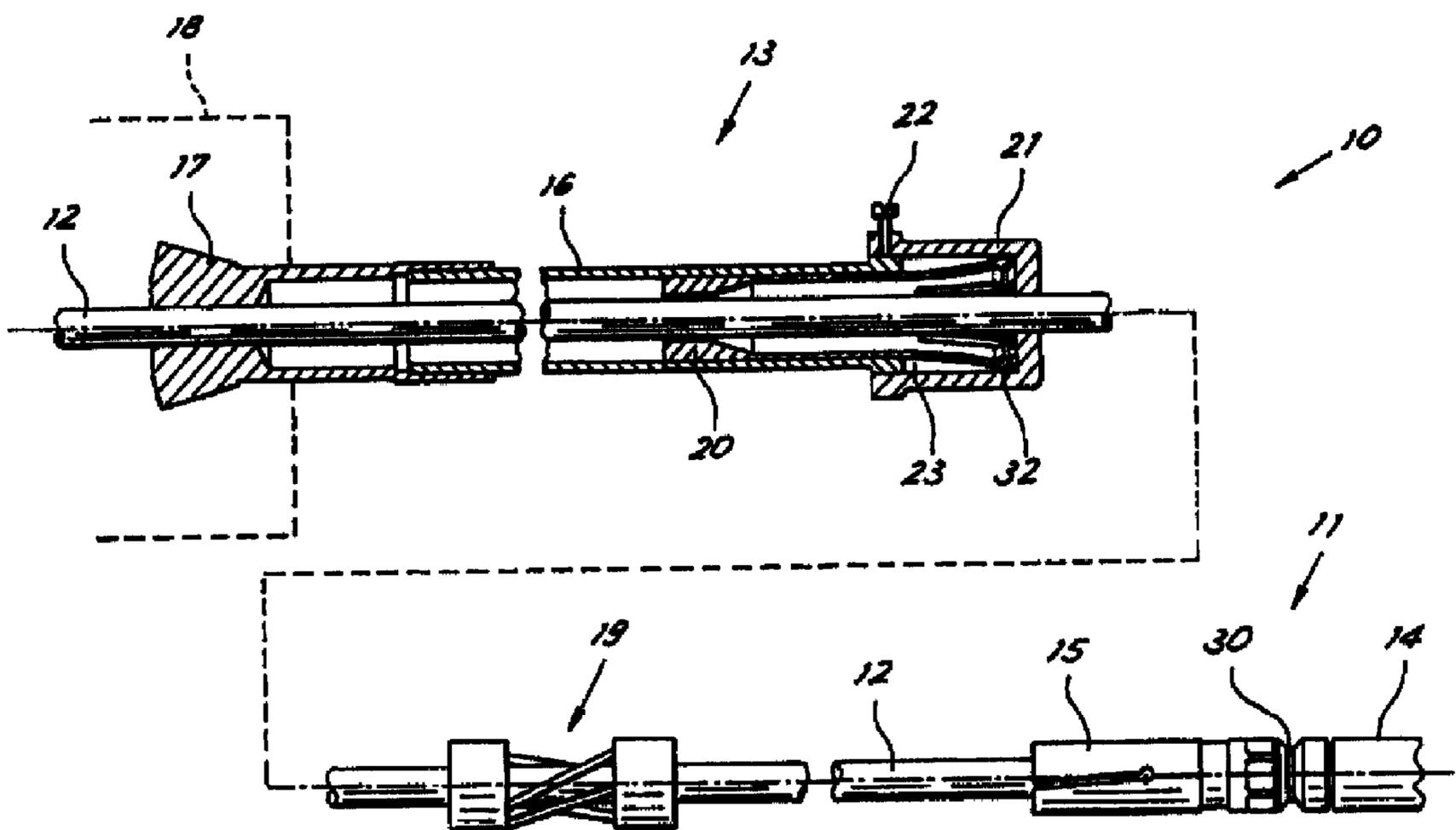




(86) Date de dépôt PCT/PCT Filing Date: 1999/03/05  
 (87) Date publication PCT/PCT Publication Date: 1999/09/10  
 (45) Date de délivrance/Issue Date: 2006/05/02  
 (85) Entrée phase nationale/National Entry: 1999/11/02  
 (86) N° demande PCT/PCT Application No.: EP 1999/001556  
 (87) N° publication PCT/PCT Publication No.: 1999/044775  
 (30) Priorité/Priority: 1998/03/06 (MI 98 U 000143) IT

(51) Cl.Int./Int.Cl. *B23B 13/12* (2006.01)  
 (72) Inventeur/Inventor:  
 CUCCHI, PIETRO, IT  
 (73) Propriétaire/Owner:  
 PIETRO CUCCHI S.P.A., IT  
 (74) Agent: SMART & BIGGAR

(54) Titre : DISPOSITIF DE GUIDAGE D'UNE BARRE FOURNIE A UNE BROCHE DE TOUR  
 (54) Title: DEVICE FOR GUIDING A BAR FED IN A LATHE SPINDLE



(57) Abrégé/Abstract:

A device for guiding a bar between a collet (15) of a magazine (11) and a mandrel (18) of a lathe (13) comprises a guiding insert (20, 120) which slides with a minimum of side clearance within a duct (16) constituting the mandrel drawrod (18). The insert (20, 120) has an axial passage (24) for the bar with at least one section (26) designed to be traversed by the bar with a minimum of side clearance. The insert (20, 120) is impelled by the collet (15) along the duct (16) towards the mandrel. Return means (28, 30, 31) are provided to control return of the insert (20, 120) to a starting position close to an inlet end of the duct upon re-extraction of the collet from the duct.



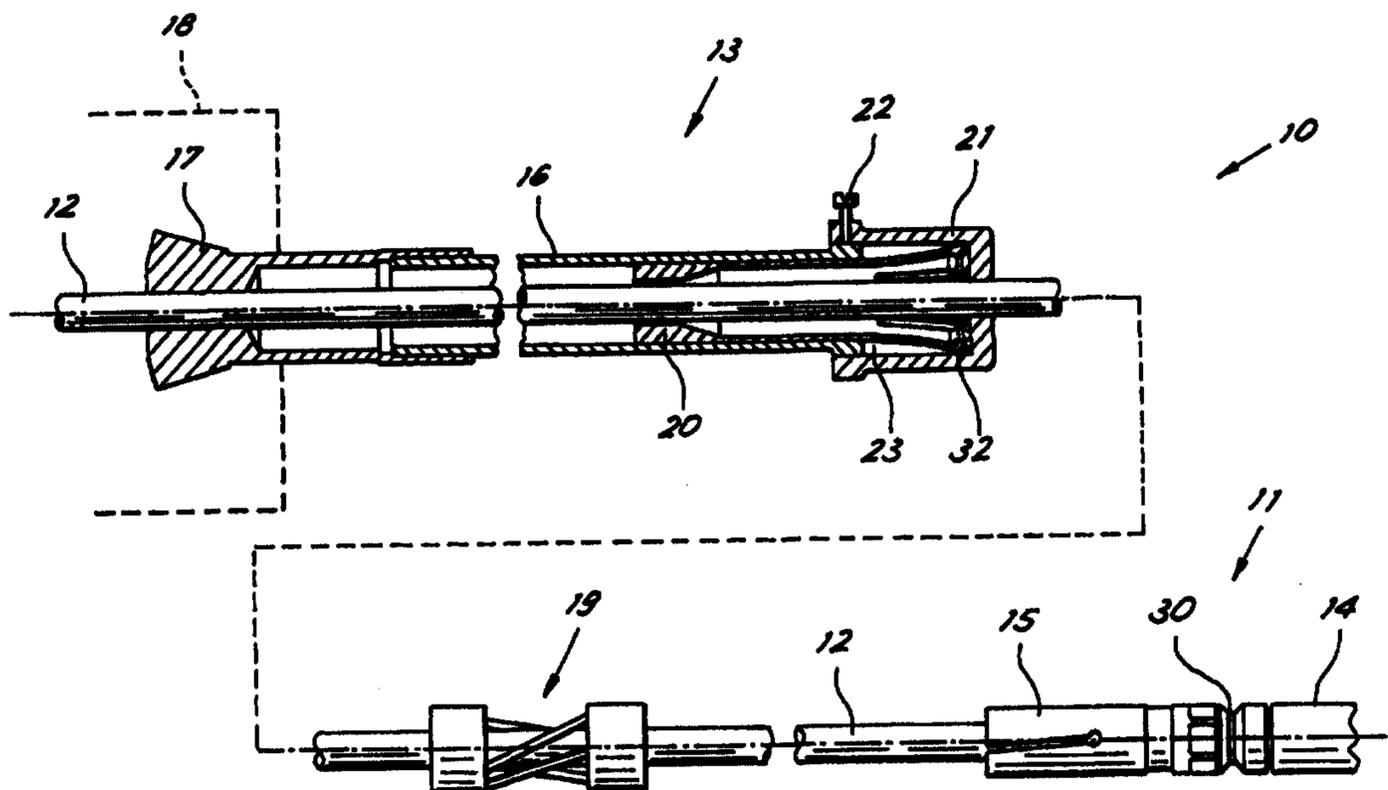
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B23B 13/12</b>	<b>A1</b>	(11) International Publication Number: <b>WO 99/44775</b> (43) International Publication Date: 10 September 1999 (10.09.99)
<p>(21) International Application Number: PCT/EP99/01556</p> <p>(22) International Filing Date: 5 March 1999 (05.03.99)</p> <p>(30) Priority Data: MI98U000143 6 March 1998 (06.03.98) IT</p> <p>(71) Applicant (for all designated States except US): PIETRO CUCCHI S.P.A. [IT/IT]; Via Genova, 8, I-20060 Bussero (IT).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): CUCCHI, Pietro [IT/IT]; Via Genova, 2, I-20060 Bussero (IT).</p> <p>(74) Agent: FARAGGIANA, Vittorio; Ingg. Guzzi e Ravizza s.r.l., Via V. Monti, 8, I-20123 Milano (IT).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>	

(54) Title: DEVICE FOR GUIDING A BAR FED IN A LATHE SPINDLE



## (57) Abstract

A device for guiding a bar between a collet (15) of a magazine (11) and a mandrel (18) of a lathe (13) comprises a guiding insert (20, 120) which slides with a minimum of side clearance within a duct (16) constituting the mandrel drawrod (18). The insert (20, 120) has an axial passage (24) for the bar with at least one section (26) designed to be traversed by the bar with a minimum of side clearance. The insert (20, 120) is impelled by the collet (15) along the duct (16) towards the mandrel. Return means (28, 30, 31) are provided to control return of the insert (20, 120) to a starting position close to an inlet end of the duct upon re-extraction of the collet from the duct.

**DEVICE FOR GUIDING A BAR FED IN A LATHE SPINDLE**

The present invention relates to a device for guiding a bar between a magazine collet and a mandrel of a lathe. In the prior art there are known problems due to insufficient support of the bars rotating at high speed while being fed to automatic lathes. Generation of vibrations is detrimental both for the precision of the work and for the supporting structures.

The conditions are especially critical when the bar is at the start or end of the processing. The problem of managing to satisfy the supporting needs is complicated by the fact that the collet of the bar pusher supporting the bar has to run along the same path as the bar. Since the collet very often has a diameter much larger than the diameter of the bar, to enable the collet to pass it is necessary to leave the bar support slack. This is particularly true inside the mandrel drawrod that is to say inside the duct which conveys the bar towards the mandrel and guides it as far as the collet of the lathe. The general purpose of the present invention is to obviate the aforementioned problems by providing a device which provides optimal support of the bar and the collet of the bar pusher throughout the entire feeding stroke.

In view of this purpose it is sought to provide in accordance with the present invention a device for guiding a bar between a magazine collet and a mandrel of a lathe comprising a guiding insert which slides with a minimum of

side clearance within a duct constituting the mandrel  
drawrod with the insert having an axial passage for the  
bar with at least one section designed to be traversed by  
the bar with a minimum of side clearance, the insert being  
5 impelled along the duct towards the mandrel and return  
means being provided to return the insert to a starting  
position close to an inlet end of the duct upon  
re-extraction of the collet from the duct.

To clarify the explanation of the innovative principles of  
10 the present invention and its advantages compared with the  
prior art there is described below with the aid of the  
annexed drawings a possible embodiment thereof by way of  
non-limiting example applying said principles. In the  
drawings:

- 15 - Fig. 1 shows a schematic partial cutaway view of the bar  
feeder and machining lathe couple forming the subject  
matter of the present invention;
- Fig. 2 shows a cross-sectional view of a detail of  
Fig. 1;
- 20 - Fig. 3 shows a view similar to that of Fig. 1 of a bar  
feed end area;
- Fig. 4 shows a view similar to that of Fig. 1 of a bar  
feed intermediate area;
- Fig. 5 shows a view similar to that of Fig. 3 of a  
25 different embodiment of a device according to the  
invention.

With reference to the figures, Fig. 1 shows a feeder and  
lathe couple generically indicated by reference 10

composed of a feeder 11 which transfers a bar 12 to a lathe 13. The magazine comprises a bar pusher 14 which ends with a collet 15 which supports the rear end of the bar to feed the bar into a drawrod or guide tube 16 of the lathe. The drawrod ends with a grasping collet 17 for the mandrel 18.

Along the bar path the magazine comprises supporting and centering means among which for example is shown a cage-type centering device 19 which can open to allow the collet 15 to pass through.

The magazine and lathe are not further described or shown herein since they are substantially known and therefore can be easily imagined by the expert in the field.

According to the principles of the invention in the drawrod of the lathe there is a guiding device which comprises a guiding insert 20 sliding along the drawrod 16.

Fig. 2 shows the sliding insert 20 in greater detail. Said insert has a diameter only slightly smaller than the internal diameter of the lathe drawrod so as to be able to slide within it with a minimum side clearance. The insert defines internally an axial passage 24 formed by a first leading section 25 having a diameter large enough to receive the magazine collet with minimum side clearance and by a second section 26 having a diameter large enough to receive the bar 12 with minimum side clearance. The two sections are connected by a tapered section 27.

The insert has an inlet end provided with a crown of

elastic fingers 28 each ending with a gripping tooth 29 facing towards the passage 24. The insert can be made from spring steel.

The fingers 28 are slightly divaricated to hold the teeth  
5 radially spaced by an amount greater than the diameter of section 25. In other words, under normal conditions the teeth do not protrude into the opening of the passage 24. As can be clearly seen in Fig. 1, the guiding device also comprises a terminal element 21 which is secured (for  
10 example by means of a clamp 22) to the inlet end of the drawrod and which defines a chamber 23 larger in width than the internal diameter of the drawrod. The chamber 23 is designed to receive the elastic fingers 28 of the insert to enable them to remain in the divaricated  
15 position. A radial projection 32 facing towards the passage of the bar constitutes a limit stop for the reverse movement of the insert.

In use, the guiding device is initially in the position shown in Fig. 1 with the insert arranged at the beginning  
20 of the drawrod and with the elastic fingers in the chamber 23. The magazine starts the bar along the guides until it fits into the drawrod, passes through the insert 20 and enters the mandrel. The coupling section 27 helps in inserting the point of the bar.

25 Under these conditions the bar is supported and centered in at least four points, to wit the magazine collet, the centering device 19, section 26 of the insert and the lathe collet. The long bar is thus perfectly supported in

order to avoid undesirable vibrations in the lathe.

As the bar gradually becomes shorter the collet advances until it traverses the centering device 19. When the collet has passed the centering device 19, the bar is supported and centered at three points, to wit the magazine collet, section 26 of the insert and the lathe collet. Since the bar has grown shorter it is still perfectly supported at three points.

As the bar continues to grow shorter, the magazine collet reaches the drawrod. Fig. 4 shows the entry of the magazine collet into the drawrod.

When the collet reaches the end of section 25 of the insert with an oversize diameter the insert begins to slide forward impelled by the collet. The axial distance between the end of section 25 and teeth 29 is identical to the distance between the head of the collet and a circumferential recess or groove 30 provided on the base of the collet.

As can be clearly seen in Fig. 3, when the elastic fingers 28 leave chamber 23 and enter the drawrod they are impelled radially towards the inside and the teeth 29 engage in the groove 30.

The collet continues its stroke as far as the stop where the insert 20 reaches the outlet end of the drawrod.

As it travels through the drawrod the magazine collet is guided and centered perfectly by the insert 20 in the drawrod with the latter being made internally with a constant diameter if necessary by means of an internal

adapter tube.

Upon completion of the work the magazine collet begins the return stroke, pulling the insert back to the initial position shown in Fig. 4. Once the fingers 28 have again  
5 reached the chamber 23 they re-expand, disengaging the teeth 29 from the groove 30 and freeing the collet which thus continues its return stroke unhindered. The insert rests with the free ends of the fingers against the limit stop projection 32.

10 The cycle can be resumed from the beginning with a new bar.

At this point it is clear that the intended purposes have been attained by providing optimal guiding and centering in the various stages of the work.

15 Naturally the above description of an embodiment applying the innovative principles of the present invention is given by way of non-limiting example of said principles within the scope of the exclusive right claimed here. For example, element 21 can be screwed onto the  
20 appropriately threaded end of duct 16.

Fig. 5 shows a variation in which insert 20 is replaced by an insert 120 which slides forward in the drawrod impelled by the collet and returns to its initial position by means of a thrust spring 31. With this solution the gripping  
25 fingers and the groove on the collet are not necessary. The insert can also be made of low-friction plastic, for example Teflon(R).

Moreover, the insert can be made in two parts, for example

screwed or coupled to render the bar guiding part interchangeable so as to adapt it to bars of different diameters.

## CLAIMS

1. Guiding device for guiding a bar between a collet (15) of a magazine (11) and a mandrel (18) of a lathe (13) comprising a guiding insert (20, 120) which slides with a minimum of side clearance within a duct (16) constituting the mandrel drawrod (18) with the insert (20, 120) having an axial passage (24) for the bar with at least one section (26) designed to be traversed by the bar with a minimum of side clearance with the insert (20, 120) being impelled by the collet (15) along the duct (16) towards the mandrel and return means (28, 30, 31) being provided to return the insert (20, 120) to a starting position close to an inlet end of the duct upon re-extraction of the collet from the duct.
2. Device as claimed in claim 1, characterized in that the insert (20, 120) has a further section (25) for axial passage of the bar which faces towards the magazine collet and is designed to receive the collet with a minimum of side clearance.
3. Device as claimed in claim 2 characterized in that said further section (25) has an inlet aperture for the collet which is provided with elastic fingers (28) bearing teeth (29) facing towards the inside of the passage with the elastic fingers (28) tending to remain elastically divaricated to bring the teeth (29) outside the aperture of said further section (25) with the fingers coming to rest in said starting position inside a chamber (23) close

to the inlet end of the duct having a diameter larger than the diameter of the duct to enable the fingers to remain in their divaricated position with the fingers being thrust inwards against their elastic force and the teeth  
5 (29) engaging on the collet when the insert slides within the duct so as to constitute said return means.

4. Device as claimed in claim 3 characterized in that the chamber (23) is made inside a terminal element (21) secured to the inlet end of the duct.

10 5. Device as claimed in claim 2 characterized in that provided between at least one section (26) and the further section (25) is a tapered connecting section (27).

6. Device as claimed in claim 1 characterized in that the return means comprise a thrust spring (31) which impels  
15 the insert (120) along the duct towards the inlet end.

7. Device as claimed in claim 3 characterized in that the collet has a radial coupling groove for the teeth (29) when they are thrust inwards.



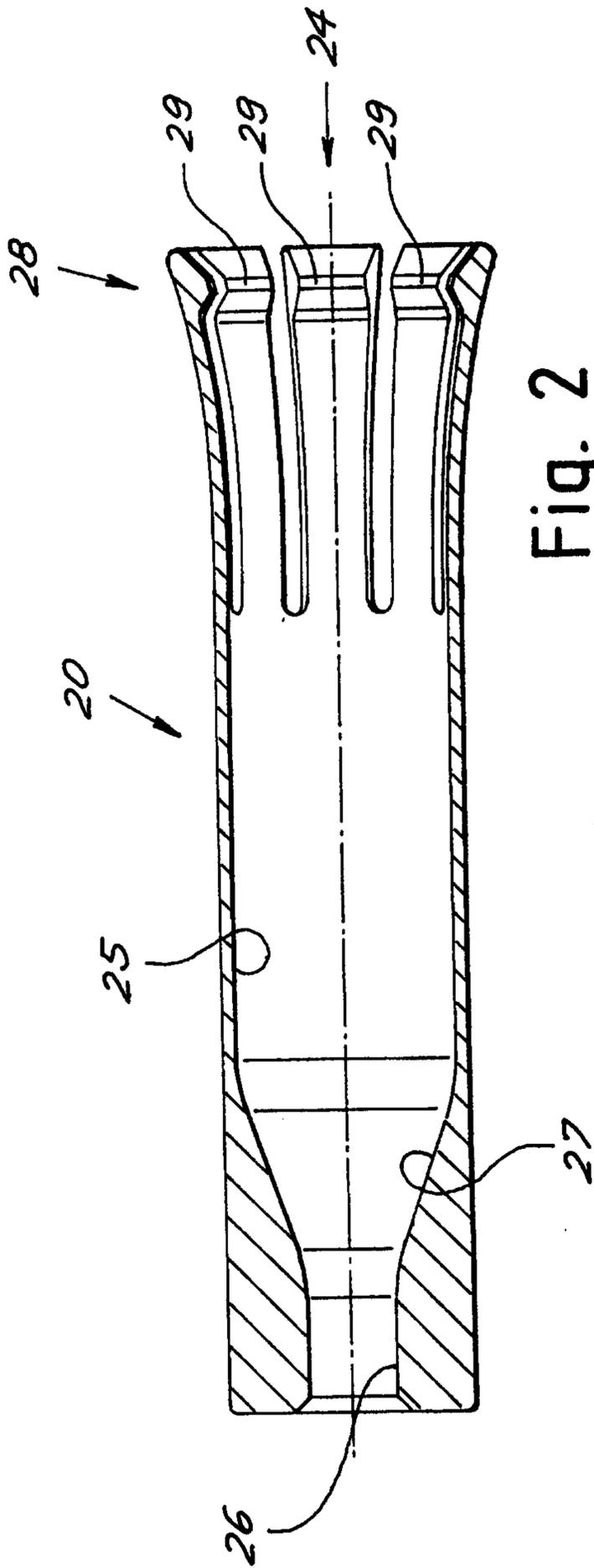


Fig. 2

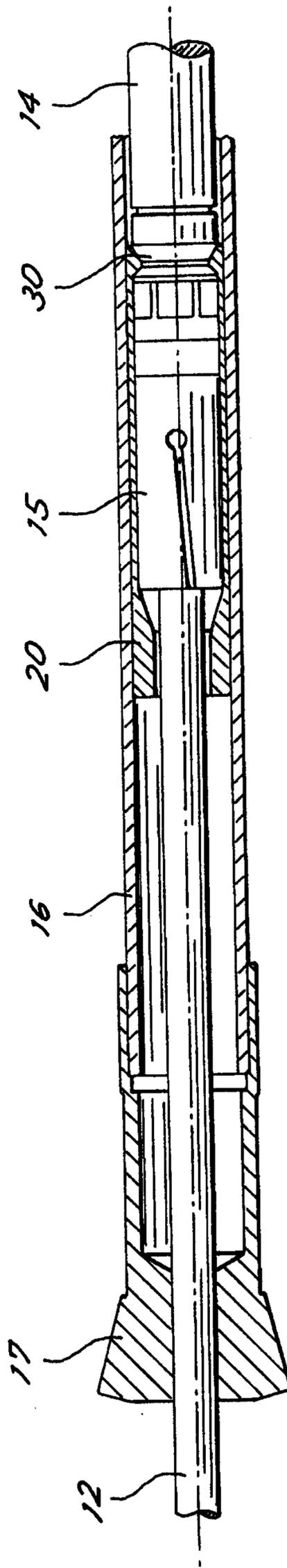


Fig. 3

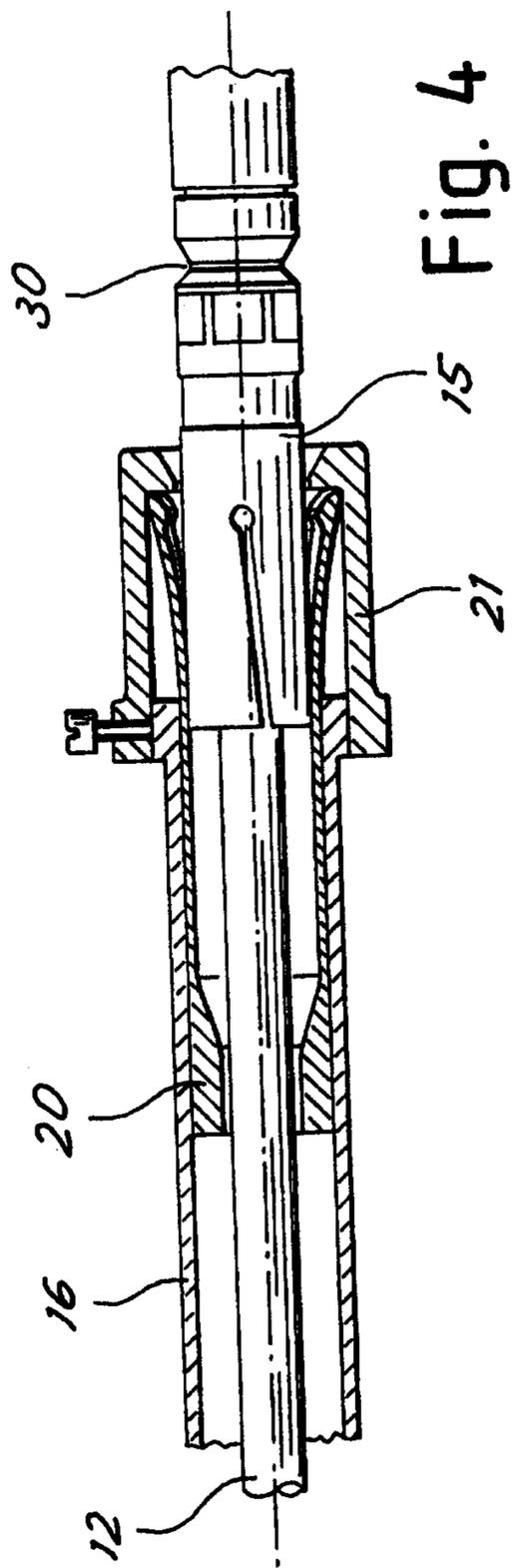


Fig. 4

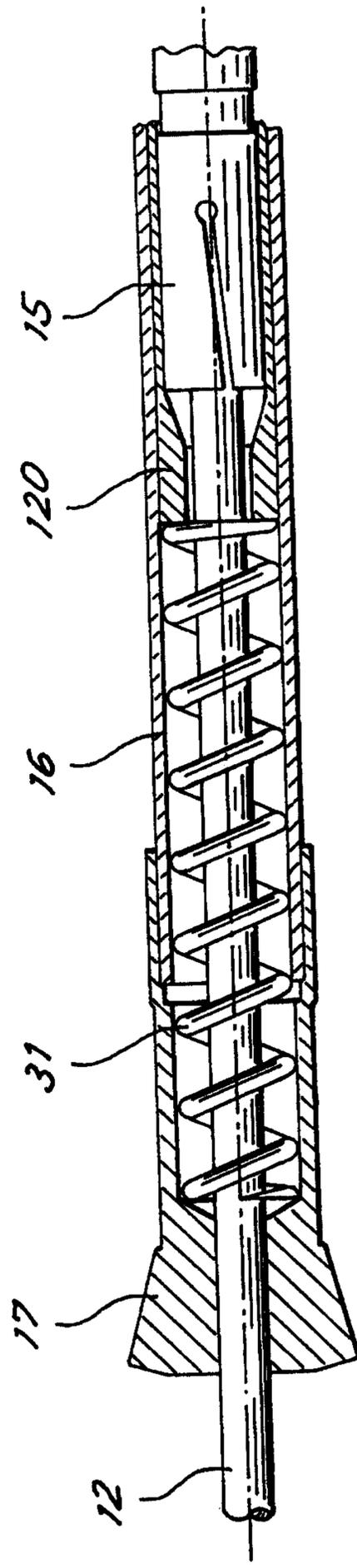


Fig. 5

