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PATENT SPECIFICATION

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(54) VALVE BODY AND PIPE CONNECTION ASSEMBLIES

(71) We, IMI OPELLA LIMITED, a British Company, of Kynoch Works, Witton, Birmingham B6 7BA do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to valve body and pipe connection assemblies and is concerned with such assemblies in which pipes extend to or from the body sufficiently close together to make it impossible to attach each pipe to the body separately by its own screw-threaded means. Mixer taps for baths and wash basins are sometimes made of a type referred to as "Single hole" mixer taps in which this problem is inherent in the construction. In the "single hole" type of mixer tap as referred to throughout this specification, inlet passages in the tap body for hot and cold supplies of fluid are disposed close together so that the tap may be fitted into a single hole in a mounting (eg a bath or basin) and the two supplies of fluid pass into the passages through this hole.

In a conventional method of assembling supply pipes for hot and cold supplies of fluid to a mixer tap of the single hole type, the pipes are brazed to the tap body to interconnect them to the inlet passages. While this is acceptable practice for metal taps, it would be convenient to replace brazing with a method of assembly which enables taps to be more easily removed than is possible after brazing. Apart from this, it is impossible to use the technique for the assembly of metal inlet pipes to tap bodies made from plastics material.

According to the present invention, a valve body and pipe connection assembly comprises a valve body having a plurality of passages for the flow therethrough of fluid, the passages having openings which are directed in the same direction from the body, a plurality of pipes aligned one with each of the openings, and a rigid washer

member which is held in position against the body, the washer having a plurality of holes with one pipe passing through each hole and exerting an axial force upon a shoulder of each pipe so that by virtue of the engagement of the washer with the shoulder of each pipe, each pipe is held in position aligned and in fluid-tight relationship with the opening of the respective passage.

Conveniently the washer member is held in position against the body by releasable mechanical fastening means.

In one form of the invention, the fastening means is a nut which is screw-threadably received upon the valve body with all of the pipes passing through a bore in the nut, and a rigid washer member is disposed between the nut and a shoulder on each pipe so that an axial force is imposed by the nut upon the washer member which, by virtue of its engagement with the shoulder of each pipe, holds each pipe in position in alignment with the opening of a respective passage.

In another form of the invention the fastening means are screws which pass through the washer member and are received within screw-threaded holes within the valve body.

If the valve body and washer member are both made of metal then the washer member may be held in position by brazing or soldering it to the body.

Advantageously sealing means are provided to surround each pipe and fluid-tightly seal the pipe against the body.

The shoulder upon each pipe may be provided in conventional manner by a separate olive located upon each pipe end portion. Preferably, however, to provide a rigid shoulder, the shoulder is an integral part of the pipe. The shoulder is advantageously formed as part of an integral annular radially outwardly extending flange of the pipe, the flange being a radially outward deformation of an annular wall portion of the pipe.

Two embodiments of the invention will

now be described, by way of example, with reference to the accompanying drawings in which:

5 Figure 1 is a cross-sectional view of part of a single hole type mixer tap shown assembled to a sink and having pipes secured to the tap in accordance with a first embodiment;

10 Figure 2 is a view similar to Figure 1 but showing a second embodiment, and

Figure 3 is a view in the direction of arrow 'A' of Figure 2.

15 In the first embodiment, Figure 1, a single hole mixer tap of plastics material comprises a body 1 having a boss 2 which is received through a hole 3 in a sink top 4. The tap body is held within the hole by a retaining nut 5 received upon an outer screw-thread of the boss 2 on the inner side of the sink top so as to urge a shoulder 6 of the body against the upper surface of the sink top.

20 The tap has two passages 7 one for hot and one for cold supplies of water and these passages extend side-by-side along the boss 2 to enlarged passage openings 8 at the lower surface of the boss 2.

25 The water is supplied to each passage 7 through the two supply pipes 9 which have end portions snugly received within the enlarged passage openings 8. Each pipe 9 is formed with an integral annular radially extending flange 10 adjacent its end. This flange is formed from the wall of the pipe by known upsetting techniques. In this particular case, an annular bulge is provided in a radially outward direction in the pipe wall by rotating a roller around the inner surface of the pipe wall and pressed against the wall. The pipe is then held securely below the bulge while pressure is applied axially to its open end, and, as the region of the bulge is weaker than the remainder, then the pipe wall at the bulge collapses and is forced in a radially outward direction so as to convert the bulge into the flange 10 which has a downwardly directed shoulder 10a.

30 Each flange 10 retains sealing means in the form of a resilient 'O' ring 11 which is pinched between the cylindrical surface of the enlarged passage opening and the outside surface of pipe 9.

35 Pipe-securing means are provided which comprise a nut 12 and a rigid metal washer member 13. The washer member is provided with two holes 14 through which the two pipes 9 extend with the flanges 10 disposed between the 'O' rings 11 and the member 13. The nut has a hole 15 through which both pipes extend and the nut is screwed onto the screw-thread of the boss 2. A flange 16 of the nut imposes an axial force upon the member 13 towards the tap body. As the member 13 is rigid then this in turn imposes an axial force on the shoulder 10a around the whole of each flange 10 so as to hold the

pipe in position and retain its 'O' ring 11 to prevent leakage of water.

It is found that in the above assembly, the pipe-securing means rigidly holds the pipes in sealing position and the assembly may be readily dismantled. 70

In the second embodiment, Figures 2 and 3, a single hole mixer tap comprises a body 18 moulded from plastics material and has a boss 19 which is received through a hole 20 in a sink top 21. A retaining nut 22 holds the body against the sink top. As described in the first embodiment, passages 23 extend along the boss to openings 24 which receive end portions of supply pipes 25. Each pipe has an integral external flange 26 which retains an O-ring 27 between the surface of the opening 24 and the pipe 25. The pipes 25 are held in position in the openings 24 by means of a rigid washer member 28. This washer member is provided with two holes 29 through which the two pipes 25 extend so that the washer member bears against the flanges 26. The washer member in this second embodiment is held in position against the end of the boss 19 by means of three cross-head self-tapping screws 30 which extend through respective holes in the washer and are received within screw-threaded holes in the tap body. As the three screws 30 are tightened, the washer member engages with the flanges of the two pipes and imposes an axial force around each of the flanges. 80 85 90 95

In a modification of this second embodiment, the tap body is made of metal and the washer member is held against the body by means of three screws having parallel screw-threaded shanks received in appropriately threaded holes in the body. 100 105

In a third embodiment (not shown in the drawings), a tap body is made of metal and a metal washer member is secured in position on the body by brazing or soldering techniques. 110

WHAT WE CLAIM IS:—

1. A valve body and pipe connection assembly comprising a valve body having a plurality of passages for flow therethrough of fluid, the passages having openings which are directed in the same direction from the body, a plurality of pipes aligned one with each of the openings, and a rigid washer member which is held in position against the body, the washer having a plurality of holes with one pipe passing through each hole and exerting an axial force upon a shoulder of each pipe so that by virtue of the engagement of the washer with the shoulder of each pipe, each pipe is held in position aligned and in fluid-tight relationship with the opening of a respective passageway. 115 120 125

2. A valve body and pipe connection assembly according to claim 1 wherein the washer member is held in position against 130



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20 The tap has two passages 7 one for hot and one for cold supplies of water and these passages extend side-by-side along the boss 2 to enlarged passage openings 8 at the lower surface of the boss 2.

25 The water is supplied to each passage 7 through the two supply pipes 9 which have end portions snugly received within the enlarged passage openings 8. Each pipe 9 is formed with an integral annular radially extending flange 10 adjacent its end. This flange is formed from the wall of the pipe by known upsetting techniques. In this particular case, an annular bulge is provided in a radially outward direction in the pipe wall by rotating a roller around the inner surface of the pipe wall and pressed against the wall. The pipe is then held securely below the bulge while pressure is applied axially to its open end, and, as the region of the bulge is weaker than the remainder, then the pipe wall at the bulge collapses and is forced in a radially outward direction so as to convert the bulge into the flange 10 which has a downwardly directed shoulder 10a.

35 Each flange 10 retains sealing means in the form of a resilient 'O' ring 11 which is pinched between the cylindrical surface of the enlarged passage opening and the outside surface of pipe 9.

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pipe in position and retain its 'O' ring 11 to prevent leakage of water.

It is found that in the above assembly, the pipe-securing means rigidly holds the pipes in sealing position and the assembly may be readily dismantled.

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80 In a modification of this second embodiment, the tap body is made of metal and the washer member is held against the body by means of three screws having parallel screw-threaded shanks received in appropriately threaded holes in the body.

95 In a third embodiment (not shown in the drawings), a tap body is made of metal and a metal washer member is secured in position on the body by brazing or soldering techniques.

100 WHAT WE CLAIM IS:—

1. A valve body and pipe connection assembly comprising a valve body having a plurality of passages for flow therethrough of fluid, the passages having openings which are directed in the same direction from the body, a plurality of pipes aligned one with each of the openings, and a rigid washer member which is held in position against the body, the washer having a plurality of holes with one pipe passing through each hole and exerting an axial force upon a shoulder of each pipe so that by virtue of the engagement of the washer with the shoulder of each pipe, each pipe is held in position aligned and in fluid-tight relationship with the opening of a respective passageway.

2. A valve body and pipe connection assembly according to claim 1 wherein the washer member is held in position against

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the body by releasable mechanical fastening means.

3. A valve body and pipe connection assembly according to claim 2 wherein the fastener is a nut and the nut is screw-threadedly received upon the valve body with all of the pipes passing through a bore in the nut, and a rigid washer member is disposed between the nut and the shoulder on each pipe so that an axial force is imposed by the nut upon the washer member which, by virtue of its engagement with the shoulder of each pipe, holds each pipe in position in alignment with the opening of a respective passage.
4. A valve body and pipe connection assembly according to claim 2 wherein the washer member is held in position by screws passing through the washer member and received within screw-threaded holes within the valve body.
5. A valve body and pipe connection assembly according to claim 1 wherein the valve body and washer member are both made of metal and the washer member is held in position by brazing or soldering it to the body.

6. A valve body and pipe connection assembly according to any one of the preceding claims and comprising sealing means surrounding each pipe fluid-tightly to seal the pipe against the body.

7. A valve body and pipe connection assembly according to any one of the preceding claims wherein the shoulder of each pipe is formed as part of an integral annular radially outwardly extending flange of the pipe, the flange being a radially outward deformation of an annular wall portion of the pipe.

8. A valve body and pipe connection assembly constructed and arranged substantially as described herein with reference to and as shown in Figure 1 of the accompanying drawings.

9. A valve body and pipe connection assembly constructed and arranged substantially as described herein with reference to and as shown in Figures 2 and 3 of the accompanying drawings.

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