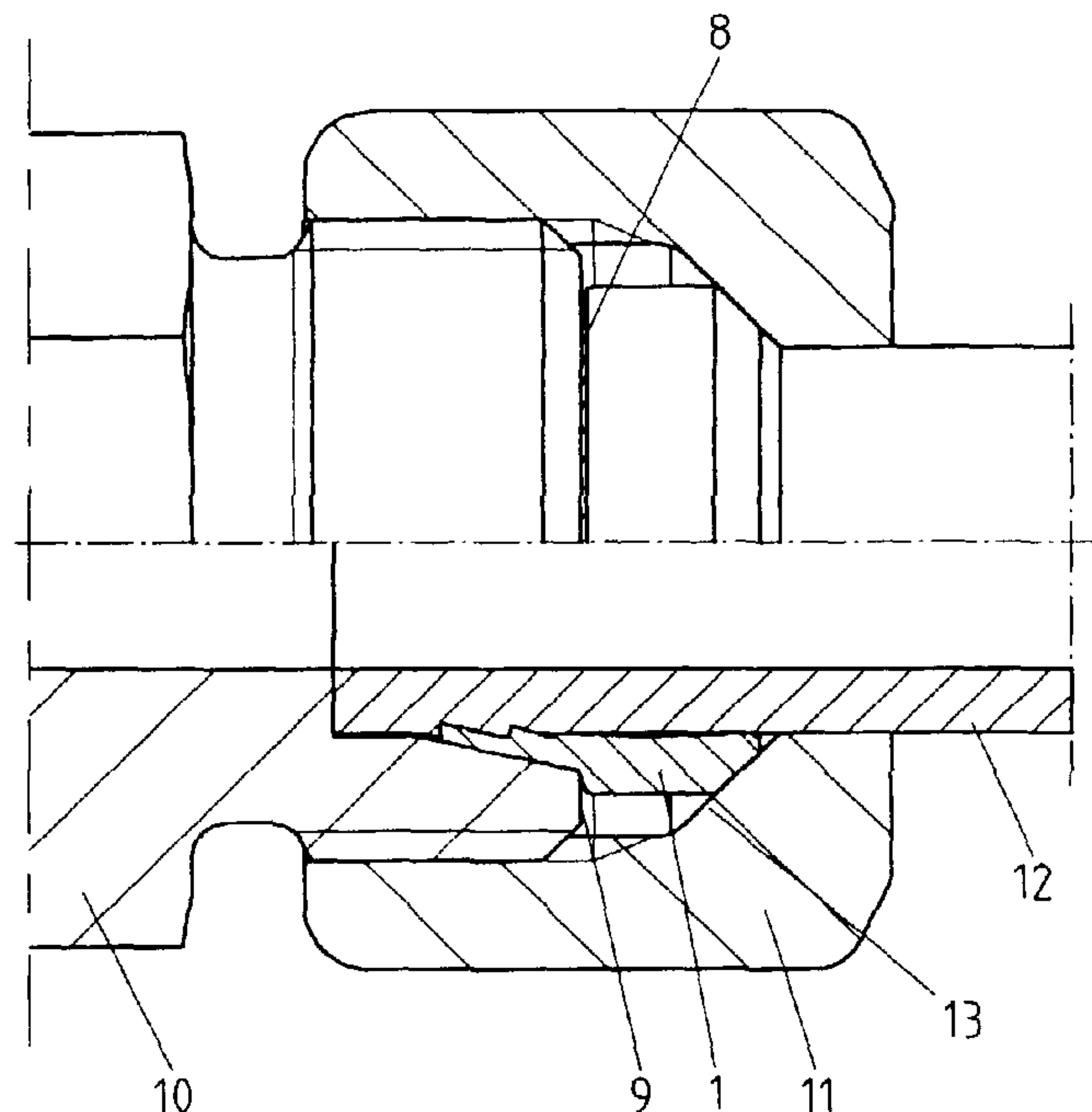




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(57) Abrégé/Abstract:

The invention relates to a screw connection comprising a seal ring (1), a connecting piece (10), and a union nut (11) for joining pipes, whereby the seal ring is designed as a cutting ring having one or more cutting edges (2, 3). Said cutting ring can be inserted into a boring of the connecting piece, said boring conically exiting a face, by screwing the union nut onto the connecting piece, and the exterior of the seal ring is provided with a ring reinforcement on the side of the nut. Said ring reinforcement forms a ring surface on the transition thereof to the narrow ring part. The ring surface produced by the reinforcing part of the cutting ring is provided with a slope to the pipe axis that ranges from 45° to 90°. When fully assembled, the axial length of the ring reinforcement is such that the transfer elements placed on the ring surface transfer their negative image or themselves onto the face of the connecting piece. The transfer elements have three-dimensionally shaped contours whose negative image can be transferred to the face of the connecting piece. In a manner similar to a die, the negative image is pressed into the face of the connecting piece by the pressing force exerted by the assembler.



ABSTRACT

The invention relates to a screw connection comprising a seal ring (1), a connecting piece (10), and a union nut (11) for joining pipes, whereby the seal ring is designed as a cutting ring having one or more cutting edges (2, 3). Said cutting ring can be inserted into a boring of the connecting piece, said boring conically exiting a face, by screwing the union nut onto the connecting piece, and the exterior of the seal ring is provided with a ring reinforcement on the side of the nut. Said ring reinforcement forms a ring surface on the transition thereof to the narrow ring part. The ring surface produced by the reinforcing part of the cutting ring is provided with a slope to the pipe axis that ranges from 45° to 90° . When fully assembled, the axial length of the ring reinforcement is such that the transfer elements placed on the ring surface transfer their negative image or themselves onto the face of the connecting piece. The transfer elements have three-dimensionally shaped contours whose negative image can be transferred to the face of the connecting piece. In a manner similar to a die, the negative image is pressed into the face of the connecting piece by the pressing force exerted by the assembler.

DESCRIPTION

5 The invention relates to a screw joint with a sealing ring, a connecting piece and a union nut for making a tube connector, the sealing ring being designed as a cutting ring with one or several cutting edges which can be inserted into a conical bore of the connecting piece starting from an end face by screwing the union nut onto the connecting piece, and the
10 sealing ring being provided with an annular reinforcement on the nut side of its outside which forms a ring surface at its transition to the narrow ring portion.

Cutting-ring unions in which the cutting ring used is provided
15 with several cutting edges which are arranged axially one behind the other are known, for instance, from DE 12 96 901. This patent also reveals that the cutting ring is to be provided with a reinforcement pointing radially outward on a portion of its axial length at the end of the nut side. When
20 carrying out the assembly, the cutting ring area is squeezed into the cone of the connecting piece by actuating the screw-on nut, thereby effecting a deflection of the cutting edges towards the tube jacket and cutting into the jacket. The annular reinforcement on the nut side brings about a limitation of the range of deflection and, thus, stabilization of
25 the cutting ring.

A screw joint with a cutting ring which is provided with a reinforcement designed as ribs and spread over the circumference is known from DE 33 41 726. The ribs point radially
30 outward and extend axially. At their end facing the nut, they are provided with a stop face adapted to the conical bore of the nut. With their other end, they form a stop face with the end face of the connecting piece. As soon as the named stop
35 faces reach their respective counterfaces, the torque to be applied by the fitter increases sharply, indicating the end of the assembly operation.

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The assembly instructions for cutting-ring screw joints according to DIN 3859, Part 2, specify that the union has to be assembled after finger-tight screwing with 1 1/2 turns of the union nut (complete assembly). After a disassembly, however, it is no longer objectively discernible whether these instructions have been carried out correctly. According to the assembly instructions, a visual assessment of the collar throw-up caused by the cutting edges is carried out. However, such an assessment is always subjective and depends on the experience of the fitter. The assembly operation carried out is not verifiable at the stop faces and the collar throw-up on the tube jacket. Even if overtightening was carried out, this cannot be clearly recognized by viewing the stop faces and the collar throw-up.

Therefore, the object of the invention is to indicate means by which the quality of a completed assembly operation is objectively discernible and can be demonstrated at any time by disassembly of the system.

According to the invention, the solution of this task is achieved in that the annular face resulting from the reinforcing portion of the cutting ring is provided with an inclination between 45° and 90° in relation to the tube axis and that the axial length of the annular reinforcement is of such a size that, in case of complete assembly, the transfer elements arranged on the annular face transfer their negative image formation or themselves onto the end face of the connecting piece.

According to the invention, the transfer elements have spatially designed contours whose negative image formation is transferrable onto the end face of the connecting piece. Similar to an embossing die, the negative image is embossed into the end face of the connecting piece by the squeezing force exerted by the fitter. This operation is assisted by the fact that the surface of the cutting ring is hardened so that,

in contrast, the end face of the connecting piece has a lesser hardness, thereby facilitating the embossing operation.

5 In a simplified embodiment, the transfer elements are designed as corrugated elements. Such an embossed pattern can be easily made, is visually discernible without problem and, in addition, is safely palpable in bad visibility conditions.

10 In a further variation of the invention, the transfer elements are designed as company logos.

15 In a further embodiment of the invention, the transfer elements are designed as dye pigments. As a result of the build-up of the annular face of the cutting ring onto the end face of the connecting piece during the initial assembly, the assembly torque increases sharply and transfers the transfer elements onto the end face of the connecting piece. The sharp increase of the assembly torque is a signal for the fitter that assembly has been successfully completed. At the same
20 time, when effecting disassembly, the assembly condition achieved can be objectively verified at the end face of the connecting piece since there must be corresponding embossed patterns or colour codes if the initial assembly has been carried out as instructed.

25 In a variation of the invention, the transfer means can also be used to demonstrate overtightening of the system. In doing so, the axial length L_1 of the annular reinforcement is of such a size that transfer elements arranged on the annular face
30 transfer their negative image formation or themselves onto the end face of the connecting piece only in case of overtightening. In this embodiment, the axial length of the annular reinforcement L_1 is, therefore, designed shorter. Consequently, no contact of the ring face of the cutting ring
35 with the end face of the connecting piece takes place in case of complete assembly and the $1\frac{1}{2}$ turns of the union nut to DIN, but only in case of overtightening, i.e. approx. $1\frac{3}{4}$ turns of the union nut. Provided assembly is correct, the

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shortened annular reinforcement L_1 will have a relatively low stiffness, thus damping vibration transmissions similar to the effect of metallic springs.

5. A detailed explanation of the invention is given in the accompanying drawings wherein:

Figure 1 shows a semi-sectional view of a cutting ring according to the invention;

- 10 Figure 2 shows an exploded view of all components of a screw joint in semi-section and full section according to the invention;

15 Figure 3 shows a semi-sectional view of a correctly assembled screw joint according to a first variant of the invention;

Figure 4 shows a semi-sectional view of a correctly assembled screw joint according to a second variant of the invention;

- 20 Figure 5 shows a semi-sectional view of an overtightened screw joint according to a second variant of the invention;

Figures 6a and 6b show a side elevation a and a longitudinal section b of a connecting piece with a marking,

1. with a shortened annular reinforcement L_1 following overtightening, and
25 2. with an extended annular reinforcement L_1 following normal assembly.

Figure 1 shows a longitudinal partial section and a partial view of a cutting ring 1 according to the invention having the cutting blades 2 and 3 and the cutting blade or stop edge 4 with different radii. On its outer face there is provided an annular reinforcement 5 on the nut side which forms an annular face 6 at its transition to the narrow ring portion. The annular face 6 has an inclination in relation to the tube axis 7 which is between 45° and 90° . In the one embodiment of the invention, the axial length L_1 of the annular reinforcement is of such a size that, in case of complete assembly, the transfer elements 8 arranged on the annular face 6 transfer

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their negative image formation or themselves onto the end face 9 of the connecting piece 10.

5 In this connection, reference is made to Figure 2 showing an exploded view of all components of a screw joint in longitudinal partial section and in a partial view according to the invention, with 10 depicting the connecting piece, 1 the cutting ring, 11 the union nut and 12 the tube to be connected.

10 Figure 3 shows these elements in correctly assembled condition. Following finger-tight tightening, the union nut 11 which, with its inner face 13, is acting onto the correspondingly designed inclined surface of the cutting ring 1 and, 15 with its annular face 6, is striking the end face 9 of the connecting piece 10, is given 1 1/2 turns. This causes the transfer elements 8 to be squeezed into the softer end face 9 of the connecting piece and to effect a negative image formation thereof. If the screw joint is disassembled, the 20 image on the end face 9 will demonstrate that the screw joint was assembled correctly.

Figure 4 shows a further embodiment of the invention in which it is not the correct assembly condition of a marking and, 25 thus, a verification by an embossed pattern on the end face 9 of the connecting piece 10 which is achieved, but an overtightening. For this purpose, the length L_1 of the annular reinforcement is shortened, with equal axis length L of the cutting ring 1, in such a way that, with correct assembly of 30 the tube connector, the annular face 6 will not make contact with the end face 9 of the connecting piece 10 with its contours or transfer elements 8, so that no embossed pattern is created. It is only upon overtightening, i.e. upon giving the union nut approx. 1 3/4 turns, that a squeezing action is 35 exerted from the annular face 6 onto the end face 9 of the connecting piece 10, thereby achieving an embossed pattern of the end face and, thus, an identification of the over-

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tightening which has occurred. This condition is shown in Figure 5.

5. Figures 6a and 6b show an exemplified illustration of the marking of the end face edge 14 of the connecting piece 10 for identification of:

1. an overtightening with a shortened annular reinforcement L_1 , and
- 10 2. a normal assembly with an extended annular reinforcement L_1 .

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Vocabulary List

- 1 Cutting ring
- 2 Cutting edge
- 5 3 Cutting edge
- 4 Cutting edge or stop edge
- 5 Annular reinforcement
- 6 Annular face
- 7 Tube axis
- 10 8 Transfer element
- 9 End face of connecting piece
- 10 Connecting piece
- 11 Union nut
- 12 Tube
- 15 13 Conical inner face
- 14 End face edge of connecting piece 10

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PATENT CLAIMS

- 5 1. A screw joint with a sealing ring, a connecting piece and
a union nut for making a tube connector, the sealing ring
being designed as a cutting ring with one or several cut-
ting edges which can be inserted into a conical bore of the
connecting piece starting from an end face by screwing the
union nut onto the connecting piece, and the sealing ring
10 being provided with an annular reinforcement on the nut
side of its outside which forms a ring surface at its
transition from the narrow ring portion to the reinforced
portion of the ring surface, characterized in that the
annular face (6) is provided with an inclination between
15 45° and 90° in relation to the tube axis (7) and that the
axial length L_1 of the annular reinforcement (5) is de-
signed in such a way that, with correct assembly, the
transfer elements (8) arranged on the annular face (6)
transfer their negative image formation or themselves onto
20 the end face (9) of the connecting piece (10).
2. A screw joint as claimed in Claim 1, characterized in that
the transfer elements (8) have spatially designed contours
whose negative image formation is transferrable onto the
25 end face (9) of the connecting piece (10).
3. A screw joint as claimed in Claim 1 or 2, characterized in
that the transfer elements (8) are designed as embossed
patterns.
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4. A screw joint as claimed in Claim 1, 2 or 3, characterized
in that the transfer elements (8) are designed as cor-
rugated elements.
- 35 5. A screw joint as claimed in Claim 1, 2 or 3, characterized
in that the transfer elements (8) are designed as company
logos.

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6. A screw joint as claimed in any of the preceding claims, characterized in that the transfer elements (8) have dye pigments.

5 7. A screw joint as claimed in any of the preceding claims, characterized in that the axial length L_1 of the annular reinforcement (5) is of such a size that transfer elements (8) arranged on the annular face (6) transfer their negative image formation or themselves onto the end face of the
10 connecting piece in case of overtightening only.

Fig. 1

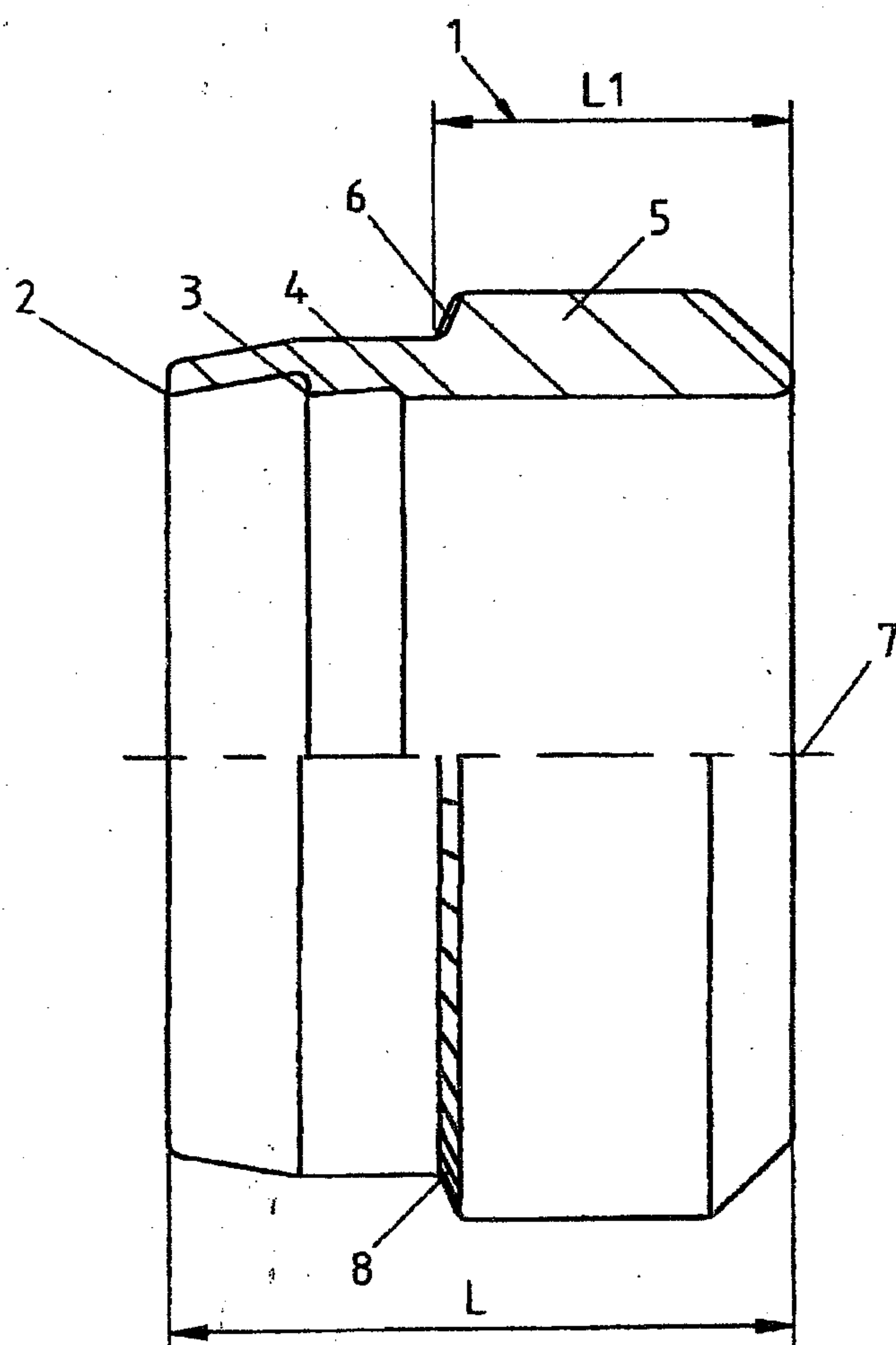


Fig. 2

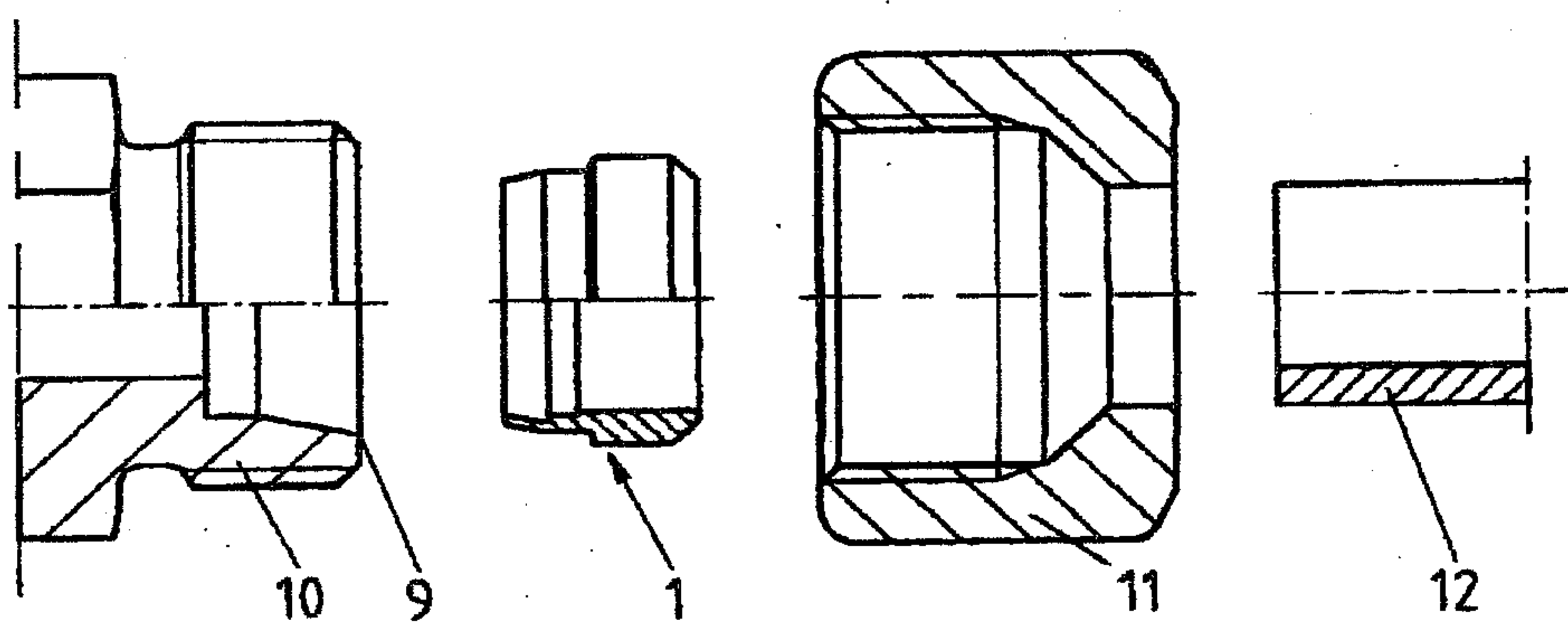


Fig. 3

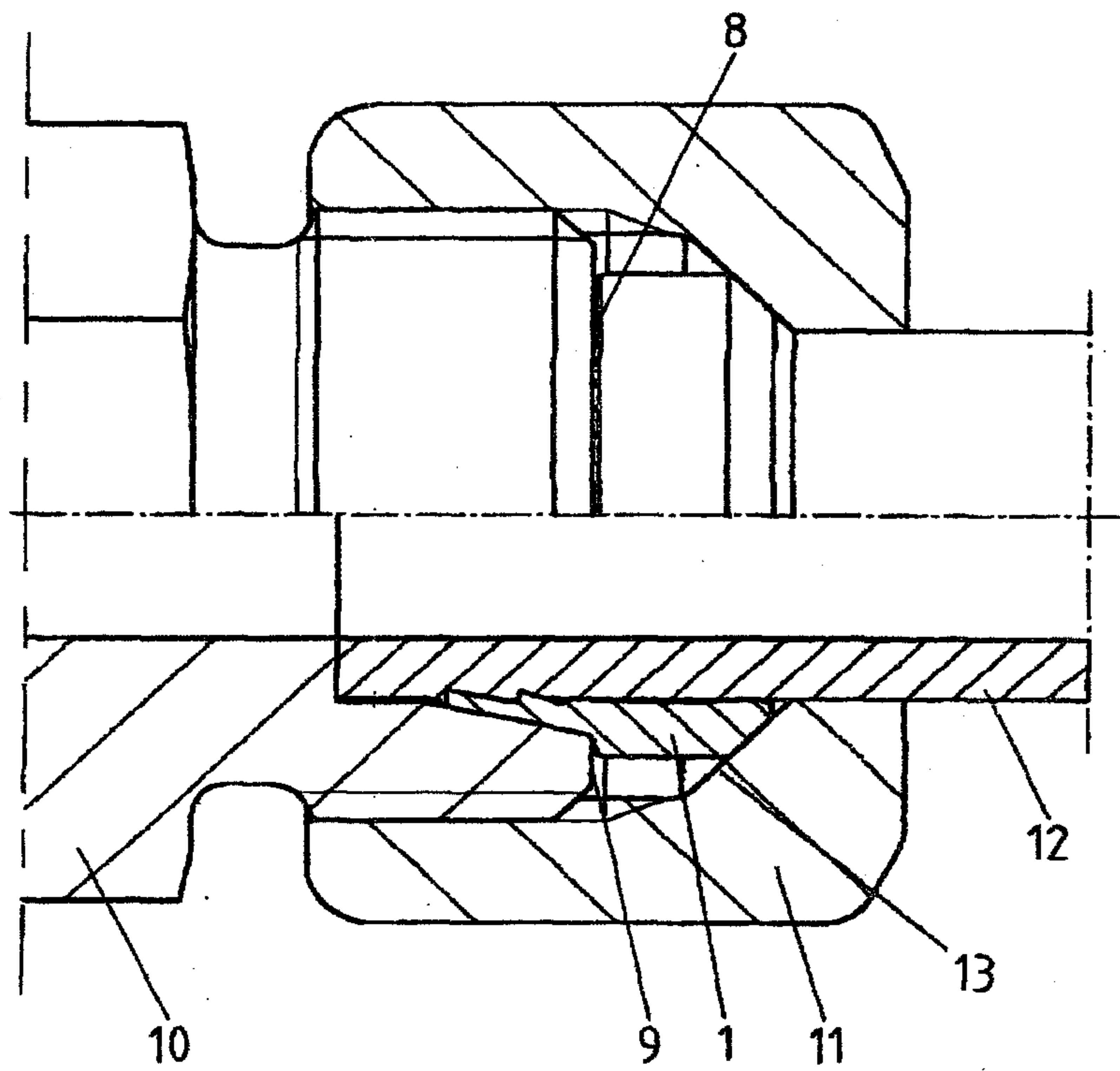


Fig. 4

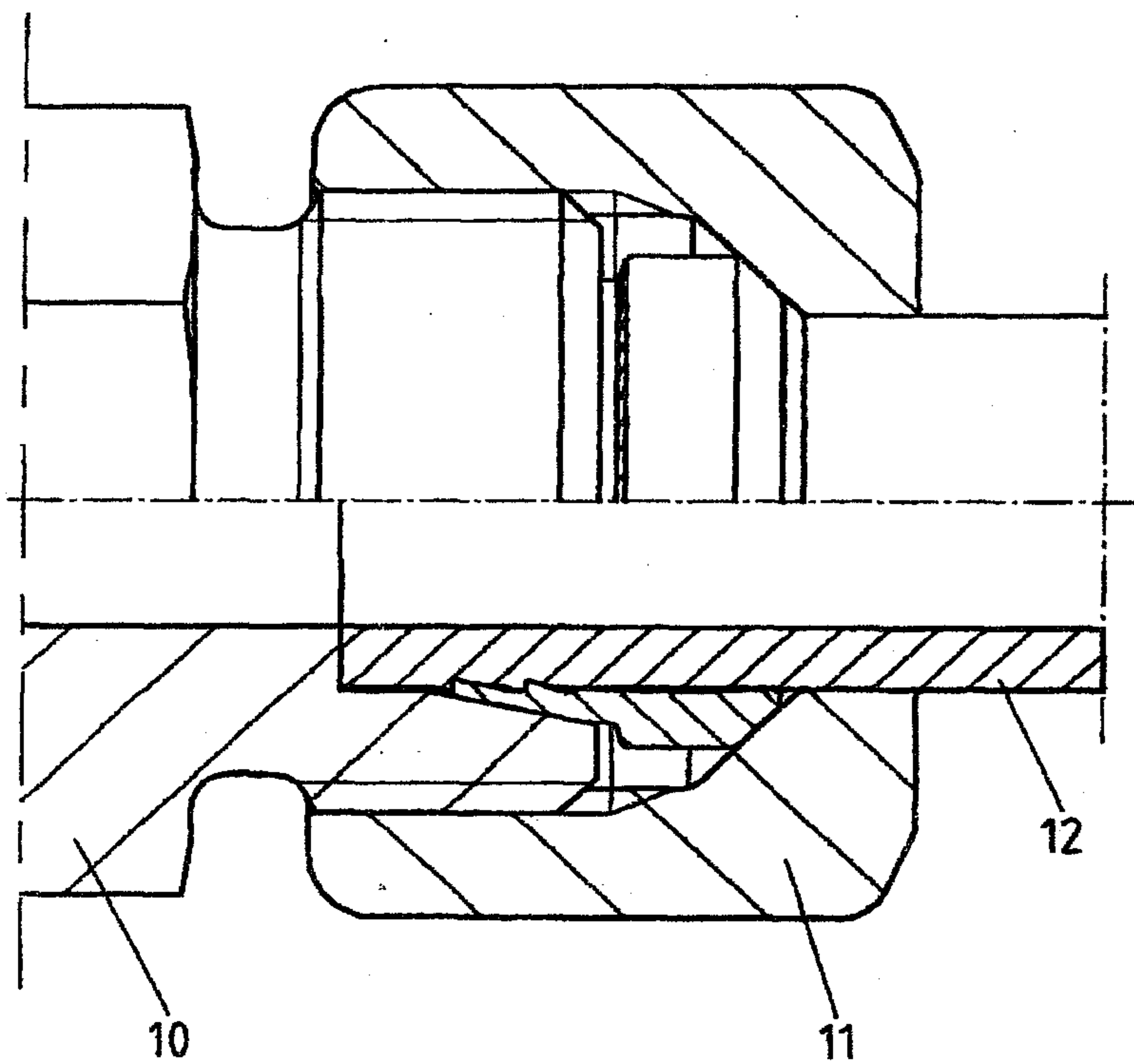


Fig. 5

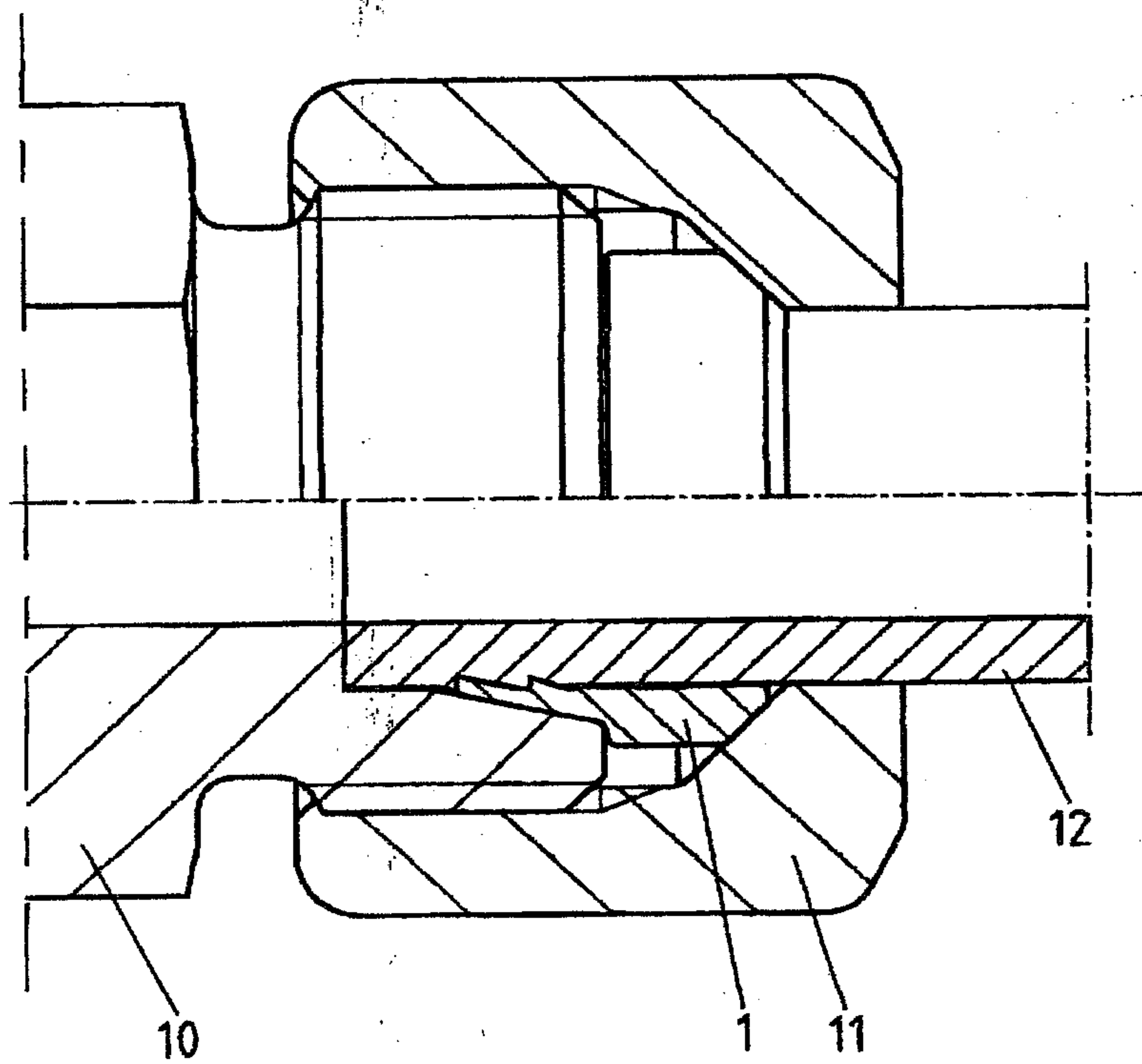


Fig. 6

