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(56) Documents cited
GB 2222861 A GB 2220718 A

(58) Field of search
UK CL (Edition K) F2G G31
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(54) Snap-fit coupling for slender pipes

(57) In a connector for slender pipes spacer and seal rings are inserted into the end of one pipe. The leading end of the one pipe is retained in the outside of a bushing. The end of a second pipe is pushed into the bushing. An annular flanged portion formed around the second pipe is held against the front face of the bushing by pawls projecting from a socket body which has projections engaged in holes in the connector body. The one pipe is clamped by stepped oblique walls inside the connector body.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Fig. 1

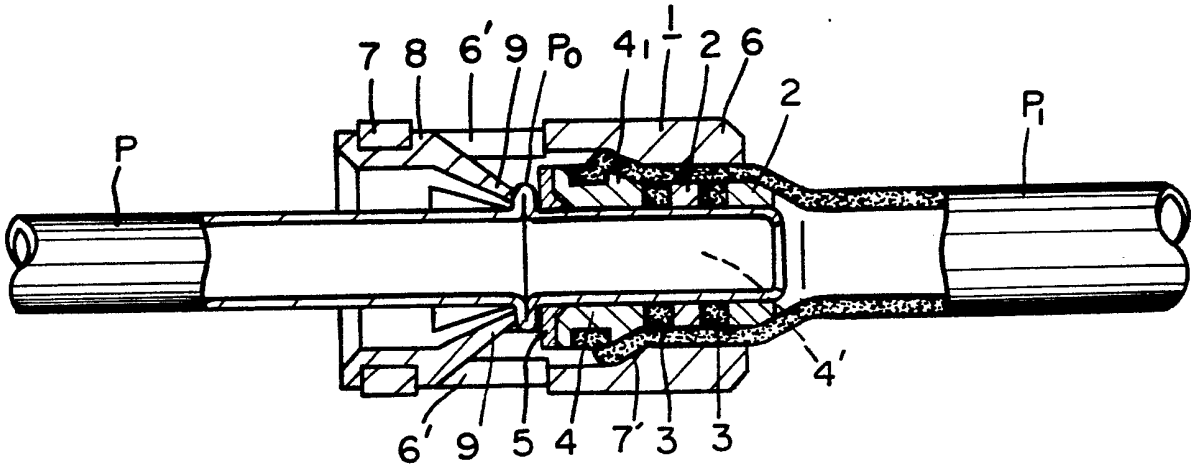


Fig. 2

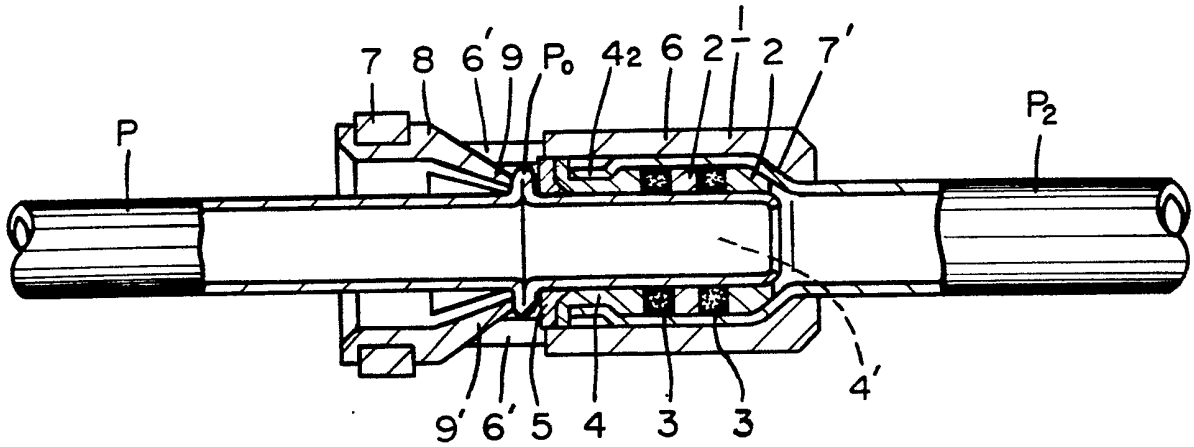


Fig. 3

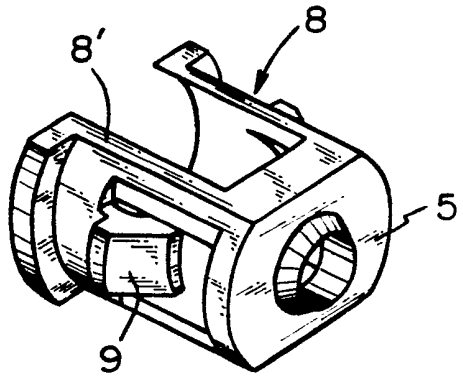
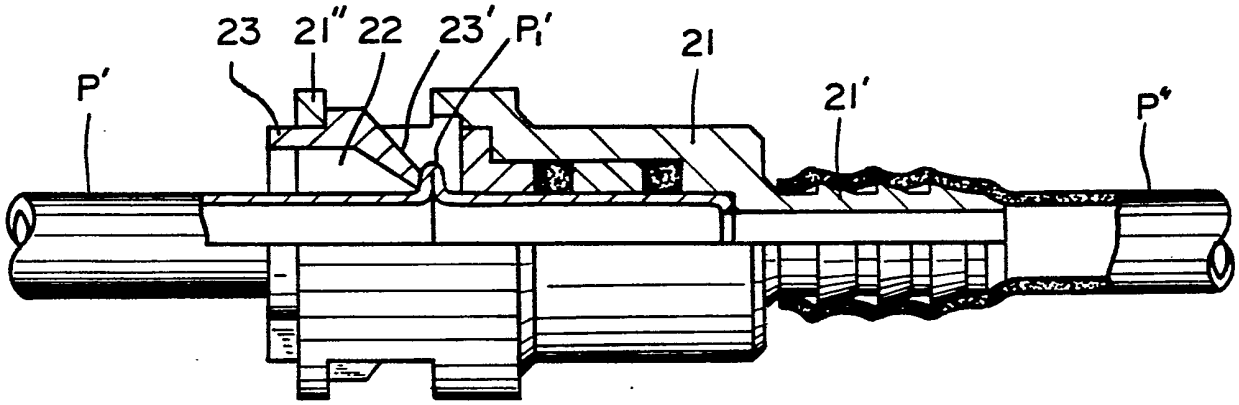


Fig. 4



CONNECTOR FOR CONNECTING SLENDER PIPING MEMBERS AT END PORTIONS

Field of the Invention:

The present invention relates to a connector for connecting the end portions of slender piping members such as metal pipes or resin tubes and flexible hoses of a resin or rubber, or metal pipes or resin tubes and metal pipes (as will be shortly referred to as the "piping members"), that is to say having a diameter of about 20 mm or less and are used to supply oil or air to various machines or apparatus such as automobiles.

A prior art connector is shown in Fig. 4 for use in connecting piping member such as a flexible hose made of a resin or rubber. In Fig. 4, a flexible hose P" having undulating circumference at its back is formed with a stepped larger-diameter through chamber 22, which has a rear circumferential end portion of its cylindrical wall formed with a retaining wall 21" and extends from a communication bore formed with a connecting cylindrical wall 21' of the flexible hose P". A seal ring member is fitted in the larger-diameter through chamber 22. In the retaining wall 21" of a connector body 21 having a bushing member retained in the stepped portion of the larger-diameter through chamber 22 retaining the seal ring member, there is fitted the stepped portion of the rear end annular wall of a socket body 23 having forward oblique pawl walls at the leading end. These pawl walls are retained in engagement holes or slots which are formed in the cylindrical wall of the larger-diameter through chamber 22 at the side of the connector body 21. The bulging wall portion P_1',

which is fitted in the larger-diameter through chamber 22 formed in the vicinity of the portion of a piping member P' to be connected, is elastically engaged in its connected state by the aforementioned pawl wall 23'.

However, the structure of the prior art connection is disadvantageous in that frequent troubles are encountered in the use of a narrow piping place because the whole length of the connector is axially elongated by the fitting arrangement at the through chamber 22 and the retaining wall 21" leading to the cylindrical wall of the chamber. Moreover, the pushing connection of the flexible hose P" to the connecting cylindrical wall 21' having the undulating circumference will invite troublesomeness. Due to aging at the connected portions left outside for a long time, the gas-tightness is degraded to induce a leakage. There arises another problem that the relative sizes in the connector body 21 require a high-grade of machining accuracy.

The present invention has been conceived in view of the problems of the prior art thus far described and has an object to provide a connector for connecting the end portions of slender piping members, which is enable to be used in a narrow piping place by shortening the total axial length of the connector, to retain the gas-tightness without fail for a long time by the use of seal rings which are sandwiched gas-tight directly between the overlapping circumferential walls in the vicinity of the ends of the connected portions, and to facilitate the connecting operations.

In order to achieve the above-specified object, according to the present invention, there is provided

a connector for connecting the ends of slender piping members, in which a spacer and seal rings are inserted into the vicinity of the end portion of one piping member to be connected, in which a bushing is fitted to retain the leading end portion of the one piping member in the outer circumference of the bushing, in which the vicinity of the end portion of the other piping member to be connected is pushed into the axial core of the bushing, in which an annular flanged portion formed on the outer circumference of the other piping member is held in abutting engagement with the front face of the bushing through an annular wall, in which a plurality of retaining holes or slots are formed to project from the circumferential wall fitted in the one piping member, in which the circumferential wall portion of the one piping member is clamped by the stepped oblique walls having a retaining wall at their leading end circumferential edge and positioned inside of the connector body, and in which the base of a socket body having a plurality of elastic pawl walls projecting obliquely in the connecting direction and the annular wall formed integrally with the pawl walls is engaged by the retaining wall in the circumference of the axial through bore to be assembled with the other piping member in face-to-face relation to the

connector body, whereby the one and other piping members are connected by engaging the flanged wall of the piping member side elastically by the pawl walls.

Since, according to the present invention, the spacer and the seal rings are fitted in advance in the vicinity of the end portion the one flexible hose or the expanded end portion of the metal pipe to be connected and since the bushing is inserted to position the connected portions of those piping members inside of the connector body, the connector in its entirety can be shortened in the axial direction. As a result, the connector can be easily used in a narrow place for the piping operation. At the same time, the gas-tightness can be retained for a long time without any fear of leakage by the actions of the seal rings which are hermetically sandwiched directly between the overlapping circumferential walls in the vicinity of the end portions of the piping members. Moreover, the connecting operations can be facilitated merely by engaging the base of the socket body and the retained wall through the pushing of the other piping member made of a metal or resin.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a partially cut-away longitudinal sec-

tion showing the connector of the end portions of slender piping members according to one embodiment of the present invention;

Fig. 2 is similar to Fig. 1 but shows another embodiment of the present invention;

Fig. 3 is a perspective view showing a socket body itself; and

Fig. 4 is a partially cut-away longitudinal section showing the portions connected by the connector according to the prior art.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In Figs. 1 to 3, reference numeral 1 designates a connector. Numerals 2, 3 and 4 designate an annular spacer, elastic seal rings and an annular bushing having a rising wall at its leading end, respectively. These elements 2, 3 and 4 are pushed or fitted in the vicinity of the end portion, which is to be connected, of one piping member such as a flexible hose P_1 (as shown in Fig. 1) made of a resin or rubber or a metal pipe P_2 (as shown in Fig. 2) having its end portion expanded. The piping member P_1 or P_2 has its leading end either retained on an annular ridged wall 4_1, which is ridged from an outer circumference of the bushing 4 (as shown in Fig. 1), or caulked in an an-

nular groove 4_2 which is also formed in the outer circumference of the bushing 4 (as shown in Fig. 2). Reference letter P designates the other piping member made of a metal or resin. The end portion of the piping member P, which is to be connected, is pushed into an axial bore 4' of the bushing 4 until an annular flanged wall P_o extending outward from the outer circumference of the piping member P comes into abutting engagement at its one side with the leading face of the bushing 4 through an annular wall 5 of a later-described socket body 6. Numeral 6 designates a connector body which is made of a metal or resin such that it is formed in its circumferential wall with a plurality of regaining holes or slots 6' and has its leading circumferential edge formed into a retaining wall 7. Moreover, the connector body 6 is assembled in advance with the aforementioned flexible hose P_1 or metal pipe P_2. The connector body 6 is formed with a stepped oblique wall 7' which is expanded to clamp the circumferential wall of the other piping member P together with the ridged wall 4_1 of the bushing 4 or the spacer 2 located at the rearmost position. Numeral 8 designates the socket body which is made of an elastic material such that it is formed: around the axial through bore with a plurality of elastic pawl

walls 9 tapered in the connecting direction; a support wall portion 8' extending in the axial direction but having different circumferential positions from those of the pawl walls 9; and the aforementioned annular wall 5 integrated with the wall portion 8'. The socket body 8 thus formed is assembled on the other piping member P in a face-to-face relation to the connector body 6. In the aforementioned abutting engagement, the rear end base of the socket body 8 is retained on the retaining wall 7 of the connector body 6, and the other side of the flanged wall P_o of the other piping member P is elastically retained by the pawl walls 9 so that the other piping member P is connected to the one piping member P_1 or P_2.

Incidentally, the aforementioned annular wall 5 has a function to adjust the positioning of the connector body 6 and the socket body 8 relative to the end portion of the other piping member P. For this connection, the annular wall 5 is assembled from the end portion of the piping member P to be connected. Moreover, the retention of the retaining wall 7 is facilitated by the radial pressure and constriction at the base of the socket body 8.

As has been described hereinbefore, the connector for connecting the ends of slender piping members ac-

cording to the present invention effects the connection by positioning the vicinity of the end portion of the one piping member such as the flexible hose P_1 or the metal pipe P_2 in the connector body 6. Thus, the length of the connector 1 can be shortened in the axial direction. As a result, the connector can be used easily without any trouble within a narrow portion. At the same time, even a flexible hose can be held gas-tight with neither fail nor fear of leakage for a long time by the action of the seal rings 3 which are fitted directly sandwiched within the connector body 6 between the overlapped circumferential walls of the end portions of the one piping member such as the flexible hose P_1 or the metal pipe P_2 and the other piping member P. Moreover, the connecting operations can be easily performed merely by pushing the one piping metal or resin member P to bring the socket 8 into engagement with the retaining wall 7 as a result of the radial pressure or construction of the base of the socket 8. Thus, it is possible to provide a remarkably useful connector for connecting slender pipes at the two end portions.

CLAIMS

1. A connector for connecting the end portions of slender piping members to each other, comprising:

a first piping member including a spacer, a seal ring and a bushing having means for retaining the leading end portion of said bushing in the outer circumferential portion of said bushing, said spacer, said seal ring and said bushing being fitted in the inner end of the vicinity of the end portion of said one piping member to be connected;

a second piping member having an annular flanged wall formed on its outer circumference, the vicinity of the end portion of the second piping member to be connected being pushed into the axial bore of said bushing;

a connector body formed in its outer circumferential wall with a plurality of retaining holes or slots, at its leading end circumferential edge with a retaining wall. and at its rear end portion with a stepped inwardly oblique wall for clamping the circumferential wall of the first piping member; and

a socket body formed with a plurality of elastic pawl walls disposed to face said connector body and projecting obliquely in the assembling direction from the circumference of its axial core, into which the second piping member is to be pushed, and an annular wall formed at its leading end integrally with elastic pawl walls, said socket body having its base retained in the retaining wall of said connector body,

whereby the first and second piping members are connected by holding one side of said annular flanged wall in abutting engagement with the front face of said bushing through the

annular wall of said socket body and by holding said elastic pawl walls in elastic engagement with the other face of said annular flanged wall.

2. A connector according to claim 1, wherein the first piping member is a flexible hose or a metal pipe having at its end portion expanded.

3. A connector according to claim 1 or 2, wherein the second piping member is made of a metal or resin.

4. A connector according to claims 1, 2 or 3, wherein said retaining means includes an annular ridged wall.

5. A connector according to any preceding claim, wherein said retaining means includes an annular groove in which the corresponding portion of the first piping member is caulked.

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