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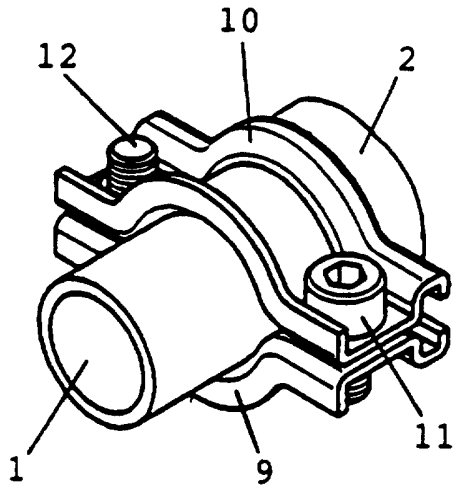
(54) Title: A PIPE COUPLING AND A METHOD FOR SECURING A PIPE TO A COUPLING PIECE

(57) Abstract

A pipe coupling for securing a pipe to a coupling piece, whereby the end of the pipe (1) extends into said coupling piece (2), said pipe coupling being provided with clamping (4), which on the one hand are shaped in such a manner as to engage a correspondingly shaped part of the coupling piece, and which on the other hand clampingly engage said pipe, and being provided with sealing means (3) between said pipe and said coupling piece.



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A PIPE COUPLING AND A METHOD FOR SECURING A PIPE TO A COUPLING PIECE

The invention relates to a pipe coupling for securing a pipe to a coupling piece, whereby the end of the pipe extends into said coupling piece. A pipe coupling of this kind may be used for securing a pipe to the housing of a valve, whereby said housing is provided with a coupling piece. The coupling piece may also be a part of another element to which the pipe is to be connected, or form the connection between two or more pipes, whereby two or more pipes may be connected to said coupling piece. The pipe and also the coupling piece may thereby be made of a suitable material, such as plastic material, metal or another material which meets the requirements made thereof.

A great many embodiments of pipe couplings are known, which each have their specific characteristics and which are thus to a greater or smaller extent suitable for a particular field of application.

Thus clamp couplings are known in which the end of the pipe is inserted into the coupling piece, after which an annular clamping means, which is wedge-shaped in axial direction, is forced between the pipe and the coupling piece by means of a screwed cap, which engages the externally threaded coupling piece. A clamping means of this type functions both to clamp down the pipe and to form a seal between the pipe and the coupling piece. One of the drawbacks of a pipe coupling of this type is the fact that only a limited axial force can be taken up between the coupling piece and the pipe. Consequently pipe couplings of this type are not suitable for use with pipes containing a medium which is subject to high pressures or high pressure pulses.

Another frequently used pipe coupling consists of a screwed connection, wherein the end of the pipe is externally threaded and the coupling piece is internally threaded. This pipe coupling is capable of taking up a large axial force, whilst in addition an adequate seal may be obtained by suitably selecting the screw thread or by interpolating a sealing element. A drawback of a pipe coupling of this type is the fact that the coupling piece must be rotated relative to the pipe when coupling the two, which is often a difficult operation requiring a great amount of space, in particular when the coupling piece forms part of a valve housing.

The object of the invention is to provide a clamp coupling of simple design, which is capable of transmitting a large axial force between the coupling piece and the pipe, which is simple to fit and wherein the position of the coupling piece with respect to the pipe can be slightly varied in axial direction as well as in other directions.

Another object of the invention is to provide a clamp coupling which can be used several times, that is, which can be removed and be refitted again.

The pipe coupling, wherein the end of a pipe extends into a cylindrical hole of the coupling piece and a flexible sealing ring is provided between the pipe and the coupling piece, and wherein a clamping means engages the pipe and engages behind a radially oriented stop surface of the coupling piece with a radially inwardly oriented edge, is according to the invention characterized in that said clamping means is provided with a cylindrical clamping surface for engaging the pipe, and in that said sealing ring is positioned in a chamber provided within said hole.

The use of a cylindrical clamping surface makes it possible to transmit a great force between the pipe and the clamping means without any deformation of or damage to the material of the clamping means and/or the material of the pipe. Furthermore an effective seal may be provided in that the sealing ring is positioned in an annular chamber, whose dimensions are precisely adapted to the dimensions and the shape of the sealing ring.

From EP-A-0 053 330 a pipe coupling is known wherein the end of the pipe extends into a cylindrical hole in the coupling piece, whereby a flexible sealing ring is present and whereby a clamping means engages both the pipe and the coupling piece. The clamping means is a precisely machined part, which is provided with an element in the shape of a ring, which acts as a tooth, which element engages with said pipe under deformation of the pipe material. In order to obtain an adequate joint the pipe surface must be adapted to make it possible to effect said engagement, whilst the pipe coupling cannot be removed and be refitted again in view of the fact that the pipe surface is damaged. After the joint has been made the sealing ring is furthermore positioned in an annular chamber which is bounded by the coupling piece as well as by the clamping , as a result of which a satisfactory support of the sealing ring is impossible, especially if a slight movement of the clamping with respect to the coupling piece must be possible in the mounted condition of the clamping or if the clamping is not mounted exactly coaxially.

According to another aspect of the invention the clamping is provided with two identical parts which are made of plate material, said parts together forming the cylindrical clamping surface and the aforesaid edge. By manufacturing

the clamping of a metal plate, which is possible because said clamping takes place via a cylindrical clamping surface, a simple and effective construction may be used, as will become apparent from the embodiments yet to be described.

According to another aspect of the invention the radially oriented stop surface is positioned closer to the open side of the cylindrical hole of the coupling piece than the chamber provided within the hole. As a result of this the dimension in radial direction of the clamping is relatively small, because the clamping does not need to extend around the coupling piece at the location where the coupling piece is provided with the aforesaid chamber for the sealing ring. As a result of the small difference between the inside diameter and the outside diameter of the clamping which can be achieved in this manner, it has become simpler to manufacture the clamping of plate material.

The invention furthermore relates to a method for securing a pipe within a coupling piece, wherein the end of the pipe is inserted into the coupling piece with the interposition of a sealing ring, and wherein a clamping is subsequently fitted around a part of the pipe and around an adjacent part of the coupling piece, which clamping engages said coupling piece, whereby said clamping engages said pipe with a cylindrical clamping surface.

Further aspects of the invention, which may be used both separately and in combination with each other, will be described below with reference to the Figures and be mentioned in the claims.

Hereafter a few embodiments of a pipe coupling will be described by way of illustration with reference to the drawing.

Figure 1 is a sectional view of a first embodiment;

Figure 2 is a perspective view of the first embodiment;

Figure 3 is a sectional view of a second embodiment; and

Figure 4 is a view along line IV-IV in Figure 3.

The illustrated embodiments are only shown by way of example and corresponding parts of the two embodiments are numbered alike.

Figure 1 shows a part of a pipe 1 extending inside coupling piece 2. To that end coupling piece 2 is provided with a hole having a diameter which is slightly larger than the outside diameter of pipe 1.

Coupling piece 2 may form part of for example a valve housing, but the invention may be used with every other element to which a pipe is to be secured.

The hole of coupling piece 2, into which pipe 1 is inserted, comprises an internal chamber, in which a sealing ring 3 is provided. Sealing ring 3 is for example an O-ring or another flexible ring which may provide an adequate sealing between pipe 1 and coupling piece 2. Instead of a sealing ring 3 also other sealing may be used, whereby also a sufficiently close tolerance between pipe 1 and coupling piece 2 may be considered to constitute a seal.

A clamping 4 is provided around pipe 1, said clamping also extending around coupling piece 2. To that end clamping 4 is provided with a radially outwardly extending part 5, which terminates in an inwardly oriented edge 6. Said inwardly oriented edge 6 of clamping 4 engages behind a part 7 of coupling piece 2. Part 7 of coupling piece 2 is for example formed by providing an external annular chamber 8 in said coupling piece, into which chamber edge 6 may extend.

Figure 2 is a perspective view of the pipe coupling according to Figure 1. The Figure thereby shows that clamping 4 consists of two shell parts 9, 10, which are interconnected by of bolts 11, 12. Bolt 11 is thereby threaded into shell part 9 and bolt 12 is connected to shell part 10 in a similar manner. It will be apparent that the two shell parts 9, 10 are drawn together by tightening the bolts 11, 12. The dimensions of clamping 4 are thereby such that a solid clamping down around pipe 1 can be effected, so that clamping 4 can no longer be moved relative to pipe 1. Because the edge 6 of clamping 4 abuts against a radially oriented stop surface made up of part 7 of coupling piece 2, clamping 4, and thus pipe 1, is secured against axial movement relative to coupling piece 2.

Figure 3 shows a partial longitudinal section of a second embodiment of a pipe coupling according to the invention. Also in this embodiment a pipe 1, only the end of which is shown in sectional view, is inserted into a coupling piece 2, which forms part of a device of some kind. In this embodiment the diameter of the hole of coupling piece 2 into which pipe 1 is inserted is considerably larger than the outside diameter of pipe 1. As a result of this pipe 1

can be readily slid into coupling piece 2, also when both parts are completely aligned. In this embodiment a sealing ring 3 is used, which sealing ring is configured such that an adequate sealing is effected even when pipe 1 is out of alignment with coupling piece 2.

Figure 4 is a view along line IV-IV of Figure 3, showing in particular the by which shell parts 15, 16 of clamping 4 are clamped down on pipe 1. Said consist of a rod 17 bent in the shape of a semi-circle, which is threaded at both ends 14. The semi-circular part of rod 17 is provided around clamping 4, and the ends 14 of rod 17 extend through holes in closing part 18, which abuts against clamping 4 with a semi-circular edge. A solid clamping down of shell parts 15, 16 on pipe 1 can be effected by tightening bolts 19.

As is the case with the first embodiment, clamping 4 of the second embodiment is provided with a radially inwardly oriented edge 6, which extends into a recess in coupling piece 2 formed for that purpose.

It will be apparent that it is possible in both embodiments to obtain a fixation between pipe 1 and coupling piece 2 which is capable of taking up a large axial force between said parts, on the one hand because an optimum clamped connection can be effected between clamping 4 and pipe 1, whilst on the other hand a large axial force can be taken up also between said two parts, as a result of the manner in which clamping 4 engages coupling piece 2. Generally an exact alignment between the pipe and the coupling piece is not required thereby, whilst moreover the depth of insertion of pipe 1 into coupling piece 2 may vary to a certain extent. On the other hand the pipe coupling is of

simple design, comprising a minimum number of different parts.

The invention is not limited to the above-described embodiments, of course, proceeding on the principle of the invention those of average skill in the art will be able to think of a great many variations.

CLAIMS

1. A pipe coupling for securing a pipe (1) to a coupling piece (2), wherein the end of the pipe (1) extends into a cylindrical hole of said coupling piece (2) and a flexible sealing ring (3) is provided between the pipe (1) and the coupling piece (2), and wherein a clamping (4) engages said pipe and thereby extends behind a radially oriented stop surface of the coupling piece (2) with a radially inwardly oriented edge (6), characterized in that said clamping (4) is provided with a cylindrical clamping surface for engaging said pipe (1), and in that said sealing ring (3) is positioned in a chamber (8) provided within said hole.

2. A pipe coupling according to claim 1, characterized in that said clamping (4) is provided with two identical parts (9, 10; 15, 16) which are made of plate material, said parts together forming the cylindrical clamping surface and the said edge (6).

3. A pipe coupling according to any one of the preceding claims, characterized in that said radially oriented stop surface is positioned closer to the open side of the cylindrical hole of the coupling piece (2) than the chamber provided within said hole.

4. A pipe coupling according to any one of the preceding claims, characterized in that separate fastening (14, 17, 18, 19) are provided around that part of the clamping (4) which forms said cylindrical clamping surface.

5. A method for securing a pipe (1) within a coupling piece (2), wherein the end of said pipe (1) is inserted into said coupling piece (2) with the interposition of a sealing ring (3), and wherein a clamping (4) is subsequently fitted around a part of said pipe (1) and around an adjacent part of said coupling piece (2), which clamping (4) engages said coupling piece (2), characterized in that said clamping (4) engages said pipe (1) with a cylindrical clamping surface.

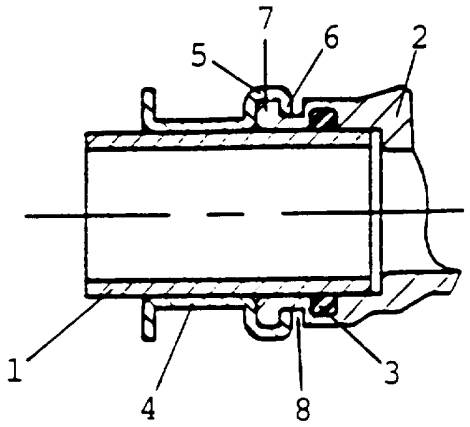

FIG.1

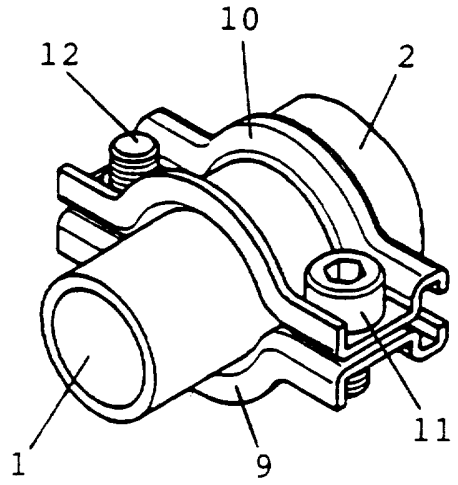

FIG.2

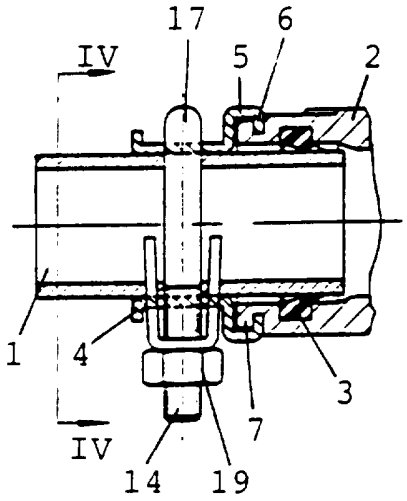

FIG.3

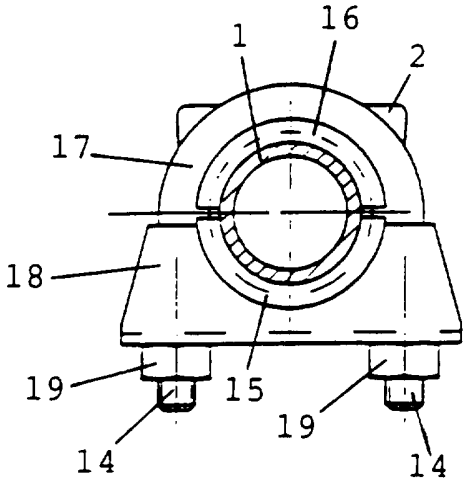

FIG.4

INTERNATIONAL SEARCH REPORT

Inter ıal Application No
PCT/NL 96/00077

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F16L21/06 F16L21/08

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)
IPC 6 F16L

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 practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB,A,1 358 024 (HAROLD SHIRE ET AL.) 26 June 1974 see figures 1-9	1-3,5
Y	FR,A,2 244 115 (VON ROLL AG) 11 April 1975 see figures 1-3	1-3,5
A	GB,A,1 035 633 (CORNING GLASS WORKS) 13 July 1966 see figures 1-4	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A-1358024	26-06-74	NONE	
FR-A-2244115	11-04-75	CH-A- 559874	14-03-75
		DE-A- 2432771	20-03-75
GB-A-1035633		NONE	