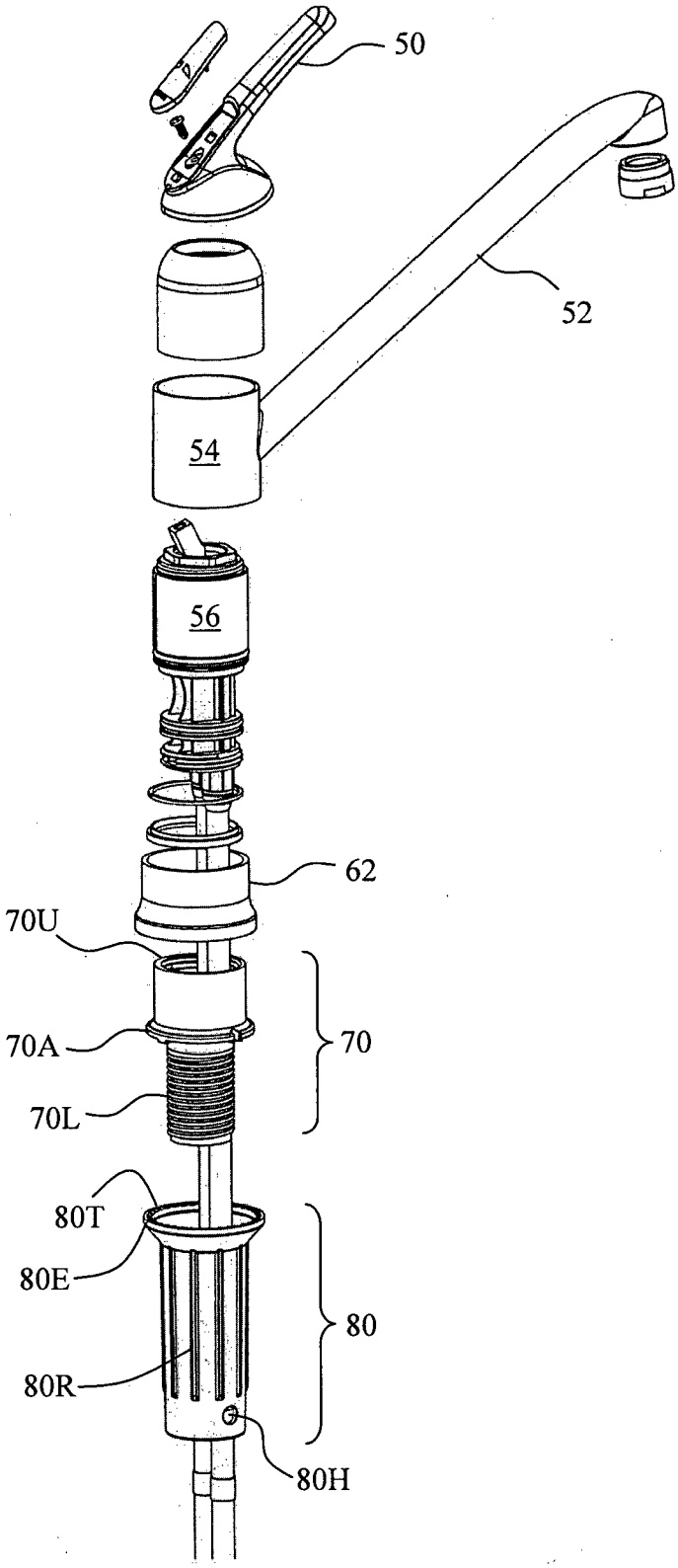


Figure 5

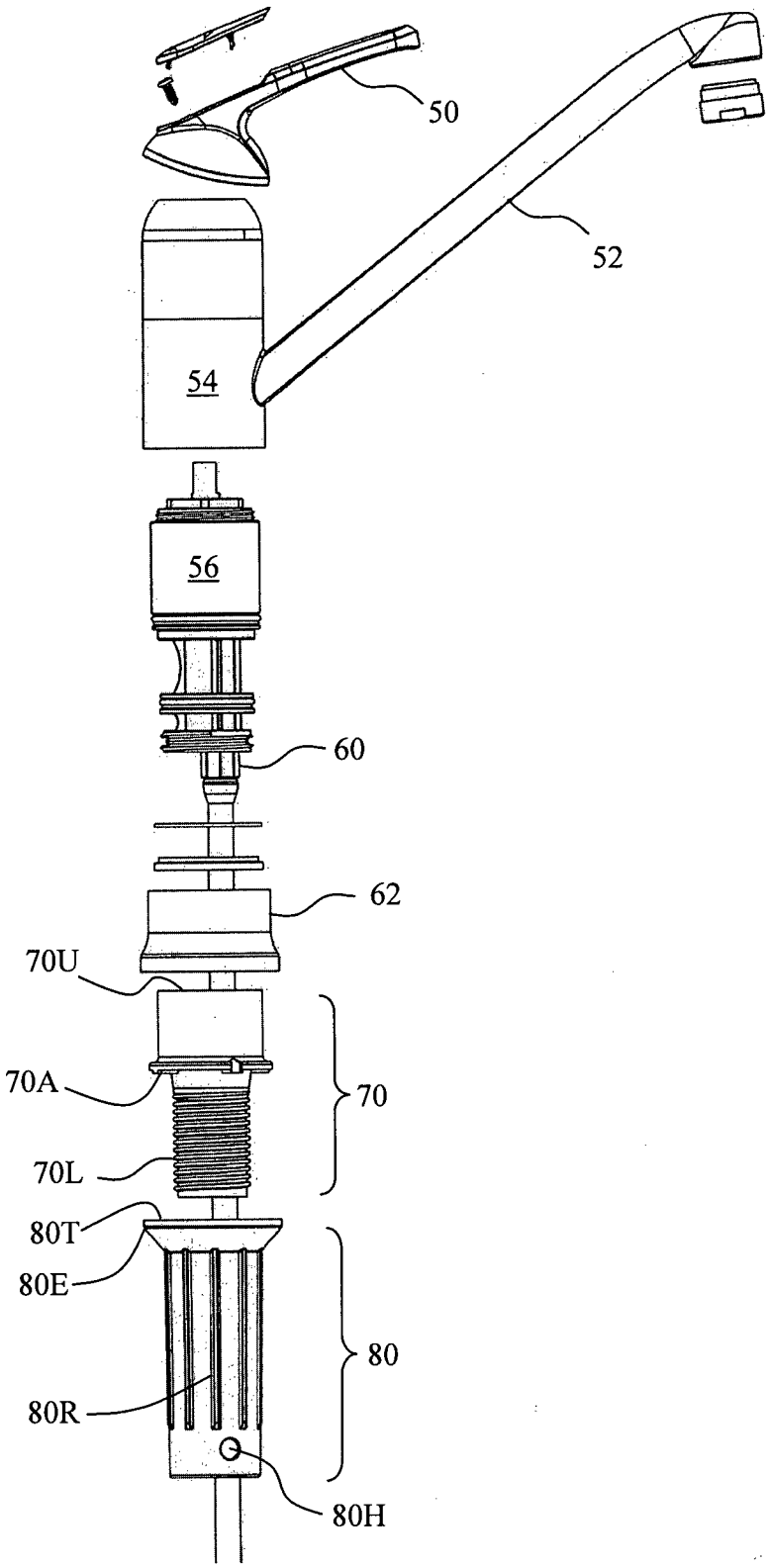


Figure 6

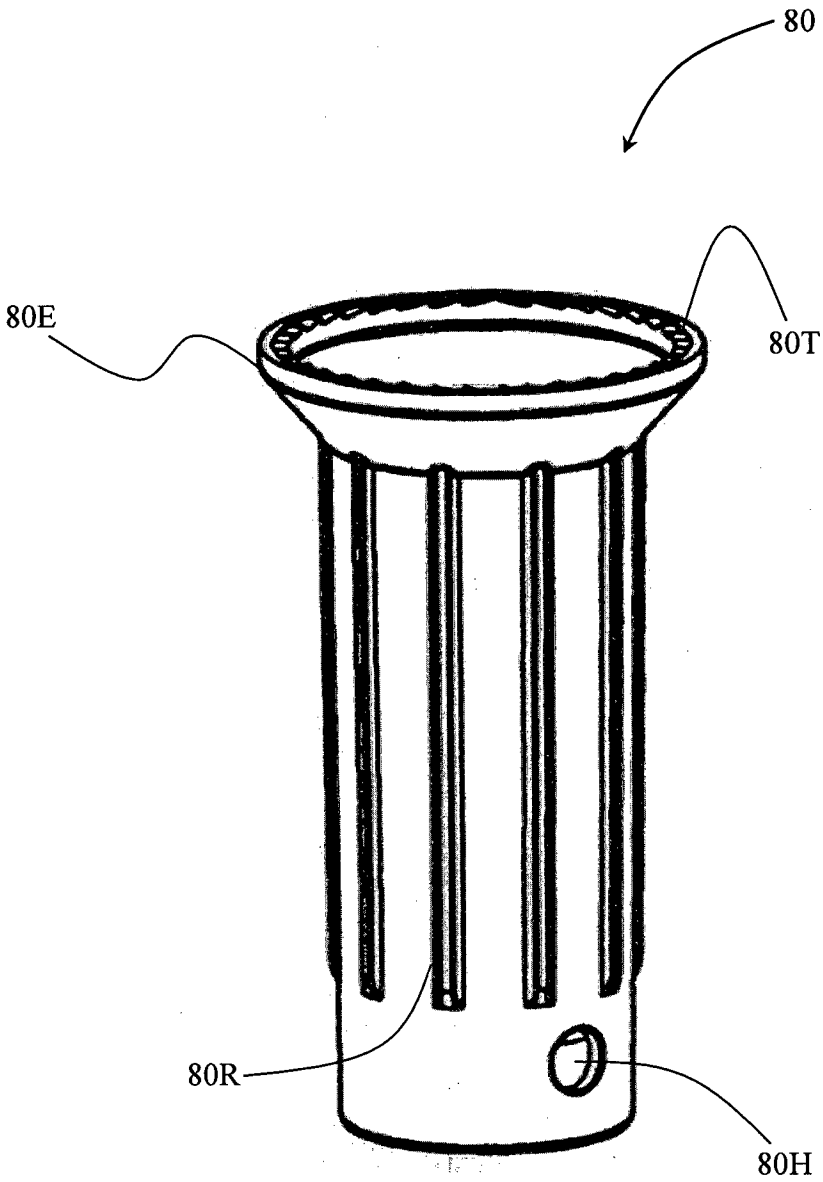


Figure 7

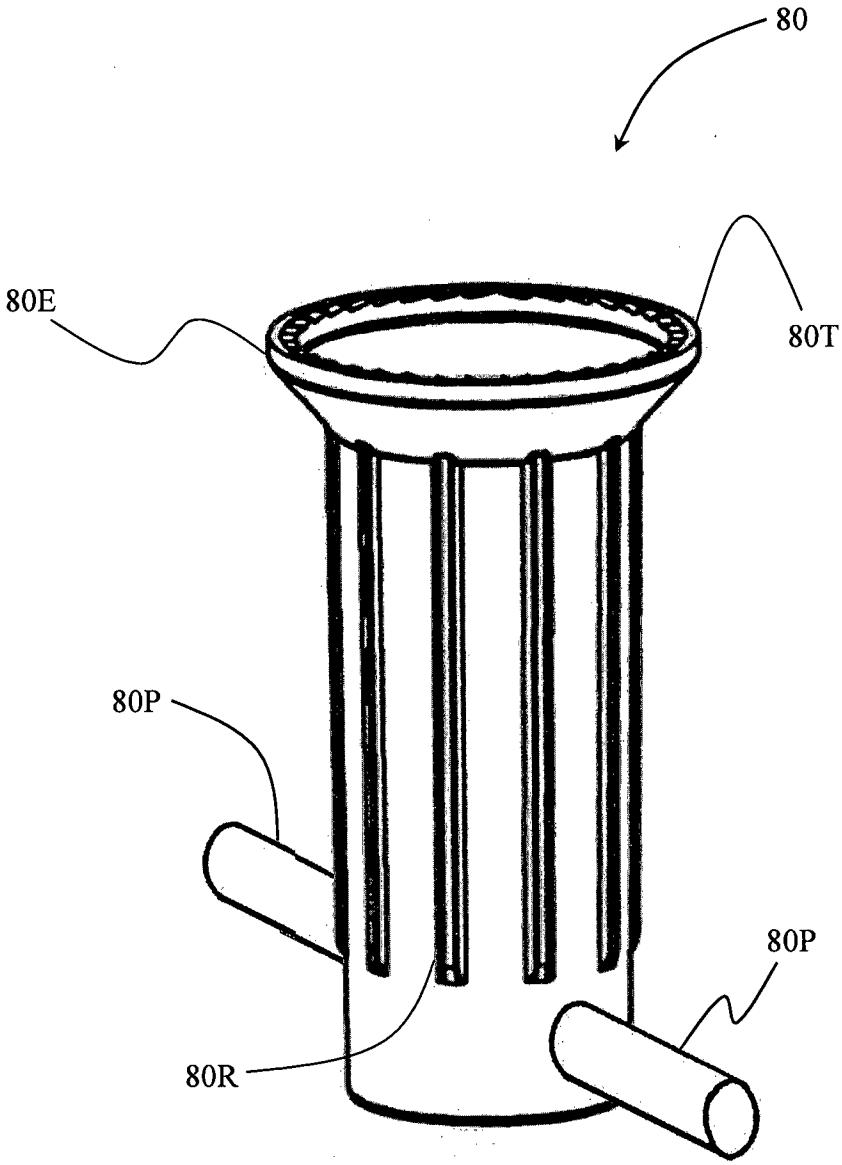


Figure 8

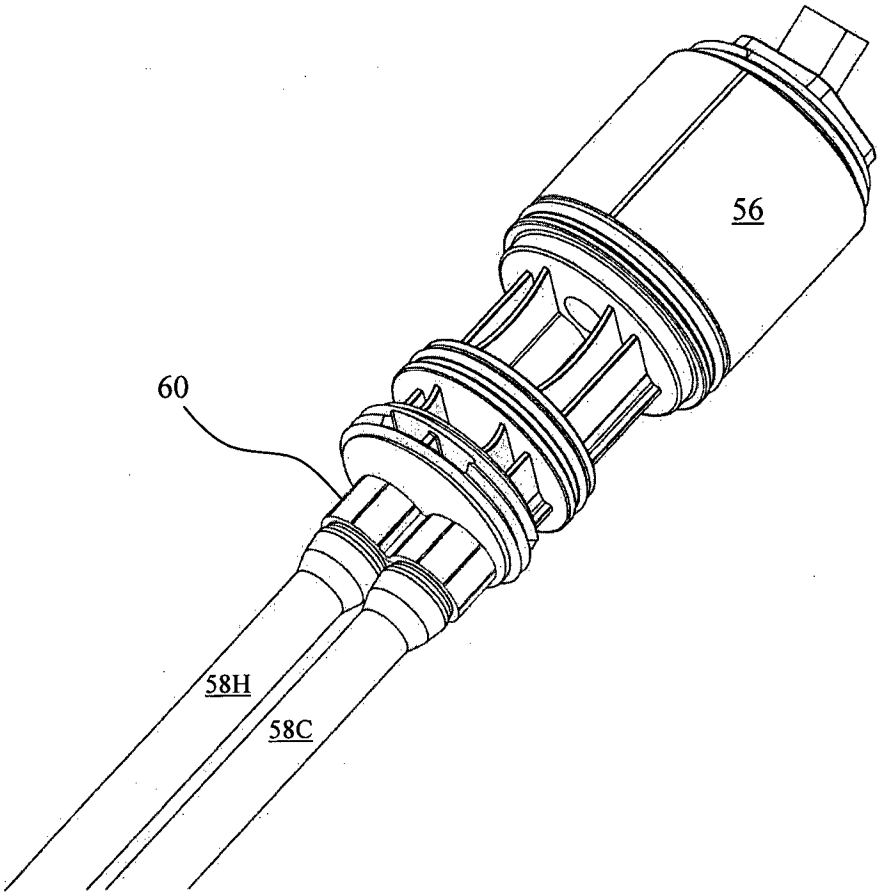


Figure 9

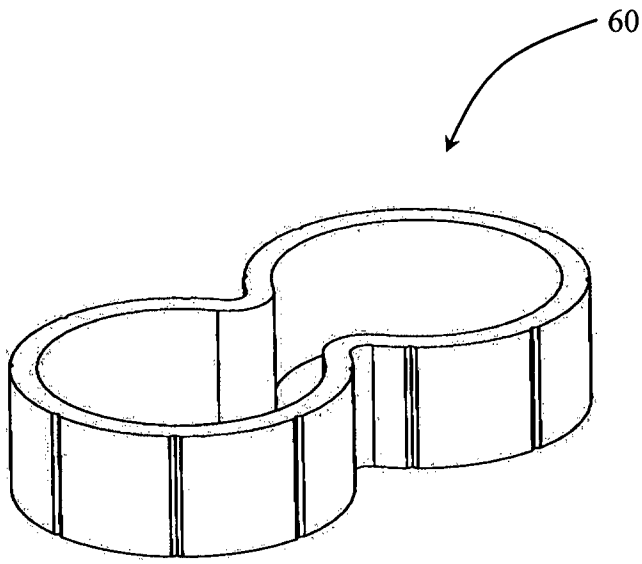


Figure 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2013/000055

A. CLASSIFICATION OF SUBJECT MATTER

E03C 1/04 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC – CPC E03C 1/0401 and keywords (CLAMP+, HAND+, THREAD+, SCREW+, NUT);

WPI & EPODOC – IPC & CPC E03C 1/04/low and keywords (TAP, FAUCET+, FITTING+, THREAD+, SCREW+, NUT, HAND+, EAS+, FASTEN+, ROTAT+, TIGHT+, MOUNT+, CLAMP+, WEDG+, ELONGAT+, EXTEND+, SHANK+, SLEEVE+, COLLAR+) and like terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 July 2013	08 July 2013

Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au Facsimile No.: +61 2 6283 7999	Stephen Marchant AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832533

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/MY2013/000055**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 201198586 Y (BANGYUAN LUO) 25 February 2009 & English abstract retrieved from EPODOC database Fig. 1, abstract	1-24
X	US 6018828 A (LOSCHELDER) 01 February 2000 Figs. 1-4, column 2 line 29	1-24
X	DE 10110379 C1 (HANSA METALLWERKE AG) 23 May 2002 Fig. 1, column 3 lines 25-27	1-24
A	DE 10322076 A1 (RAEKE et al) 02 December 2004	

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/MY2013/000055**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
CN 201198586 Y	25 Feb 2009	None	
US 6018828 A	01 Feb 2000	None	
DE 10110379 C1	23 May 2002	None	
DE 10322076 A1	02 Dec 2004	None	

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.