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(71) Applicant:
MURATA KIKAI KABUSHIKI KAISHA
Kisshoin, Minami-ku Kyoto-shi 601 (JP)

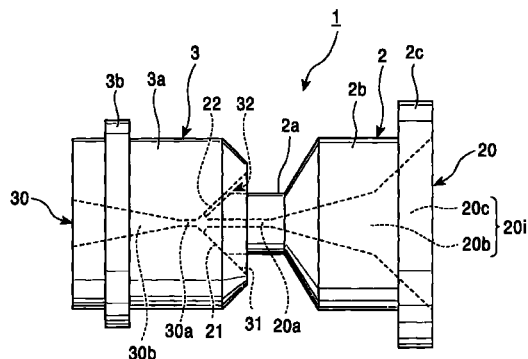
(72) Inventors:
• **Okayama, Tomoaki**
Jouyou-shi, Kyoto (JP)
• **Takeuchi, Hidetoshi**
Souraku-gun, Kyoto (JP)

(74) Representative:
Liedl, Christine, Dipl.-Chem. et al
Albert-Rosshaupter-Strasse 65
81369 München (DE)

(54) **Yarn texturing nozzle**

(57) A yarn texturing nozzle 1 is of a divided type comprising a yarn introduction side member 2 and a yarn processing section side member 3. Approximately U-shaped air introduction grooves 22 are formed in an inclined end face 21 of the yarn introduction side member 2, and an inclined end face 31 of the yarn processing section side member 3 is engaged with the inclined face 21 of the yarn introduction side member 2 so that the inclined end faces seal each other, thereby forming U-shaped air blowout ports. In addition, the yarn introduction side member 2 has an approximately conical connection passage 20b and an inlet passage 20c, and the yarn processing section side member 3 has an approximately conical yarn processing passage 30b.

FIG. 1



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Description

Field of the Invention

[0001] The present invention relates to the structure of a yarn texturing nozzle that uses the jet force of a pressurized fluid (compressed air and so on) to cause a filament yarn such as synthetic fibers to be looped or entangled in order to make the yarn bulky.

Background of the Invention

[0002] There are publicly known techniques for using the jet force of a pressurized fluid to cause synthetic fiber filaments forming a yarn to be looped or entangled in order to make the yarn bulky. Known yarn texturing nozzles include a type called a "Taslan nozzle" and a type called a "Hebberline nozzle", the former is excellent in bulkiness but requires frequent maintenance such as cleaning of a nozzle section, and the latter has been developed to further increase the speed compared to the former but requires such fine nozzle hole machining as provides a diameter of 1 mm or smaller as well as a short maintenance period.

[0003] There are also publicly known techniques that have been improved to enhance the bulkiness and maintainability of the prior art. For example, a yarn pass has a elliptical cross section to prevent a yarn from rotating in the yarn pass in order to improve the bulkiness, or an opening through which a yarn is fed to the exterior from a nozzle is formed like a trumpet to improve the bulkiness.

[0004] According to the prior art, however, an introduction passage through which a pressurized fluid is jetted is formed by machining a round or elliptic hole of a very small diameter in a wall face of the nozzle, thereby increasing costs and making maintenance difficult.

Summary of the Invention

[0005] The object to be achieved by the present invention has been described, and means for achieving this object is described next. Namely, the present invention provides a yarn texturing nozzle for making a yarn bulky using the jet force of a pressurized fluid, wherein the nozzle is of a divided type comprising a yarn introduction side member and a yarn processing section side member, wherein non-circular grooves are formed in an inclined end face of the yarn introduction side member, and wherein an inclined end face of the yarn processing section side member is engaged with the inclined face of the yarn introduction side member so that the inclined end faces seal each other, thereby forming non-circular air blowout ports.

[0006] In addition, the yarn introduction side member comprises at its center an introduction line through which a yarn is inserted and passed and comprises a conical inlet section in which a yarn is inserted through

its inlet side and the width of which increase toward the Inlet side, the inlet section being in communication with the introduction line while having its diameter decreasing toward said inclined end face.

[0007] In addition, the yarn processing section side member comprises at its center an feed line through which a yarn is inserted and passed, the feed line being disposed at the inlet side through which a yarn is inserted, the yarn processing section side member also comprising a processing passage located after the feed line in communication therewith and having its diameter increasing in a tapered manner.

Brief Description of the Drawings

[0008]

Figure 1 is a side view of a yarn texturing nozzle according to the present invention.

Figure 2 is a side sectional view showing the state where the yarn texturing nozzle has been fittingly inserted into a holder.

Figure 3 is a front view of a yarn introduction side member.

Figure 4 is a sectional view of an air blowing section.

Figure 5 is a perspective view of the yarn texturing nozzle.

Figure 6 shows the state where a sheath yarn and a core yarn have been introduced to the yarn texturing nozzle.

Detailed Description of the Preferred Embodiments

[0009] An embodiment of the present invention is described next with reference to the accompanying drawings.

[0010] First, the entire configuration is explained. As shown in Figure 1, a yarn texturing nozzle 1 according to the present invention has a two-piece structure comprising a yarn introduction side member 2 and a yarn processing section side member 3.

[0011] The yarn introduction side member 2 comprises a tip 2a, an intermediate section 2b, and an engagingly locking section 2c connectively installed in this order from the front of Figures 1 and 2 (the front actually corresponds to the left of the sheets of Figures 1 and 2) and each shaped approximately like a cylinder. The diameter increases in the order of the tip 2a, the intermediate section 2b, and the engagingly locking section 2c, and the tip 2a has at its front end an inclined end face 21 formed conical shape. In addition, the joint between the tip 2a and the intermediate section 2b is formed conical shape.

[0012] In addition, the yarn introduction side member 2 has machined at its center a yarn insertion hole 20 stretching from the tip 2a through the intermediate section 2b to the engagingly locking section 2c. The yarn

insertion hole 20 is composed of an introduction line 20a, a connection passage 20b, and an inlet passage 20c arranged in this order from the front so as to be in communication with one another. The approximately cylindrical introduction line 20a penetrates the front end of the inclined end face 21, and the rear of the introduction line 20a is in communication with the connection passage 20b. The connection passage 20b is shaped conical having its radius increasing rearward, and the rear of the connection passage 20b is in communication with the inlet passage 20c at a rear position of the intermediate section 2b. Furthermore, the inlet passage 20c is shaped conical having its radius increasing rearward, its rear end is in communication with the rear end of the yarn introduction side member 2, and the connection passage 20b and the inlet passage 20c form an inlet section 20i.

[0013] As shown in Figures 1 to 4, a plurality of (in this embodiment, three) air introduction grooves 22, 22, ... are provided in the inclined end face 21 of the tip 2a. As shown in Figure 3 (Figure 3 is a front view of the tip 2a and does not show the intermediate section 2b and the engagingly locking section 2c), the air introduction grooves 22, 22, ... are radially provided on the inclined end face 21 of the tip 2a at an approximately equal interval and their center is in communication with the front end of the introduction line 20a. In addition, the air introduction grooves 22, 22, ... have an approximately U-shaped cross section in the wall surface of the inclined end face 21, as shown in Figure 4.

[0014] On the other hand, the yarn processing section side member 3 is composed of a processing section 3a and an engagingly locking section 3b. The processing section 3a is shaped approximately like a cylinder, has a rear end shaped conical having its radius decreasing rearward, and has inside the processing section 3a an inclined end face 31 extending frontward to form a receiving section 32. The inclined end face 31 is constructed to fit the inclined end face 21 of the tip 2a of the yarn introduction side member 2 so that the end faces can seal each other when the tip 2a of the yarn introduction side member 2 is joined with the receiving section 32 of the yarn processing section side member 3.

[0015] A yarn insertion hole 30 is machined at the center of the yarn processing section side member 3. The yarn insertion hole 30 is composed of a feed line 30a and a yarn processing passage 30b arranged in this order from the rear so as to be in communication with each other. The feed line 30a is in communication with the front end of the inclined end face 31, and the front of the feed line 30a is in communication with the yarn processing passage 30b. The yarn processing passage 30b is tapered in such a way that its radius increases frontward, and its front end penetrates the front end of the yarn processing section side member 3.

[0016] The assembly and configuration of the yarn introduction side member 2 and yarn processing section

side member 3 configured as described above will be described with reference to Figure 2. In Figure 2, a holder 4 has an approximately cylindrical space inside, and the yarn processing section side member 3 is fittingly inserted into the space from its front. An O-ring 42 is buried in the inner wall surface of the holder 4 so that the yarn processing section side member 3 is fittingly inserted under a sufficient resistance up to a position defined by the engagingly locking section 3b. A flange 7 is installed from the front of the yarn processing section member 3 and is fixed using a screw (not shown in the drawings) and a pin 9.

[0017] In addition, the yarn introduction side member 2 is fittingly inserted into the holder 4 from its rear, but the O-ring 42 is also buried in the inner wall of holder 4 located in its rear so as to provide a sufficient resistance when the yarn introduction side member 2 is fittingly inserted. A fixing cap 5 is used to press and fix the inclined end face 21 of the tip 2a of the yarn introduction side member 2 to the inclined end face 31 of the yarn processing section side member 3 so that the end faces seal each other. The fixing method may be screwing as shown in the drawing or the use of a setscrew. In addition, a space 40 in the holder 4 shown in Figure 2 is closed by the O-rings 42, 42.

[0018] The air introduction grooves 22, 22, ..., which are provided in the inclined end face 21 of the yarn introduction side member 2 as described above, serve to allow the space 40 shown in Figure 2 to be in communication with the introduction line 20a (or the feed line 30a) to form air blowing ports while the inclined end faces 21, 31 are sealing each other. In this manner, the air blowing ports (jet holes) in the yarn texturing nozzle according to the present invention may be obtained by simply forming approximately U-shaped grooves in the inclined face of one of the two divided members. This configuration eliminates the needs for a step for machining in the member, holes of a very small diameter as in the prior art, thereby allowing the inner surfaces of the U-shaped grooves to be finished easily and reducing costs.

[0019] In addition, by removing the yarn introduction side member 2 from the yarn processing section side member 3, maintenance can be carried out easily to maintain the air blowing ports in good conditions. Although this embodiment provides the air introduction grooves 22, 22, ... in the yarn introduction side member 2, the grooves may be provided in the yarn processing section side member 3.

[0020] In addition, although this embodiment has obtained good results using the approximately U-shaped air introduction grooves, the shape of the grooves is not limited to this embodiment but for example, rectangular or V-shaped grooves may be used to obtain similar effects, to allow the grooves to be finished easily, and to reduce costs.

[0021] In addition, the fixing cap 5 is installed from behind the yarn introduction side member 2, a guide 6 is

installed at the radial center of the fixing cap 5, and an introduction hole 6a is provided at the radial center of the guide 6 and allows the yarn insertion hole 20 to be in communication with the exterior. In addition, a plurality of drain holes 5a, 5a, ... are machined in the fixing cap 5 to allow the yarn insertion holes 20 to be in communication with the exterior. In addition, a guide member 8 is rotatably supported on the pin 9 for fixing the flange 7.

[0022] In the yarn texturing nozzle according to the present invention configured as described above, a filament yarn such as synthetic fibers is fed from the introduction hole 6a of the guide 6 into the yarn insertion hole 20 of the yarn introduction side member 2. At this point a sheath yarn 50 and a core yarn 51 are introduced into the yarn insertion hole 20 as shown in Figure 6. When fed, the core yarn 51 contains moisture.

[0023] Then, a pressurized fluid is jetted out from an air introduction pipe 41 in the holder 4 shown in Figure 2. After passing through the air introduction grooves (air blowing ports) 22, 22, ... via the space 40 in the holder, the pressurized fluid is jetted into the introduction line 20a (or the feed line 30a). At this time, due to the jetted pressurized fluid, the sheath yarn 50 and the core yarn 51 fed by a roller (not shown in the drawings) into the yarn insertion hole 20 in the yarn introduction side member 2 located in the rear pass through the introduction line 20a and the feed line 30a and are driven into a yarn processing passage 30b.

[0024] In the yarn processing passage 30b, the jet force of the pressurized fluid unbinds constituent filaments from the sheath yarn 50 and the core yarn 51 fed into the yarn processing passage 30b from the feed line 30a, and the sheath yarn 50 and the core yarn 51 are further fiercely moved to cause the filaments to be entangled with one another or to be looped, thereby improving bulkiness. Consequently, both yarns 50 and 51 are entangled with each other to form a single yarn, which is then fed to the exterior from the yarn processing passage 30b. The pressurized fluid generally comprises compressed air, but a pressurized fluid containing moisture and so on may be used.

[0025] Thus, the approximately conical yarn processing passage 30b is located in front of the feed line 30a in communication therewith, so the pressurized fluid compressed in the feed line 30a and jetted at a high speed flows out at a dash in the yarn processing passage 30b in a direction in which the radius of the passage 30b increases. Consequently, both yarns 50 and 51 are efficiently entangled or looped to provide a sufficient bulkiness. In addition, this configuration enables bulkiness to be provided while reducing the amount of pressurized fluid jetted compared to the prior art, thereby reducing operational costs.

[0026] In addition, the pressurized fluid jetted from the air introduction grooves 22, 22, ... partly flows backward to the yarn insertion hole 20 in the yarn introduction side member 2. As described above, the yarn

texturing nozzle 1 according to the present invention is shaped conical having its radius gradually increasing to provide a sufficient channel for the pressurized fluid flowing backward, thereby allowing dirt and dust accumulated in the yarn insertion hole 20 and moisture contained in the core yarn 51 to be ejected rearward. This configuration serves to effectively wash the inside of the yarn insertion hole 20 to reduce the frequency of maintenance for the yarn introduction side member 2, while effectively improving the durability of the constituent members.

[0027] Due the above configuration, the yarn texturing nozzle according to the present invention has the following effects.

[0028] This nozzle makes a yarn bulky using the jet force of a pressurized fluid, and is of a divided type comprising the yarn introduction side member and the yarn processing section side member. The non-circular grooves are formed in the inclined end face of the yarn introduction side member and the inclined end face of the yarn processing section side member is engaged with the inclined face of the yarn introduction side member so that the inclined end faces seal each other, thereby forming the non-circular air blowout ports. This configuration only requires, for example, approximately-U-shaped grooves to be formed in the inclined face of one of the two divided members, thereby eliminating the needs for a step for machining in the member, holes of a very small diameter as in the prior art, thereby allowing the inner surfaces of the U-shaped grooves to be finished easily and reducing costs. In addition, by removing the yarn introduction side member from the yarn processing section side member, maintenance can be carried out easily to maintain the air blowing ports in good conditions.

[0029] In addition, the yarn introduction side member comprises at its center the introduction line through which a yarn is inserted and passed and comprises the conical inlet section in which a yarn is inserted through its inlet side and in which its width increases toward the inlet side, and the inlet section is in communication with the introduction line while having its diameter decreasing toward the inclined end face. This configuration provides a sufficient channel for a pressurized fluid flowing backward, thereby allowing dirt and dust accumulated in the channel and moisture contained in the introduced yarn to be ejected rearward. Thus, this configuration serves to effectively wash the inside of the channel to reduce the frequency of maintenance for the yarn introduction side member, while effectively improving the durability of the constituent members.

[0030] In addition, the yarn processing section side member comprises at its center the feed line through which a yarn is inserted and passed, the feed line is disposed at the inlet side through which a yarn is inserted, the yarn processing section side member also comprises the processing passage located after the feed line in communication therewith and having its diameter

increasing in a tapered manner. A pressurized fluid compressed in the feed line and jetted at a high speed flows out at a dash in the yarn processing passage in the direction in which the radius of the passage increases. Consequently, the filaments are efficiently 5 entangled or looped to provide a sufficient bulkiness.

Claims

1. A yarn texturing nozzle for making a yarn bulky 10 using the jet force of a pressurized fluid, characterized in that the nozzle is of a divided type comprising a yarn introduction side member and a yarn processing section side member, in that non-circular grooves are formed in an inclined end face of the 15 yarn introduction side member, and in that an inclined end face of the yarn processing section side member is engaged with the inclined face of said yarn introduction side member so that the inclined end faces seal each other, thereby forming 20 non-circular air blowout ports.
2. A yarn texturing nozzle as in Claim 1, characterized in that said yarn introduction side member comprises at its center an introduction line through 25 which a yarn is inserted and passed and comprises a conical inlet section in which a yarn is inserted through its inlet side and the width of which increases toward the inlet side, the inlet section being in communication with the introduction line 30 while having its diameter decreasing toward said inclined end face.
3. A yarn texturing nozzle as in Claim 2, characterized in that said yarn processing section side member 35 comprises at its center an feed line through which a yarn is inserted and passed, the feed line being disposed at the inlet side through which a yarn is inserted, the yarn processing section side member also comprising a processing passage located after 40 the feed line in communication therewith and having its diameter increasing in a tapered manner.

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FIG. 1

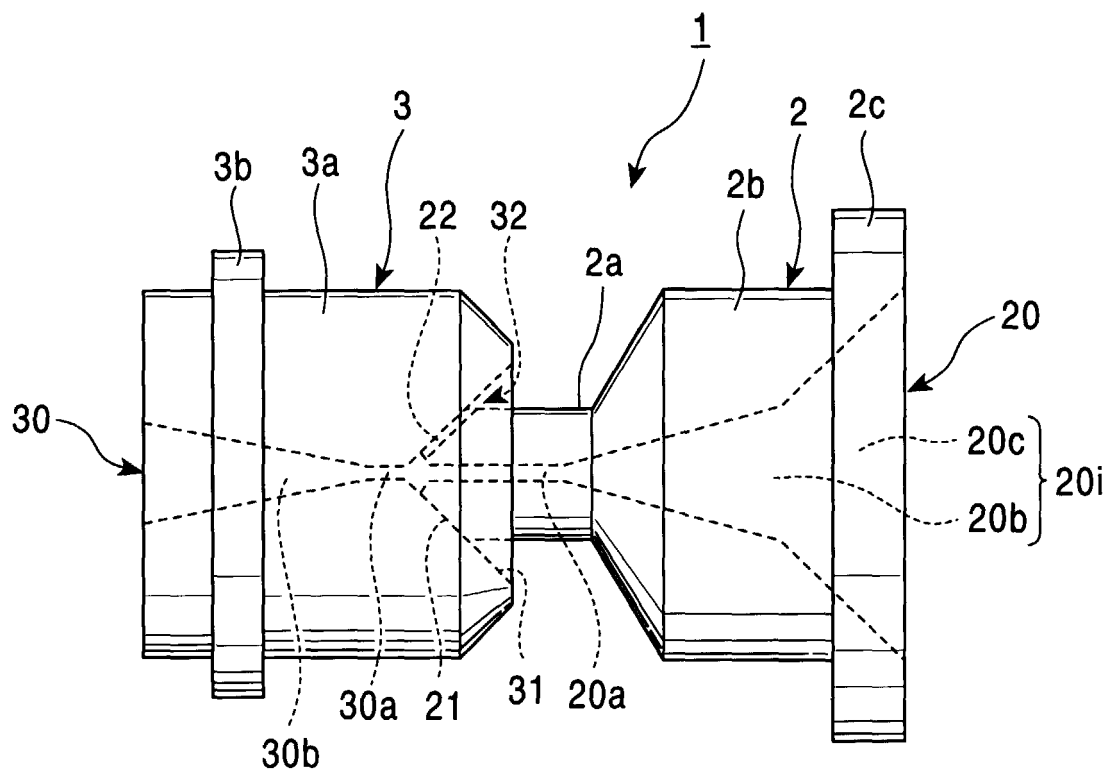


FIG. 2

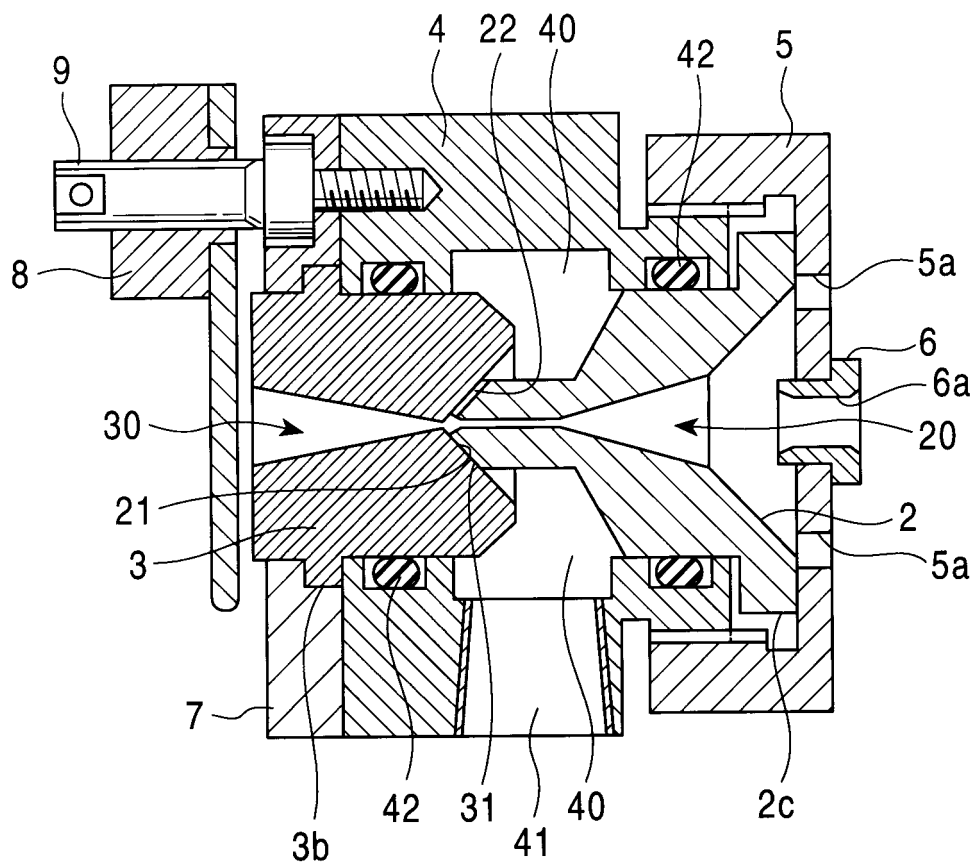


FIG. 3

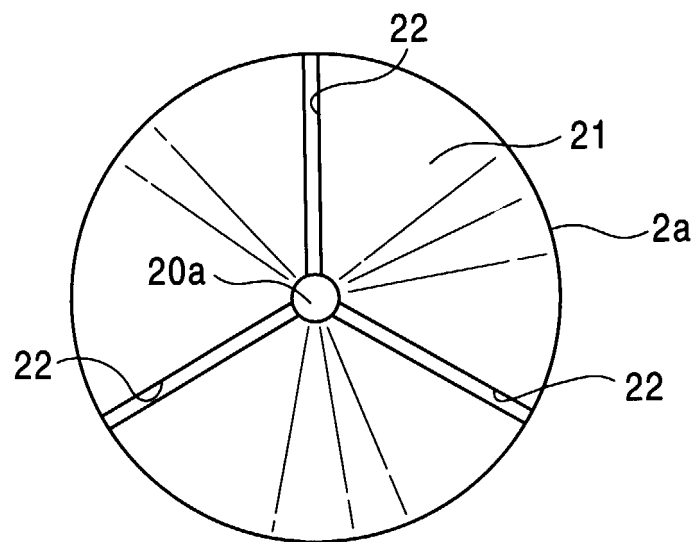


FIG. 4

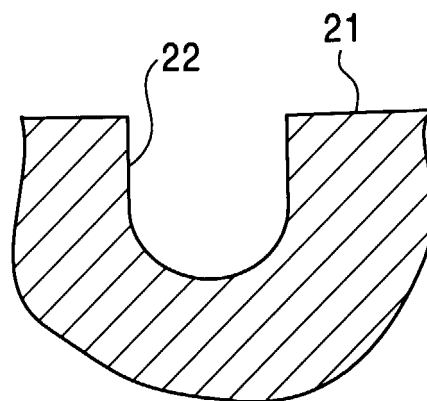


FIG. 5

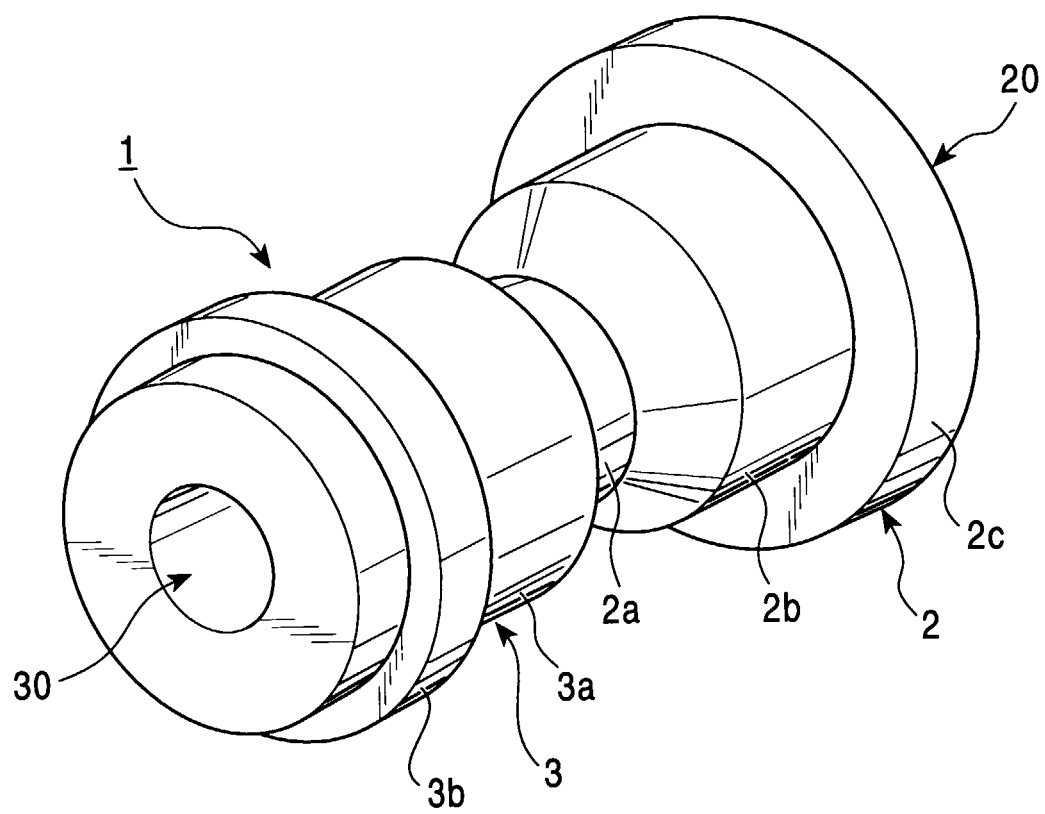
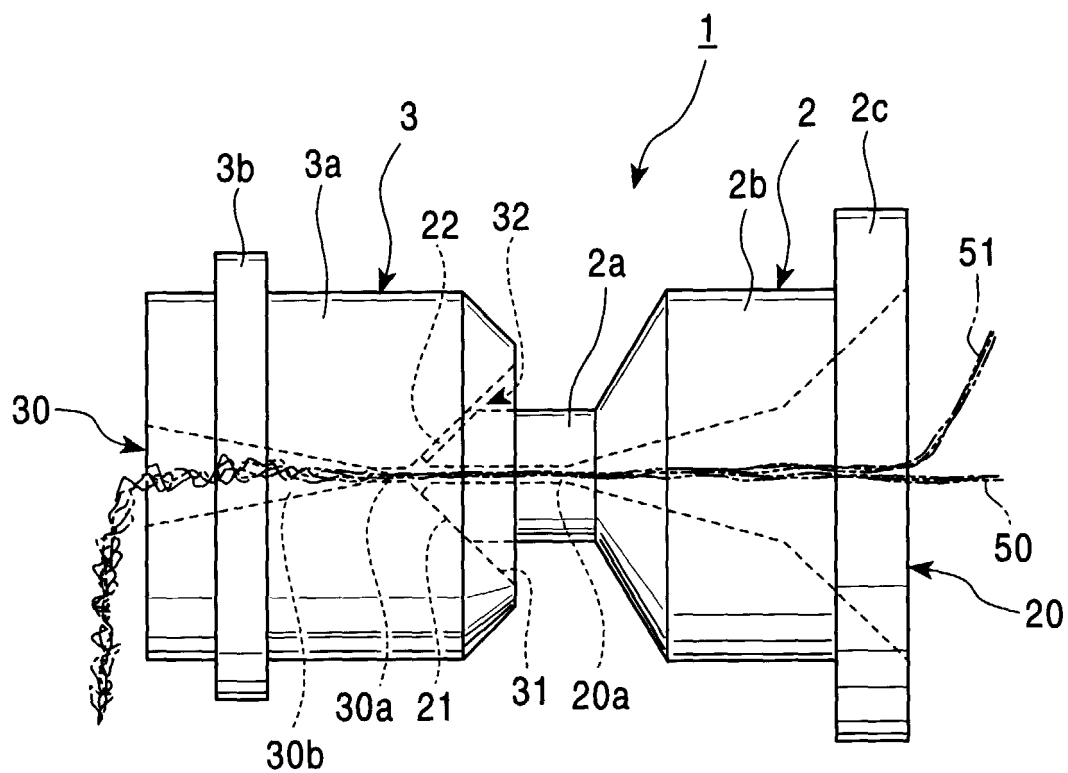


FIG. 6





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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 1775

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 April 2000	Examiner V Beurden-Hopkins, S
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 99 12 1775

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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