(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 623 693 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **94200782.4**

(51) Int. Cl.[5]: **D01D 4/00**

(22) Date of filing: **25.03.94**

(30) Priority: **04.05.93 IT MI930880**

(43) Date of publication of application:
09.11.94 Bulletin 94/45

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(71) Applicant: **COGNETEX S.p.A.**
Via Statale Selice, 47
I-40026 Imola (Bologna) (IT)

(72) Inventor: **Prodi, Paolo**
Via Cavour, 3
I-48100 Ravenna (IT)
Inventor: **Pini, Mauro**
Via Ciamei, 10
I-48018 Faenza (Ravenna) (IT)
Inventor: **Sangiorgi, Valerio**
Via Massarenti, 75
I-48014 Castel Bolognese (Ravenna) (IT)

(74) Representative: **Fusina, Gerolamo**
Ing. Barzanò & Zanardo Milano S.p.A,
Via Borgonuovo, 10
I-20121 Milano (IT)

(54) Improved spinning block.

(57) The present invention relates to an improved spinning block (1) for spinning molten thermoplastic material to obtain synthetic yarn, said spinning block (1) comprising a clamping ring (6) operating at the lower end of the circumferential edge of the spinning block (1) to fix this latter to the overlying boiler body (11) by means of a releasable connection comprising threads (9) of one or more starts or cam-like projections.

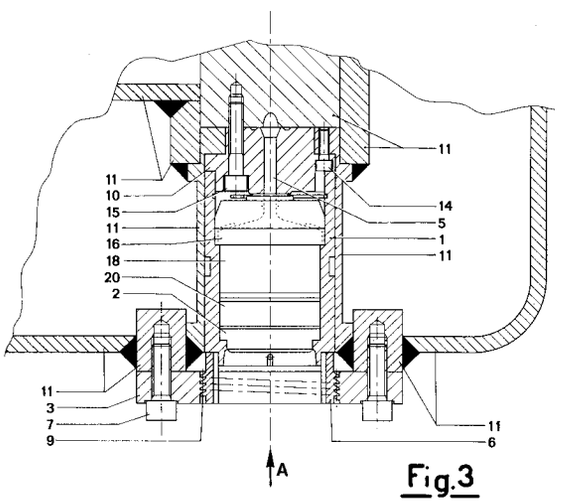

Fig.3

EP 0 623 693 A2

This invention relates to an improved spinning block for spinning thermoplastic material in which said block comprises a clamping means for removably connecting the spinning block to a boiler body of a spinning machine.

It is known to produce yarn from thermoplastic masses such as polyesters, polyamides etc. by an extrusion spinning process. In this process the starting polymer, which is initially in the solid state, is transferred by a heating process into the liquid state and is then suitably fed to the actual spinning block's. Said spinning blocks have a heating system using diphenyl vapour or a similar fluid originating from a vapour generator in common with a ducting system for distributing the directly fed vapour. In known quadrangular or circular arrangements the individual spinning blocks are positioned one following the other along the spinning beam of the boiler body.

The heat from the diphenyl vapour is transferred to the blocks by thermal conductivity or by thermal convection. Arrangements of this kind have been known for some time in the synthetic yarn production field. However, even today such spinning blocks suffer from various technical problems from a number of aspects. For example the spinning block illustrated and described in European patent 0163248 has its threaded upper end arranged to connect to the threaded circumferential side of a flange previously screwed to the boiler body.

Although this type of fixing may be satisfactory, it allows poor accessibility for the screwing operation together with visual inaccessibility for the operator who has to connect and remove the spinning block to and from the boiler body.

It should be noted that connecting and removing the spinning block to and from the boiler body, or more precisely the spinning beam, are operations which arise fairly frequently during normal maintenance and during the changing of yarn production batches.

The said fixing operation requires a certain ability on the part of the operator as he cannot directly see the two threaded portions to be connected together, with the possibility therefore of imprecise initial screwing with damage to the threads. These threads can also be damaged by impact and by the presence of particles soiling the thread, all this being the result of the fact that the joint is in an upper internal position not visible to the operator connecting the spinning block.

It is apparent to the expert that in the light of the aforegoing discourse on the state of the art the whole spinning block together with the flange screwed to the boiler body have to be replaced if the connection thread becomes worn or damaged, said flange not being easily accessible. This results in an increase in synthetic yarn production costs both because of the replacement of the spinning blocks which in their preassembled state are of high cost, and because of the need to halt the production process for a considerable time.

In addition, with these known arrangements it is difficult to achieve temperature uniformity throughout the spinning block. It is essential that all parts in contact with the molten polymer obtain their heat as far as possible directly by conduction from the ducting system distributing the diphenyl vapour, ie directly from the heating chamber, and that the possibility of dispersion or uncontrolled radiation transmission of thermal energy is as small as possible or better still non-existent.

Also from this viewpoint the spinning block described in the aforesaid European patent and also those spinning blocks used up to the present time in the art have considerable drawbacks because of poor thermal energy transfer conditions resulting from a construction in which the material continuity of the components of the spinning block is interrupted, so that thermal energy transmission to more or less large regions takes place by radiation. It is well known that radiation is a form of thermal energy transmission which depends on a number of variables which are not easy to control, especially in complex production plants.

This results in imperfect temperature uniformity throughout the various parts of the spinning block.

The object of the improvement according to the invention is to eliminate damage to the connection thread and enable the spinning block to be heated to a temperature which is rigorously uniform throughout its parts. Reliable and rapid connection and removal can be surprisingly achieved with the improved spinning block described and claimed in the present invention, with the precise intention of attaining an operational life exceeding that previously attainable.

In accordance therewith and in the light of the aforementioned

problems and drawbacks connected with the current arrangements proposed in the art, the present invention provides an improved spinning block for spinning molten thermoplastic materials to obtain yarn, said spinning block comprising a clamping ring operating at the lower end of the circumferential edge of the spinning block to fix this latter to the overlying boiler body by means of a releasable connection.

In one embodiment of the spinning block of the present invention, the clamping ring has a circular rim of height sufficient to engage a number of threads of one or more starts on a plate or flange fixed to the lower end of the boiler body by screw elements.

In a further embodiment of the spinning block of the present invention the clamping ring comprises cam-like circumferential projections for its removable connection to the plate, this latter being fixed to the lower end of the boiler body.

With reference to the aforegoing, the accompanying drawing shows preferred embodiments which are neither binding nor limitative in terms of the mutual position of the components or the consequent simplifications which could derive therefrom; said embodiments are described hereinafter with reference to the accompanying drawings, in which:

Figure 1 is a perspective exploded isometric schematic view of the improved spinning block to be mounted on and fixed to the overlying boiler body by means of an underlying mounting and removal tool, said figure also showing the clamping ring comprising threads of one or more starts;

Figure 2 is a perspective isometric schematic view of the improved spinning block analogous to Figure 1, but with a clamping ring comprising cam-like circumferential projections for its removable connection to a plate fixed to the lower end of the boiler body;

Figure 3 is a schematic section taken on the vertical axis through the spinning block connected to the boiler body by the lower clamping ring which connects to the plate fixed to the lower end of the boiler body by screw elements;

Figure 4 is a schematic view from below in the direction of the arrow A of Figure 3.

Figure 5 is a perspective isometric view of a constructional modification of part of a spinning block, in which during its mounting and removal a temporary coupling support is formed to facilitate said operations by the operator;

Figure 6 is a vertical axial section through two spinning blocks of Figure 5 connected to the boiler body, of which the left block is in the suspended intermediate position before its final fixing and the other has been finally fixed;

Figure 7 is a perspective isometric view of a detail of the boiler body from below showing the suspension region for the spinning block of Figures 5 and 6.

In the figures corresponding parts carry identical reference characters for simplicity.

The various devices which operate downstream and upstream in mutual cooperation with the spinning block are not described as these are already known and do not concern the improvement of the present invention.

The polymer in the molten liquid state is fed under pressure through the central duct 5 in the flange 10 which is fixed to the boiler body 11 by the screw elements 15 and 14.

After passing through the duct 5 said liquid polymer enters the spinning block 1. All this is well known to the expert of the art, as is the fact that the pressurized molten polymer then passes through the distributor disc 16 to then pass into the filter cylinder 18, from which it emerges to pass to the disc 20 comprising sized holes. From said disc 20 the liquid polymer passes through the gauging nozzles of the disc 2, representing the actual spinning element, to leave in the final form of spun yarn to be collected by an underlying winding unit (not shown).

The spinning block 1, wherein the aforesaid internal elements have bee, preassembled, is positioned within the boiler body 11 to the lower end of which a plate 3 is fixed by connection screws 7.

Said plate 3, fixed to the boiler body 11, has a threaded central hole and the clamping ring 6 has a corresponding peripheral thread 9 (Fig.1) or the central hole has cam-like circumferential recesses and the clamping ring 6 has corresponding cam-like circumferential projections 9a (see Figure 2).

The mounting tool 12, with magnetic ends 19 and with positioning and insertion teeth 4, enables the clamping ring 6 to be gripped to screw it to the plate 3, hence fixing the spinning block 1 to the boiler body 11 by a releasable connection.

Rotation for screwing purposes is achieved by engagement between the teeth 4 and slots 8 in the clamping ring 6. This latter enables the operator, who has an unimpeded view, to clamp the block 1 to the overlying boiler body 11 accurately and quickly, avoiding any damage to the thread or cam contour 9 by impact. The clamping ring 6 achieves the surprising advantage of material continuity between the boiler body 11 and the spinning block 1 via the plate 3. The said material continuity ensures thermal energy transmission by conduction, to achieve when under steady working conditions a temperature which is rigorously uniform throughout the spinning block 1, to obtain optimum quality of the synthetic yarn produced.

In the embodiment of Figures 5-7, the spinning block 1 still comprises, as in the embodiment of the preceding figures, a support and fixing element 1a for housing the distributor disc 16 for the molten mass, the filter cylinder 18, the disc 20 comprising sized holes and the disc 2 comprising gauging nozzles, and is removably fixable to the boiler body 11 of the spinning machine within a skirt of the boiler body 11. The clamping ring 6 is associated with the lower end of the element 1a to removably connect it rigidly to the overlying boiler body 11.

In this embodiment the boiler body 11 comprises, preferably in the region in which the upper end of the support and fixing element 1a is housed, at least one support peg 21 projecting towards the interior of the seat 22 housing the element 1a. The

peg 21 is preferably screwed into the boiler body 11 as shown in Figure 7.

The element 1a comprises at least one circumferential groove 23 and at least one recess 24 in its outer wall, the recess 24 connecting the groove 23 to the upper edge of the element 1a. The groove 23 extends preferably along the entire circumference of the element 1a and has a width in the longitudinal direction of the element 1a which is substantially greater than the diameter of the peg 21.

The arrangement and configuration of the peg 21, groove 23 and recess 24 are such as to enable the element 1a to move axially within its seat to beyond the peg 21 when the element 1a is in that angular position in which the recess 24 is vertically aligned with the peg 21. The element 1a, complete with its internal elements 16, 18, 20, 2, is then inserted in this angular position by the operator and is then rotated about its axis into another angular position in which the recess 24 is no longer vertically aligned with the peg 21, so that the peg 21 acts as a support element for the element 1a by engaging the upper wall of the groove 23 as shown in the left part of Figure 6. The operator ceases holding the spinning block 1, which then remains retained by the boiler body 11, so substantially facilitating the fixing of the block.

It will be noted that the mutual arrangement of the peg 21 and groove 23 is such that when the block 1 is in its suspended position the lower part of the thread of the boiler body 11 which is to receive the clamping ring 6 remains free and accessible, as can be seen by observing the left hand block of Figure 6. The operator can hence easily begin to apply the ring 6. On continuing its rotation by the tool 12, the block 1 is progressively shifted by axial movement into its final fixing position, shown on the right hand side of Figure 6.

The presence of the support peg 21 or the like also facilitates the removal of the block 1, by enabling it to remain temporarily suspended while the removal of the ring 6 is completed.

In this embodiment the ring 6 is removably fixable by rotation to the lower part of the skirt of the boiler body 11 instead of to the plate 3. There is however no reason why the fixing system for the ring 6 provided for the embodiment of Figures 1-4 cannot also be used for the embodiment of Figures 5-7.

According to a further development of the invention, the clamping ring 6 comprises engagement means for rotational engagement with the support and fixing element 1a during the fixing and removal of the element 1a to and from the boiler body 11. As shown in Figures 5 and 6 these means can advantageously comprise at least one pin 25 radially projecting into the ring 6 and at least one recess 26 provided in the lower edge of the support and fixing element 1a, to receive the pin 25. Two diametrically opposite pins 25 and two diametrically opposite recesses 26 are preferably provided. On rotating the ring 6 the pins 25 penetrate into their respective recesses 26 to also rotate the element 1a both during the mounting and during the removal of the block 1.

It will be apparent that the advantages relative to the ease of application without damage and to the greater heating uniformity, already shown for the embodiment of Figures 1-4, are present also for the embodiment of Figures 5-7.

The description is given by way of example only, in that modifications can be made to the invention without leaving the inventive scope of an improved spinning block, in accordance with the claims given hereinafter.

For example, the groove 23 could extend only through a certain circular arc starting from the position of the recess 24. In this case the element 1a would remain rotationally at rest during its mounting and removal and said rotation engagement means would not be provided. Advantageously two diametrically opposite support pegs or the like 21 could be provided together with two recesses 24 with relative partial circumferential grooves 23 or a single annular groove 23. Instead of at the upper end of the support and fixing element 1a, the groove 23 and recess 24 or the grooves 23 and recesses 24 together with the peg or pegs 21 could be provided for example in an intermediate region of the element 1a.

Claims

1. A spinning block for spinning molten thermoplastic material to obtain yarn, comprising a support and fixing element for housing a distributor disc for the molten mass, a filter cylinder and at least one gauging nozzle disc forming the spinning die, said element being removably fixable to a boiler body of a spinning machine within a skirt rigid with the boiler body, characterised by further comprising a clamping ring to be associated with the lower end of said support and fixing element to removably connect it rigidly to the overlying boiler body.

2. A spinning block as claimed in claim 1, characterised in that the clamping ring has a peripheral thread with one or more starts, engageable with a corresponding thread in a central hole of a plate rigidly fixed to the skirt of the boiler body.

3. A spinning block as claimed in claim 1, characterised in that the clamping ring comprises on its peripheral surface cam-like circumferential projections for its removable connection to the plate rigidly fixed to the lower end of the boiler body.

4. A spinning block as claimed in one of the preceding claims, characterised in that the boiler body comprises at least one support peg or the like projecting towards the interior of the housing seat for said support and fixing element, said element having at least one circumferential groove and, in its outer wall, at least one recess connecting said groove to the upper edge of said element, said recess and said groove being such as to enable said support and fixing element to undergo axial movement beyond said peg or the like when said element is in a corresponding angular position, and to support said element by the engagement of said peg or the like in said groove when said support and fixing element is in another angular position before applying said clamping ring for fixing said element to the boiler body.

5. A spinning block as claimed in claim 4, characterised in that said groove has a width in the longitudinal direction of said element which is greater than the diameter of said peg or the like.

6. A spinning block as claimed in claim 4 or 5, characterised in that said groove extends through the entire circumferential development of said element.

7. A spinning block as claimed in claim 6, characterised in that the clamping ring comprises engagement means for its rotational engagement with said element during the fixing and removal of said element to and from the boiler body.

8. A spinning block as claimed in claim 7, characterised in that said engagement means comprise at least one pin projecting radially into said ring and at least one recess provided in the lower edge of said support and fixing element.

9. A spinning block as claimed in one or more of claims 4 to 8, characterised in that said recess and said groove are provided at the upper end of said support and fixing element.

10. A spinning block as claimed in one or more of claims 1, 4, 5, 6, 7, 8, 9, characterised in that said ring is removably fixable by rotation to the lower part of said skirt of the boiler body.

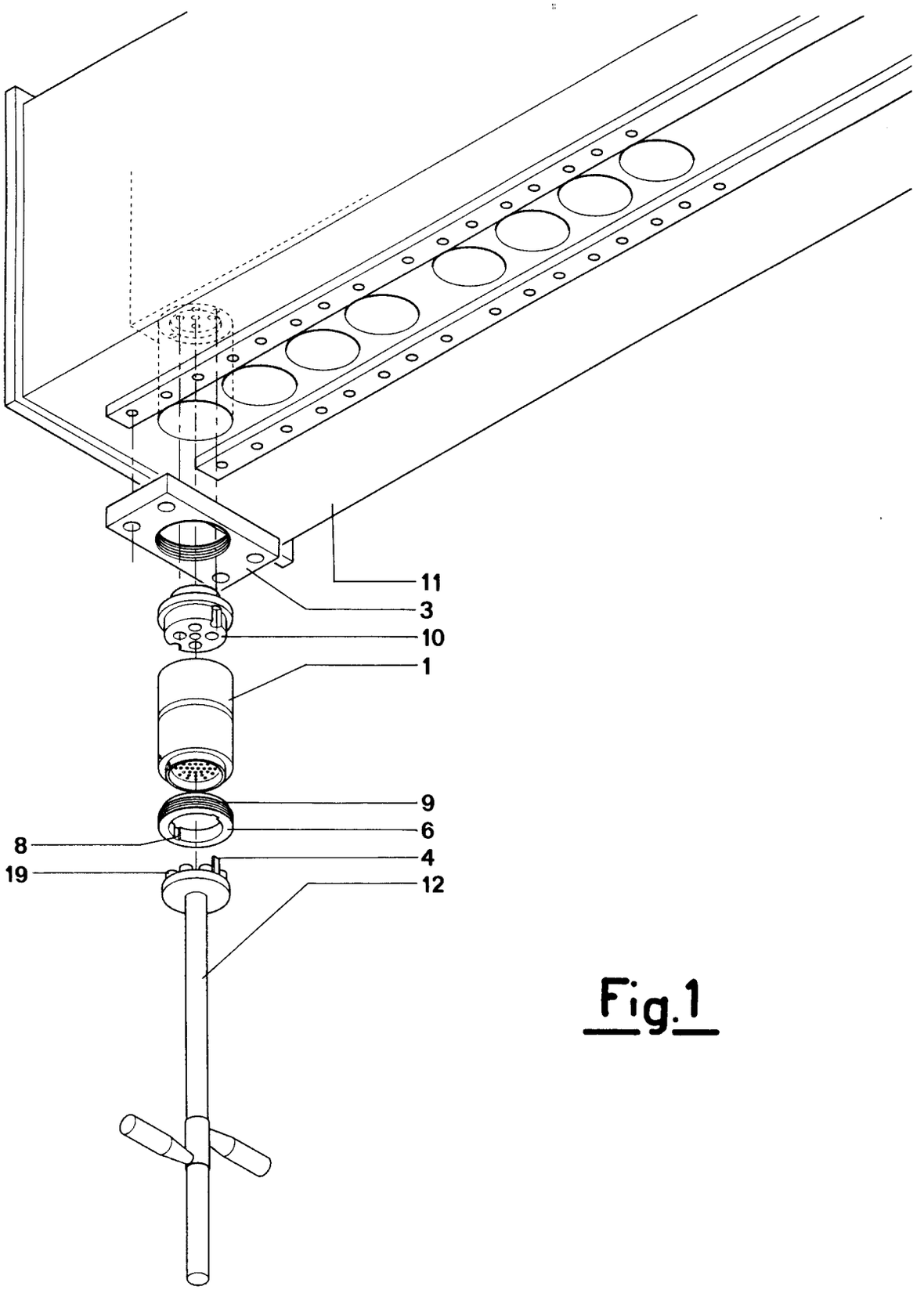

Fig.1

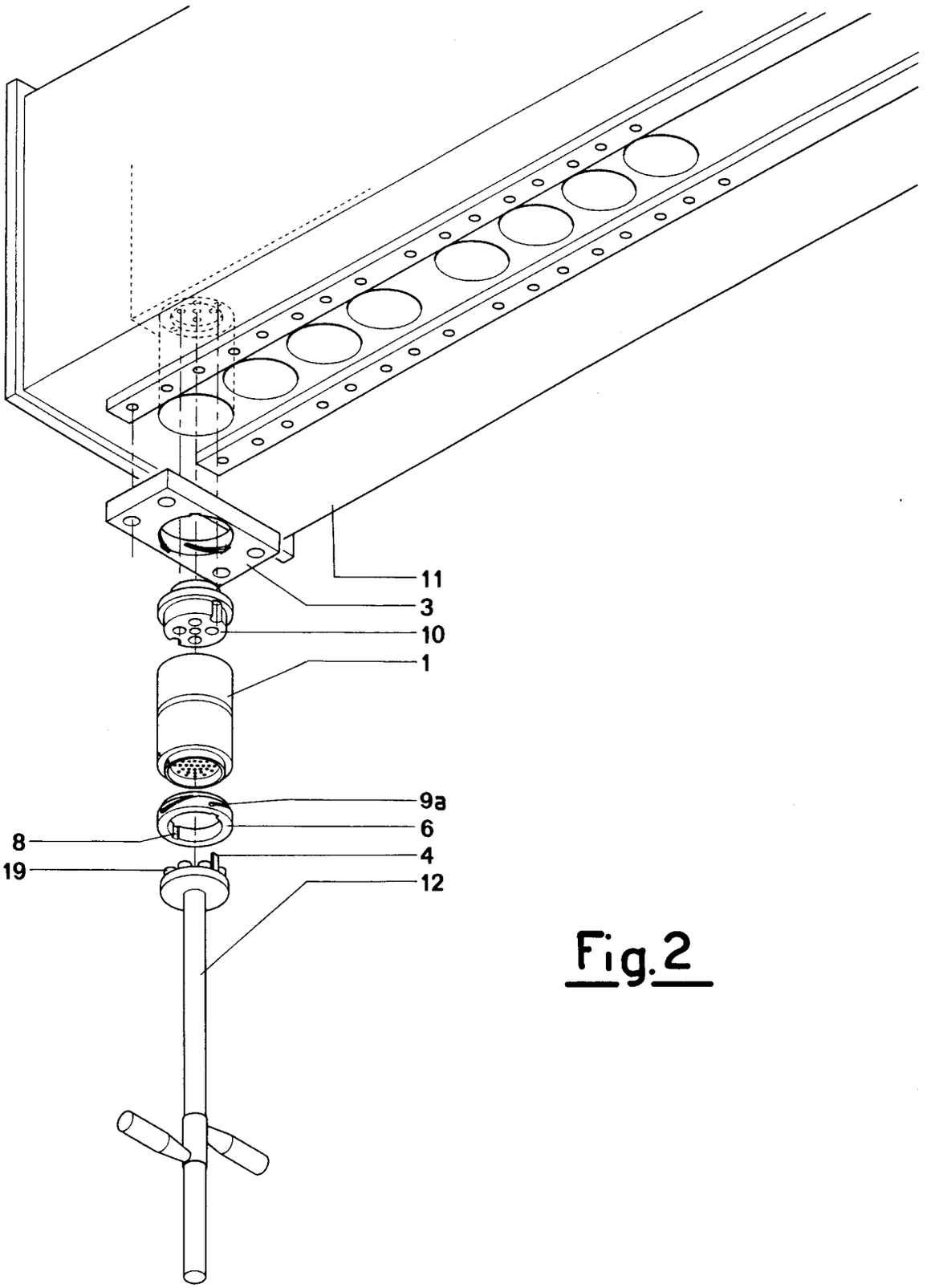

Fig.2

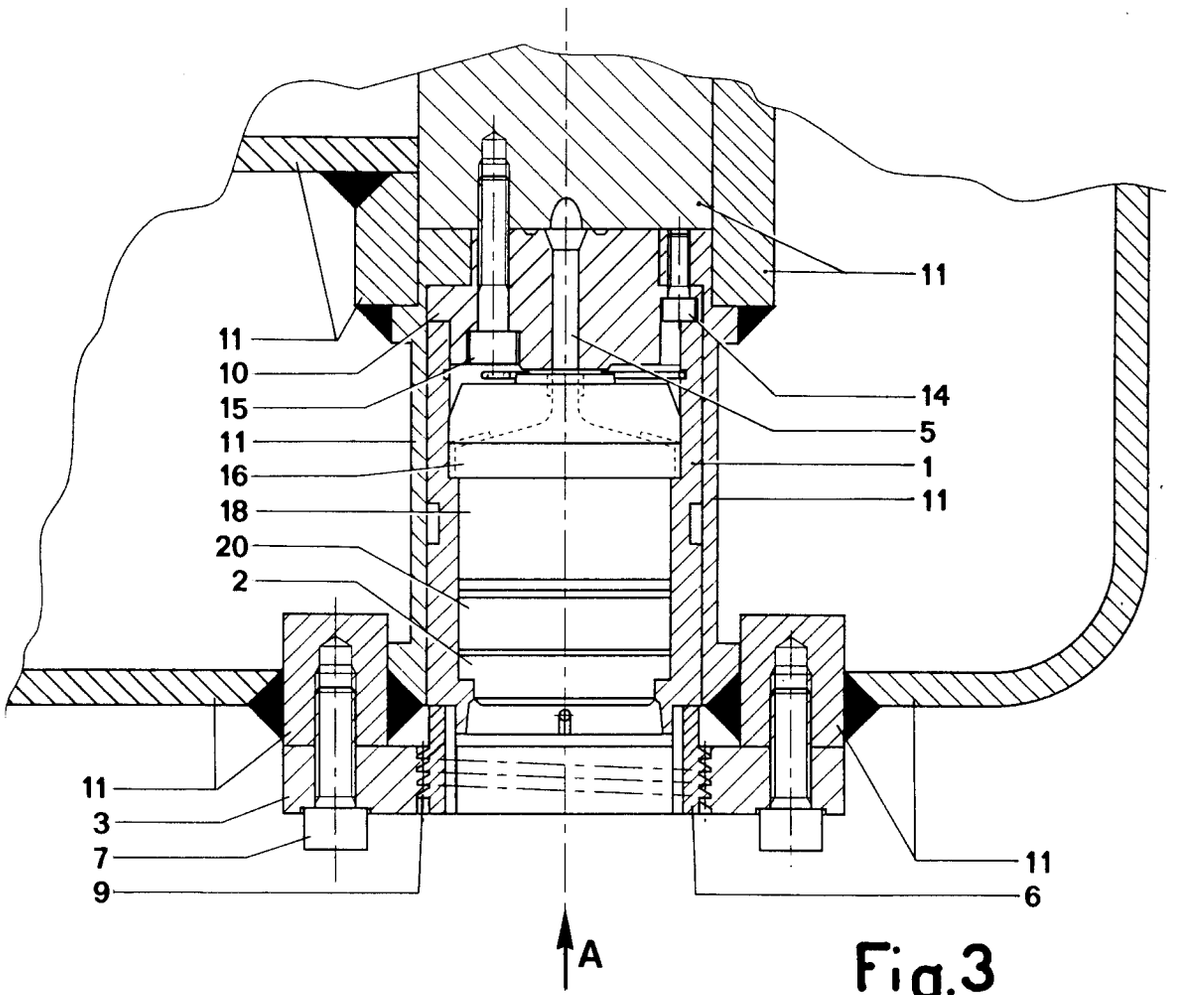

Fig.3

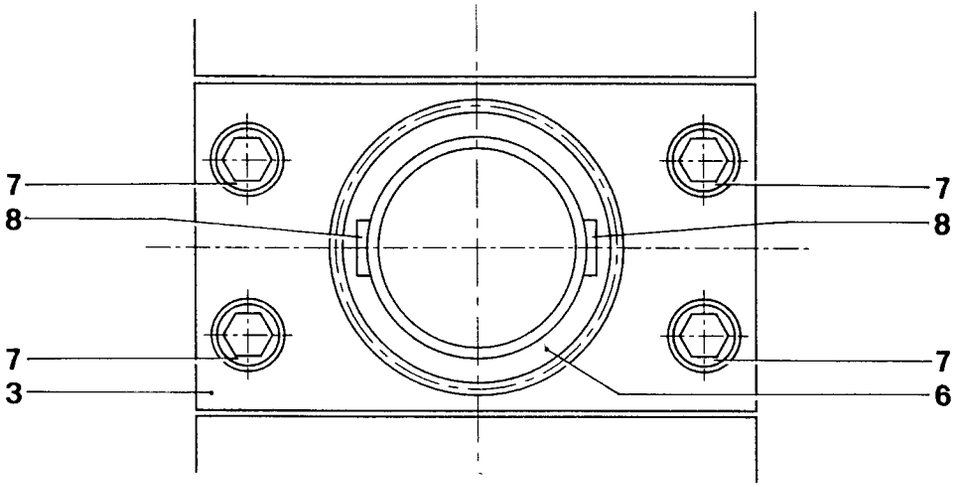

Fig.4

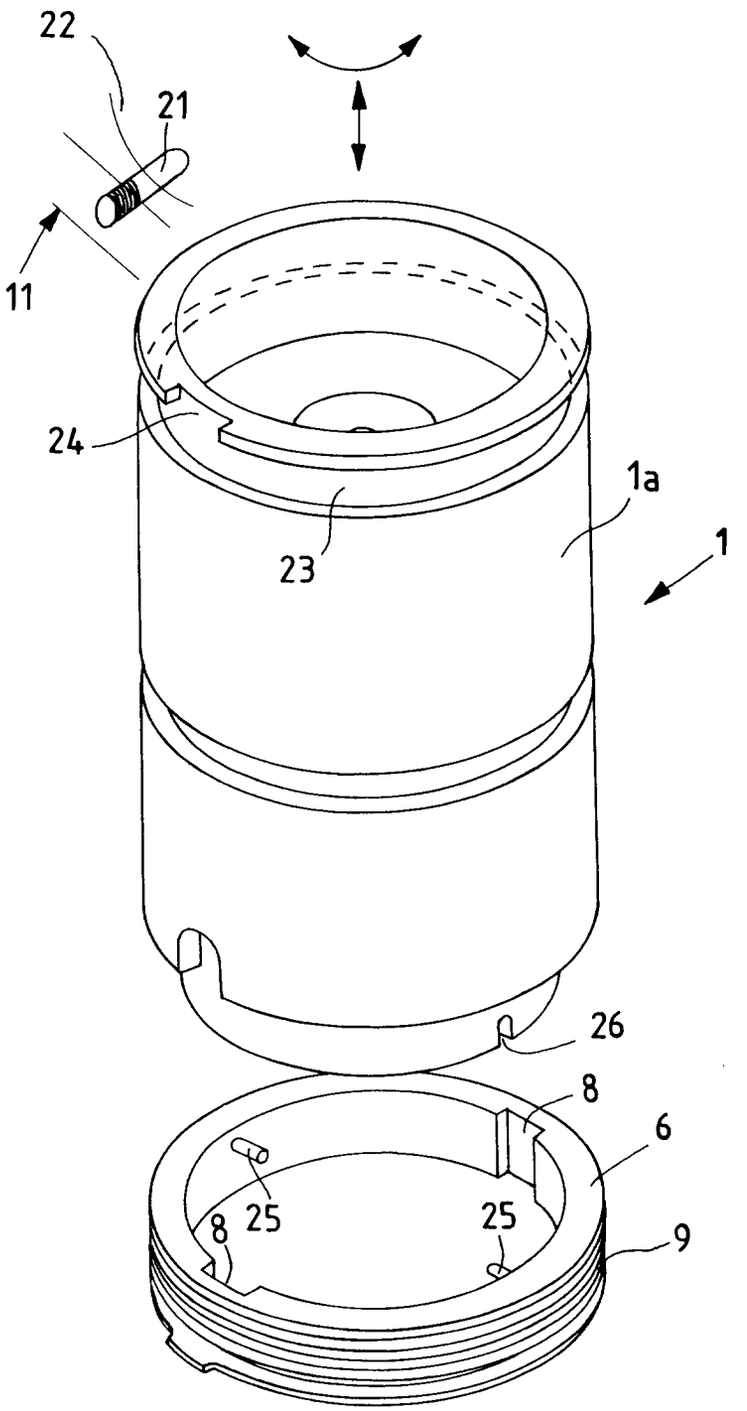

Fig.5

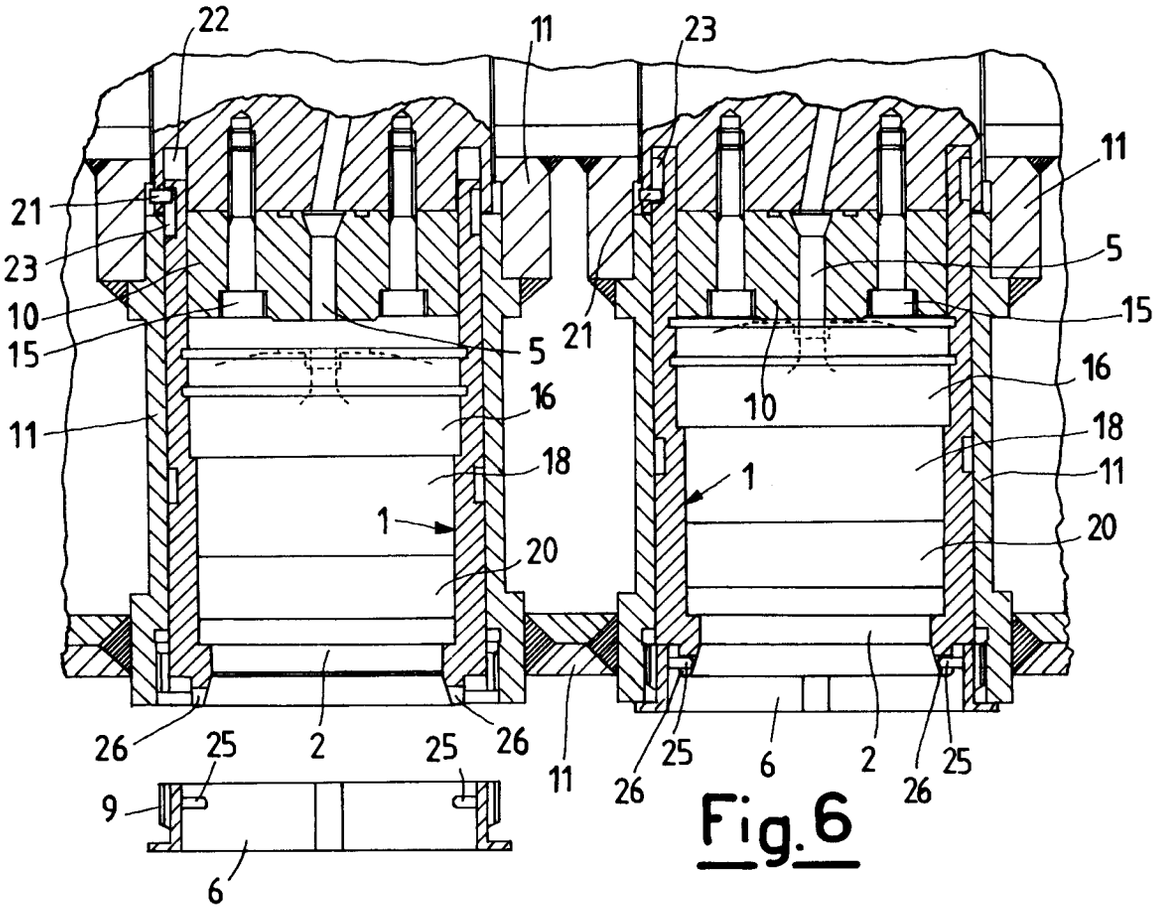
22
11
23
21
23
10
15
5
21
11
5
15
16
10
16
18
11
18
1
1
20
20
26
25
2
25
26
11
26
25
6
2
26
25
9
6

Fig.6

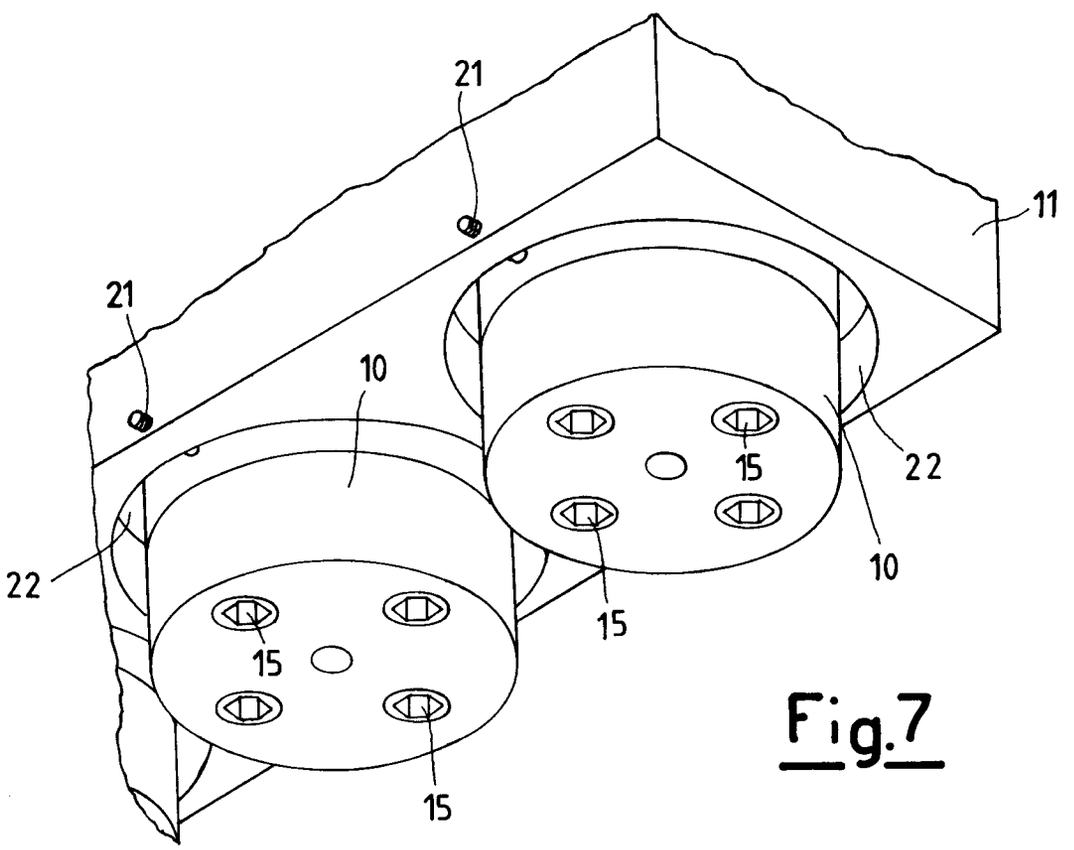
21
11
21
10
22
15
22
10
15
15
15

Fig.7