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

(11) Publication number: **0 460 799 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **91303743.8**

(22) Date of filing: **25.04.91**

(51) Int. Cl.[5]: **B65H 59/16**, B65H 57/14, D02G 1/02

(30) Priority: **26.05.90 GB 9011879**

(43) Date of publication of application:
11.12.91 Bulletin 91/50

(84) Designated Contracting States:
CH DE FR IT LI

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(54) False twist apparatus.

(57) A twist stop device (10;28) for a false twist texturing machine comprises a roller having an array of wear resistant pins (22) extending outwardly to define a V-shaped zig-zag path for a yarn (27) passing therearound, and a pair of walls (12) disposed adjacent the array of pins (22) on opposite sides thereof to support the pins (22) and facilitate threading of the yarn (27) around the device (10;28). The roller is in two parts (11,19;20,30) each comprising a wall (12) and portion (13) of a hub part of the roller, the two parts (11,19;29,30) when assembled retaining the pins (22) in their locations and a bearing (16) within the hub parts (13). The pins (22) are at equiangularly spaced locations, with a slot (26) at at least one location where no pin (22) is present to facilitate removal of yarn wraps (27).

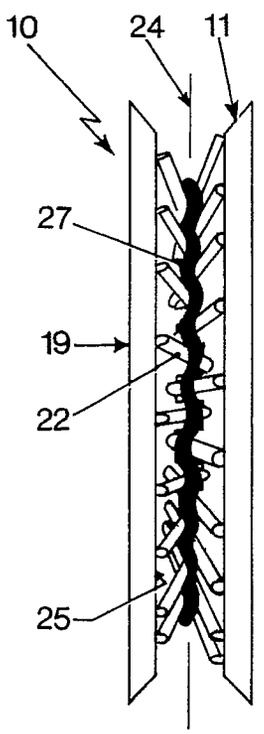

FIG.3

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This invention relates to false twist apparatus, and in particular to apparatus for use in determining the point, in the path of a textile yarn through a false-twist crimping machine, at which the twisting of the yarn commences. Such a device is known as a twist-stop, and has the effect of preventing the passage of twist, generated in the yarn by a false-twist device, from travelling upstream of the twist-stop.

Many differing types of twist-stop device are known, and many other devices which have another primary function, for example feed rollers, may also serve very satisfactorily as twist-stop devices. However the latter generally do not give the precise control of the yarn which is required in this sensitive area, and it may not be practicable to position them for good twist-stop functioning. Therefore it is customary for false-twist crimping machines to be fitted with devices which have the sole function of twist-stopping. A large proportion of such twist-stopping devices are in the form of a rotatable member around the periphery of which the yarn is caused to pass, such periphery providing a tortuous or zig-zag yarn path. Such twist-stop devices are also of many differing forms. For example, in GB Patent No 908112, there is described a rotatable disc having at its periphery a series of radial slits whereby oppositely bent blades form a zig-zag V-shaped groove in which the yarn runs. A similar device is shown in GB Registered Design No 895467, comprising a pair of coaxially secured discs with pressed-out ribs between cut-outs on each disc, the ribs on one disc interdigitating with those on the other disc. However twist-stops of such a construction tend to abrade the yarn and can cause filament breakages in multi-filament yarns, or even yarn breaks. Alternatively they may become distorted and cease to be effective as a twist stop. To reduce these problems the ribs may be stamped out of the discs without slits or cut-outs, as described in GB Patent No 1297097. Such ribs, or lugs, may have a rounded cross-section so as to provide for more gentle control of the yarn than was the case with the previously described type of twist-stop device. However due to difficulties in producing identical ribs as regards dimensions and surface finish, not only from one twist-stop to another, but also around the periphery of a single twist stop, the control of the yarn in this sensitive area is not as satisfactory as is desired. Furthermore the sheet metal from which the above described twist stop devices are made tends to wear rapidly under the abrading action of the yarn.

To improve upon the latter device there has been produced a twist stop in which the aforementioned ribs on each of the two coaxially secured discs are formed of a ceramic material, the discs being of a plastics material. The discs of this device are moulded with the ceramic discs in situ, and this entails a difficult and costly manufacturing process. Also the surface finishing of the ceramic ribs prior to assembly of the twist-stop is difficult and costly.

As an alternative to the above described twist stop devices there is also known a twist stop comprising a plurality of cylindrical pins secured around the periphery of a roller, which pins are alternately oppositely inclined out of the central plane of the roller to form a V-shaped, zig-zag yarn path around the periphery of the twist stop. The pins are of a ceramic material and of circular cross-section, so that substantially identical size and surface finish can readily be produced on all pins. Such a twist-stop has been used extensively and successfully for more than 17 years. It is easier and less costly to produce than the ceramic-ribbed twist-stop described above, and this is an important factor in yarn texturing since damaged twist-stops, which affect the quality of the textured yarn, are often tolerated due to the high cost of repeated replacement.

Despite the commercial success of the latter twist-stop, the pins are prone to damage, and it can be difficult to thread-up for a machine operator who is not highly experienced. To overcome this problem, shrouds have been fixed to texturing machines to assist in guiding the yarn and protecting the pins. However such shrouds make it more difficult to remove yarn wraps from the twist stop and yarn or debris can get between the twist-stop and the shroud.

It is an object of the present invention to provide a twist stop which overcomes, at least to a significant extent, all of the abovementioned disadvantages of the prior known twist stop devices.

The invention provides a twist stop device comprising a roller having an array of cylindrical pins of a wear resistant material extending outwardly thereof, with alternate pins being relatively disposed and oppositely inclined relative to a median plane of the roller whereby the array defines a V-shaped, zig-zag yarn path for a yarn running around said device, and the roller comprising a pair of walls disposed adjacent the array of pins on opposed sides thereof and extending radially outwardly of the roller at least to the outer ends of the pins.

The pins may be of a ceramic, sapphire, hardened steel or tungsten carbide material, and may be retained in receiving formations provided in the roller. The pins may be clipped or adhesively bonded in the receiving formations, which may be bores or recesses.

The walls may be of a plastics material, and may be integral with a hub part of the roller. The roller may be formed in two parts, each comprising

a wall and a hub portion. The parts of the roller may be substantially identical, each hub portion comprising half of the hub part. Each hub portion may have a plurality of pin receiving recesses therein, equi-spaced therearound, and interdigitating formations may be provided on said two hub portions. A plurality of interdigitating formations may each be provided with one pin receiving recess therein. Each wall may comprise a peripheral lip which extends over at least part of the outer ends of those pins inclined towards that wall. Each wall may also comprise an inwardly directed surface which is inclined relative to the median plane of the device and contacts those pins inclined towards that wall over the length of those pins.

The pins may be inclined at an angle of between 15° and 30°, for example 20°, relative to the median plane, and each pin may have a diameter of substantially 1mm. The pins may be disposed at equi-angularly arranged locations, and there may be at least one more location than pins in the device. There may be two diametrically opposed locations at which no pin is provided, for example 40 pins may be provided at 42 equi-angularly arranged locations. At the or each location having no pin disposed thereat, a slot may be provided in the walls, which slot may extend radially inwardly substantially to the hub part.

The device may be of comparatively small overall diameter, for example up to 50mm, and may be substantially 36 mm in diameter. The device may comprise a bearing axially located in the hub part. The interdigitating formations may be formed so as to resist separation of the two parts, or the two parts may be secured to each other as by an adhesive, welding or by screws or rivets.

Alternatively at least one spigot may be formed on one of the hub portions, and for the or each spigot a bore be provided in the other of the hub portions, the or each bore being adapted to receive a spigot therein. The or each bore may have a counterbore part into which an enlarged head of a spigot, formed after assembly of the roller, is received. The invention will now be further described with reference to the accompanying drawings in which :-

Fig 1 is a front elevation of one half of one embodiment

Fig 2 is a sectional view on line 2-2 of the embodiment of Fig 1, with the bearing removed for clarity,

Fig 3 is a side view of an assembly of two halves corresponding with that shown in Figs 1 and 2.

Figs 4 to 7 are front elevations and sectional views onlines 5-5 and 7-7 respectively of the two roller parts of a second embodiment prior to assembly, and

Fig 8 is a sectional view of the assembled second embodiment of roller.

Referring now to Figs 1 and 2, there is shown one half 11 of one embodiment of twist stop device 10 in accordance with the present invention. The half device 11, which may be moulded of a plastics material, comprises a wall 12 and a half hub part 13, the latter having a through bore 14 and a counterbore 15 into which a ball bearing 16 (not shown in Fig 2) is fitted. The half hub part 13 is formed to have a plurality of alternating , radially extending ribs and recesses, 17 and 18 respectively which can interdigitate with corresponding formations on another half 19 (Fig 3) of the twist stop device 10. In this case, 21 ribs 17 and 21 recesses 18, all of equi-angular extent, are formed around the half hub part 13, although other numbers of ribs and recesses may be provided if desired. The ribs 17 and recesses 18 of the two twist-stop halves 11, 19 may be formed so as to resist separation of the two halves 11, 19 when assembled as shown in Fig 3. However welding, eg ultrasonic welding, or adhesive bonding of the two halves 11, 19 is preferred. Alternatively the two halves 11, 19 may be secured to each other by screws or rivets.

In twenty of the ribs 17 and twenty of the recess 18 are formed semi-circular grooves 20, 21 respectively, the remaining rib 17^1 and recess 18^1 which are not provided with grooves being diametrically opposed. Into each of the grooves 20 is fitted a pin 22 of circular cross-section. The grooves 20 and the inwardly directed surface 23 are inclined relative to the median plane 24 of the assembled twist stop 10 (Fig 3) at an angle of substantially 20°, the surface 23 being aligned with the bottom of the recesses 18 so as to support the pins 22 over their entire length. A peripheral rib 25 extends over approximately half of the outer ends of the pins 22 so as to prevent the pins 22 from flying out of the twist stop 10 as it rotates. The pins 22 are of a hard wearing material such as ceramic, sapphire, hardened steel or tungsten carbide, and because of their simple shape, can readily be manufactured, ground and polished to the required dimensions and surface finish. The pins 22 may be clipped or adhesively bonded into the grooves 20.

Two twist stop halves 11, 19 as described above are assembled together as shown in Fig 3 to form the complete twist stop 10. The ball bearing 16 is housed in the two counterbores 15,and the ribs 17 of twist stop half 11 enter the recesses 18 of the twist stop half 19. At the same time, the semi-circular portion of the pin 22 protruding from the grooves 20 in the ribs 17 of each twist stop half 11, 19 enter the grooves 21 in the recesses 18 of the other twist stop half 19, 11 respectively. It is ensured on assembly that the non-grooved rib 17^1

of each twist stop half 11, 19 enters the non-grooved recess 18^1 of the other twist stop half 19, 11. Radially outwardly of the ribs 17^1 and recesses 18^1 are slots 26 which extend radially in the walls 12 substantially to the hub part 13 to facilitate the cutting and removal of yarn wraps from around the twist stop 10, without damaging any of the pins 22.

Referring now to Figs 4 to 8, there is shown the two parts of a second embodiment of twist stop device 28 in accordance with the invention. The device 28 comprises a male part 29 (Figs 4 and 5) and a female part 30 (Figs 6 and 7), which have many features corresponding with features of device 10 previously described. Such corresponding features are referenced with corresponding reference numerals. However in their embodiment, three spigots 31 are provided on the male part 29, to be received in three correspondingly positioned bores 32 in the female part 30, instead of the previously described interdigitating formations. The bores 32 each have a counterbore 33 to accommodate an enlarged head 34, of a spigot 31, formed after assembly of the two parts 29, 30. The bearing 16 is fitted to the counterbores 15 during such assembly. Instead of the semi-circular grooves 20, 21 of the previous embodiment 10, blind bores 35 in the hub part 13 of the male part 29 receive the inner ends of alternate pins 22, whilst the remainder of the pins 22 have their inner ends received in a part circular groove formed between two ribs 36 also provided on the hub part 13 of the male part 29. Corresponding pairs of ribs 36 are also provided on the hub part 13 of the female part 30. The outer ends of the pins 22 are received in similar groove/two rib formations 37 provided at alternate pin locations on the male and female parts 29, 30 respectively adjacent the peripheral rib 25.

As can be seen from Figs 3 and 8, the two twist stop halves 11, 19 or parts 29, 30, when assembled, ensure that the array of pins 22 provide a V-shaped, zig-zag path for a yarn 27 passing around the twist stop 10 or 28. The accurately produced pins 22 minimise damage to the yarn 27. Since the pins 22 are retained and protected by the peripheral ribs 25, there is less likelyhood of the twist stop being damaged, and hence replacement is less frequent than was the case with known pinned twist stops. Furthermore, since threading is easier and yarn displacement is less likely due to the presence of the walls 12, the pins 22 may be shorter than was the case heretofore, thereby making the present twist-stop less costly to manufacture than the known twist stops. Cheaper twist stops are more likely to be replaced when damaged, and therefore less poor quality yarn is likely to be produced.

Also the smaller pins provide that the present twist stop is lighter than known twist-stops, thereby ensuring longer bearing life and hence less frequent twist stop replacement. Furthermore a lighter twist stop is able to be accelerated to its operating speed by finer yarns without yarn breakage, than is the case with known heavier twist stops.

Other embodiments of twist stop in accordance with the invention will be readily apparent to persons skilled in the art. For example the pins may be inserted in holes in the periphery of a single hub part, and the two wall parts then secured to the hub part by an adhesive, by welding or by screws.

Claims

1. A twist stop device comprising a roller having an array of cylindrical pins of a wear resistant material extending outwardly thereof, with alternate pins being relatively disposed and oppositely inclined relative to a median plane of the roller whereby the array defines a V-shaped, zig-zag yarn path for a yarn running around the device, characterised in that the roller (10;28) comprises a pair of walls (12) disposed adjacent the array of pins (22) on opposed sides thereof and extending radially outwardly of the roller (10;28) at least to the outer ends of the pins (22).

2. A device according to claim 1 characterised in that the pins (22) are retained in receiving formations (20,21;35,36,37) provided in the roller (10;28).

3. A device according to claim 1 or claim 2 characterised in that the walls (12) are formed integrally with a hub part (13) of the roller (10;28) and a bearing (16) is axially located in the hub part (13).

4. A device according to any one of claims 1 to 3 characterised in that the roller (10;28) is formed in two parts (11,19;29,30) each comprising a wall (12) and a hub portion (13).

5. A device according to claim 4 characterised in that interdigitating formations(17,18) are provided on the two hub portions (13).

6. A device according to any one of claims 1 to 5 characterised in that each wall (12) comprises a peripheral lip (25) which extends over at least part of the outer ends of those pins (22) inclined towards that wall (12) and in that each wall (12) has an inwardly directed surface (23) which is inclined relative to the median plane (24) of the device (10;28) and contacts those pins (22) inclined towards that wall (12) over

the length of those pins (22).

7. A device according to any one of claims 1 to 6 characterised in that the pins (22) are inclined at an angle of between 15° and 30° relative to the median plane (24) and are disposed at equi-angularly arranged locations.

8. A device according to claim 7 characterised in that there are two diametrically opposed locations at which no pin (22) is provided, and in that a slot (26) is provided in the walls (12) each location having no pin (22) disposed thereat.

9. A device according to claim 4 characterised in that at least one spigot (31) is formed on one of the hub portions (13) and for the or each spigot (31) a bore (32) is provided in the other of the hub portions (13) adapted to receive a spigot (31) therein.

10. A device according to claim 4 characterised in that the two roller parts (11,19;29,30) are secured to each other by an adhesive.

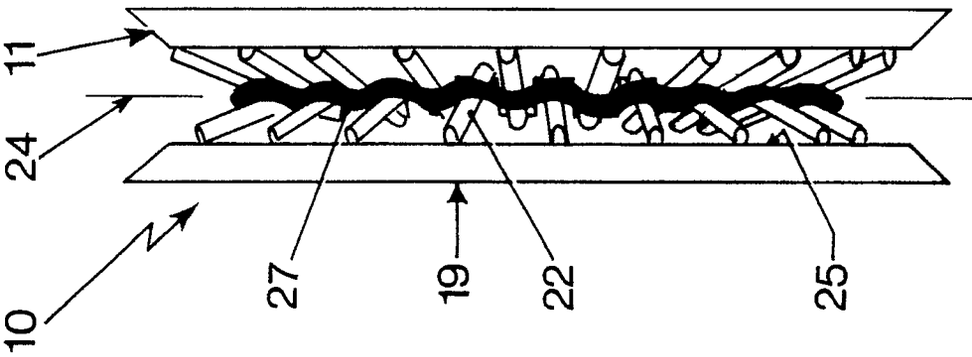

FIG.3

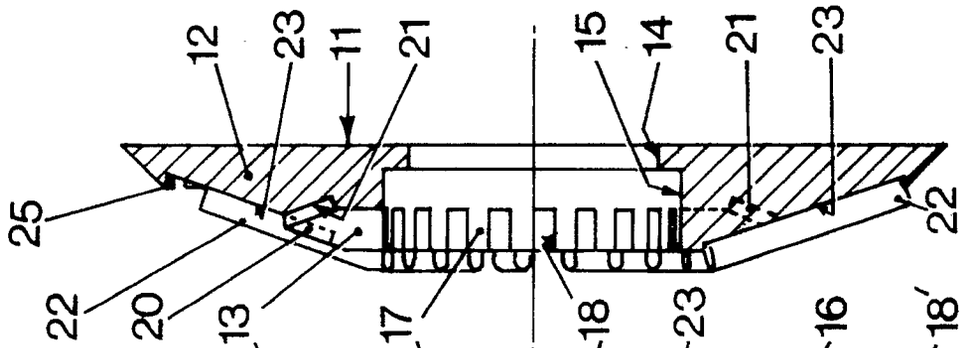

FIG.2

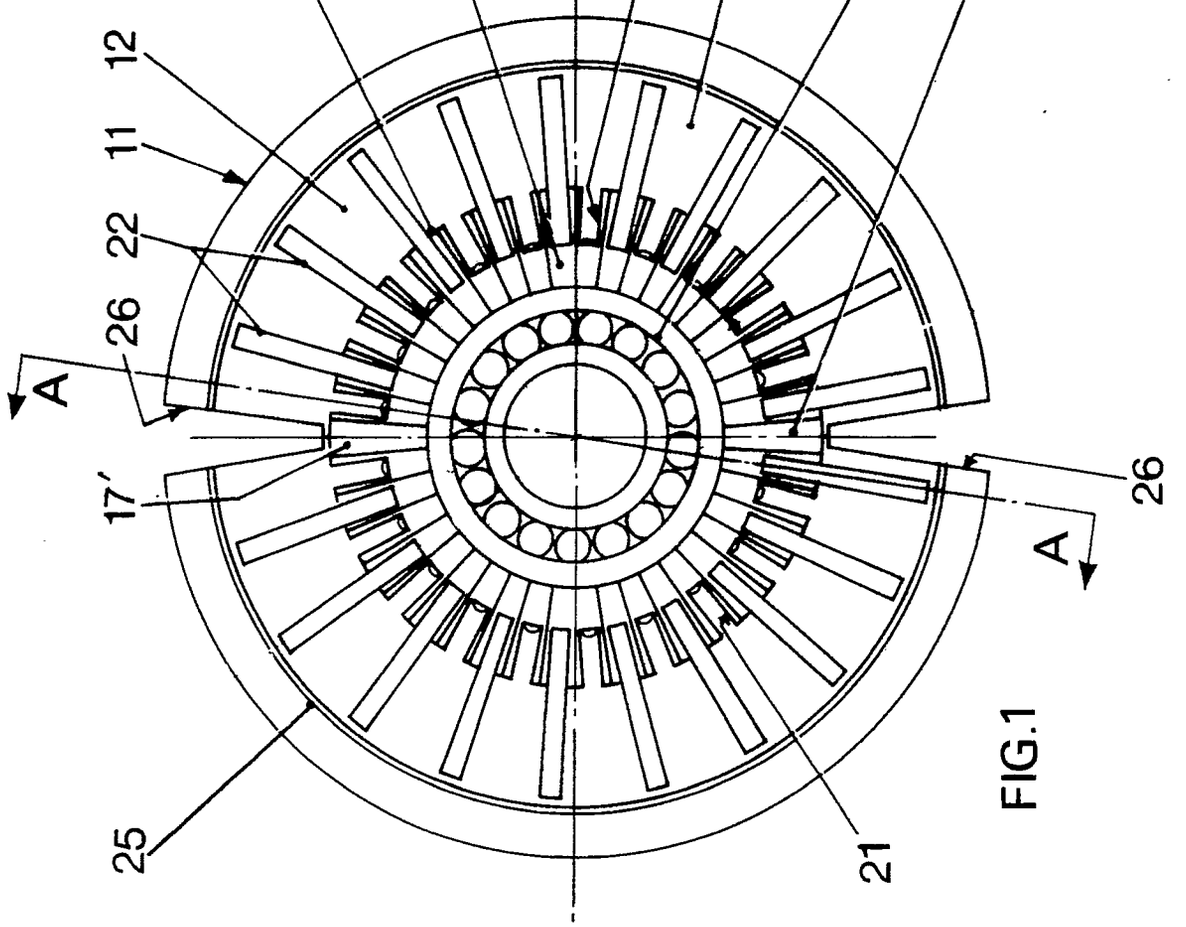

FIG.1

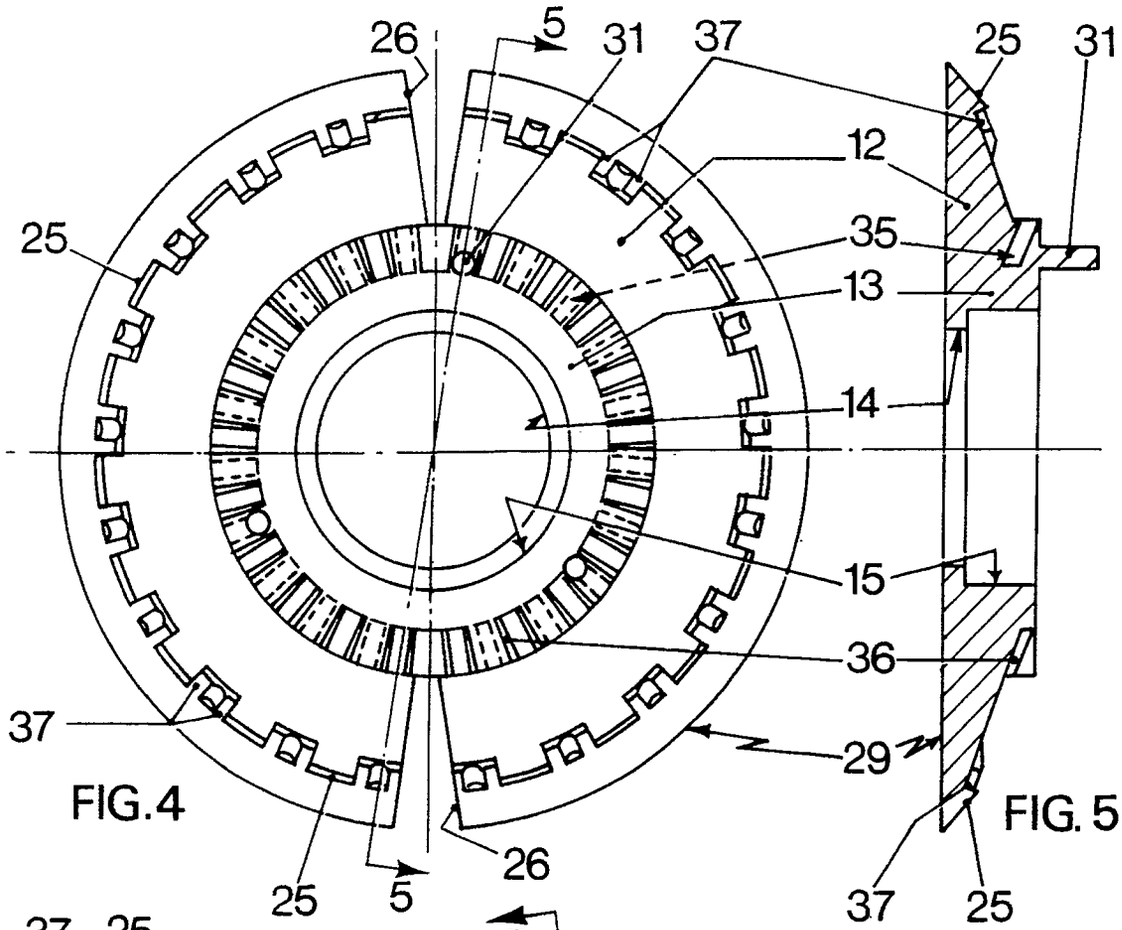

FIG.4

FIG. 5

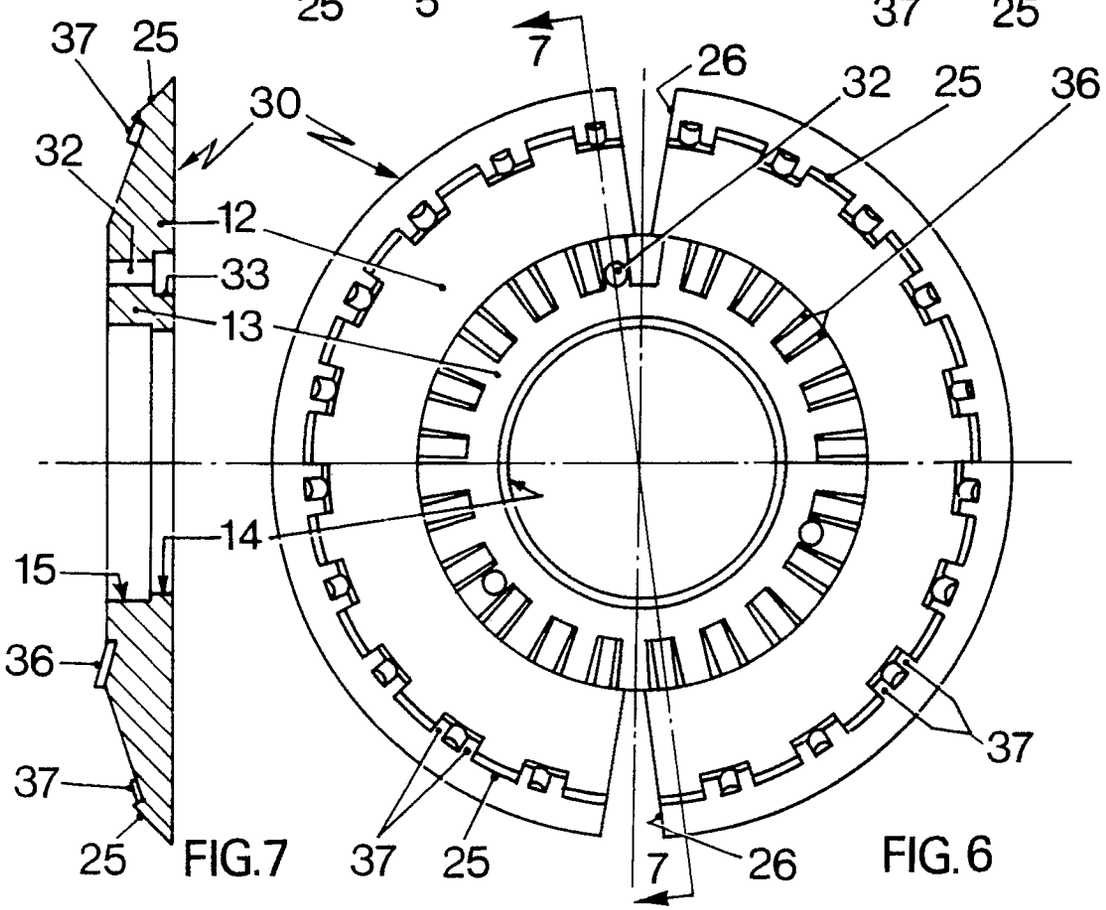

FIG.7

FIG.6

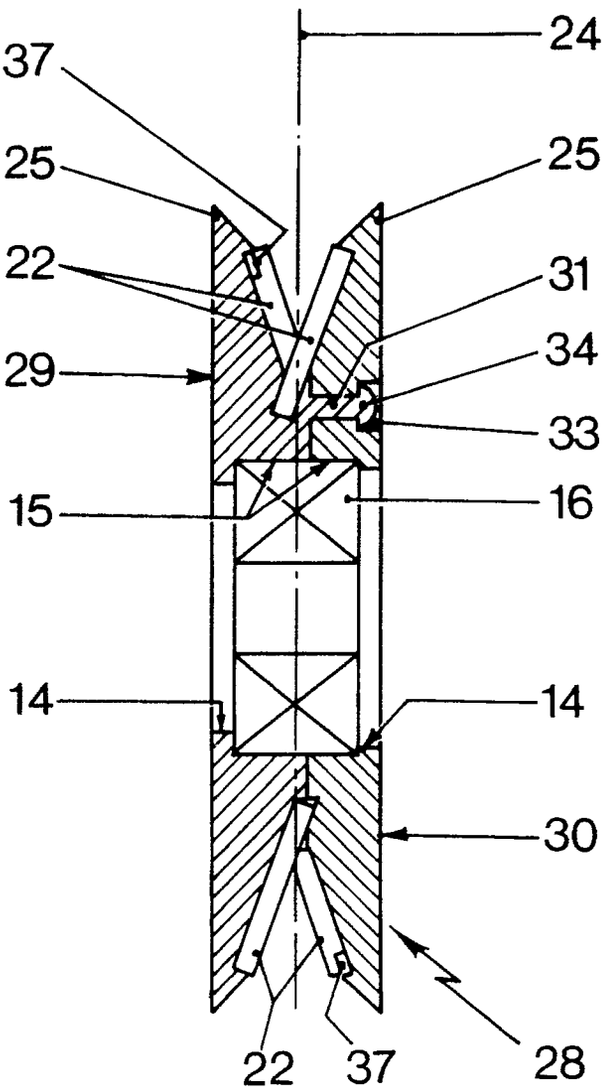

FIG.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 3743

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D	GB-A-1 297 097 (ZINSER TEXTILMASCHINEN GMBH) * page 1, line 67 - line 94 * * * page 3, line 32 - line 71; claim 1; figures 3-6 * *	1	B 65 H 59/16 B 65 H 57/14 D 02 G 1/02
A	BE-A-4 889 28 (L.L.HERREWEGHE) * page 2, line 31 - page 3, line 7; claim 2; figures 1,2 * *	1	
A	US-A-2 714 494 (EDWARD A. WENTZ) * column 2, line 40 - line 60; figures 3,5 * *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 H
D 02 G
D 01 H

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	11 October 91	TAMME H.-M.N.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
A: technological background
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