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CA 2166844 C 2007/08/21

(11)(21) 2 166 844

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 1996/01/09

(41) Mise à la disp. pub./Open to Public Insp.: 1996/07/17

(45) Date de délivrance/Issue Date: 2007/08/21

(30) Priorité/Priority: 1995/01/16 (FR95.00612)

(51) Cl.Int./Int.Cl. *F16L 37/098* (2006.01),
F16L 37/42 (2006.01)

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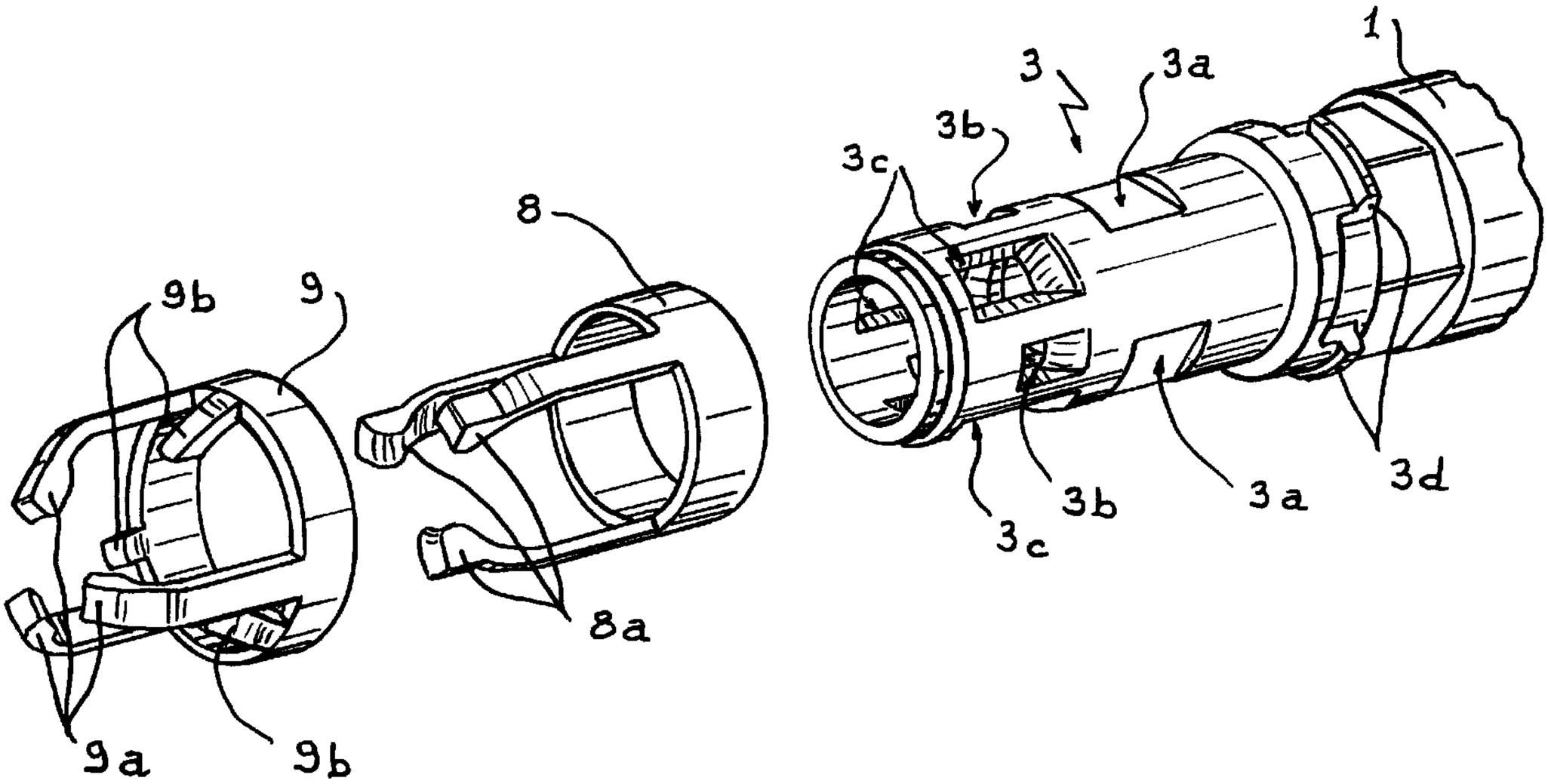
(54) Titre : RACCORD RAPIDE
(54) Title: IMPROVEMENTS IN QUICK CONNECTIONS



(57) Abrégé/Abstract:
This invention relates to a quick connection for removably connecting pipes, wherein a safety ring incorporating claws axially immobilizes the male element of the connection after a first axial manoeuvre of the bush has controlled opening of the locking ring likewise incorporating claws. This intermediate position allows decompression of the pipe associated with the male element which is finally released only after a second axial manoeuvre of the bush exerted in direction opposite the preceding one.

ABSTRACT OF THE DISCLOSURE

This invention relates to a quick connection for removably connecting pipes, wherein a safety ring incorporating claws axially immobilizes the male element of the connection after a first axial manoeuvre of the bush has controlled opening of the locking ring likewise incorporating claws. This intermediate position allows decompression of the pipe associated with the male element which is finally released only after a second axial manoeuvre of the bush exerted in direction opposite the preceding one.

FIELD OF THE INVENTION

The present invention relates to quick connections used for removably joining pipes, of the type comprising two male and female elements adapted to fit and to lock on each other, causing automatic opening of a loaded flap valve mounted in the female element connected to the source of the pressurized fluid which traverses the device.

BACKGROUND OF THE INVENTION

Different types of such mechanisms for automatically locking the two fitted elements have been proposed. In U.S. Patent No. 3 873 062 to JOHNSON, this mechanism is formed by a ring which comprises an annular element whose opening is oriented axially with respect to the body of the female element and which is fast with longitudinal sectioned claws so as to come, under the effect of elastic means associated with said ring, into engagement by their free end in an annular depression provided in the endpiece of the male element, which is thus retained axially. This locking ring is axially connected to a sliding manoeuvring bush which envelops said ring and the body of the female element, with the result that the axial displacement of this bush by the operator provokes, against the elastic means mentioned above, the recoil of the ring and the withdrawal of its claws from the depression of the male element which may thus be withdrawn from the female element.

Such a system functions satisfactorily for relatively moderate fluid pressures. On the other hand, if the pressure of the fluid conveyed by the pipes to be connected exceeds a certain value, when axially manoeuvring the bush with a view to disconnection, the pressurized fluid enclosed in the downstream pipe connected to the male element provokes the sudden expulsion of this element

from the female element, due to this fluid bearing against the closed valve. The violence of such expulsion is such that it risks injuring the operator.

It is an object of the present invention to overcome this drawback.

SUMMARY OF THE INVENTION

To that end, the present invention relates to a quick safety connection for removably joining pipes, of the type in which the locking mechanism which axially immobilizes the male element once it has been fitted in the female element, has provoked opening of the loaded flap valve mounted in this female element, comprises, on the one hand, an annular member provided with longitudinal claws adapted to engage, under the effect of elastic means, in an annular depression of the body of the male element, on the other hand, a manoeuvring bush whose axial displacement provokes extraction of said claws from the depression and release of the male element, characterized in that the female element further comprises an annular safety member incorporating claws which, intervening after a first axial manoeuvre exerted on the bush, immobilizes the male element in an intermediate position for which the loaded flap valve is closed and the pressurized fluid enclosed in the downstream pipe associated with said male element escapes to the outside, while a second axial manoeuvre exerted on the bush in the direction opposite the preceding one, controls the annular safety member and ensures total release of the male element.

Consequently, a functioning is obtained, similar to that of the quick connections incorporating a transversely mobile lock which are of the so-called "double detent" type (cf DE-A-2 741 512 to SCHILDMANN), while conserving the structural advantages specific to the quick connections of the type incorporating claws.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more readily understood on reading the following description with reference to the accompanying drawings, in which:

Figure 1 is an axial section through a quick connection according to the invention, shown in the position in which its two elements are coupled.

Figure 2 is a view in perspective showing the body of the male element and the two clawed rings associated therewith, in the separate state.

Figure 3 illustrates the arrangement of the two pieces which, once assembled on each other, form the outer manoeuvring bush of the connection.

Figure 4 is a transverse section through the connection along the plane of section indicated at IV-IV in Figure 1; the plane of section of Figure 1 has been recalled at I-I.

Figure 5 is an axial section along the plane indicated at V-V in Figure 4.

Figure 6 is the transverse section corresponding to plane VI-VI of Figure 5.

Figures 7, 8 and 9 are axial sections on a smaller scale similar to that of Figure 1, showing the position of the pieces of the connection in three successive phases of the process of disconnection.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings and firstly to Figure 1, the female element A of the quick connection comprises a tubular body formed by the assembly of three hollow cylindrical pieces 1, 2 and 3. The rear piece 1 is profiled to allow fit of the end of the upstream pipe 4 connected to the source of pressurized fluid, while the inner piece 2, equipped with an O-ring 5, presents at its end facing said piece 1, a tapered profile adapted to define a seat

for the seal 6a borne by the head of a tubular flap valve 6 associated with a spring 7. It will be observed that the reverse may be adopted, namely the seal may be mounted on the tapered seat.

As shown in Figure 2, the principal piece 3 of this body 1-2-3 comprises three longitudinal flat portions 3a disposed in the same transverse plane. In front of these flat portions 3a, the wall is pierced with two series of three slots respectively referenced 3b and 3c, slots 3c extending over a greater axial length than slots 3b. As may be seen in Figures 4 and 6, the three flat portions 3a, the three slots 3b and the three slots 3c are mutually orientated at 120° in each series.

On the principal piece 3 of the body 1-2-3 is slidably engaged a safety ring 8 provided with three forwardly facing claws 8a. These claws 8a are introduced in the long slots 3c of the piece 3 so as to project by their free end in the inner bore of said piece.

On the safety ring 8 there slides a locking ring 9 of larger diameter. This ring 9 similarly comprises three front claws 9a engaged in the short slots 3b of the piece 3. It should be observed that ring 9 is also fast with three teeth 9b which extend forwardly between the claws 9a, the end of each tooth 9b being applied on a flat portion 3a of the body.

The connection also comprises a manoeuvring bush which, as illustrated in Figure 3, is constituted by a sleeve 10 and a front bush element 11. The latter is provided with three longitudinal extensions 11a which extend rearwardly and whose free end presents an outwardly facing heel 11b so as to clip elastically in one of the three windows 10a provided to that end in the sleeve 10, consequently ensuring reciprocal connection of the pieces 10 and 11 of the bush, both axially and in rotation.

With the locking ring 9 there is associated a spring 12 which abuts against stops 3d of piece 3 to push said ring 9 forwardly and elastically engage the claws 9a thereof inside the slots 3b. It will be observed that the claws 8a and 9a, the teeth 9b and the longitudinal extensions 11a fit between one another, ensuring guiding of rings 8 and 9 in the axial direction, in combination with slots 3b and 3c, as shown by the transverse sections of Figures 4 and 6.

With the female element A thus constituted there is associated a male element B of conventional type. This male element B is formed by a cylindrical tubular piece 13 of which one end is fastened to the pipe 14 to be connected to the pipe 4 connected to the female element A, while the opposite end is in the form of an endpiece 13a adapted to be introduced in the front opening of the piece 3 of the body 1-2-3. On this piece 13 is made an annular depression 13b provided immediately to the rear of the terminal endpiece 13a.

To set forth the functioning of the connection described hereinabove, the position of connection illustrated in Figure 1 will be the starting point. To arrive at this position, the operator has engaged the endpiece 13a in the body 1-2-3 and has brought the two elements A and B axially closer, the effects of which being, on the one hand, to push the valve 6 up to open position, on the other hand, to open the ends of the claws 9a of the locking ring 9, said ends finally being applied in the depression 13b under the effect of spring 12 associated with said ring. The two elements A and B are locked on each other, O-ring 5 ensuring tightness of the connection.

It will be observed that the claws 9a cannot open to release the piece 13 further to the oblique profile of the front edge (referenced 3'b in Figure 1) of the

short slots 3b. On the contrary, the ends of the claws 8a of the safety ring 8, although likewise engaged in the depression 13b, are not maintained and may consequently move apart, with the result that they do not ensure any hold.

In order to dissociate the two elements A and B, the operator must in the first place displace the manoeuvring bush 10-11 axially to the rear, i.e. in the direction of arrow F1 of Figure 7. The extensions 11a of the bush 11 abut against the ring 9 which recoils against the spring 12, so that the ends of the claws 9a are extracted from the depression 13b and release the piece 13, which moves forwardly under the effect of the spring 7 associated with valve 6 which tends thus to push the endpiece 13a. Furthermore, the ends of the claws 8a of the safety ring 8 are covered by the axial bore 11c of the bush 11 and are consequently maintained applied in the depression 13b.

The intermediate position illustrated in Figure 8 is thus taken, for which valve 6 is closed, while the piece 13 of the male element B is retained axially by the claws 8a and can therefore not be dissociated from the female element A. It will be noted that, in this intermediate position, the pressurized fluid enclosed in the pipe 14 escapes to the outside through the clearances existing between the pieces of the female element A and through longitudinal grooves 10b made to that end in the inner wall of the sleeve 10. There is thus decompression of the pipe 14 and of the piece 13 which forms the male element B.

In order to disengage the latter from the female element A, the operator must act again on the bush 10-11 by displacing it axially towards the front, in the direction of arrow F2 in Figure 9. The axial displacement

of the bush 10-11 has for effect that the ends of the claws 8a of the safety ring 8 are no longer engaged in the bore 11c and are consequently free to open radially to leave the depression 13b when the operator exerts a traction on the male element B (arrow F3 in Figure 9). The decompression exerted in the intermediate position according to Figure 8 avoids any risk of sudden expulsion.

Once the male element B is completely extracted from the female connection A, the spring 12 returns the ring 9 to the standby position. It will be noted that the axial displacement of the ring 9 is limited by stop of the teeth 9b of this ring against the front edge of the flat portions 3a, which eliminates any risk of untimely blocking. The connection is thus ready for a new operation of connection.

It goes without saying that the number of claws 8a and 9a may vary to a wide extent, as a function in particular of the diameter of the connections to be made. Furthermore, it should be noted that, except of course for the springs 7 and 12, virtually all the pieces constituting the quick connection according to the invention are capable of being easily made of moulded plastics material, which substantially reduces the weight of the device and its manufacturing costs; the different pieces may be assembled with the aid of robots or manipulators, without particular difficulty.

CLAIMS

1. Quick safety connection for removably joining pipes, of the type in which a locking mechanism which axially immobilizes a male element once it has been fitted in a female element, has provoked opening of a loaded flap valve mounted in the female element, comprising, on the one hand, an annular locking member provided with longitudinal claws adapted to engage, under the effect of elastic means, in an annular depression of the body of the male element, on the other hand, a manoeuvring bush whose axial displacement provokes extraction of said claws from the depression and release of the male element, wherein the female element further comprises an annular safety member incorporating claws received in the depression of the male element, which annular safety member, intervening after a first axial manoeuvre exerted on the bush, immobilizes the male element in an intermediate position for which the loaded flap valve is closed and pressurized fluid enclosed in the downstream pipe associated with said male element escapes to the outside, while a second axial manoeuvre exerted on the bush in the direction opposite the preceding one, controls the annular safety member and ensures total release of the male element.

2. The quick connection of Claim 1, wherein the annular safety member is mounted for axial sliding movement between the annular locking member and a tubular body of the female element, the claws of the two members being engaged in slots made in said tubular body so as to project by their free end inside said tubular body in order to cooperate with the annular depression.

3. The quick connection of Claim 2, wherein the first axial manoeuvre of the bush brings an axial bore thereof to the level of free ends of the claws of the safety member, thus preventing opening of said free ends which remain engaged in the annular depression of the male element until the second axial manoeuvre exerted on said bush.

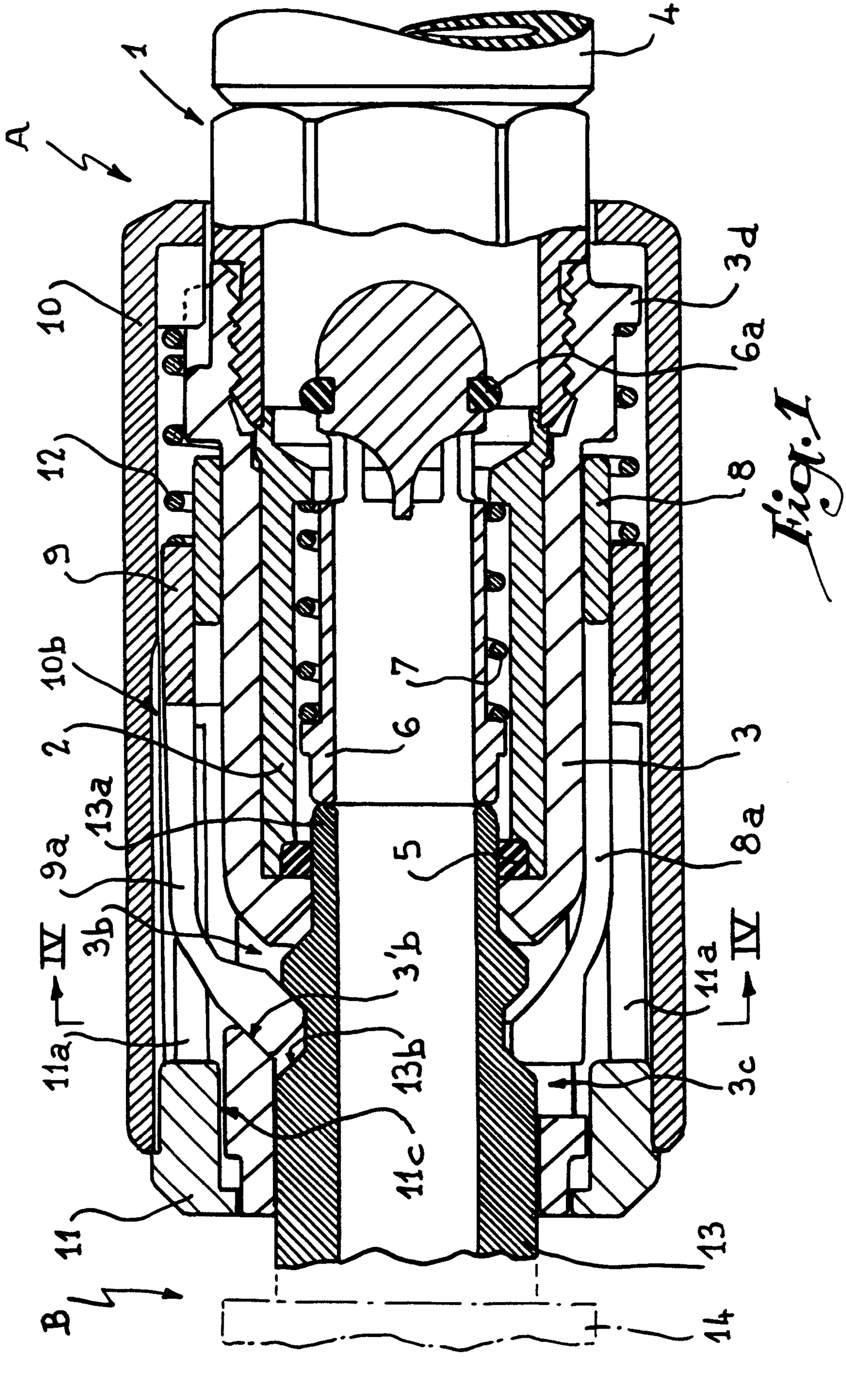

4
1
A
10
12
9
10b
2
13a
9a
3b
IV
11a
3'b
13b
11c
11
B
14
13
3c
IV
11a
8a
5
6
7
3
3d
6a
8

Fig.1

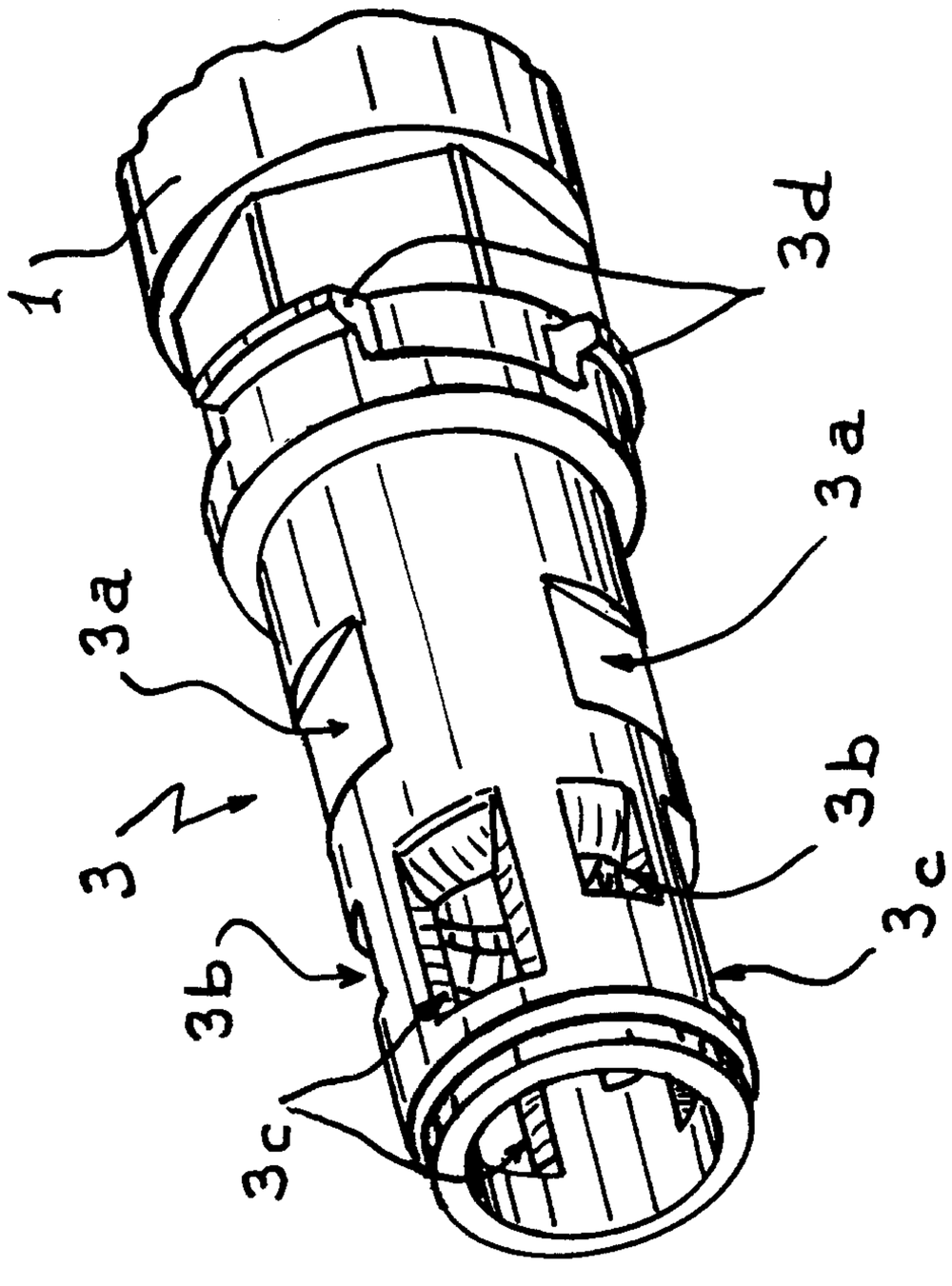
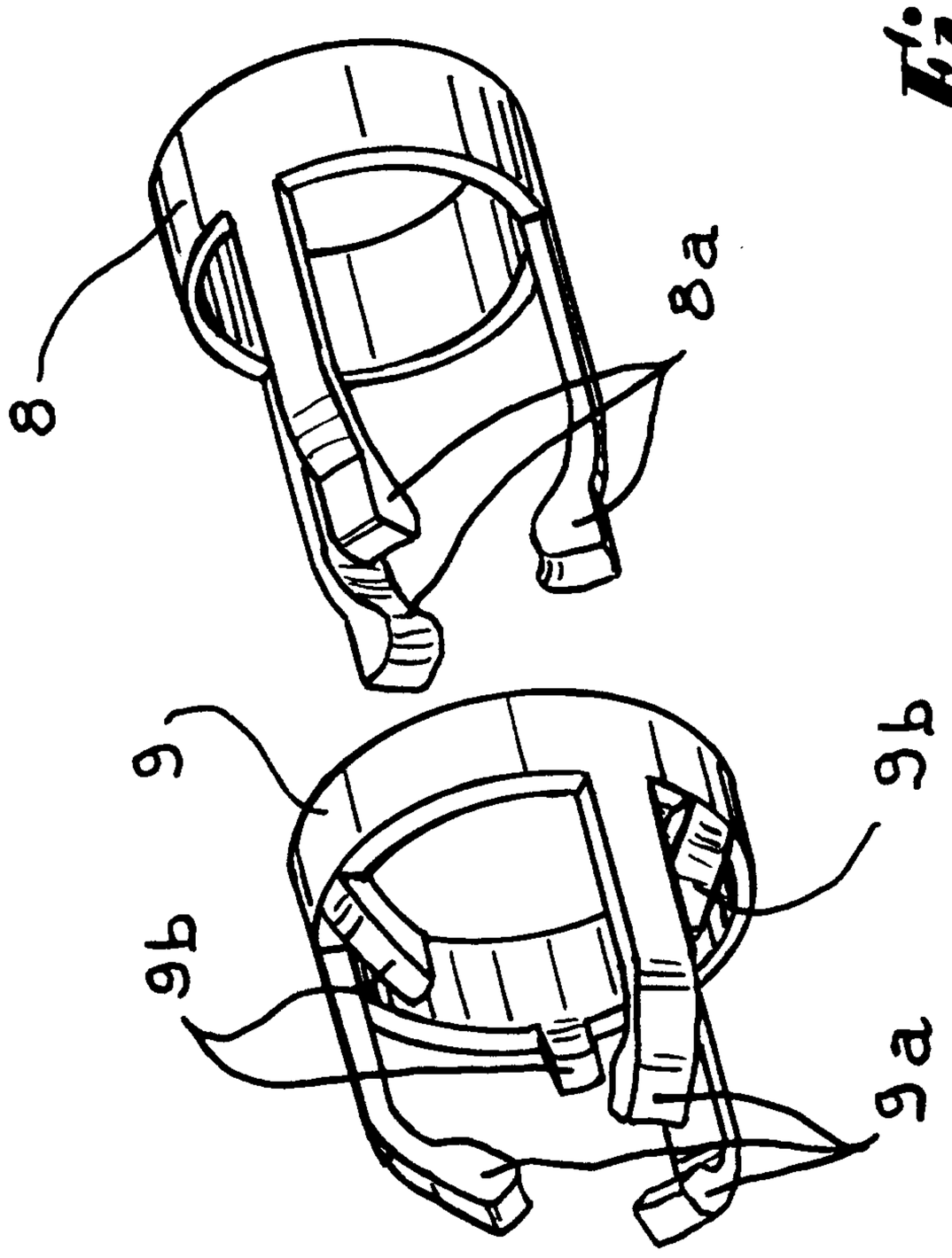


Fig. 2



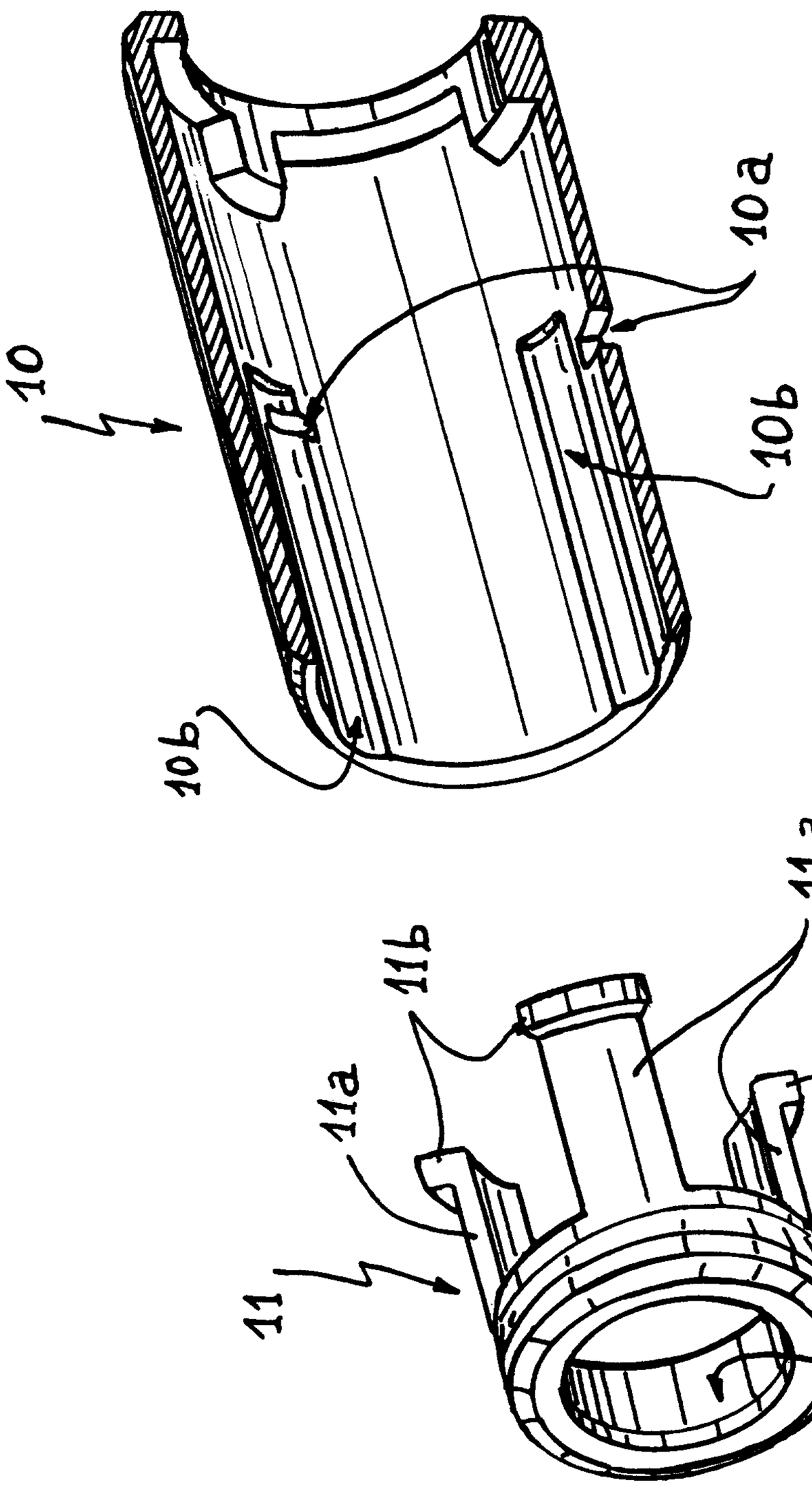
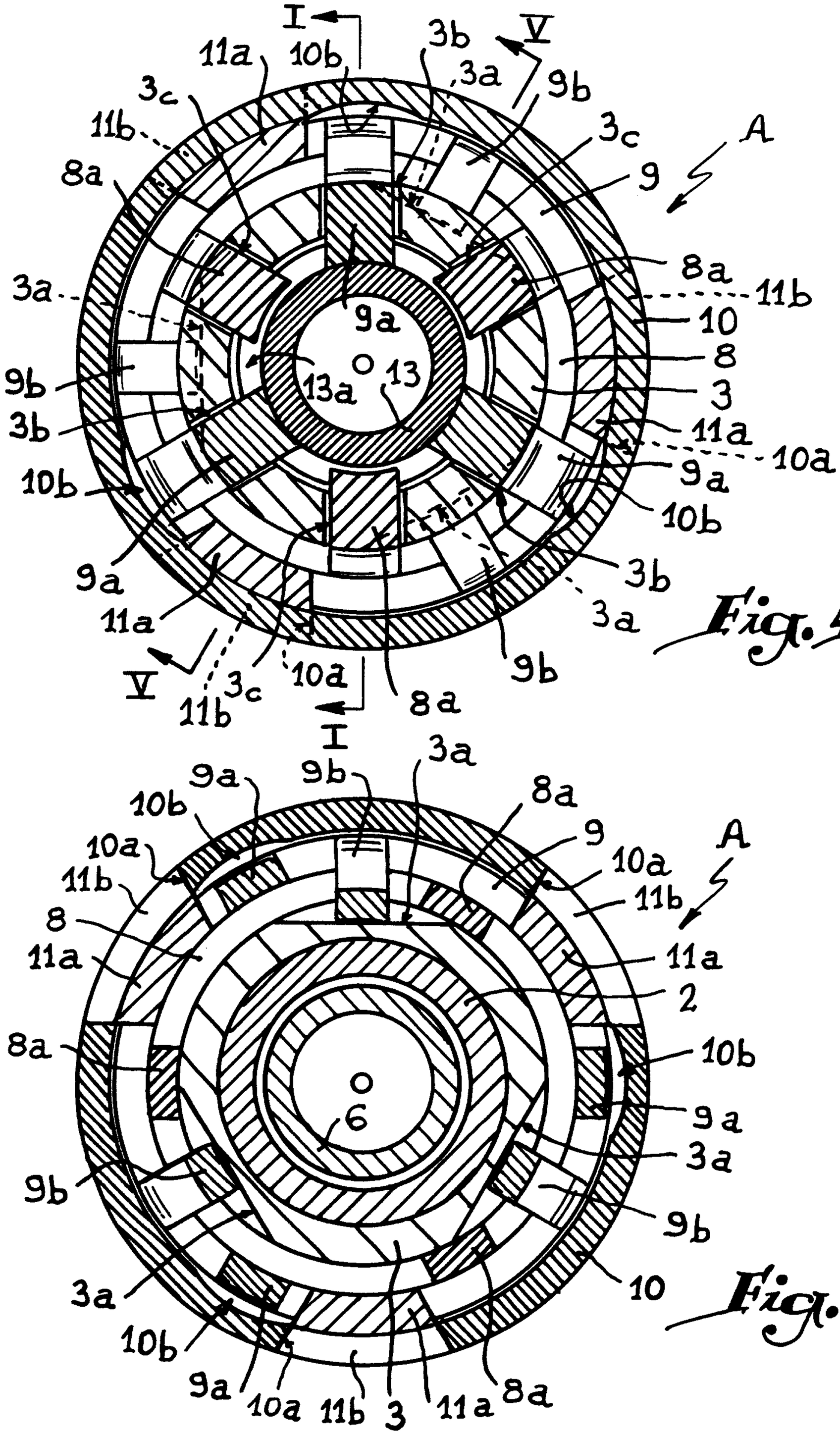


Fig. 3


I
11a
10b
3b
V
3a
9b
3c
11b
A
8a
9
3a
9a
13a
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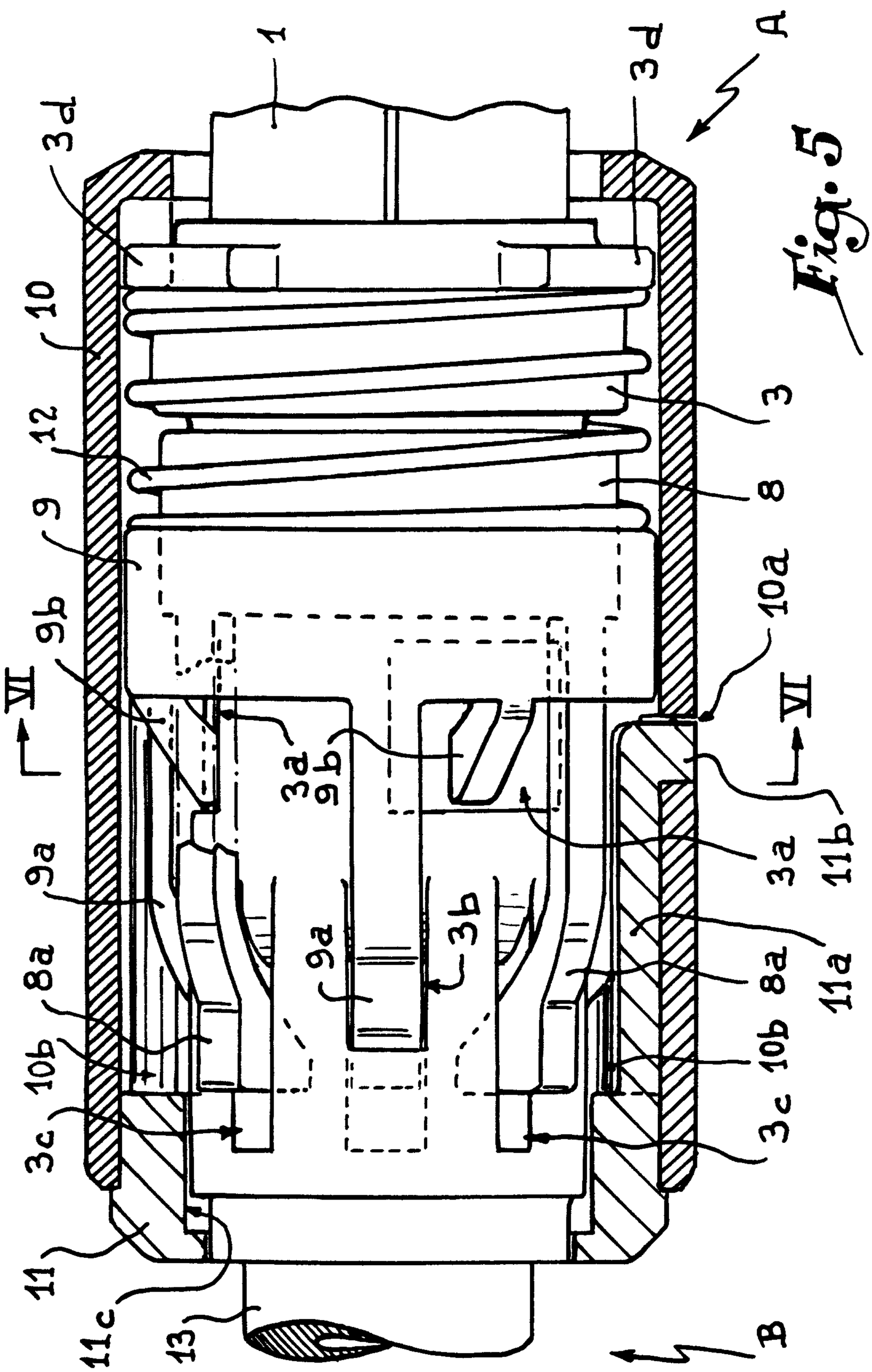
3b
10b
9a
11a
V
11b
3c
10a
I
8a
9b
3a
9a
10b
10a
11b
8
11a
8a
9
10a
11b
A
11a
2
10b
9a
3a
9b
10
6
3a
10b
9a
10a
11b
3
11a
8a

Fig. 4

Fig. 6


A
3
3d
10
12
9
9b
VII
3a
9b
9a
8a
10b
9a
3b
3c
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B
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VI
3a
11b
11a
8a
10b
3c

Fig. 5

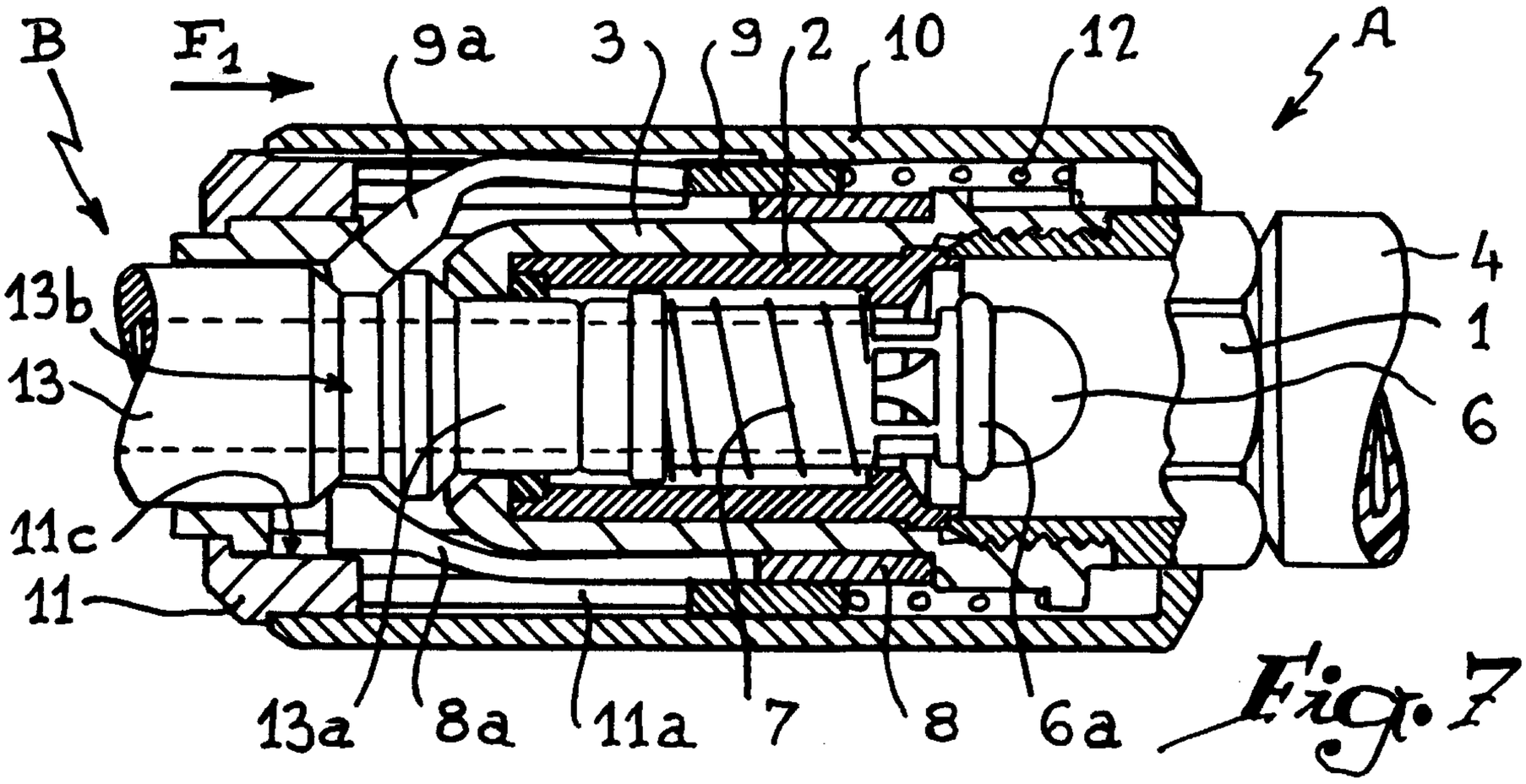


Fig. 7

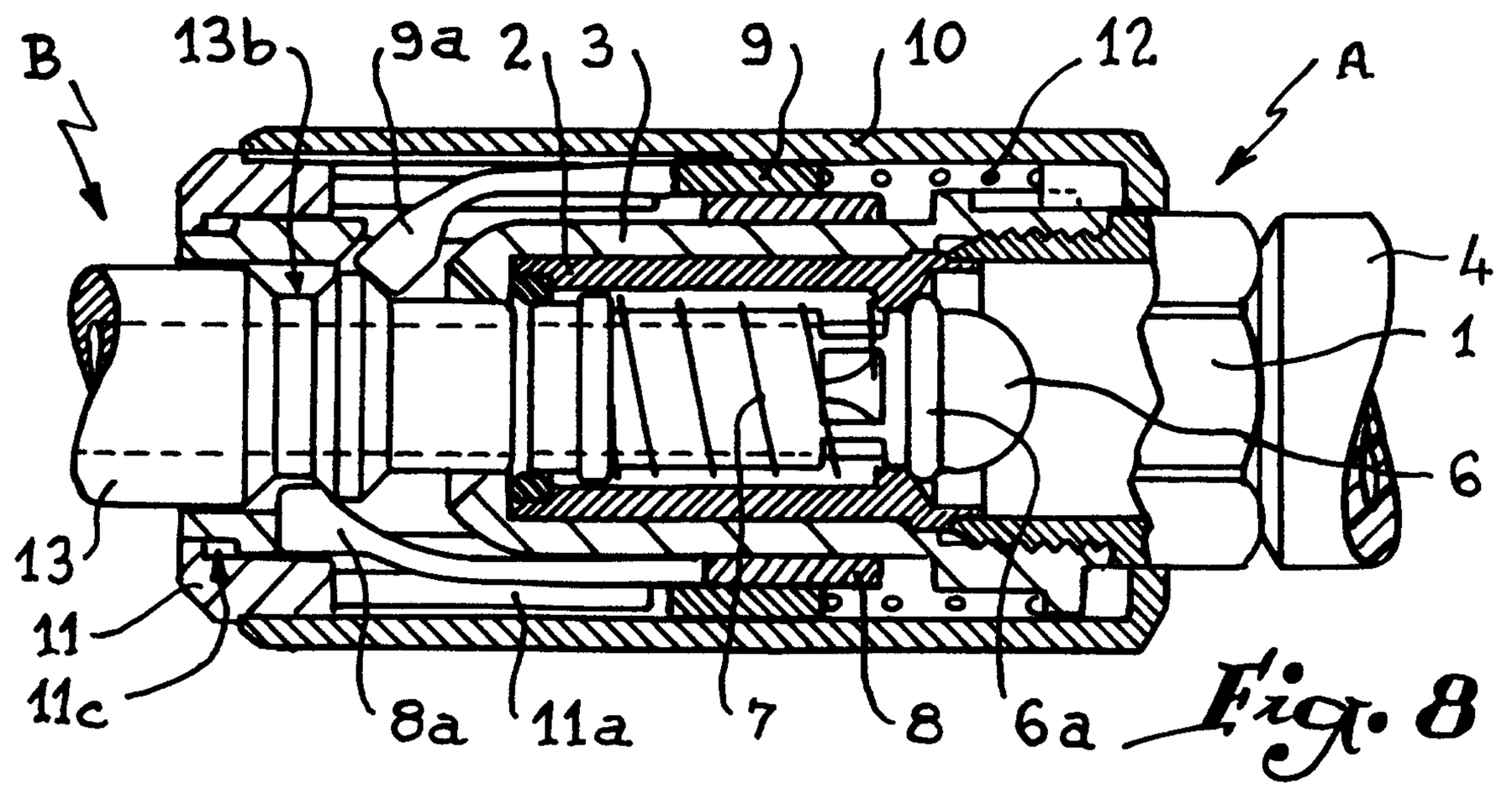


Fig. 8

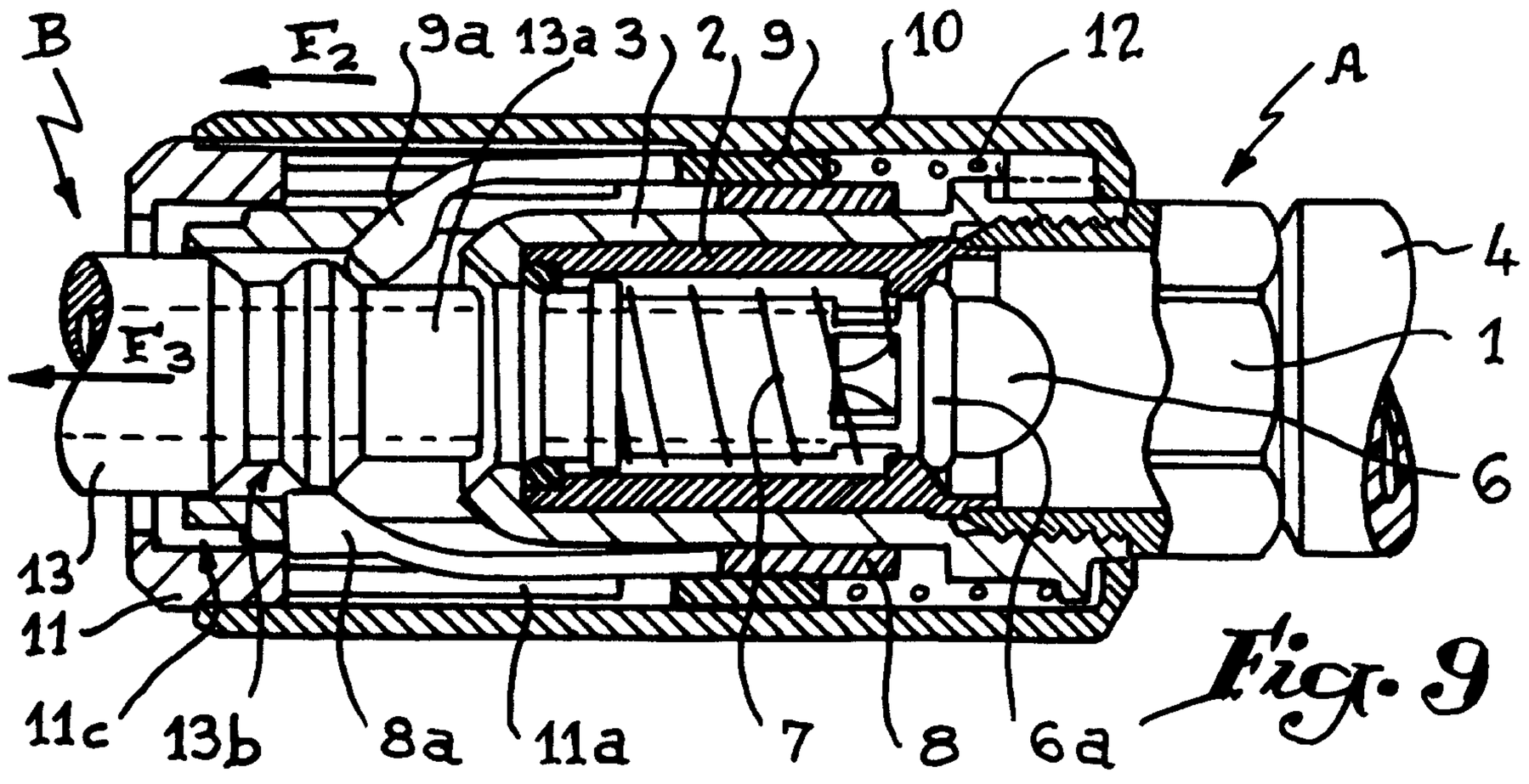
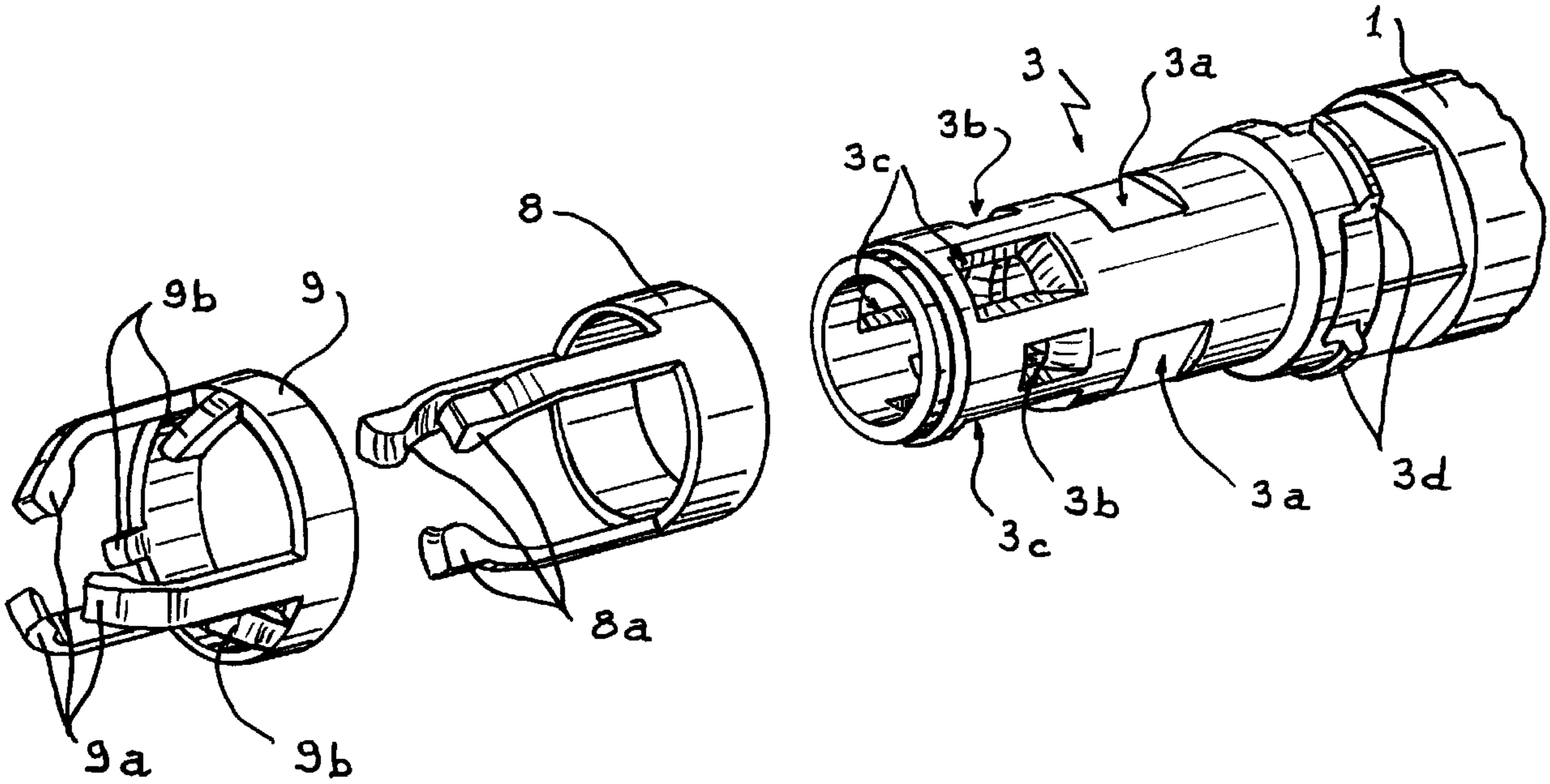


Fig. 9


1
3
3a
3b
3c
3d
8
8a
9
9a
9b