Feb. 23, 1960 C. D. MATTESON 2,926,026

CONDUIT CONNECTOR

Filed Oct. 3, 1955 3 Sheets-Sheet 1

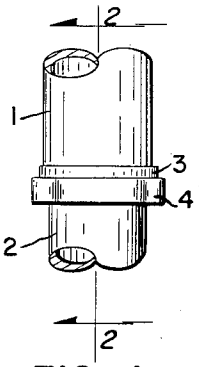


FIG. 1.

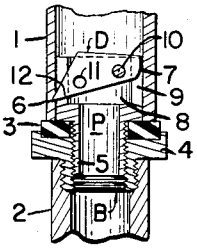


FIG. 2.

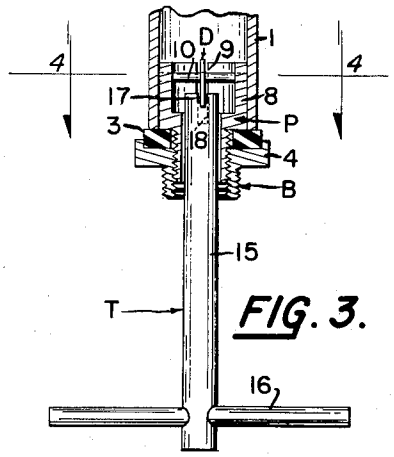


FIG. 3.

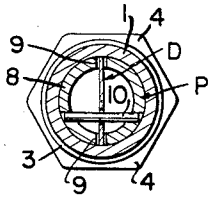


FIG. 4.

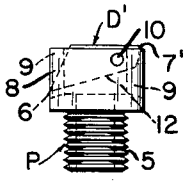


FIG. 5.

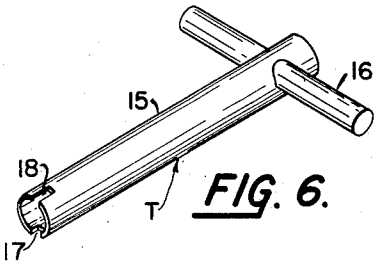


FIG. 6.

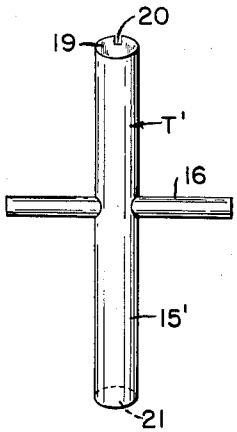


FIG. 7.

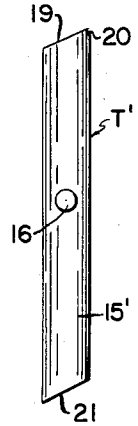


FIG. 8.

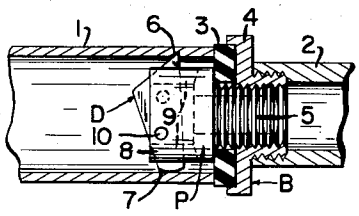


FIG. 9.

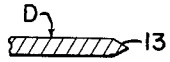


FIG. 9a.

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CONDUIT CONNECTOR

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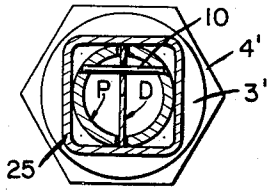


FIG. 11.

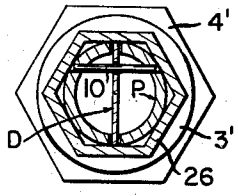


FIG. 12.

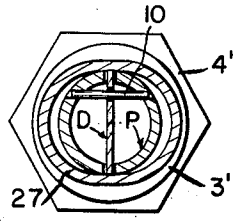


FIG. 13.

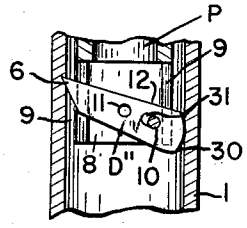


FIG. 14.

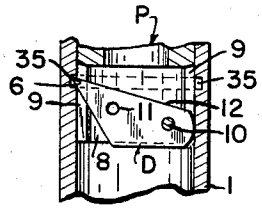


FIG. 15.

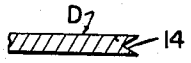


FIG. 10a.

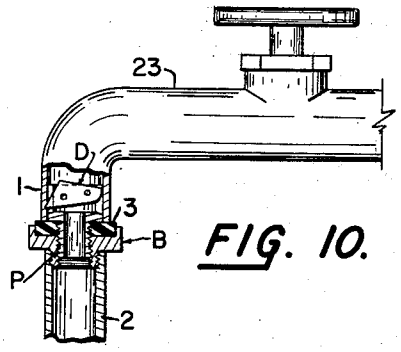


FIG. 10.

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CONDUIT CONNECTOR

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3 Sheets-Sheet 3

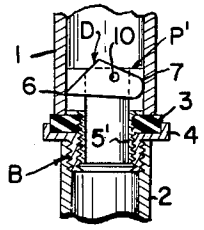


FIG. 16.

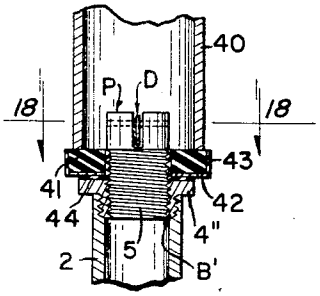


FIG. 17.

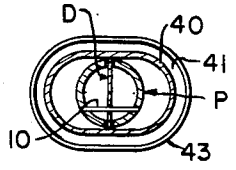


FIG. 18.

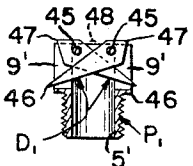


FIG. 19.

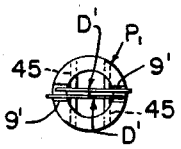


FIG. 20.

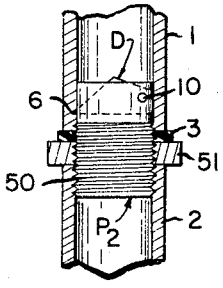


FIG. 21.

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United States Patent Office 2,926,026 Patented Feb. 23, 1960

2,926,026

CONDUIT CONNECTOR

Clarence D. Matteson, Fort Collins, Colo.

Application October 3, 1955, Serial No. 538,087

9 Claims. (Cl. 285—8)

This invention relates to conduit connectors and more particularly to a conduit connector for connecting a first conduit and a second conduit, as when the first conduit is smooth or unthreaded or has a non-circular shape, so that threading cannot be utilized.

For connecting conduits, such as water pipes and the like, both threaded joints and brazed joints are used extensively. Threaded joints require that the end of a length of pipe or nipple be threaded exteriorly so as to engage corresponding threads on the inside of a coupling, T, or similar fitting. For brazed joints, the end of a pipe or nipple is ordinarily placed in a socket formed in a fitting and the juxtaposed surfaces heated to a temperature such that when brazing metal is flowed into the joint it will adhere to both surfaces and form a strong, tight connection. Nevertheless, there are many instances in which neither a threaded nor a brazed joint is practicable or desirable. When an extension of a conduit is desired, as from a faucet, it is relatively simple to connect a hose or other pipe to the end of a faucet which is threaded, but if the faucet is not threaded, then the attachment of a second conduit thereto may be time consuming and expensive, as well as quite difficult in the event the proper tools are not readily available. Furthermore, when the faucet is chrome plated or otherwise surface treated to provide a pleasing appearance, threading the outside of such a faucet is undesirable and heating or brazing not only requires considerable equipment but may spoil the appearance of the exterior surface. It may be also be desirable at times to provide different types of connections, such as changing from an inside to an outside thread or to attach a different size of nipple or the like, or a connection having a different type of thread. Furthermore, some faucets and other conduits are non-circular at the end, i.e., have an oval or other rounded shape, or have an hexagonal or other polygonal shape, while others may have worn, damaged or stripped threads. In addition, a brazed connection to a faucet is a permanent installation and cannot be removed without reheating, while persons temporarily occupying premises may not wish to become involved in the expense of a comparatively permanent installation.

Previous attempts to produce conduit connectors which require neither threading nor brazing have included dogs or jaws which clamp against the inside or the outside of the first conduit, but the actuating mechanism for these jaws or dogs has generally been placed inside the second conduit, so that undue restriction to flow occurs. In addition, the position of a number of these dogs or jaws has been such that an adequate clamping effect could not readily be secured. Also, each of these involves the problem of an adequate seal at the connection. In other types of such connectors, a flexible material is expanded against the inside of the first conduit, but such types are generally limited to very low pressures and ordinarily cannot be used when, for instance, the ordinary household

pressure of perhaps 40–75 pounds per square inch is encountered.

Among the objects of the present invention are to provide a novel conduit connector; to provide such a connector which is particularly adapted to attach a second conduit to a first conduit; to provide such a connector which will provide a relatively strong connection and tight seal irrespective of the cross sectional shape and the condition of the interior or exterior surfaces, i.e., whether smooth or not; to provide such a connector which may be readily placed in position without the use of heating or other complicated equipment; to provide such a connector which may be tightened securely in place yet removed with ease when desired; to provide such a connector with may be tightened in position to a desired degree, as by a conventional wrench; to provide such a connector which does not tend to damage the conduits; to provide such a connector which does not require threading or any other surface configuration on the outside of the first conduit; to provide such a connector which may be made in more than one form, certain forms being particularly adapted for use with smaller conduits and others with larger conduits; to provide one such form which is particularly adapted to be used in connection with a first conduit of irregular cross section; to provide such connectors which produce a minimum of restriction to the flow of liquid through the conduits; and to provide such connectors which may be readily manufactured and of suitable material so that they are long-wearing and sturdy in use.

The foregoing and additional objects of this invention, together with the novel features thereof, will become apparent from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of a joint between two conduits connected by a conduit connector constructed in accordance with this invention;

Fig. 2 is a longitudinal section taken along line 2—2 of Fig. 1;

Fig. 3 is a longitudinal section perpendicular to that of Fig. 2 and illustrating the use of a novel tool in installing the conduit connector of Figs. 1 and 2;

Fig. 4 is a transverse section taken along line 4—4 of Fig. 3;

Fig. 5 is a side elevation of a plug which forms a part of the connector of Fig. 2, a part thereof being slightly modified;

Fig. 6 is a perspective view of the tool shown in Fig. 3;

Fig. 7 is a front elevation of a tool alternative to that of Fig. 6;

Fig. 8 is a side elevation of the tool of Fig. 7;

Figure 9 is a longitudinal section, similar to Fig. 2, but illustrating the installation of a connector at the end of a horizontal conduit;

Fig. 9*a* is a fragmentary cross section, on an enlarged scale, of one edge of a dog forming a part of the connector of Fig. 2.

Fig. 10 is a side elevation, with certain parts broken away to show the interior parts more clearly, of the connector of Figs. 1 and 2 attached to a faucet;

Fig. 10*a* is a fragmentary cross section, similar to Fig. 9*a*, illustrating an alternative construction of the dog edge;

Fig. 11 is a cross section, similar to Fig. 4 but illustrating the use of the connector in attaching a second conduit to a first conduit which is rectangular in cross-section;

Fig. 12 is a similar cross section in which the first conduit is hexagonal in cross section;

Fig. 13 is a similar cross section in which the first conduit is oval in cross section;

Fig. 14 is a fragmentary longitudinal section, similar

to Fig. 2 but illustrating a modified form of connector which is installed at the upper end of an upright conduit;

Fig. 15 is a fragmentary longitudinal section of a connector similar to that of Fig. 2 installed in the position of Fig. 14, but in which the conduit is provided with a groove on the inside;

Fig. 16 is a longitudinal section, similar to Fig. 2, but illustrating a further embodiment of the connector;

Fig. 17 is a longitudinal section, similar to Fig. 2 but illustrating a special type of connector for use with a first conduit of non-circular cross section;

Fig. 18 is a transverse section taken along line 18—18 of Fig. 17;

Fig. 19 is a longitudinal section taken through an alternative type of a plug, which may form a part of the connector;

Fig. 20 is a top plan view of the plug of Fig. 19; and

Fig. 21 is a longitudinal section of a still further alternative type of connector connecting two conduits together.

As illustrated in Figs. 1–4 of the drawings, a conduit connector constructed in accordance with this invention may be utilized in connecting a first conduit **1** to a second conduit **2**, the exterior of the conduit **1** normally being smooth, but also may be rough or irregular, or may be threaded, while a connector constructed in accordance with this invention, as in Fig. 2, may comprise generally a plug P and a bushing B. Bushing B may be threaded on the outside so as to be attached to cooperating threads on the inside of the second conduit **2**, while a washer **3** may be clamped against the end of the first conduit **1** by a flange **4** of the bushing B, flange **4** being conveniently provided with a well to receiver washer **3**. The bushing B may also be threaded interiorly so as to engage the outside threads of an axial extension **5** of the plug P, which is smaller in diameter than the remainder of the plug P, which in turn is adapted to fit within the first conduit **1** adjacent the end thereof. The plug P may be provided with a dog D having at one end a point **6**, adapted to bite into or penetrate the inner surface of the first conduit **1**, so as to lock the plug P within the first conduit **1**. The opposite edge **7** of the dog D abuts against the inner surface of the conduit **1**, opposite the point **6**, and is preferably rounded, as in Fig. 2, so as to provide a cam action which assists in forcing point **6** into the conduit wall, as well as assisting in preventing rotation of dog D and plug P while bushing B is being tightened or loosened. The plug P may also be considered to have an inside extension or axial flange **8**, which may be provided with a pair of oppositely disposed, axially extending slots **9**, in which the dog D is adapted to move, the dog conveniently being pivoted on a pin **10** which extends transversely of the plug P and preferably adjacent the open end of the slot **9** opposite the dog point **6**. This off-center position of pin **10** facilitates use of a tool during installation and removal, as described later, as well as increasing the distance which point **6** can penetrate by moving through a small arc. The dog D may also be provided with a small hole **11**, in which a hook or the like may be inserted for pulling the dog out of engagement with the inner surface of the conduit **1**, as when the connector is to be removed. Also, the under edge **12** of dog D preferably slants across from point **6** to end **7**, such as shown. As shown in Fig. 5, a similar plug P may be provided with a dog D′ which may be substantially identical with dog D of Fig. 2, except that the hole **11** is not present and the end **7′** opposite point **6** is pointed. Also, to insure that the edge **7** will bite into the inner surface of conduit **1**, to prevent rotation of plug P, the edge **7** of dog D may be sharpened to provide a knife-like edge **13**, as in Fig. 9*a*, or may be provided with a groove **14**, as in Fig. 10*a*, to provide two parallel sharpened knife edges.

For installation of the connector, the plug P, with bushing B threaded thereon loosely and the washer **3** in position, is inserted within the end of the first conduit **1**. Then, a tool T or other suitable device device may be inserted through the plug P to engage the dog D and push the point **6** outwardly against the inner surface of conduit **1**, as well as prevent the dog D and plug P from twisting when the bushing B is tightened, as with a wrench on the knurled or preferably hexagonal flange **4**, as shown in Fig. 4. When the point **6** of the dog D is pressed against the inner surface of conduit **1**, and the plug P is prevented from turning by the tool T, as the bushing B is tightened on the threaded outer extension **5** of the plug P, the washer **3** will be pressed into engagement with the end of conduit **1** and at the same time the plug P will be drawn toward the bushing B. Even with only a slight penetration of the surface at first, such movement causes the dog D to pivot about pin **10** and the point **6** to bite deeper into the surface, as well as cause end **7** or **7′** to bite into the surface, to resist axial movement of plug P. Thus, when the bushing B has been tightened until quite snug, the plug P will have been pulled down, or to the position of Fig. 2 in which the dog D has penetrated the inner surface of conduit **1** and the washer **3** is clamped tightly against the end of conduit **1**. This not only insures that the plug P and bushing B will be tightly attached to the conduit **1**, but also that an effective seal will be provided. As shown in Fig. 2, the washer **3** may also abut the shoulder formed on plug P outwardly from the extension **5**, but such abutment is not necessary for an adequate seal to be produced, since the leakage which must be avoided is that between the end of conduit **1** and the flange **4** of bushing B. After the plug P and bushing B have been installed in this manner, the tool T may be removed and the second conduit **2** attached to the bushing B, the cooperating threads thereof providing a fluid tight seal, although a suitable sealing compound may be used in the threads, or, if desired, a sealing gasket may be placed between the end of conduit **2** and the under side of flange **4**.

The tool T, as illustrated in Figs. 3 and 6, may comprise a tubular barrel **15** provided with a transverse handle **16** at one end and a pair of slots **17** and **18** at the opposite end of different depths, so that when the plug P is to be installed, the barrel **15** of the tool T may be inserted within the plug P and the lower edge **12** of the dog D engaged by the shallower slot **17** so as to push the point **6** against the inner surface of conduit **1**, such thrust tending to cause dog D to pivot clockwise about pin **10**, when viewed in the position of Fig. 2.

When the connector is to be removed, the bushing B is loosened and the tool T placed within the plug P in a position reverse to that just described above, i.e., with the shallower slot **17** in engagement with the lower edge of the dog D adjacent the pin **10**, so that axial pressure with the tool will tend to cause the dog D to pivot in a counter-clockwise direction about the pin **10**, as viewed in the position of Fig. 2. Such thrust will also push the plug P into the conduit **1**, such movement being accommodated by the bushing B having previously been loosened. Thus, as the plug P is pushed into the conduit **1**, the thrust of tool T tends to cause the dog point **6** to move inwardly towards the center of the plug P, so that the point **6** will be disengaged from the conduit **1**, whereupon the plug P can be removed while a slight pressure is still exerted with the tool T. During the use of the tool T to install plug P, the deeper slot **18** performs the primary function of engaging the dog D to prevent rotation of the plug P, while the bushing B is being tightened. Thus, slot **18** is deeper than slot **17**, so that when the tool T is placed against the dog with the slot **17** engaging the lower edge **12** of dog D just beneath the pin **10**, the slot **18** will be sufficiently deep that the bottom will not contact the under edge **12**, thereby permitting the dog D to pivot as described above.

In the alternative tool T', illustrated in Figs. 7 and 8, a barrel **15** is provided with a handle **16** which may be placed adjacent the center rather than at one end, since one end **19** of the barrel **15'** is beveled at a suitable angle so that the high edge of bevel **19** may be placed against the edge **12** of dog D adjacent point **6**, so that the point **6** may be pushed outwardly against the inner surface of conduit **1** and the opposite edge of the end **19** of the tool will not engage the edge **12** of dog D. Also, the high edge of end **19** of the tool may be provided with a slot **20** to prevent dog D and plug P from turning while the bushing B is initially tightened. At its opposite end, the barrel **15'** may be provided with a bevel **21** having the same angular relation to the center line of barrel **15'** as bevel **19**, but a slot therein being unnecessary, since the bevel **21** is utilized in removing the plug P by placing the high point of the bevel **21** against the edge **12** of the dog D adjacent pin **10**, thereby pushing the dog D and plug P into the conduit **1** after bushing **4** has been loosened and simultaneously causing the dog D to turn to a loose position, as described above.

It will be understood that other tools may be utilized in installing and removing the connector and that when the dog D is provided with a small hole **11** adjacent the point **6**, a hook may be inserted within the plug P to engage hole **11** and pull the dog D away from the surface of the conduit **1**. In addition, such a hook may be utilized in retrieving a plug which may have slipped into the conduit **1**, as following complete removal of bushing B accidentally.

As illustrated in Fig. 9, when the connector is utilized in attaching a second conduit **2** to a first conduit **1** which is disposed in a horizontal position, the plug P is preferably installed with the point **6** uppermost, so that when the connector is to be removed and the dog D has pivoted about the pin **10**, the dog will fall to a position within slot **9** and point **6** will not tend to bite into the surface as the plug P is pulled out. As will be evident, the dog D is preferably made of relatively hard material, such as stainless steel or tool steel which may be provided with a plating of chromium, nickel or the like, so that the point **6** will bite into any ordinary pipe or conduit and will therefore have a very long and useful life.

As will be evident from Fig. 5, in its normal position and prior to insertion of plug P within the conduit **1**, the dog D rests substantially within the confines of the plug P and in any event preferably does not extend outwardly beyond the edges of the slot **9**. However, when the dog D is caused to pivot about pin **10**, the point **6** will bite into the inner surface of the conduit **1** and as the bushing B is tightened, the point **6** will penetrate further into the wall of the conduit **1** as the opposite end **7** or **7'** engages the opposite wall. As will be evident from Fig. 2 and Fig. 9, the device of this invention will accommodate some differences in size of the conduit, as will be evident from the fact that conduit **1** of Fig. 2 is slightly smaller than the conduit **1** of Fig. 9, but in the latter instance the dog D has merely pivoted further. Of course, a longer dog D may be substituted for a larger conduit. The conduit **2** may, of course, be a pipe, or it may be a hose coupling or other type of connection, or it may be a flexible pipe of the plastic variety.

A particularly useful type of installation of the connector of this invention is a temporary or semi-permanent connection of piping or tubing to a faucet which has a smooth end. As shown in Fig. 10, the plug P may be readily placed in position in the end of a faucet **23**, the point **6** of dog D being pushed against the inside of conduit **1**, which forms the end of the faucet **23**, and the bushing B then tightened so as to pull the dog D into locking position and simultaneously clamp the washer 3 against the end of conduit **1**. Then, the conduit **2**, such as tubing, may be connected to the bushing B and the joint is complete, it being understood that the outside threads of bushing B may be conventional pipe threads, as for a pipe or hose coupling, or any suitable size or type of threads or other suitable type of connection.

As will further be evident from Figs. 11 to 13, inclusive, a connector constructed in accordance with this invention may also be utilized in attaching a second conduit to a first conduit which is non-circular in cross section. For instance, as in Fig. 11, the plug P may be placed inside a rectangular or square conduit **25**, with the point of the dog D engaging one of the sides of the conduit **25**. The washer **3'** and the flange **4'** of the bushing B should be sufficiently large that the washer **3'** can be clamped against the end of conduit **25** around all four sides. Similarly, when a conduit **26** of Fig. 12 having a hexagonal cross section is involved, the washer **3'** and flange **4'** of the bushing B are sufficiently large to seal the ends of the conduit **26**, while the point of dog D preferably engages the inner surface of the conduit **6** at or adjacent a mid-point of one of the sides. When a conduit **27** having an oval cross section is involved, as in Fig. 13, again the washer **3'** and flange **4'** of the bushing B are sufficiently large to seal the end of the conduit, while the point **6** of the dog D preferably engages the conduit **27** at or adjacent the center of a side having a shorter radius. Generally, when the conduit is irregular in cross section, the dog D is placed directly across the smallest dimension, since the greatest transverse dimension may be sufficient that the dog D will not bite properly into the surface.

The conduit **1** to which conduit **2** is to be attached may extend downwardly or may extend horizontally, as described previously, and also may extend upwardly. That is, the plug P may be inserted into the upper end of a vertical conduit **1**, as in Fig. 14, wherein the point **6** of an alternative dog D'' is biting into the surface of conduit **1** in the manner previously described, the remainder of plug P and also the bushing B conveniently being substantially identical with the similar parts shown in Figs. 2, 5 and 9 and therefore not illustrated in Fig. 14. The dog D'' may be similar to dog D of Fig. 2, except that dog D'' may be more elongated in shape and the end **30** opposite point **6** wider, in comparison. Also, pin **10** may be engaged by an elongated slot **31** which permits the dog D'' to be more nearly self-centering when the plug P is installed in a comparatively larger conduit. Also, dog D'' tends to accommodate a greater difference in size of conduit, the slot **31** accommodating different angular positions of the dog.

If desired, as illustrated in Fig. 15, a small groove **35** may be formed in the wall of the conduit **1** adjacent the end thereof and in a position to be engaged by the point **6** of dog D, in order to facilitate positioning of the plug P in the conduit and also to insure a resistance against axial movement of point **6** when bushing B is initially tightened. Such a groove **35** may be utilized when pressures higher than normal are to be expected, while the groove **35** may be produced by any suitable inside scribing or boring tool.

As will be observed from Figs. 4 and 11–13, the only resistance to flow through the plug P is occasioned by the cross sectional area of the dog D and the pin **10**. However, the dog D may be relatively thin and the dog and pin comparatively small in section in comparison with the total inside cross sectional area of the plug P, so that no serious obstruction to liquid flow will develop, particularly when the inner diameter of the plug about dog D is greater than the inner diameter of axial extension **5**, so that the former may compensate for the cross sectional area occupied by the dog and pin and the effective cross sectional area of each may be approximately the same. However, when less expense and a minimum of machining is desired, or for other reasons, a construction such as illustrated in Fig. 16 may be utilized, in which the extension **5'** of a plug P' is relatively larger in diameter than the extension **5** of the plug P of Fig. 2, so that the cross sectional area of the passage

through plug P may be substantially uniform. While a small portion of this cross sectional area is occupied by the pin **10** and dog D, the cross sectional area of these parts is relatively small, as indicated previously.

It will be noted from Figs. 11–13 that the washer **3'** and the flange **4'** are relatively large compared with the washer **3** and flange **4** of the bushing B of Fig. 2. Thus, when it is desired to reduce the size of flange **4** of bushing B for a conduit of non-circular cross section, a construction such as illustrated in Figs. 17 and 18 may be utilized. In this construction, a plug P, which is similar to the plugs previously described, may be installed in a similar manner across the smaller dimension of an oval shaped tube or conduit **40**, while the flange **4''** of bushing B' need not be any larger than required by the conduit **2**. The washer **41** may correspond in shape but be slightly larger than the end of the conduit **40** and extend inwardly to a hole which accommodates the plug P. The washer **41** may be clamped against the end of the conduit **40** by a laterally extending plate **42**, conveniently having an upstanding flange **43** extending around its outer periphery so as to hold washer **41** securely in position. The connector of Figs. 17 and 18 may be installed in a similar manner, but in general requires slightly less material and produces a more streamlined appearance than the construction of Figs. 11–13, for instance, although no more effective in use. If desired, a thin gasket **44** may be placed between the flange **4''** of bushing B' and the underside of plate **42**, since the cooperating threads on the inside of bushing B' and the outside of the outer extension of plug P may not necessarily be sufficiently tight to prevent leakage when the dog D reaches the desired position. Of course, after the plug P, washer **41**, plate **42**, and bushing B' have been connected to the conduit **40**, the second conduit **2** may be connected to the bushing B' in the manner previously described. Similar arrangements may be made to accommodate conduits having other non-circular cross sectional shapes.

When a slightly stronger joint is desired, as when the pressure of fluid is to be greater than a single dog might be able to withstand, dual or double dogs may be utilized, as in the case of the plug illustrated in Figs. 19 and 20, this plug being essentially similar to the plugs previously described but differing principally in size. The plug P_1 of Fig. 19 is similar to the plug P' of Fig. 16, except that the slots **9'** in the principal portion of the plug may be slightly deeper and the threaded extension **5'** may be slightly heavier, while a pair of pins **45** extend in parallel relation adjacent the inner edges of each of the slots **9'**. A dog D_1 is pivotally mounted on each of the pins **45** and is provided with a point **46** which extends outwardly from the opposite slot **9'** when in conduit engaging position, as shown. As will be evident, each of the dogs D_1 may be moved to a position in which the points **46** are within the slots **9'**, for insertion or removal of the plug. The dogs D_1, as in Fig. 20, may be disposed in side by side relation and the end **47** of each, opposite the point **46**, may be adapted to bite into the surface to prevent turning. In the event that a cam action of ends **47** is desired, the slots **9'** could be staggered so that the end **46** of each dog will extend through a slot and the cam ends **47** will each engage the inside of plug P_1.

The plug P_1 may, of course, be associated with a bushing B in the manner previously described and may be installed and removed in the manner indicated above. For pushing the dogs D_1 outwardly for installation, a flat end tube may be utilized, such as the barrel of a tool similar to the tool T or T', except that the end of the barrel is flat but may be provided with oppositely disposed slots to prevent turning of the plug. When the plug P_1 is to be removed, the bushing which cooperates therewith is first loosened and the plug pushed slightly into the conduit. This will loosen the dogs D_1 and a hook may be placed over the upper edges of the dogs, such as at the dotted position **48** of Fig. 19, so that an axial pull on the dogs will move the points **46** inwardly and the plug may be readily removed.

In the construction illustrated in Fig. 21, the plug P_2, similar to the plug of any of the previous embodiments, may be provided with a pin **10** on which the dog D is pivoted, such as similar to the plug of Fig. 2, Fig. 5 or Fig. 16. However, the lower threaded extension **50** of the plug P_2 may be somewhat longer, to permit the second conduit **2** to be directly connected thereto, with a nut **51** first threaded onto the extension **50** so as to clamp the gasket **3** against the end of conduit **1** and also to pull the dog point **6** into the inner surface of the conduit. After the plug P_2, washer **3** and nut **51** have been installed in this manner, the second conduit **2** may then be connected to the threaded extension **50** of the plug. In the event that a sufficiently tight seal is not produced between the plug and conduit **2** in this manner, a thin washer or gasket may be interposed between the nut **51** and the end of conduit **2**.

Although several different embodiments of this invention have been illustrated and described, it will be understood that various other embodiments may exist and that various changes may be made therein, without departing from the spirit and scope of this invention.

What is claimed is:

1. A conduit connector for connecting a first fluid conduit formed of metal to a second fluid conduit, comprising a tubular member attachable at its lower end to the second conduit and having a laterally extending flange portion thereabove at least as large as said first conduit and provided with means for forming a seal when engaging the end of said first conduit; a hollow plug insertable in said first conduit and having at its outer end an axial tubular extension; locking means comprising a thin, metallic dog disposed transversely of said plug, said plug having axial slots at opposite sides for limiting lateral movement of said dog therein; a pin mounted offset a substantial distance from the center of said plug in a direction away from one end of said dog and extending transversely of said plug for pivotally and loosely supporting said dog, said one end of said dog having a single point so as to penetrate the inner surface of said first conduit upon pivotal movement about said pin with the opposite end of said dog engaging the inner surface of said first conduit opposite said pointed end, the transverse cross-sectional area of said locking means and pin being only a minor part of the cross-section area of the opening through said plug or tubular extension to permit substantially unrestricted fluid flow therethrough; and cooperating means between said hollow member and said axial extension of said plug for moving said sealing means of said lateral flange into sealing engagement with said first conduit and moving said plug axially outwardly relative to said first conduit so as to produce locking engagement of said dog with said first conduit.

2. A conduit connector for connecting a first conduit to a second conduit, as defined in claim 1, wherein said cooperating means comprises threads.

3. A conduit connector for connecting a first conduit to a second conduit, as defined in claim 1, wherein said locking means comprises two dogs each having one end pointed and said points extend in opposite directions.

4. A conduit connector for connecting a first conduit to a second conduit, as defined in claim 1, wherein said dog is provided with a hole between said point and said pin.

5. A conduit connector for connecting a first conduit to a second conduit, as defined in claim 1, wherein the end of said dog opposite said point is rounded to

form a cam tending to force said point into said conduit wall.

6. A conduit connector for connecting a first conduit to a second conduit, as defined in claim 1, wherein the end of said dog opposite said point is provided with at least one sharp axial edge adapted to bite into the wall of said first conduit.

7. A conduit connector for connecting a first conduit to a second conduit, as defined in claim 1, wherein said dog is provided with an elongated hole engaging said pin.

8. A conduit connector for connecting a first conduit to a second conduit, as defined is claim 1, wherein said plug is cylindrical and the inner diameter of said plug at said dog is greater than the inner diameter of said axial extension.

9. A conduit connector for connecting a first conduit to a second conduit, as defined in claim 1, wherein the inside of said first conduit is provided with a lateral groove for engagement by said dog point.

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