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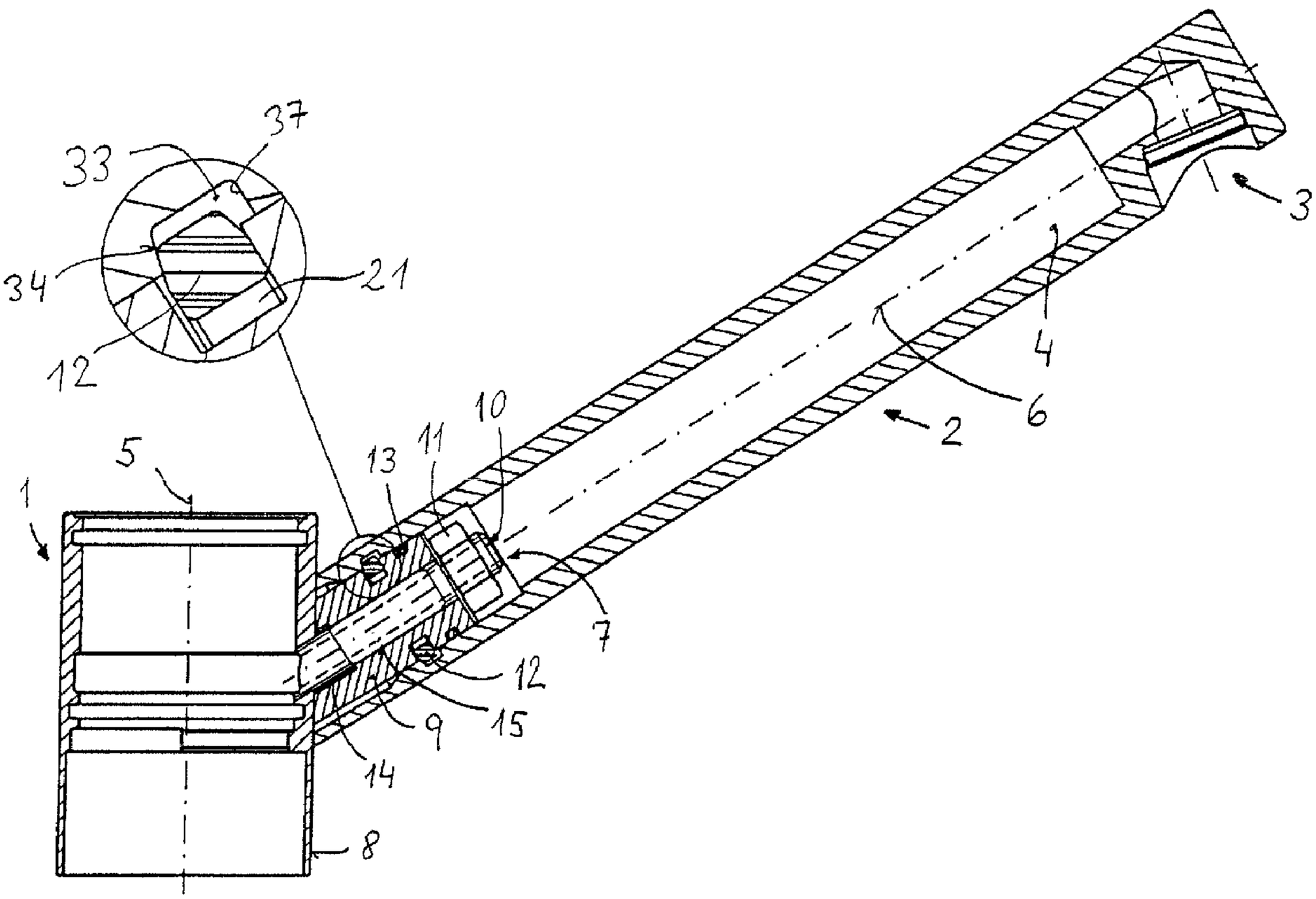
(54) Title: FASTENING ELEMENT FOR FITTING PARTS




(57) Abrégé/Abstract:
A fastening element for fitting parts providing for fastening with zero backlash between its parts. This is achieved by a fitting part (2), which is slid on a connecting insert, tightened to another fitting part (1) and featuring a spring ring, which snaps radially open in a corresponding groove in the inner wall of said fitting part (2) and thus locks both fitting parts together. This because an inclined flank of the spring ring pushes a corresponding flank of the groove towards the fitting part (1) by using its wedge-shape.

## Abstract

A fastening element for fitting parts providing for fastening with zero backlash between its parts. This is achieved by a fitting part (2), which is slid on a connecting insert, tightened to another fitting part (1) and featuring a spring ring, which snaps radially open in a corresponding groove in the inner wall of said fitting part (2) and thus locks both fitting parts together. This because an inclined flank of the spring ring pushes a corresponding flank of the groove towards the fitting part (1) by using its wedge-shape.

# Fastening element for fitting parts

The present invention relates to hydraulically communicating fittings and in particular, to a device for fastening a lateral fitting part to a wide fitting part.

A fitting, such as used for faucets, is described in U.S. Patent No. 5,014,749. Therein, at first, a smooth tube is screwed in a body. A decorative cover sleeve is slipped over the smooth tube thereafter, wherein the decorative cover sleeve has inwardly projecting ribs that rest on the outer surface of the smooth tube, which are interconnected by an internal ring. Subsequently an elastomeric ring is slipped over the smooth tube too such that the elastomeric ring is adjacent to the internal ring. Then, a washer is brought in position to engage with a matching groove on the smooth tube such that the elastomeric ring is axially compressed between said internal ring and the washer. Thus, the decorative cover sleeve is pushed axially towards the body.

The object of the present invention is to provide a simplified design, which enables easier mounting.

This object is achieved by means of a fastening element for fitting parts which are designed to allow hydraulic communication between them wherein, in order to fasten a lateral fitting part having an inner shoulder, to the outside of a outer wall of a wide fitting part at a predetermined angle, the fastening element comprises a connecting insert which is capable of being mounted inside the lateral fitting part and which has means in order to be fastened to the wide fitting part and at the same time to ensure hydraulic communication between the wide fitting part and the lateral fitting part, and

wherein the connecting insert has at least one outer clearance such that the fastening element can be mounted on the lateral fitting part by means of a spring ring clamped between this clearance and the inner shoulder, and the spring ring having at least one flank for engaging with said inner shoulder, and said flank is inclined with respect to a plane lying at right angles to a symmetry axis of the spring ring.

Further advantageous embodiments of the invention are described hereinafter.

The invention is explained in more detail below by way of example, with reference to drawings in which:

fig. 1 shows a diagrammatic illustration of two fitting parts which are connected to one another by means of an installed fastening element according to the invention;

fig. 2 shows an enlarged cross section of the edge of such a spring ring;

fig. 3 shows a side view of a spring ring for such a fastening element;

fig. 4 shows a top view of such a spring ring;

fig. 5 shows an illustration of a detail to explain the operation of such a spring ring, and

fig. 6 shows an enlarged partial illustration of such a fastening element.

Fig. 1 shows two fitting parts 1 and 2 which may be, for example, a housing, a tubular piece, a hydraulic appliance, etc., said figure illustrating, in particular, preferably a wide fitting part 1 in the form of a housing part of a water fitting with an at least approximately cylindrical outer contour and a lateral fitting part 2 in the form of an outflow pipe with an outflow 3 for water or another liquid. The term "hydraulic" refers, within the meaning of the invention, to any liquid. The outflow pipe 2 has an axial cavity or passage 4 which communicates with an orifice forming the outflow 3. The fitting parts 1 and 2 have in each case axial symmetry axes 5 and 6, which are located in one and the same plane, and are connected in close contact to one another by means of a fastening element 7. One end (30 in fig. 6) of the fitting part 2 is in contact with the outside of the cylindrical wall 8 of the fitting part 1 which has the larger diameter. The cylindrical wall 8, the shape of which is not appreciably impaired by this contact, is thus in contact with a sectional plane of the fitting part 2, said sectional plane being designed for this purpose in the special form of what is known as a penetration, so that the shape of this end (30 in fig. 6) of the fitting part 2 is matched to the outer surface of the cylindrical wall 8 of the fitting part 1. The tubular fitting part 2, which has the smaller diameter, can thereby be joined, flush, to the fitting part 1 at a predetermined angle. A sharp contact edge is thereby formed, as seen from outside, between the fitting parts 1 and 2.

The fastening element 7 according to fig. 1 and 6 comprises a plurality of parts, to be precise a connecting insert 9, a threaded shank 10 with a nut 11, a spring ring 12 (fig. 2 to 5), a sealing ring 13 and a

special seal 14. The connecting insert 9 has a circular cross section and is provided with an axial continuous bore 15. The connecting insert 9 itself may consist of one, two or more parts; it is preferably of one-piece design, and it is therefore also referred to as a pipe connection piece.

Fig. 6 shows further details of the fastening element 7 according to the invention. A region 16 at the end of the pipe connection piece 9 facing the wide fitting part is likewise designed as a penetration, so that it can be added, flush, to the fitting part 1. The other end of the pipe connection piece 9 is delimited by an end face 17 formed perpendicularly to the axis 6. The pipe connection piece 9 has a cylindrical outer surface 18, so that it can be introduced slideably, with only a little play, into a bore 19 at one end of the fitting part 2 as far as a shoulder 20. The pipe connection piece 9 also has a relatively wide and deep groove 21 for the spring ring 12 and a smaller groove 22 for the sealing ring 13. The grooves 21 and 22 are designed to be parallel to the end face 17. In the region at the end 16 of the connecting insert (9) facing the wide fitting part (1) pipe connection piece 9, there is formed by a widened inner bore 23, as far as a shoulder 34, an air gap where the special seal 14, for example a silicone seal, is accommodated, the end portion of which is preferably likewise designed as a penetration, so that it can be added, flush, to the fitting part 1. The nut 11 presses against the end face 17 via a curved washer 25.

The threaded shank 10 has a coaxial inner bore 26 and, on the outside, is provided with a middle smooth outer surface between a first end region 27 having an external thread for the nut 11 at one end and a second end region 28 likewise having an external thread at the other end. The cylindrical wall 8 of the fitting part 1 has a continuous oblique internally threaded wall 29 which is formed coaxially to the axis 6. The second end region 28 is screwed into this bore 29. The end of the threaded

shank of this side is shaped at least approximately according to the inner contour of the fitting part 1.

Fig. 3 shows the lateral shape of the spring ring 12 which, as may be gathered from fig. 4, is not completely annular, since it has a cut-out at an angle w from about 30° to 110°. A resilient clamping piece may also otherwise serve as a spring ring 12.

The fitting part 2 (fig. 6) has, adjacent to its oblique end 30, a widened inside diameter, so that there is an air gap 31 as far as a transitional ramp 32. Between the ramp 32 and the end face 17 of the pipe connection piece 9, in the mounted state, there is, on the inside of the fitting part 2, a peripheral groove 33 which is designed to have the spring ring 12 clamped in it in such a way that the pipe connection piece 9 can be held firmly on the fitting part 2 and be pressed against the latter.

Preferably, as illustrated in fig. 5, that shoulder 34 of the groove 33 which faces the fitting part 1 is preferably designed to be inclined inward. Moreover, as illustrated in fig. 5 and 2, the edge region of the cross section of the spring ring 12 is in the shape of a symmetrical trapezium, the small unequal side being located at the outer edge between two preferably oblique or inclined flanks 35 and 36 which, in particular, may also be designed symmetrically, and the shoulder 34 and the flank 35 having the same inclination.

The fastening element according to figures 1 to 6 functions as follows:

First, the oblique end region 28 of the threaded shank 10 is screwed with its second end region 28 into the threaded bore 29 of the wall 8, until the inner end of said threaded shank is at least approximately in alignment with the inner contour of the fitting part 1. The pipe connection piece 9, if appropriate with the seal 14 mounted, is then pushed

over the threaded shank 10, until said pipe connection piece comes to bear at least approximately with one end face against the fitting part 1 in a suitable rotary position and the threaded end region 27 of the threaded shank 10 projects from the bore 15. Finally, the nut 11 on the portion 27 is screwed down and preferably tightened via the curved washer 25, in order to retain the pipe connection piece 9 against the wall 8 of the housing 1.

Once the pipe connection piece 9 is firmly fixed to the wall 8 of the fitting part 1 in the correct rotary position with respect to the angle between the axes 5 and 6 and the sealing ring 13 is introduced into the groove 22 and the spring ring 12 into the groove 21, the fitting part 2 to be fastened can then be slipped over the pipe connection piece 9. The trapezoidal edge, that is to say the radial outer end region of the flank 36, of the elastic spring ring 12 slides over the ramp 32 and is pressed into the groove 21, until, when the fitting part 2 moves further on, said spring ring spreads into the groove 33 of this fitting part 2, so that the shoulder 34 and the flank 35 are in contact with one another in the manner of wedge surfaces. The selected dimensions are such that, in the correct rotary position of the fitting part 2, the end region 30 is in contact all-round with the outer surface 8 of the fitting part 1. This spring ring 12 therefore makes a firm connection which can no longer be pulled off. Since the shoulder 34 (fig. 5), nearer to the fitting part 1, of the groove 33 inside the fitting part 2 is designed obliquely, specifically with the same angle of incidence as in the case of the trapezoidal edge 35 of the spring ring 12 with which it comes into contact, radial bracing occurs, which ensures a play-free connection between the fitting parts 1 and 2. The small angle of incidence at the flank also brings about self-locking.

According to the present invention, therefore, the pipe 2 is pressed against the fitting part 1 by means of the spring ring 12. The spring ring 12 may also in a known way have, for example, circular cross section if a releasable connection is to had instead. Preferably, however, the spring ring 12 has at least one flank 35 which is inclined with respect to a plane lying at right angles to the axis of the groove, preferably the spring ring being designed radially on the inside with a rectangular cross section (35) and radially on the outside with a symmetrically trapezoidal (36) cross section.

The connection between the fitting parts 1 and 2 thereby becomes unreleasable, so that a complete unit, as a replacement for a corresponding one-piece structure is obtained. The two unreleasably connected fitting parts prove to be particularly advantageous with regard to their surface treatment. This is because a corresponding one-piece structure would be relatively difficult to clean, grind, polish, chromium-plate, lacquer, etc., particularly along the sharp contact edge between the two tubular parts. However, such surface treatments can be carried out satisfactorily in the case of the originally separate fitting parts according to the invention.

It is unimportant for the present invention whether the cross sections of the fitting parts 1 and 2 are circular or have another, for example elliptic shape. The cylindrical wall 8 is therefore to be understood, in general, as the outer wall of the fitting part 1.

The connecting insert 9 is preferably designed in one piece. It may also consist of two parts, such as would be obtained, for example, by a cut along the plane of the flat wall 37 (fig. 5) of the groove 33, because the two parts would then anyway be retained by the nut 11.

In this case, a sealing ring could be inserted between the ramp 32 and the spring ring 12.

Patent claims

1. A fastening element for fitting parts which are designed to allow hydraulic communication between them wherein, in order to fasten a lateral fitting part having an inner shoulder, to the outside of a outer wall of a wide fitting part at a predetermined angle, the fastening element comprises a connecting insert which is capable of being mounted inside the lateral fitting part and which has means in order to be fastened to the wide fitting part and at the same time to ensure hydraulic communication between the wide fitting part and the lateral fitting part, and wherein the connecting insert has at least one outer clearance such that the fastening element can be mounted on the lateral fitting part by means of a spring ring clamped between this clearance and the inner shoulder, and the spring ring having at least one flank for engaging with said inner shoulder, and said flank is inclined with respect to a plane lying at right angles to a symmetry axis of the spring ring.

2. The fastening element as claimed in claim 1, wherein the connecting insert comprises an axial continuous bore for receiving a threaded shank which is provided with an axial bore and a first end region on which a nut is screwed, in order to retain the connecting insert between the nut and the wide fitting part connected to the threaded shank, and a second end region which is screwed in a threaded bore of the wide fitting part.

3. The fastening element as claimed in claim 1 or 2, wherein the outer wall of the wide fitting part has a substantially cylindrical shape and wherein an end of the connecting insert facing the wide fitting part is

designed as a penetration, in order to add the connecting insert, flush, to the wide fitting part.

4. The fastening element as claimed in one of claims 1 to 3, wherein the clearance is a peripherally formed groove.

5. The fastening element as claimed in one of claims 1 to 4, wherein the connecting insert is designed in one piece.

6. The fastening element as claimed in one of claims 1 to 5, wherein a seal is mounted in an end region of the connecting insert facing the wide fitting part.

7. The fastening element as claimed in one of claims 1 to 6, wherein a further groove for a sealing ring is present in a region between the clearance for the spring ring of the connecting insert and a free end of the connecting insert opposing the end facing the wide fitting part.

8. The fastening element as claimed in one of claims 1 to 7, wherein the spring ring is designed radially on its inside by a rectangular cross section and radially on its outside by a symmetrically trapezoidal cross section.

9. A fitting comprising a wide fitting part and a lateral fitting part, which are connected to one another by fastening element as claimed in one of claims 1 to 8.

10. A fitting as claimed in claim 9, wherein the lateral fitting part is unreleasably connected to the wide fitting part.

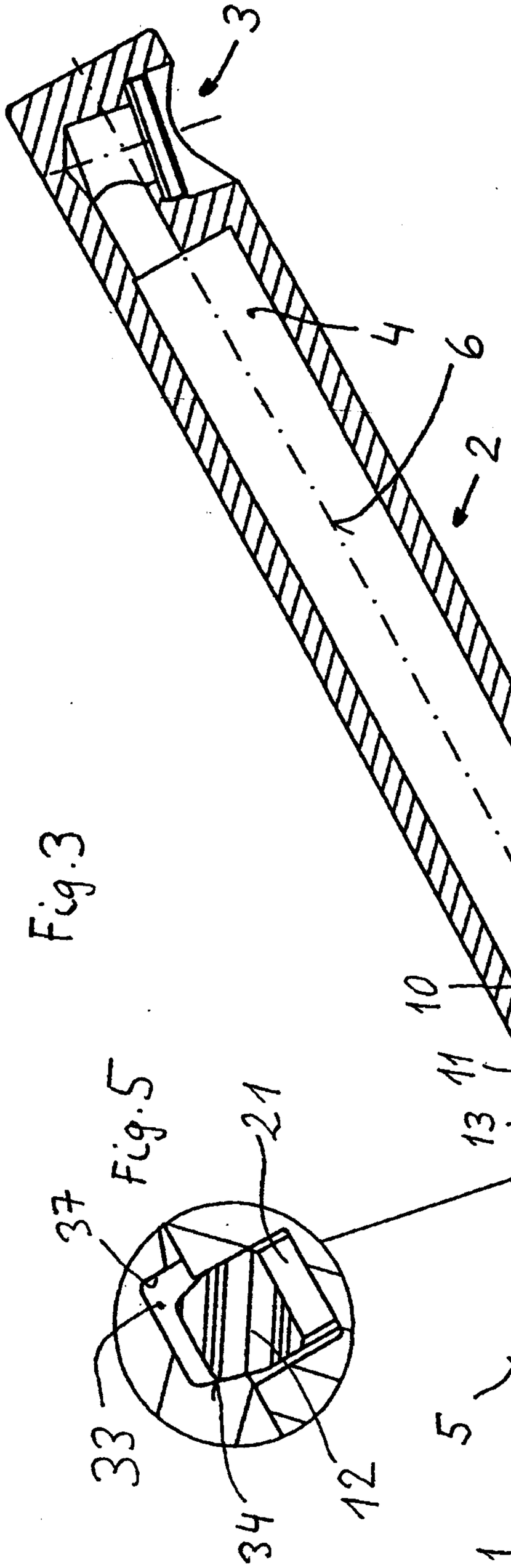



Fig. 1

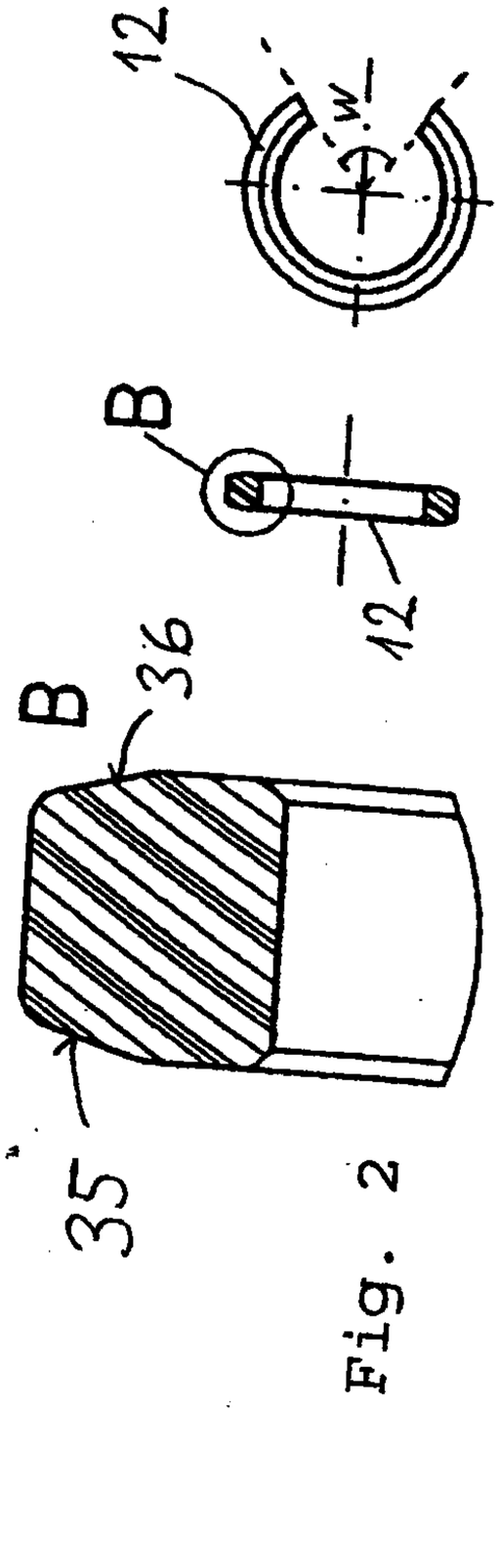



Fig. 2




Fig. 3

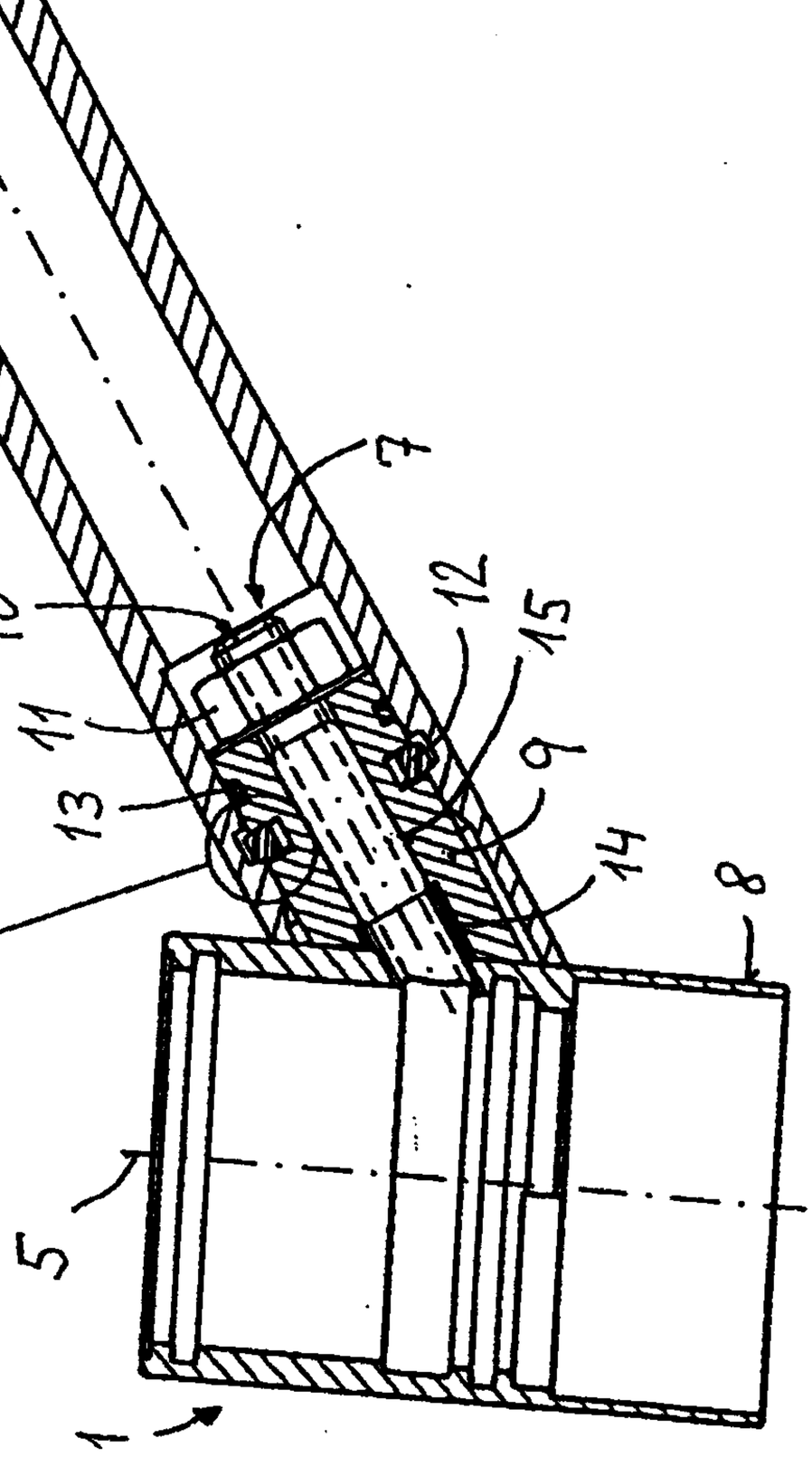



Fig. 4

Fig. 5

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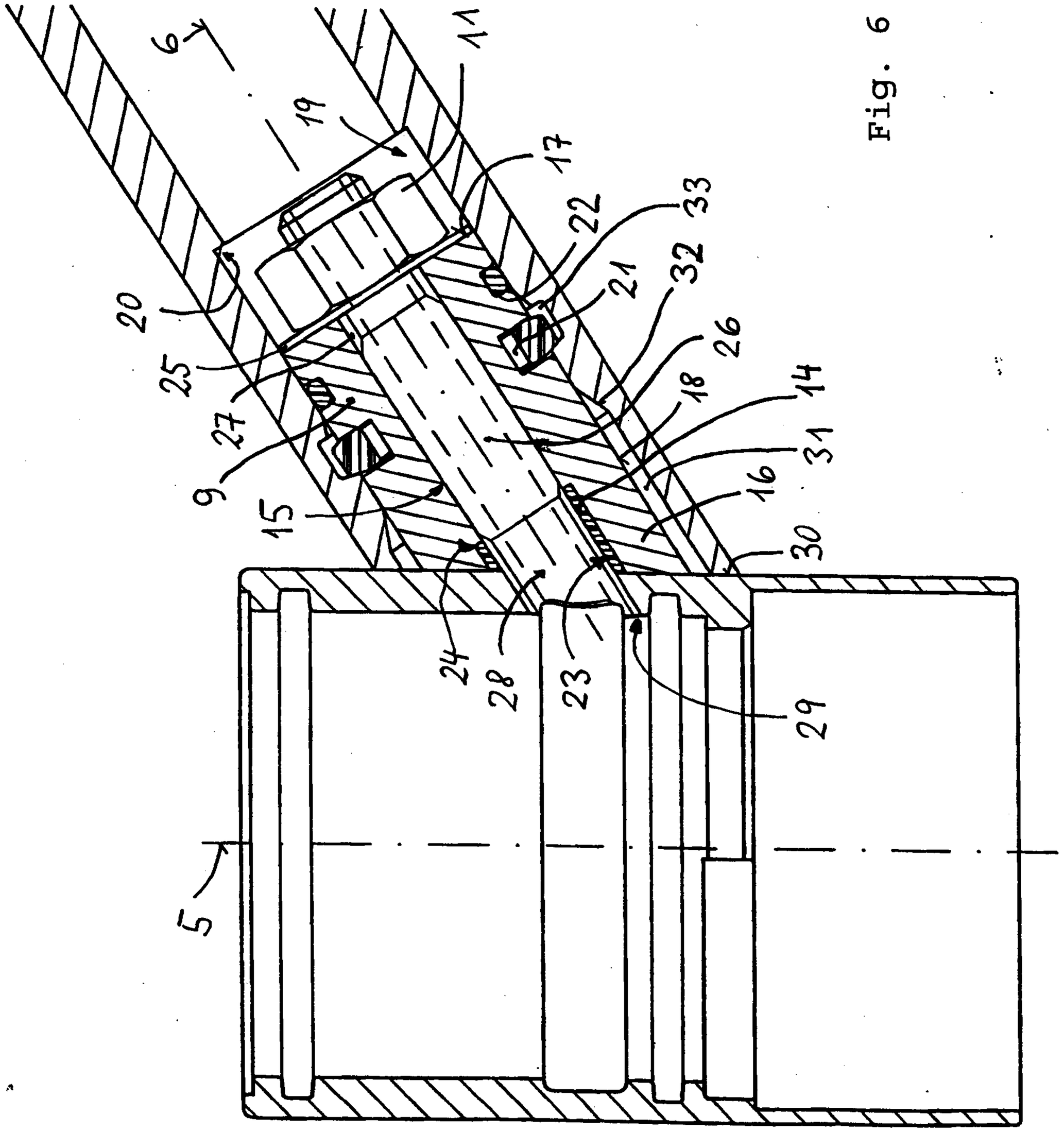
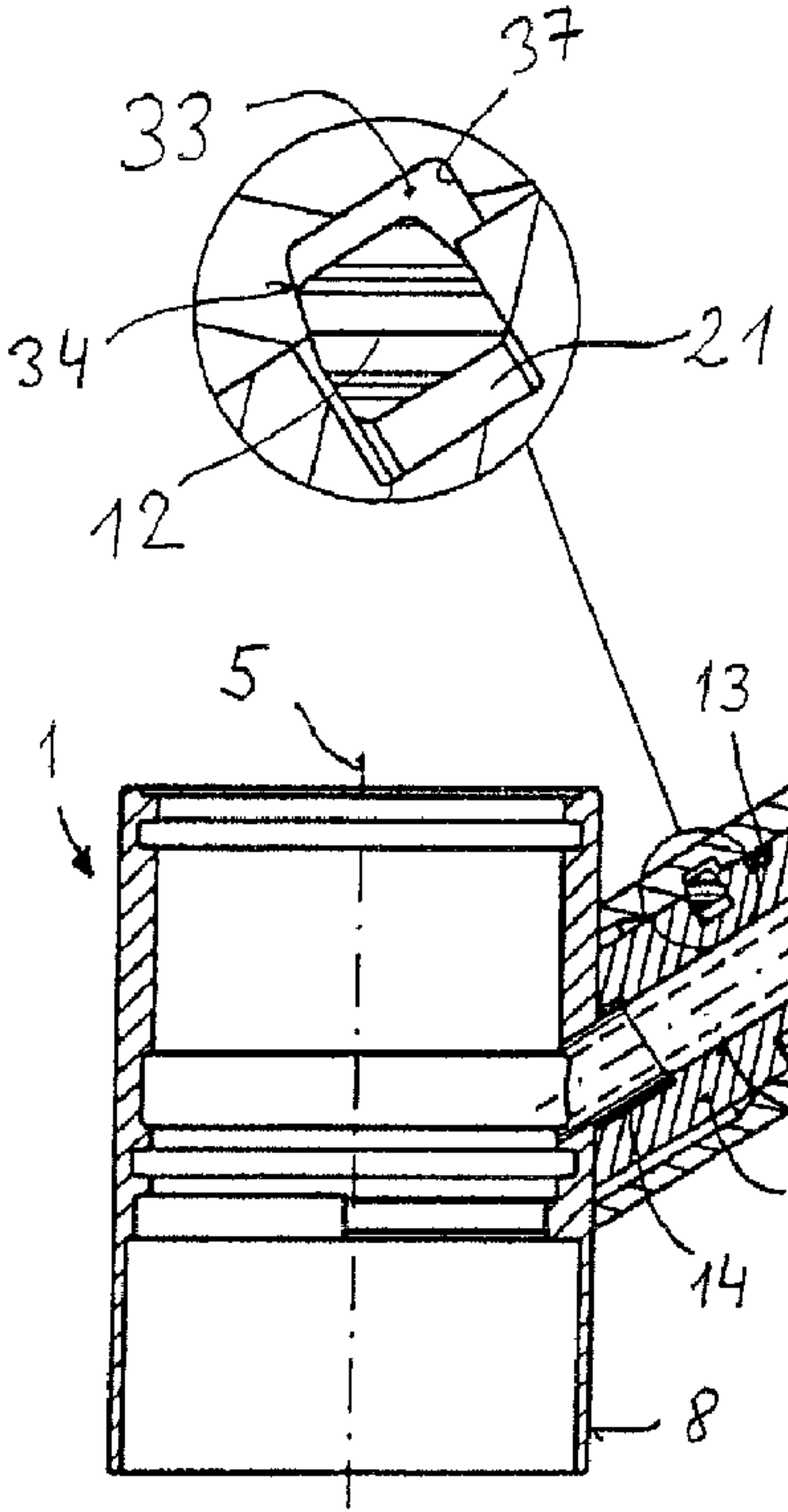



Fig. 6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