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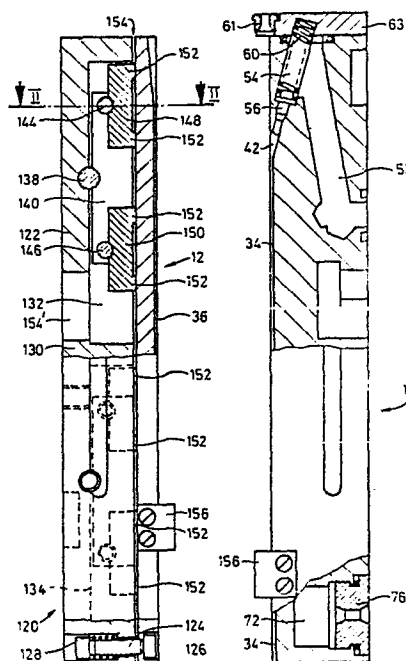
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⑤④ Thread treating nozzle.

57) The nozzle comprises parts which define a thread-treating passage and which are movable relative to each other to open and close the passage to enable insertion of a thread. One plate-like part is elastic when subjected to the degree of deformation required to permit adjustment thereof to make face-to-face sealing contact.



Thread Treating Nozzle

The invention relates to developments in the system disclosed in European Published Patent Application No. 110359 (corresponding with United States Patent No. 81051) the disclosure of which is hereby incorporated in
5 the present specification by reference. As in the case of said prior application, the present invention relates to an openable and closable thread treating nozzle, that is, a nozzle comprising a plurality of parts which define between them a thread treating passage and which
10 are movable relative to each other to open and close said passage to enable insertion of a thread. The term "nozzle" when used hereinafter refers to an openable and closable nozzle as defined above. Such a nozzle preferably comprises only two parts movable relative to
15 each other.

In the prior application, at least one part of the nozzle was provided with a flexible mounting to permit adjustment of the part to make face to face sealing
20 contact with another part or other parts of the nozzle. It has now been realized that at least some of the required flexibility can advantageously be incorporated

in the part itself.

The flexible part is, however, still advantageously associated with a flexible mounting. Such a mounting
5 preferably comprises balancing means for distributing nozzle closing forces over the part.

The part may comprise a plate-like element which is elastic when subjected to the degree of deformation re-
10 quired to permit adjustment thereof to make the face to face sealing contact referred to above.

In one embodiment of the invention, which is in accordance with published European Patent Application No.
15 39763 (corresponding with United States Patent 4435298), the disclosure of which is also hereby incorporated by reference in the present specification, the thread treating passage extends from end to end through an elongate nozzle structure. In such a structure, the flexible
20 part also preferably extends from end to end of the structure.

By way of example, one embodiment of the invention will now be described with reference to the accompanying dia-
25 grammatic drawings, in which

Fig. 1 is a vertical elevation, partly in section, of a two-part thread texturizing nozzle in accordance with the invention, and
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Fig. 2 is a plan view of the parts shown in Fig. 1, the left hand part being sectioned on the plane II - II in Fig. 1.

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The general structure and operation of the texturizing nozzle shown in the drawings has already been described in detail in European Patent Application 39763, referred to above, and also in European Patent Application No. 5 108205 (corresponding with United States Patent Application Serial No. 433733 filed October 12, 1982), the disclosure of which is also hereby incorporated in the present specification by reference.

10 In order to avoid superfluous description, the overall construction and operation of the thread texturizing nozzle will not be described again here. The various parts of the illustrated nozzle will, however, be identified and for ease of comparison the reference numerals 15 used will correspond as far as possible with those used in European Patent Application 108205.

Accordingly, two nozzle parts are indicated with the numerals 10 and 12 respectively. Part 10 is mounted on a 20 suitable carrier (not shown) by means, examples of which have already been disclosed in the prior applications referred to above. The mounting for the part 12 will be described in greater detail later in this specification.

25 Part 10 is in the form of an elongated block, made in one piece and having a plane face 26 (see Fig. 2). Part 12 is in the form of an elongated plate-like element having a plane face 28. When the nozzle is correctly closed, surfaces 26 and 28 make face to face contact and 30 form a seal against passage of texturizing fluid between them.

Part 10 has a groove 34 in surface 26 extending from

one end of the block (the "downstream" end). Part 12 has a groove 36 in surface 28, extending from one end to the other of the plate element and being slightly widened at its upstream end (see Fig. 1). When surfaces 26 and 28
5 are brought into correct engagement, grooves 34 and 36 are aligned to provide a passage extending from end to end through the nozzle but of varying cross-section therealong.

10 This passage defines a thread path through the nozzle, various details of which can be obtained from the prior applications. Treatment fluid is fed into the passage at a junction location 42 (Fig. 1) at which the thread and the fluid are brought together. The treatment fluid is
15 fed to the junction location by way of a bore 52 in part 10 leading to a chamber 54 and thence by way of a metering tube 56 to the junction location. Chamber 54 opens on to the upstream end of the block, and is closed in use by a closure plate 63 which can be removed to give
20 access to the chamber and the metering tube 56. Tube 56 is retained in the desired position by means of a compression spring 60 extending between the closure 63 and the tube. A thread guide 61, secured to the closure 63, assists in guiding a thread correctly into the passage.

25 A texturizing chamber (details not shown) is provided adjacent the downstream end of the thread passage by suitable formation of the block 10 and plate 12 as shown in European Application 108205 referred to above. Treatment fluid is permitted to leave the texturizing chamber
30 transversely of the thread path and passes into an out-flow port 72 (in block 10) which contains a flow-controlling throttle 76.

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The structure now to be described differs radically from that shown in the prior applications, and new reference numerals will be used. The plate element 12 is mounted on a plate-mounting structure generally indicated by numeral 120. This structure comprises a box-like support and housing portion 122. As best seen in the section in Fig. 2, portion 122 is open-sided on its side facing block 10 and the plate-element 12 is located to "cover" this open side of portion 122. Element 12 is retained relative to portion 122 by means of four retaining devices 124 (one only visible in Fig. 1) adjacent respective corners. Each retaining device comprises a sleeve 126 with an internal screw thread and a pair of screws entering the sleeve from opposite ends thereof. For reasons which will become clear hereinafter, the retaining effect of devices 124 permits some relative movement between element 12 and portion 122. For this purpose, a clearance is left between element 12 and the sleeve 126 of each retaining device 124, and a compression spring 128 is provided between the head of one screw and an abutment surface in the portion 122.

Within the box-like portion 122 there are two chambers separated by a transverse partition 130 (Fig. 1). The chamber 132 which is at the upper end of the nozzle as viewed in Fig. 1, together with the contents thereof, will be described in detail. The lower chamber 134, and the contents thereof, are substantially the same, and will not be described separately.

A through-bore 136 (Fig. 2) extends transversely through portion 122 at right angles to the thread passage and substantially parallel to the faces 26 and 28. Bore 136

is so located that the longitudinal axis thereof lies approximately in the plane of the surface defining the "back" of the chamber 132, that is the surface opposite the open "front" side of the chamber. A cylindrical pin 138 is located, for example by a press fit, in the bore 136 so that the pin extends across the whole width of chamber 132 (Fig. 2). Seated on pin 138 is a pair of levers 140, 142 respectively, both of which are visible in Fig. 2 but only one of which can be seen in Fig. 1. Each lever 140, 142 is in the form of a rectangular bar, and the levers are disposed (as best seen in Fig. 2) adjacent respective side walls of the chamber 132. Each bar has a semi-circular recess corresponding to the pin 138, and when seated on the pin each bar is spaced slightly from the back surface of chamber 132. Thus, the bars are free to pivot slightly about the longitudinal axis of pin 138.

Bars 140, 142 are joined at their upper ends by a pin 144, and at their lower ends by a pin 146, each of these pins having a longitudinal axis parallel to the longitudinal axis of pin 138. Seated on pin 144 is a lever 148, and seated on pin 146 is a lever 150. Levers 148, 150 each have a semi-circular recess corresponding to the respective pins 144, 146, and each has at its upper and lower ends respectively a forwardly projecting abutment portion 152. As can be seen in both Figures, the abutment portions 152 project beyond the front, open side of portion 122, whereas all other parts of the lever structure remain within the chamber 132. Abutment portions 152 engage the reverse face of plate 12 so that a gap 154 is left between the plate and the front edge of support portion 120. Each lever 148, 150 is free to pivot about

the longitudinal axis of its pin 144 or 146 until each of the abutment portions 152 engages the reverse face of plate 12.

- 5 It will be seen from the Figures that the overall external dimensions of the combination of the plate 12 and its support 120 correspond very closely with those of the block 10. This enables the combination 12, 120 to be mounted in a mounting system (not shown) which has been
10 designed to receive a pair of block-type nozzle parts, for example as shown in European Patent Application 108 205. For this purpose, support 120 is provided with suitable openings 154' for cooperation with retaining elements (not shown) of the mounting system which can be
15 identical with that shown in Application 108 205. This exchangeability of part types is not, of course, essential but does enable substitution of the combination 12, 120 in existing nozzle structures.
- 20 Whatever mounting system is used for the block 10 and the combination 12, 120, these parts will be associated in use with a nozzle closing system. This could be, for example, of the general type shown in European Patent Application 110359 comprising a "scissors"-type linkage
25 with the block 10 and combination 12, 120 mounted on respective arms of the scissors linkage, with those arms being openable and closable by a suitable drive mechanism, for example the pressurizable piston and cylinder unit shown in European Application 110359. As the
30 scissors linkage urges the nozzles parts together, ramp elements 156 (see especially Fig. 2 tend to cancel out any coarse misalignment, and a locating pin 158 on plate 12 enters a locating opening 160 in block 10 to ensure

the required alignment of grooves 34, 36 to form the thread passage. In Fig. 1, pin 158 is hidden behind element 156 on plate 12.

5 The material and the dimensions of plate 12 are so selected in relation to the closing forces applied by the closing system that the plate is elastically deformable under those forces when surface 28 is driven against surface 26. Elastic deformation is hindered only in those
10 regions in which the plate is contacted by the abutments 152, that is in eight specific contact regions (four associated with the upper chamber 132 and four with the lower chamber 134). The arrangement of levers within
15 each chamber is such that each abutment 152 achieves a predetermined area of contact with the plate 12 and that the closing forces are evenly distributed between these eight contact areas. As can be seen from Fig. 2, each contact area straddles the thread path as viewed in a direction normal to the contact area. Accordingly, the
20 closing force is applied in regions immediately bordering on the grooves 34, 36 and at a plurality of intervals spaced along the length of the thread path.

Assume now that surface 28 first makes contact with surface 26 in a localized zone at any arbitrary position on
25 those surfaces. Since the closing forces are distributed along the length of the nozzle, there will be a net moment tending to pivot plate 12 about its region of first contact with block 10 so as to bring other regions of
30 surfaces 28 and 26 into face to face contact. Since plate 12 is elastically deformable as referred to above, it can flex in response to this net moment so that face to face contact is made at least over the central zone

of each of surfaces 26 and 28 (that is the zones to either side of the grooves 34 and 36), and along the full length of the thread path. Depending upon the mis-matching of the surfaces 26 and 28, face to face sealing contact may not be achieved in regions close to the longitudinal edges of those surfaces. However, this is not essential for practical purposes provided sealing contact has been made in the central zones referred to above.

10 In the above description attention has been concentrated upon the flexing of plate 12 in order to ensure sealing contact despite inevitable inaccuracies in manufacture and assembly. However, the adjustable mounting provided by the lever systems within housing 122 also permit some
15 adjustment of plate 12 relative to block 10 during the closing movement even without flexing of the plate. Such adjustment has already been referred to in European Patent Application 110 359, and said application also shows a mounting system for blocks (such as block 10 and
20 a combination 12, 120) to enable the mounting system to take up manufacturing and assembly inaccuracies. It may be found appropriate to arrange the mounting system to take up coarse inaccuracies, and to provide flexibility in plate 12 sufficient to enable fine adjustments to ensure sealing contact.
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Plate 12 is preferably of metal and, for reasons given further below, preferably has excellent heat conducting properties. In order to provide the plate with the maximum possible flexibility, it is preferably made as thin
30 as possible while leaving adequate strength for the plate to absorb the closing forces even after formation of the groove 36. The heat flow properties of the com-

5 combination 12, 120 are quite clearly different from those of, say, the block 12 shown in European Patent Application 108 205. The provision of the chambers 132, 134 substantially reduces the cross section available for heat flow in the combination 12, 120.

10 The invention has been described by reference to a texturizing nozzle, particularly one in accordance with prior patent applications. The invention is not, however, limited to such use. It can be applied in any thread treating nozzle, for example a nozzle for applying twist to thread or for creating so called "entanglements" (an "interlacing" nozzle), or even a nozzle for simple forwarding of a thread. However, the invention is considered
15 to have its most useful application in texturizing nozzles where very considerable pressures of thread treating medium (for example air or steam) are encountered.

Claims:

1. A thread treating nozzle at least one part of which is flexible to permit adjustment of said part to make face to face sealing contact with another part or other parts of the nozzle.
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2. A nozzle as claimed in claim 1 in combination with a flexible mounting therefore.
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3. A combination as claimed in claim 2 wherein said mounting comprises balancing means for distributing closing force over said flexible part.
- 15 4. A combination as claimed in claim 3 wherein said balancing means comprises at least one lever, a pivot mounting for the lever, at least two abutment elements secured to the lever by respective pivot mountings, the pivot mountings for the abutment elements being disposed to either side of the pivot mounting for the lever.
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5. A combination as claimed in claim 4 wherein the pivot axis of each said pivot mounting extends substantially at right angles to the thread path and in a plane parallel thereto.
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6. A nozzle as claimed in claim 1 wherein said flexible part is in the form of a plate which is elastic when subjected to deformations produced during said adjustment.
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7. A nozzle as claimed in claim 1 wherein said flexible part has a groove adapted to cooperate with a groove in said other part or parts to define a thread path, and means to apply closing forces to a face on said flexible part opposite to and substantially aligned with said groove so that the closing forces create pressure in zones to either side of said groove when said sealing contact is obtained.
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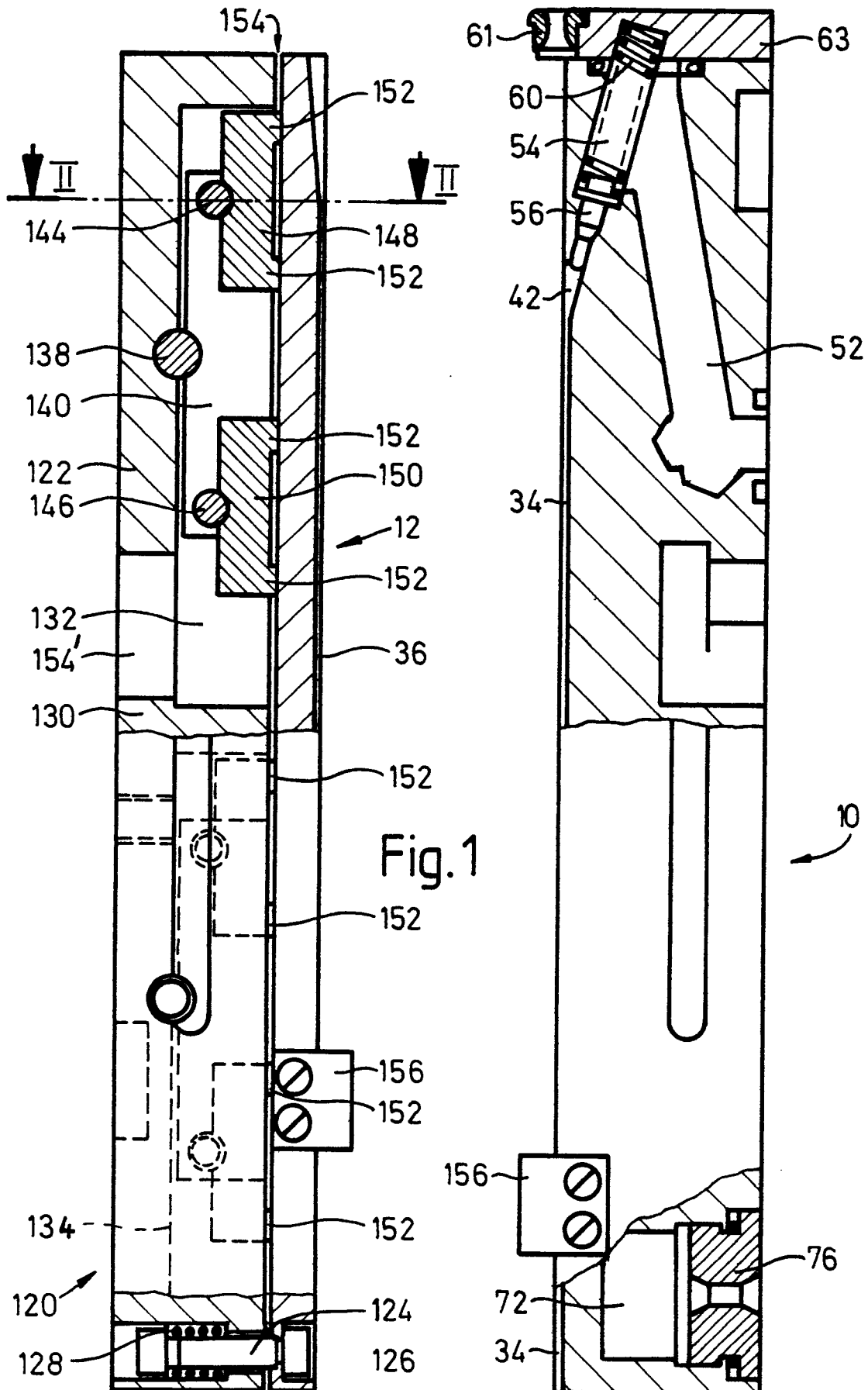


Fig. 2

