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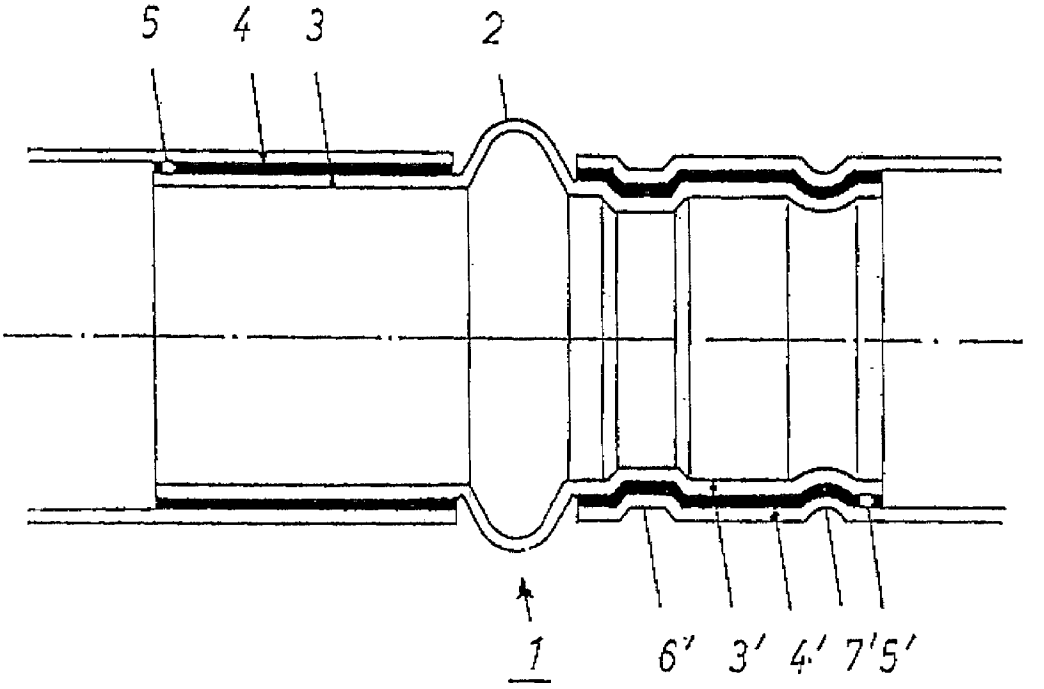
(54) **RACCORD DE TUYAUX**
(54) **PIPE CONNECTION**



(57) L'invention concerne un raccord de tuyaux, dans un tuyau dont la partie terminale lisse est enfoncée sur une pièce de raccord métallique qui présente au moins une zone en forme de douille s'étendant dans le sens longitudinal et est pourvue d'une butée s'étendant vers l'extérieur dans le sens radial, située au début de la zone en forme de douille. Un élément d'étanchéité est placé entre le tuyau et la pièce de raccord qui sont assemblés de façon permanente au moyen d'un outil de compression appliqué à l'extérieur et déformant plastiquement le tuyau. L'invention vise à créer un raccord de tuyau de ce type, adapté à des pressions et à

(57) The invention relates to a pipe connection in a pipe whose smooth-ended end section is pushed onto a metal fitting which has at least one sheath-like region extending lengthways and provided with a stop element located at the start of the sheath region and projecting radially outwards; a seal is provided between the pipe and fitting, which are joined permanently with the aid of a press tool which is applied on the outside and deforms the pipe plastically. To make a pipe connection of this type suitable for high pressures and temperatures and usable in different application fields it is proposed that the pipe (4, 4') and fitting (1) should be made in the

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des températures élevées et pouvant être utilisé dans différents domaines d'application. A cet effet, le tuyau (4, 4') et la pièce de raccord (1) sont réalisés de façon connue dans un métal déformable plastiquement; un élément d'étanchéité (5, 5') est placé dans la zone de contact entre la surface extérieure de la pièce de raccord (1) et la surface intérieure du tuyau enfoncé (4, 4'), ledit élément d'étanchéité s'étendant sur la totalité de cette zone de contact. Cette dernière présente une zone de déformation (7') formant au moins un élément d'arrêt axial de type moulure à l'extrémité de la pièce de raccord, venant en contact avec cette pièce de raccord. La distance entre la zone de déformation (7') et la face de la pièce de raccord (1) est si faible que l'élément d'étanchéité (5') situé dans cette zone vient également en contact avec la déformation.

known way of plastically deformable metal and a seal (5, 5') should be provided in the contact region between the outer surface of the fitting (1) and the inner surface of the pipe (4, 4') fitted onto it, said seal covering the entire contact region; the contact region should be provided with at least one crimp-type deformation point (7') which forms the axial securing element at the fitting end and also grips the fitting (1); the distance between the deformation point (7) and the end face of the fitting (1) is small enough to ensure that the seal (5') in that region is also gripped by the deformation.

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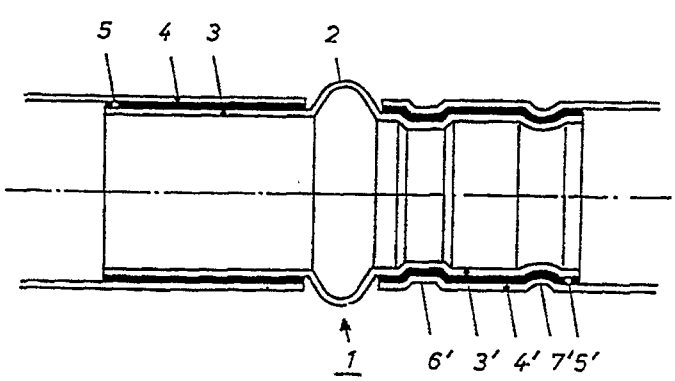
(54) Title: PIPE CONNECTION

(54) Bezeichnung: ROHRVERBINDUNG

(57) Abstract

The invention relates to a pipe connection in a pipe whose smooth-ended end section is pushed onto a metal fitting which has at least one sheath-like region extending lengthways and provided with a stop element located at the start of the sheath region and projecting radially outwards; a seal is provided between the pipe and fitting, which are joined permanently with the aid of a press tool which is applied on the outside and deforms the pipe plastically. To make a pipe connection of this type suitable for high pressures and temperatures and usable in different application fields it is proposed that the pipe (4, 4') and fitting (1) should be made in the known way of plastically deformable metal and a seal (5, 5') should be provided in the contact region between the outer surface of the fitting (1) and the inner surface of the pipe (4, 4') fitted onto it, said seal covering the entire contact region; the contact region should be provided with at least one crimp-type deformation point (7') which forms the axial securing element at the fitting end and also grips the fitting (1); the distance between the deformation point (7) and the end face of the fitting (1) is small enough to ensure that the seal (5') in that region is also gripped by the deformation.



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Description

PIPE CONNECTION

The invention is directed to a pipe connection according to the preamble of patent claim 1.

A pipe connection of the generic type is known from the firm of Geberit (see excerpt from the company brochure). In this system, a composite pipe, as it is called, is pushed onto a red-brass fitting. The composite pipe comprises an inner pipe with an aluminum jacket which conducts liquid and a sheathing pipe which is arranged over the inner pipe and serves for external protection. The inner pipe and the sheathing pipe are manufactured from plastic. The fitting has a region which extends in the longitudinal direction and which is provided with a stop, wherein the pipe to be connected is pushed on up to this stop. The region adjacent to the stop has two inner grooves, a sealing ring being arranged in each inner groove. The remaining portion is highly contoured, so that the pipe which is pushed on can mold itself to the contour during pressing. After the pipe is pushed on, pressing tongs are applied externally and the pipe is pressed on in the area of the sealing ring as well as in the contoured area. In this case, the sealing ring area assumes the sealing function and the contoured area serves to secure axially. A disadvantage in this system is that the composite pipe can be used only for a narrow range of temperature and pressure. Further, the manufacture of the fitting is very involved because the contoured end regions and the sealing ring region must be produced very precisely.

Another press connection system is known from the firm of Deutsche ALWA GmbH (see excerpt from company brochure). In this system for copper pipes and copper fittings, a continuous rubber collar is arranged in the interior of the fitting which is almost smoothly flush. In the center, the collar has a web or ridge which

extends radially inward and serves as a stop for the pipes that are pushed in. A flanging or beading is provided on the inside around the front end regions of the fitting for fixing the inserted rubber collar axially. Two spaced beads are formed externally on the fitting by pressing tongs having a wide pressing jaw. This is carried out in such a way that the pushed in pipe is pressed in in this region. A disadvantage in this system consists in that the pressing jaw occupies extensive space, so that pressing is impossible in confined areas. Further, a lengthening is required for the majority of fittings, especially in the case of T-pieces, so that the pressing tongs can be applied.

US-A-4,850,621 discloses a construction for connecting two metal pipes. The end region of one pipe has a stop which extends outward and a sleeve-like region on which are arranged two bead-like recesses that are spaced apart. A sealing ring is arranged in the first bead-like recess located in the beginning region. The second smooth-ended pipe is slid over the end region up to the stop of the first pipe. The beginning region of the second pipe has a plurality of openings distributed along the circumference, so that this region can be pressed into the second bead-like recess of the first pipe by means of a contractible circumferential band. This pressing in forms an axial securing means to prevent the two pipes from pulling out one from the other. Sealing is effected by a slight compression of the sealing ring when the second pipe is pushed on. This construction is very involved in view of the arrangement of the bead-like recesses and the openings and the use of the circumferential band and is not suitable for higher internal pressures.

CH-A-648643 shows a comparable construction for the connection of two pipes. In this case, the end region of one pipe has a collar-like widening into which the smooth-ended region of the second pipe can be pushed up to the inner stop formed by the collar-like widening. A sleeve-like seal can be arranged in the contact region between the two pipes. The two pipes are nondetachably connected with one another in a plane by local plastic deformation by means of a tool which is applied

externally. This construction has the disadvantage that the required depth for pushing in the second pipe is not detected and a gap can form between the collar-like widening of one pipe and the pushed in second pipe.

It is the object of the invention to provide a pipe connection of the type mentioned above which comprises elements that are simple to produce, is suitable for higher pressures and temperatures, and in which the danger of gap formation is excluded while retaining the ability to detect the insertion depth.

This object is met by the features indicated in the characterizing part of claim 1. Advantageous further developments are indicated in the subclaims.

In the pipe connection according to the invention, the required positioning of the pipe on the fitting, wherein the pipe is pushed on the fitting, can advantageously be visually detected directly without auxiliary means. The metal press connection by means of deformation of the pipe and fitting which has been proven successful for years is retained, so that high axial longitudinal forces and accordingly high internal pressures can be transmitted. In special cases where requirements for axial securing are extremely exacting, it may be required to provide two or more bead-like indentations or crimps at a distance from one another. In this respect, it is important that the distance from the deformation location to the front of the fitting is so small that the seal located in this region is included in the deformation. In this way, the formation of gaps between the outer surface of the fitting and the inner surface of the pushed on pipe is prevented.

In order to keep the cross-sectional change in the connection region as small as possible, a range of 0.5 to 10 mm is selected for the thickness of the seal in conformity to the pipe diameter.

Compared with the glued pipe connections in fittings and pipelines produced from plastic, the suggested system has the advantage that the field of use is considerably expanded as regards temperature and internal pressure.

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When laying pipe, it may be necessary, depending on the field of use, e.g., in a constantly moist space, to protect the outer surface. A plastic coating of the pipes, known per se, has proven to be particularly advantageous. This also applies to the outer region of the stop of the fitting.

The pipe connection according to the invention is described more fully in the drawing with reference to several embodiment examples.

Figure 1 shows a longitudinal section through a first embodiment form of the pipe connection according to the invention;

Figure 2 shows a variant of the first embodiment form in a view corresponding to Fig. 1;

Figure 3 shows another embodiment form in a view corresponding to Fig. 1.

Figure 1 shows a first embodiment form of the pipe connection according to the invention in longitudinal section, wherein the state prior to pressing is shown in the left-hand half of the illustration and the state after pressing is shown in the right-hand half of the illustration. The core of the connection is a fitting 1 made from plastically deformable metal which has a stop 2 extending radially outward. Adjoining this stop 2 on at least one side is a cylindrical portion 3, 3' extending in the longitudinal direction. In this embodiment example, two line pipes 4, 4' which are made from plastically deformable metal and have smooth ends are pushed onto a fitting 1, namely, up to the stop 2. In the contact region between the fitting 1 and the line pipe 4, 4', a seal 5, 5' is arranged between the outer surface of the cylindrical portion 3, 3' of the fitting 1 and the inner surface of the pushed on pipe 4, 4'. This seal 5, 5' extends over the entire contact region. To facilitate pushing on, the outer surface of the seal 5, 5' is wetted with a liquid or lubricated with a soapy substance.

In this embodiment form, sealing is carried out by the seal 5, 5', so that the liquid to be transported cannot leak out. If necessary and depending on the line pressure, two bead-like press locations 6', 7' can be formed one after the other by means of a pressing tool, not shown, so that this connection can also transmit the axial forces brought about by the internal pressure, wherein one bead-like press location 7' is located at the end of the cylindrical portion 3, 3'. The press locations 6', 7' are characterized in that both the fitting 1 and the respective pushed on pipe 4, 4' are included in the deformation. The type of pressing, e.g., hexagonal or lemon-shaped segments, depends on the contour of the opening of the pressing jaws, not shown.

Figure 2 shows a variant of the above-described embodiment form in the same longitudinal sectional view. The same reference numbers have been used for identical parts. In pipe connections in which, e.g., an unalloyed steel is used for the fitting 1 and line pipes 4, 4', it may be necessary, depending on the field of use, to protect the outer surface from corrosion. For this purpose, the respective line pipe 4, 4' is coated in a manner known per se with a plastic jacket 9, 9'. The exterior of the cylindrical portion 3, 3' of the fitting 1 is likewise enclosed by plastic 8 or is coated with plastic paint. When the line pipes 4, 4' are pushed on, care must be taken that the respective end face of the line pipe 4, 4' reaches to the sheathing 8 of the stop 2. When pressing the two bead-like press locations 7, 7', the plastic jacket 9, 9' is included in the deformation. This process has the advantage that only minor subsequent working, if any, is required after pressing.

Figure 3 shows another embodiment form of the pipe connection according to the invention in the same longitudinal section as Figure 1. The same reference numbers have again been used for identical parts. In contrast to Figure 1, a hardening glue 10, 10', for example, is arranged instead of a seal in the contact region between the outer surface of the fitting 1 and the inner surface of the respective pushed on pipe 4, 4'. After hardening, this glue 10, 10' provides a bonding substance-type connection, wherein the glue 10, 10' takes over the sealing

function as well as axial securing. Since the forces to be transmitted by a connection of this kind are limited, a bead-like pressing can be formed in addition in a manner comparable to Figure 1. For lower pressure levels, the glue connection will be sufficient, whereas the additional mechanical axial securing is preferred for higher pressures and for possible additional vibration stresses in the lines.

Patent Claims:

1. Pipe connection with a pipe whose smooth-ended end portion is pushed onto a metal fitting having at least one sleeve-like region which extends in the longitudinal direction and is provided with a stop which is located at the start of the extending sleeve-like region and which extends radially outward, and wherein a seal is arranged between the pipe and fitting, wherein the pipe and fitting are nondetachably connected with one another by means of a pressing tool which is applied externally and deforms the pipe plastically, characterized in that the pipe (4, 4') and fitting (1) are made in a known manner from plastically deformable metal, and a seal (5, 5') made from elastomer which extends along the entire contact region between the outer surface of the fitting (1) and the inner surface of the pushed on pipe (4, 4') is arranged in this contact region, and the contact region has at least one bead-like deformation location (7') forming an axial securing means at the end of the fitting and also comprehending the fitting (1), and the distance from the deformation location (7) to the front of the fitting (1) is small enough that the seal (5') located in this region is comprehended by the deformation.

2. Pipe connection according to claim 1, characterized in that the thickness of the seal (5, 5') ranges from 0.5 to 10 mm depending on the dimensioning of the pipes (4, 4').

3. Pipe connection according to claim 1, characterized in that the pipe (4, 4') and fitting (1) are made from nonrusting steel (stainless steel).

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4. Pipe connection according to claim 1, characterized in that the pipe (4, 4') and fitting (1) are made from titanium.

5. Pipe connection according to one of claims 1 to 4, characterized in that the fitting (1) is provided with an anticorrosive agent (8) outside of the cylindrical portion (3, 3').

6. Pipe connection according to one of claims 1 to 5, characterized in that the outer surface of the pipe (4, 4') is provided with an anticorrosive agent.

7. Pipe connection according to claim 5 or 6, characterized in that the anticorrosive agent is a plastic coating (10, 10').

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Patent Agents

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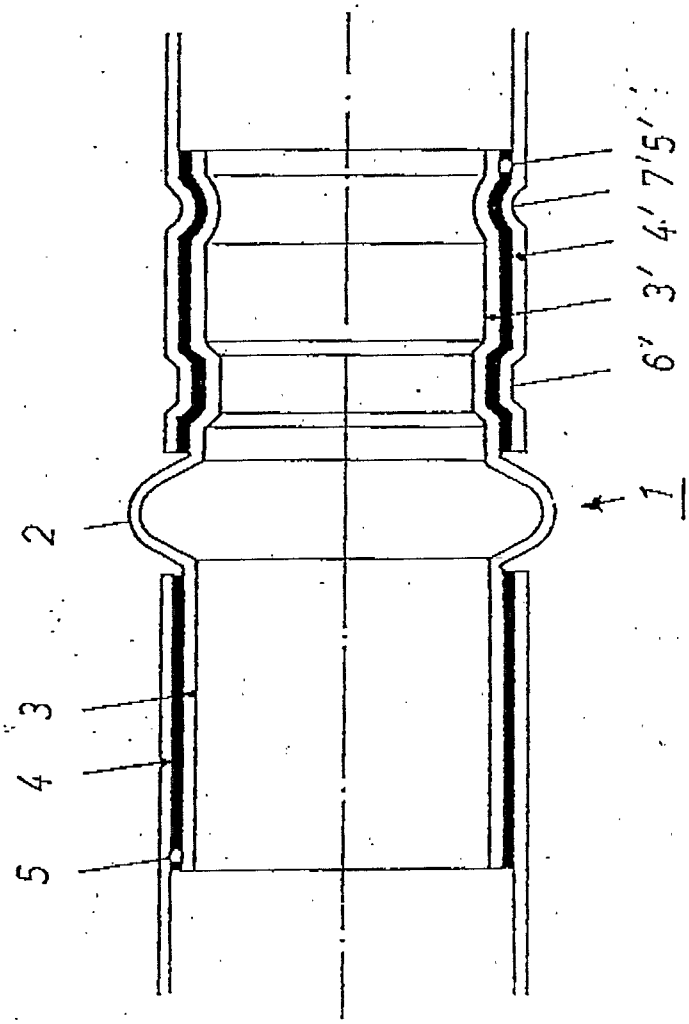

FIG. 1

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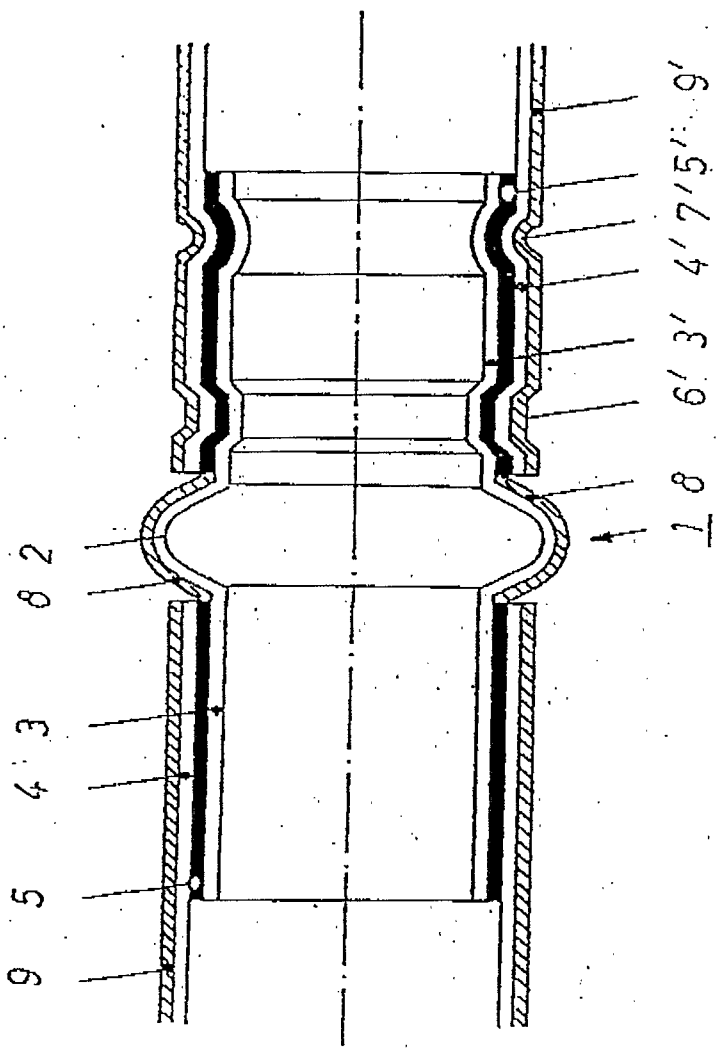

FIG. 2

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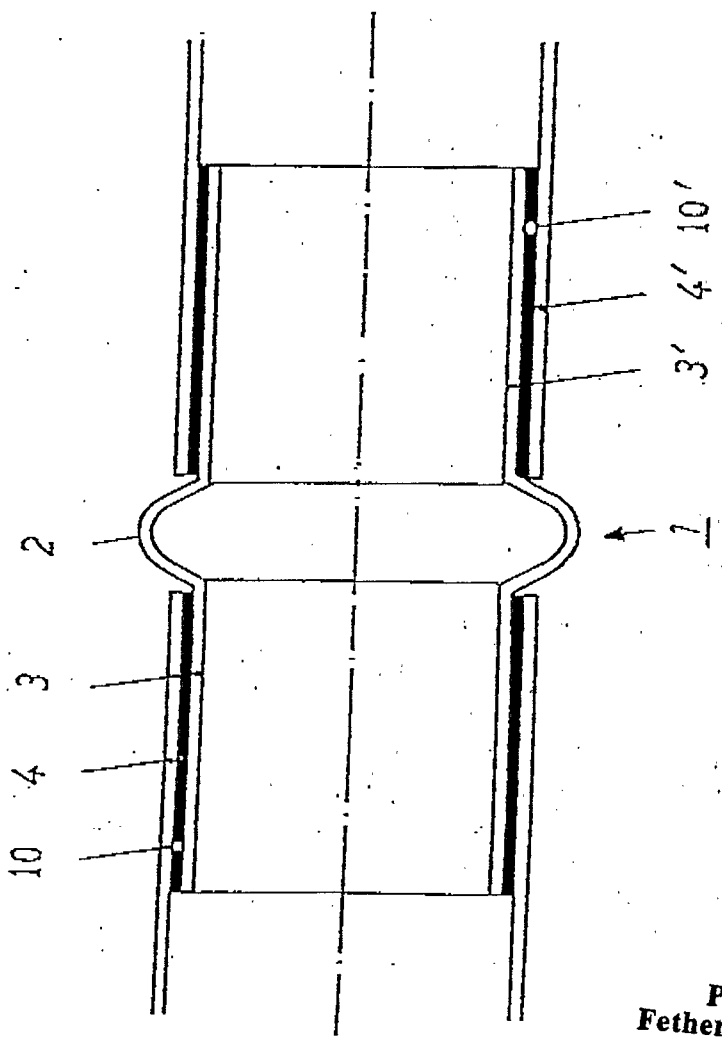

FIG. 3

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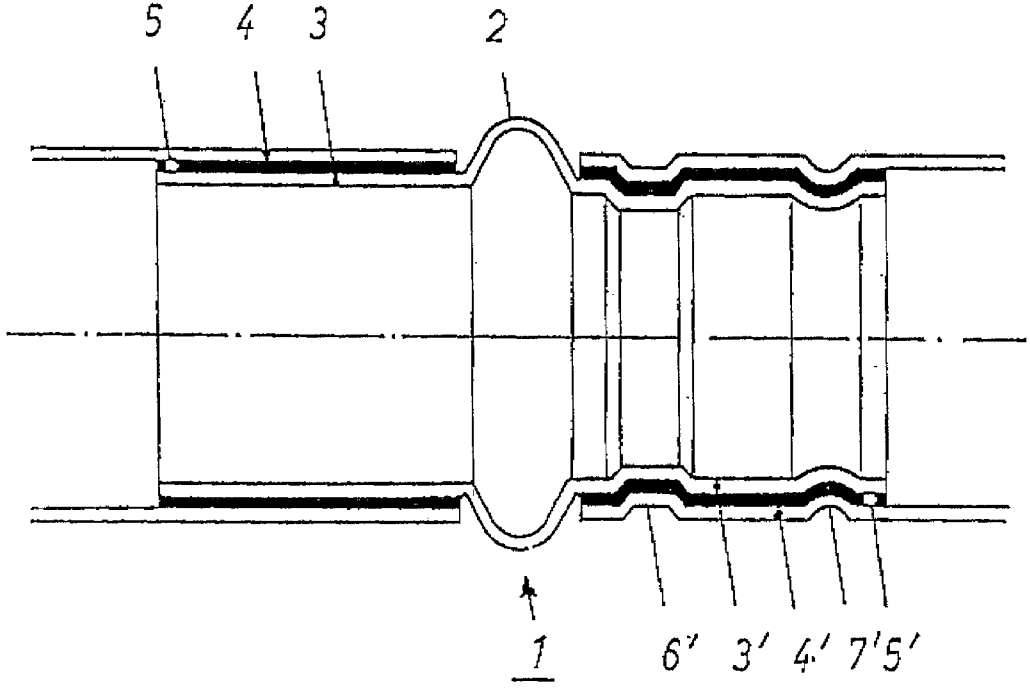
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