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(54) A crosswise connector for two intersecting pipes

(57) The invention relates to a crosswise connector for two continuous pipes which intersect each other at any desired angle one above the other, the connector comprising a pipe clamp for each pipe, which clamp surrounds the pipes to be connected and is provided with two clamping arms which leave a gap therebetween. The invention is characterised in that the pair of clamping arms (6) of one pipe clamp (1) is inserted, with its end face, into the pair of clamping arms (7) of the other pipe clamp (2) and is freely rotatably mounted therein by means of a clip-type connection (8), and in that the external pair of clamping arms (7) is securely clampable to the internal pair of clamping arms (6) by a clamping means. The pipes may be used in the construction of exhibition stands, frames, partitions and shelving.

Fig. 1

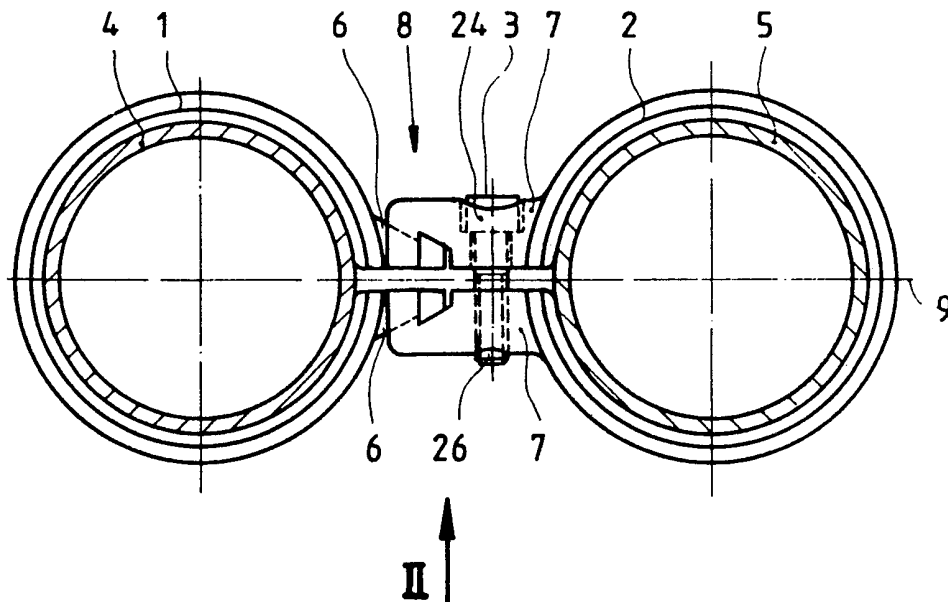


Fig.1

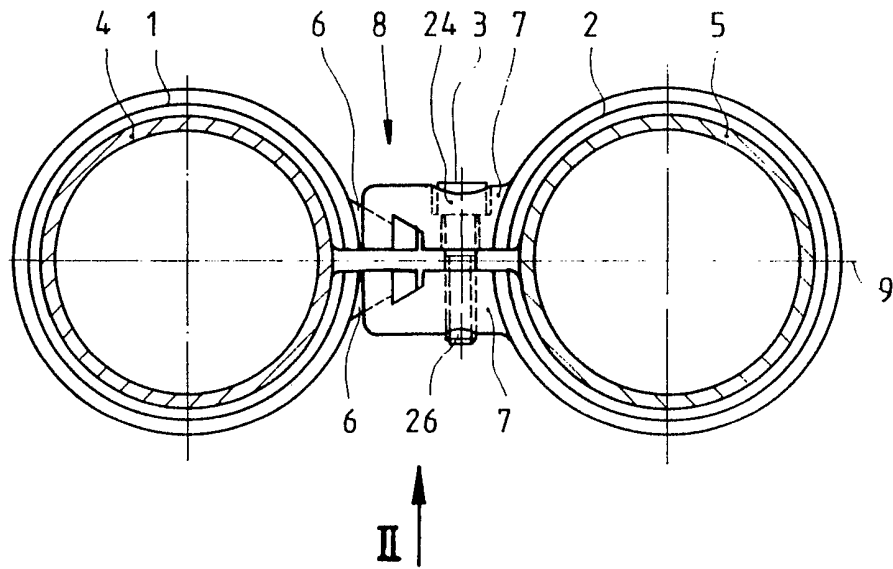


Fig.2

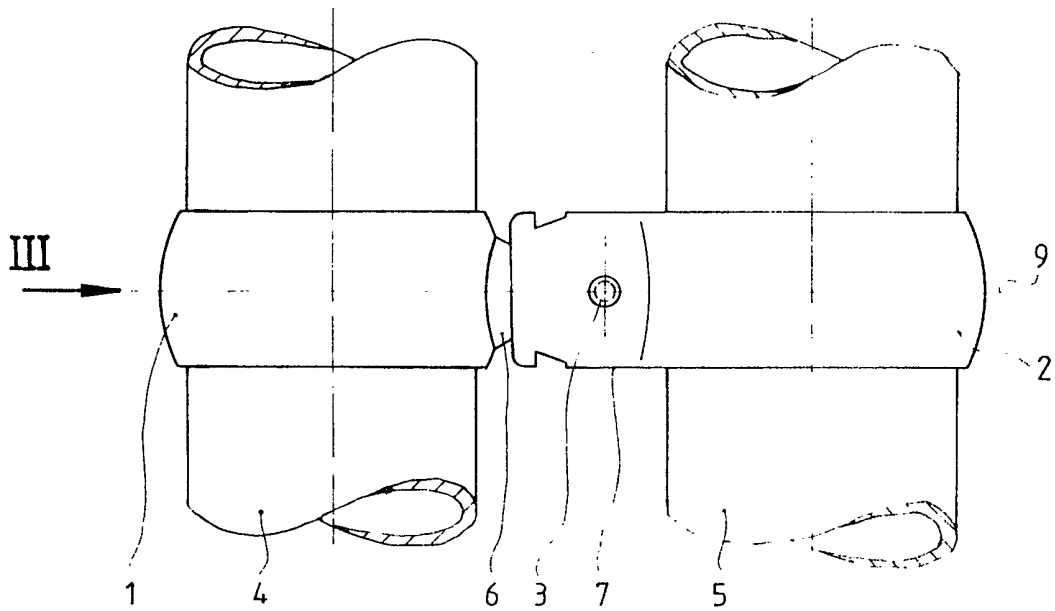


Fig. 3

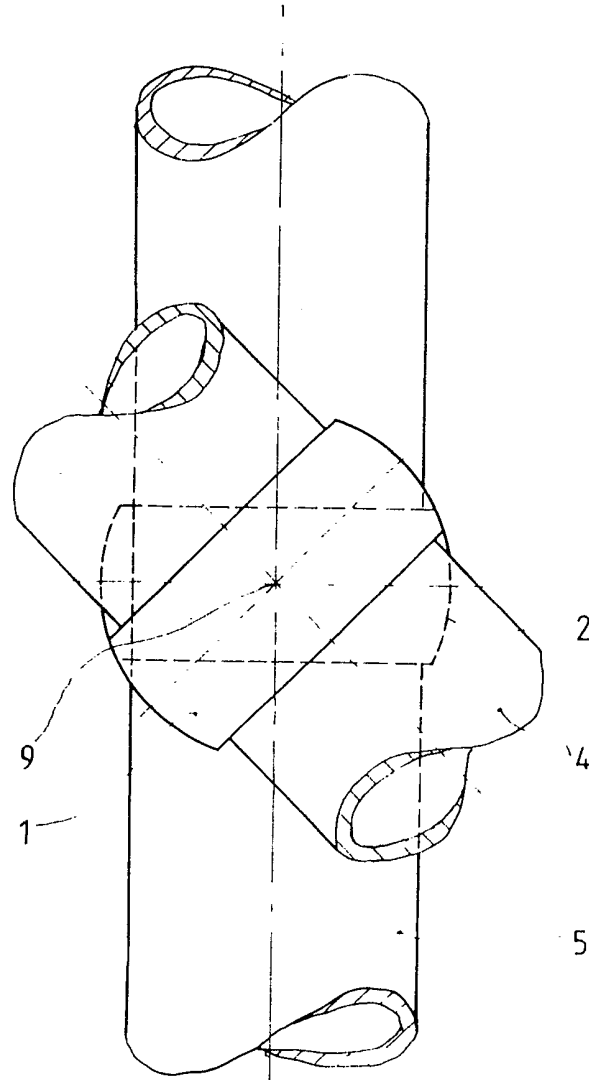


Fig. 4

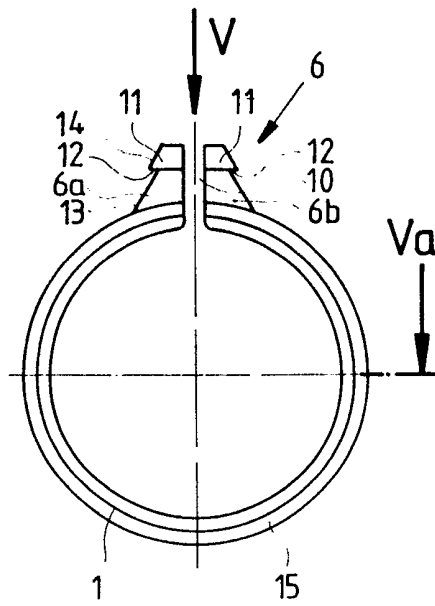


Fig. 6

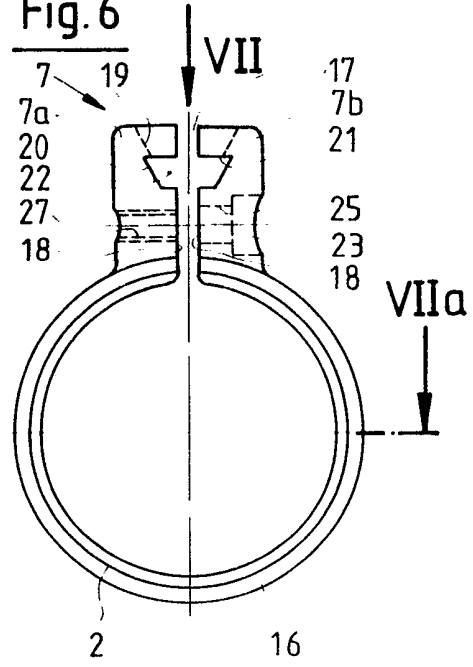


Fig. 5

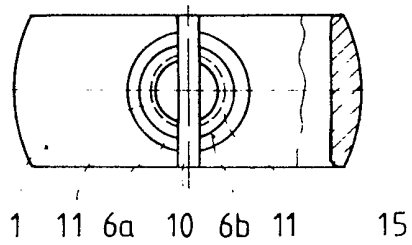
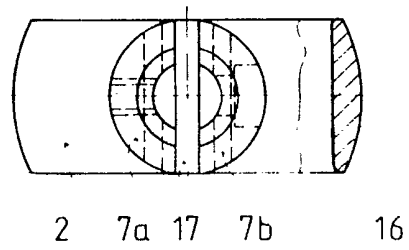


Fig. 7



SPECIFICATION

A crosswise connector for two intersecting pipes

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The invention relates to a crosswise connector for two continuous pipes which intersect each other at any desired angle one above the other, the connector comprising a pipe clamp for each pipe, which clamp surrounds the pipes to be connected and is provided with two clamping arms which leave a gap therebetween.

For the production of reticular structures formed from pipes, connecting means are required which join the pipes together at their points of intersection. Such connecting means for joining horizontal, perpendicular and diagonal pipes are employed in the construction of exhibition stands, in the construction of frames, in the construction of partitions or shelves and for similar purposes. When joining two continuous, intersecting pipes, for example, such connecting means each comprise a pipe clamp which surrounds the pipes to be connected and the clamping arms of the clamp engage in one another and are clampable to one another by means of a screw which extends therethrough. However, this type of connection only permits the pipes to be joined at a quite specific angle resulting from the disposition of the clamping arms on the pipe clamps.

Frequently, however, it is also necessary to join the pipes at quite different angles. For this purpose, German Offenlegungsschrift No. 20 38 155 already describes a clamp coupling for joining pipes which intersect at any desired angle, such a coupling comprising a pair of clamps for each of the pipes to be connected, and each clamp being provided with a recess having a semicircular cross-section. In this coupling, a member of pairs of clamps are placed one above the other and joined by means of screws extending through all of the clamps, such number being selected to correspond to the number of pipes to be connected. The clamps in this arrangement are provided with slots which are circular in shape for the accommodation of the screws around a common pivotal point, so that the pairs of clamps can be screw-connected to one another at any desired angle. In respect of its construction, however, this clamp coupling means is relatively complicated since it requires four securing screws, and it also does not permit the intersecting pipes to pivot smoothly through 360° because of the circular slots formed in the clamps for the accommodation of the screws.

In addition, German Offenlegungsschrift No. 29 03 126 describes a cross-member for joining two continuous pipes which intersect each other one above the other. The cross-member comprises a lower clamp, which is provided

with a channel into which the lower of the two intersecting pipes is placed, an intermediate layer between the lower and upper pipe, the lower surface of the intermediate layer being provided with a channel and the upper surface of the intermediate layer being provided with a channel, and an upper clamp which is also provided with a channel which covers the upper pipe, a screw-hole being provided in each of the three component parts of the cross-member for the accommodation of a screw which joins together the component parts of the cross-member. The intermediate layer between the pipes which intersect each other one above the other is formed from two component parts which lie one on top of the other in a planar manner and can be pivoted about the screw-hole. This arrangement permits the angle at which the pipes intersect one another to be stepless or smoothly varied. Such a cross-member does in fact provide a continuous rotational connection for two intersecting pipes, but it necessitates a relatively elaborate method of construction because of the two-part intermediate layer which is required.

The invention seeks to provide a crosswise connector of the above-described type which is practical to operate, consists of as few separate component parts as possible and permits the clamping force to be applied rapidly.

In accordance with the invention, this object is achieved because the pair of clamping arms of one pipe clamp is inserted, with its end face, into the pair of clamping arms of the other pipe clamp and is freely rotatably mounted therein by means of a clip-type connection, the external pair of clamping arms being securely clampable to the internal pair of clamping arms by a clamping means.

Two pipes are very rapidly and easily joined by such a crosswise connector. The pipe clamps which surround the pipes to be connected do in fact merely need to be clipped to their pairs of clamping arms, and then they are possibly rotated into the desired position relative to one another. It is then only necessary to tighten the clamping means which is associated with the external pair of clamping arms so that a secure clamp connection is effected between the pairs of clamping arms of the pipe clamps, whereby the pipes are securely fixed in the adopted position. The crosswise connector merely comprises three component parts, namely the two pipe clamps and the clamping means. Since only one clamping means needs to be actuated to apply the clamping force between the pairs of clamping arms of the pipe clamps and hence, simultaneously, between the pipes and the pipe clamps surrounding same, the clamp connection can be effected very rapidly.

In an advantageous arrangement of the invention, semicircular detents or stop projections are disposed on the free ends of the

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arms of the internal pair of clamping arms and engage in a corresponding circumferential groove formed in the inner surfaces of the arms of the external pair of clamping arms.

5 This arrangement ensures in a simple manner that the clipped-in pipe clamps are freely rotatable about their transverse axis through 360°. In such a case, it is preferable for the detents of the internal pair of clamping arms to have a conical cross-section and be provided with an undercut portion which engages behind a stepped or shoulder portion of the groove formed in the external pair of clamping arms, the groove also having a conical configuration.

10 In order to increase the contact area between the pairs of clamping arms, an advantageous development of the subject matter of the invention has the outer surface of the internal pair of clamping arms extending from the undercut portion of the detents parallel to the conical outer surface of the detents, and a correspondingly conical insert aperture is provided in the end face of the external pair of clamping arms and extends to the groove.

15 To produce the circumferential groove easily during casting of the pipe clamp, the circumferential groove in the inner surfaces of the arms of the external pair of clamping arms is advantageously provided in association with a continuous aperture which has a trapezoidal cross-section and extends at right angles to, and centrally of, the gap between the arms. During casting of the pipe clamp, the tool sliding means for forming the groove in the pair of clamping arms is passed through this aperture.

20 In an additional, advantageous arrangement of the invention, the clamping means associated with the external pair of clamping arms is a screw with a hexagonal recessed hole therein, the head of the screw being supported in a screw head receiving means in one of the arms and the threaded shank of the screw engaging in a threaded bore formed in the other arm after it has passed through a through-bore, which is provided downstream of the screw head receiving means in one of the arms and after it has traversed the gap between the arms. This arrangement permits the clamping means to be fully incorporated into the crosswise connector.

25 To achieve stepless or smooth transitions between the pipes and the pipe clamps surrounding same, it is advantageous for the section of each pipe clamp which surrounds the pipe to be provided on its outer surface with a rounded portion. The two pipe clamps are preferably formed from aluminium.

30 The present invention will be further illustrated, by way of example with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a crosswise connector in accordance with the invention;

Figure 2 is a view of the crosswise connector shown in Fig. 1, taken in the direction of

arrow II;

Figure 3 is a view of the crosswise connector shown in Fig. 2, taken in the direction of arrow III in the rotated position;

70 *Figure 4* is a detailed view of the left-hand pipe clamp of the crosswise connector shown in Fig. 1;

Figure 5 is a view of the pipe clamp shown in Fig. 4, taken in the direction of arrow V, a portion of Fig. 5 being a sectional view taken in the direction of arrow Va;

Figure 6 is a detailed view of the right-hand pipe clamp of the crosswise connector shown in Fig. 1; and

80 *Figure 7* is a view of the pipe clamp shown in Fig. 6, taken in the direction of arrow VII, a portion of Fig. 7 being a sectional view taken in the direction of arrow VIIa.

The crosswise connector comprises the two pipe clamps 1 and 2 and the screw 3 with a hexagonal recessed hole therein. The pipe clamp 1 surrounds the continuous pipe 4, while the pipe clamp 2 surrounds the continuous pipe 5. The pair of clamping arms 6 of the pipe clamp 1 is mounted in the pair of clamping arms 7 of the pipe clamp 2 via a clip-type connection 8. The clip-type connection 8 is such that the pipe clamps 1 and 2, with the pipes 4 and 5 disposed therein, are freely rotatable about the axis 9 of the crosswise connector when the screw 3 with the hexagonal recessed hole therein, which serves as a tensioning or clamping screw and is inserted into the external pair of clamping arms 7, is in its non-tightened position. That is to say, the pipes 4 and 5 may be freely pivoted about the axis 9 through 360° and, in consequence, may adopt any desirable angular position relative to each other. By tightening the screw 3 with the hexagonal recessed hole therein in the desired angular position of the pipes 4 and 5, it is possible to achieve a secure, force-locking/frictional connection between the pipes 4 and 5 and the crosswise connector.

85 The arms 6a and 6b of the pair of clamping arms 6 of the pipe clamp 1 leave a gap 10 therebetween and have a semicircular detent 11 on each of their free ends, the flat sides of the detent 11 extending in the plane of the gap 10. The detents 11 have a common trapezoidal cross-section, and their side facing the pipe clamp 1 is provided with a circumferential undercut portion 12, the outer surface 13 of the arms 6a and 6b of the pair of clamping arms 6 extending parallel to the conical outer surface 14 of the detents 11 in an inwardly offset manner. That is to say, both the arms 6a and 6b and the detents 11 form a truncated cone in each case. On its outer surface, the section of the pipe clamp 1 surrounding the pipe 4 has a rounded portion 15 to compensate for the transitional passages from the pipe 4 to the pipe clamp 1. On the outer surface of its section surrounding the

pipe 5, the pipe clamp 2 also has a rounded portion 16. The arms 7a and 7b of the pair of clamping arms 7 of the pipe clamp 2 leave a gap 17 therebetween and have a semicircular cross-section, the planar inner surfaces 18 of the arms 7a and 7b forming the boundary walls of the gap 17. A conical insert aperture 19 is formed in the end face of the pair of clamping arms 7, and its lateral wall corresponds with the outer surface 13 of the arms 6a and 6b of the pair of clamping arms 6 of the pipe clamp 1. A circular circumferential groove 20 formed in the inner surfaces 18 of the arms 7a and 7b communicates with the insert aperture 19 in the pair of clamping arms 7, and the dimensions of the groove 20 are such that it can accommodate the detents 11 of the pair of clamping arms 6 of the pipe clamp 1, the undercut portion 12 of the detents 11 abutting against a stepped portion 21 which is formed between the insert aperture 19 and the groove 20. The groove 20 has a conical cross-section and is formed in association with a through-aperture 22 which extends parallel to the end face of the pair of clamping arms 7 and has a cross-section identical in area to the groove 20, the through-aperture 22 being disposed centrally relative to the gap 17. This through-aperture 22 is used for the insertion of a tool sliding means when the groove is being produced in a casting operation. A screw head receiving means 23—for receiving the head 24 of the screw 3 with a hexagonal recessed hole therein from the outer surface—is disposed in the arm 7b beneath the through-aperture 22. A through-hole 25 in the arm 7b for the threaded shank 26 of the screw 3 with a hexagonal recessed hole therein communicates with the screw head receiving means 23. A threaded bore 27 is provided in the arm 7a opposite the through-hole 25, and the threaded shank 26 of the screw 3 with a hexagonal recessed hole therein can be inserted into the threaded bore 27.

To join the two pipe clamps 1 and 2, the initially tensioned pipe clamp is first of all compressed as far as possible, so that the detents 11 of the pair of clamping arms 6 lie as close as possible to one another. The detents 11 are then clipped into the groove 20 in the pair of clamping arms 7 of the pipe clamp 2 via the insert aperture 19, whereby, as a result of the initial tension of the pipe clamp 2, the stepped portion 21 of the groove 20 snaps into the undercut portion 12 of the detents 11 of the pipe clamp. In consequence, the rotatable connection between the two pipe clamps 1 and 2 is produced. The screw 3 with the hexagonal recessed hole therein is then screwed into the threaded bore 27 via the screw head receiving means 23. The pipes 4 and 5 are subsequently pushed through the pipe clamps 1 and 2. However, it is also possible for the pipes 4 and 5 to be

inserted into the pipe clamps 1 and 2 even before the rotatable connection is established between the pipe clamps 1 and 2. The pipes 4 and 5 are now rotated into the desired angular position with the associated pipe clamps 1 and 2, and then the screw 3 with the hexagonal recessed hole therein is securely tightened. When the screw 3 with the hexagonal recessed hole therein is tightened, a strong clamp connection is produced, on the one hand, between the external pair of clamping arms 7 of the pipe clamp 2 and the internal pair of clamping arms 6 of the pipe clamp 1 and, on the other hand, between the pipes 4 and 5 and the associated pipe clamps 1 and 2.

The pipe clamps 1 and 2 are formed from aluminium which has the advantage of being rust-free. In consequence, rust-free material may be utilised for the screw 3 with a hexagonal recessed hole therein and for a securing means (not shown) which may also be used. It is readily apparent that this crosswise connector can be installed extremely rapidly and can be disassembled again just as rapidly. It is simple and inexpensive to produce, it requires little material and, in addition, it is also attractive. The universally utilisable crosswise connector is suitable for use in the construction of exhibition stands, in the construction of frames and for similar purposes.

The above description of the drawings has shown, in detail, the particularly simple design of the crosswise connector according to the invention which is practical to operate and, despite its simplicity, has nevertheless proved to be extremely reliable. Although the invention has only been described with reference to one embodiment, modifications to the solution according to the invention, within the scope of the claimed arrangement, are obvious to the person skilled in the art and result from this description.

110 CLAIMS

1. A crosswise connector for two continuous pipes which intersect each other at any desired angle one above the other, the connector comprising a pipe clamp for each pipe, which clamp surrounds the pipes to be connected and is provided with two clamping arms which leave a gap therebetween, wherein the pair of clamping arms of one pipe clamp is inserted, with its end face, into the pair of clamping arms of the other pipe clamp and is freely rotatably mounted therein by means of a clip-type connection, and wherein the external pair of clamping arms is securely clampable to the internal pair of clamping arms by a clamping means.

2. A crosswise connector as claimed in claim 1, wherein semicircular detents are disposed on the free ends of the arms of the internal pair of clamping arms and engage in a corresponding circumferential groove formed in

the inner surfaces of the arms of the external pair of clamping arms.

3. A crosswise connector as claimed in claim 1 or 2, wherein the detents of the internal pair of clamping arms have a conical cross-section and are provided with an undercut portion which engages behind a stepped portion of the groove formed in the external pair of clamping arms, the groove also having a conical configuration.

4. A crosswise connector as claimed in claim 1, 2 or 3, wherein the outer surface of the internal pair of clamping arms extends from the undercut portion of the detents parallel to the conical outer surface of the detents, and wherein a correspondingly conical insert aperture is provided in the end face of the external pair of clamping arms and extends to the groove.

5. A crosswise connector as claimed in any one of claims 1 to 4, wherein the circumferential groove in the inner surfaces of the arms of the external pair of clamping arms is provided in association with a continuous aperture which has a trapezoidal cross-section and extends at right angles to, and centrally of, the gap between the arms.

6. A crosswise connector as claimed in any one of claims 1 to 5, wherein the clamping means associated with the external pair of clamping arms is a screw with a hexagonal recessed hole therein, the head of the screw being supported in a screw head receiving means in one of the arms and the threaded shank of the screw engaging in a threaded bore formed in the other arm after it has passed through a through-bore, which is provided downstream of the screw head receiving means in one of the arms, and after it has traversed the gap between the arms.

7. A crosswise connector as claimed in any one of claims 1 to 6, wherein the section of each pipe clamp which surrounds the pipe is provided on its outer surface with a rounded portion.

8. A crosswise connector as claimed in any one of claims 1 to 7, wherein the two pipe clamps are formed from aluminium.

9. A crosswise connector for two continuous pipes which intersect each other at any desired angle one above the other, substantially as hereinbefore described with reference to the accompanying drawings.