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(54) A yarn feed device for textile machines.

(57) The yarn feed device (1) provides a first intermediate yarn guide (20) allowing the yarn to form at least one arc of tangency to the side surface (40) of a feed member (4) in continuous rotation, in such a way that the yarn (10) only adheres to the yarn feed device (1) when the former is under tension on being required by the needle. The side surface (40) is provided with an annular region (42) of upwardly increasing diameter. Furthermore, the position of the first intermediate yarn guide (20) may be moved rotatably under control around the feed member (4), thereby changing at will the length of the arc of tangency of the yarn (10) to the feed member (4).

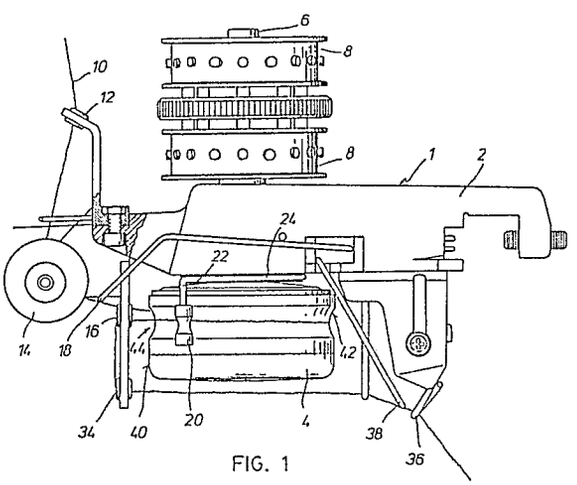

FIG. 1

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Description

A YARN FEED DEVICE FOR TEXTILE MACHINES

The invention relates to a yarn feed device for textile machines, of the type comprising an inlet yarn guide for receiving the yarn from a package, cone or like supply member; a feed member having a generally cylindrical side surface which may be engaged by the yarn extending from the inlet yarn guide; means for causing said feed member to rotate; an outlet yarn guide from which the yarn is supplied to a needle of a textile machine; a first intermediate yarn guide and at least one second intermediate yarn guide substantially adjacent said inlet yarn guide, such that the yarn extending from the inlet yarn guide to the first intermediate yarn guide and from the latter to the second intermediate yarn guide maintains at least one arc of tangency with the supply member which jointly are substantially smaller than the total perimeter of said member, the side surface of the feed member being adapted to pull the yarn engaging the surface in these arcs of tangency only when the yarn is under tension, on being required by the needle.

A feed device of the above type is disclosed in EP 0 252 866, (U.S. 4.754.936, Japan 62-154574) and provides satisfactory service, generally speaking.

Nevertheless, a sufficiently rapid response is not always obtained in the feed process on certain occasions, when the needle requires yarn and places it under tension, since the formation of an effective adherence between the yarn and the side surface of the feed member is delayed a few moments in certain cases.

To overcome this drawback, the invention provides a feed device of the type described wherein the side surface of said feed member is provided with an annular region of upwardly widening diameter regularly engaged by the yarn to be fed such that when the yarn is subjected to tension it tends to climb up a short stretch of said portion.

In this case, subjecting the yarn to tension causes it to rise to a higher level, whereby it immediately engages a larger diameter and, therefore, the adherence and consequent traction or feed takes place practically immediately.

Furthermore the known yarn feed device provides for the arcs of tangency of the yarn with the side surface of the feed member to be constant. Therefore, the feed device does not allow any distinction to be made between yarns having different adherence characteristics relative to the feed member.

The invention allows this important differentiation of yarns of differing degrees of adherence to be set up and it is achieved in that said first intermediate yarn guide may be caused adjustably to rotate around the feed member, whereby it varies the length of said arc of tangency of the yarn with said feed member.

In this way, the first intermediate guide member is adjusted so as to provide a notable extension of the arc of tangency when feeding low adherence yarns and for said extension to be reduced as the adherence increases. This obviously leads to greater regularity in the feed, independently of the degree of adherence.

Other advantages and features of the invention will be appreciated from the following description in which there are described preferred embodiments of the invention, without any limitation, with reference to the accompanying drawings, in which:

Figure 1 is an elevation view of the feed device of the invention.

Figure 2 is an upper plan view of the feed device of Figure 1.

Figure 3 is a schematic view of the feed member relative to the inlet yarn guide, the first intermediate yarn guide and the second intermediate yarn guide.

Figure 4 is a similar view of Figure 3, but showing a different position of the first intermediate yarn guide.

Figures 5 to 9 incl. are partial views of the feed member, showing the removable external jacket in section.

Figure 10 is a schematic partial view of an axial rod belonging to a rod set, the sheath covering them appearing in section.

Figure 11 is a perspective view of the first intermediate yarn guide support ring and of the yarn guide itself.

Figures 12 and 13 are perspective views of other embodiments of the first intermediate yarn guide; and

Figure 14 is a perspective view of support ring mounting member.

The feed device 1 comprises a frame 2 in which there is mounted a feed member 4 which is rotatable around a shaft 6. The feed member 4 is coaxial with pulleys 8 which may be driven by a belt or like means (not shown); the mechanical connection between the pulley and the feed member causes the latter to rotate when the pulley 8 is driven.

The feed device 1 receives yarn 10 from a yarn package, cone or like member 13, not shown. Preferably the yarn passes through an outermost yarn guide 12 and thereafter through a passage defined between two mutually facing discs 14, only the front one being visible in Figure 1. The discs are adapted to detect any undesirable thickening or irregularity in the yarn 10. Thereafter the yarn passes to an inlet yarn guide 16 and a first sensor 18 is located in the yarn path from the discs 14 to the inlet yarn guide 16 to bear against the yarn 10, so that any breakage of the yarn is detected by the sensor.

Located not immediately adjacent the inlet yarn guide 16 around the feed member 4 there is a first intermediate yarn guide 20, mounted on a vertical arm 22 of a support ring 24 which, in turn, is mounted on a mounting member 26 concentric with the feed member 4. The mounting member 26 does not rotate with the feed member 4, although it may be rotated with stepless adjustment, as described hereinafter.

The yarn extends from the inlet yarn guide 16 and

sensor 18 to the first intermediate yarn guide 20, holding itself tangential, along an arc of circumference, to the feed member 4. From said first intermediate yarn guide 20, the yarn extends to a second intermediate yarn guide 28 (Figures 3 and 4) located adjacent the inlet yarn guide 16, possibly forming a further tangent with the feed member 4.

Where the feed member 4 rotates in the direction of the arrow 30, the second yarn guide 28 is located as shown in Figures 3 and 4. Where rotation is in the opposite direction, said second yarn guide referenced as 32, is located on the other side of the inlet yarn guide 16. As is logical, in this case the yarn 10 would surround the member 4 in the opposite direction to the one shown.

From the second intemediate yarn guide 28 (or, as the case may be, from the yarn guide 32), the yarn extends to a third intemediate yarn guide 34 and therefrom to an outlet yarn guide 36, such that said yarn 10 is located out of engagement with the feed member 4. A second sensor 38 bears against the yarn in this last path to detect any yarn breakage.

The third intermediate yarn guide 34 is not required if the yarn has to extend of necessity remote from the feed member from the second yarn guide 28 (32) to the outlet yarn guide 36.

The yarn extends from the outlet yarn guide 36 to a needle, not shown, with the possible intervention of other mechanisms which need not be described for an understanding of the feed device of the invention.

The feed member 4 is provided with a side surface 40 adapted to pull the yarn in engagement therewith, when the yarn is placed under tension on being required by the needle.

As explained above, the engagement between the surface 40 and the yarn 10 only takes place along the arcs of tangency as described above. In all, the length of said arcs is substantially smaller than the length of the circumference equivalent to the perimeter of the feed member.

To provide for pulling of the yarn, the surface 40 may not be smooth polished metal, since there would be no adherence in this case and the yarn would slide over the surface 40 and there would be no feed. To provide for pulling of the yarn, it is contemplated that the surface 40 be made of rubber, leather, synthetic elastomers, plastics or like materials. It is also contemplated that the lateral surface 40 of the feed member 4 be metallic and be provided with striations, knurling or any other type of roughness. Under these conditions, there is the necessary adherence for pulling the yarn, although in certain cases the yarn may be damaged by contact with the hard metal surface or by any surface snag thereof.

The feed member 4 is rotating while the textile machine is running. When the needle does not require yarn, the latter is not under tension and therefore the tangential portions of the yarn 10 slide gently over the surface 40, without adhering thereto, whereby the yarn is not fed. When the needle requires yarn to knit, the yarn, and therewith the arcs of tangency, is placed under tension, is forceably engaged with the member and thus the yarn is fed and the needle receives the yarn it needs. Likewise, this yarn feed is interrupted when the needle ceases to need yarn, since the tension is also released.

The operation of the yarn feed if remarkably improved, according to the invention, if the said side surface 40 is provided with an annular region 42 of upwardly increasing diameter, instead of being cylindrical.

In this case, when the yarn is placed under tension, it rises a short distance up the said annular region whereby it engages a larger diameter level of the feed member, improving the adherence and the response speed in the feed process.

The annular region 42 preferably forms part of a concave portion 44, as shown. e.g., in Figure 1. Nevertheless, the concave portion may adopt diffetent forms, such as those illustrated as an example in Figures 5 to 9, where the annular region 42 is also seen to be capable of forming part of a conical portion of the side surface 40.

The invention also contemplates that the feed member 4 be surrounded with a removable outer jacket 46, i.e. which may be removed when necessary, e.g. as a result of wear. Said jacket is seen in section in Figures 5 to 9. The jacket 46 may also be mounted on a sleeve (not shown) which in turn may be mounted on the feed member 4.

Furthermore the feed member is preferably a drum having a generally continuous side surface. Nevertheless, the invention also includes an embodiment in which the feed member is formed by two parallel discs 48, provided with axial rods 50 in the periphery thereof, distributed evenly in a circle. The side surfaces 52 of said rods replace, discontinuously, the continuous surface of said drum.

The said annular region of upwardly widening diameter is also to be found on the side surface of said rod. In correspondence with that was said above, there is also contemplated the provision of sheaths 54 surrounding the rods 50. Analogously also to the previous embodiment having a continuous surface, the rods may be concavely formed as shown in Figure 10 or may adopt other forms of concavity or even be frustoconical.

It is possible successively to operate with different types of yarn with one same feed member 4, the difference lying principally in the degree of adherence to the side surface 40 of the feed member 4.

It is obvious that the adherence and, therefore, the capacity of traction of the yarn feed device varies in dependence of the length of the areas of tangency of the yarn 10 around the said side surface 40.

This highlights the interest in being able to vary the position of the first intermediate yarn guide 20. As said above, this is mounted on a vertical arm 22 of a support member 24, from which a radial arm 23 extends.

The ring 24 fits in a groove 56 of the mounting member 26 and, due to such fitting, the first intermediate yarn guide 20 may rotate adjustably around the feed member. Figure 3 shows a position of maximum yarn wrap, in which the arc of tangency between points A and B is greater. Figure 4, in turn, shows the minimum wrap position showing arcs of tangency between points C and D and between points E and F, the sum of which is less than the

curved length between A and B.

Adjustment may be readily effected by hand, depending on observations of the feed in each case.

The first yarn guide 20 is preferably formed by a ceramic cylinder, as shown in Figures 1 and 11, although it may have other suitable configurations, such as a closed eye (Figure 12), open eye (Figure 13) or other technically compatible forms.

Claims

1.- A yarn feed device for textile machines, of the type comprising an inlet yarn guide for receiving the yarn from a package, cone or like supply member; a feed member having a generally cylindrical side surface which may be engaged by the yarn extending from the inlet yarn guide; means for causing said feed member to rotate; an outlet yarn guide from which the yarn is supplied to a needle of a textile machine; a first intermediate yarn guide and at least one second intermediate yarn guide substantially adjacent said inlet yarn guide, such that the yarn extending from the inlet yarn guide to the first intermediate yarn guide and from the latter to the second intermediate yarn guide maintains at least one arc of tangency with the supply member which jointly are substantially smaller than the total perimeter of said member, the side surface of the feed member being adapted to pull the yarn engaging the surface in these arcs of tangency only when the yarn is under tension, on being required by the needle, characterised in that the side surface of said feed member is provided with an annular region of upwardly widening diameter regularly engaged by the yarn to be fed such that when the yarn is subjected to tension it tends to climb up a short stretch of said portion.

2.- The yarn feed device of claim 1, characterised in that said annular region forms part of a concave portion of said side surface.

3.- The yarn feed device of claim 1, characterised in that said annular region forms part of a conical portion of said side surface.

4.- The yarn feed device of claim 2 or 3, characterised in that said feed member is a drum having a substantially continuous side surface.

5.- The yarn feed device of claim 4, characterised in that said drum is formed by a material selected from the group formed by rubber, leather, synthetic elastomers, plastics and like materials.

6.- The yarn feed device of claim 4, characterised in that said drum is made of metal and the side surface thereof is straited, knurled or otherwise roughened.

7.- The yarn feed device of any one of the previous claims, characterised in that said feed member comprises a removable outer jacket, formed of a material selected from the group formed by rubber, leather, synthetic elastomers, plastics and like materials.

8.- The yarn feed device of claim 7, characterised in that said outer jacket is mounted around a sleeve which, in turn, may be removably mounted on the feed member.

9.- The yarn feed device of claim 1, characterised in that said feed member is formed by a series of axial rods arranged in a circle, each rod being covered by a sheath the side surface of which is provided with an annular region of upwardly increasing diameter.

10.- The yarn feed device of any one of the previous claims, characterised in that said first intermediate yarn guide is adjustably rotatable around the feed member, thereby varying the length of said arc of tangency of the yarn relative to said feed member.

11.- The yarn feed device of claim 9, characterised in that said first intermediate yarn guide is generally cylindrical with an annular groove.

12.- The yarn feed device of claim 11, characterised in that said first intermediate yarn guide has the form of a closed eye.

13.- The yarn feed device of claim 12, characterised in that said first intermediate yarn guide has the form of an open eye.

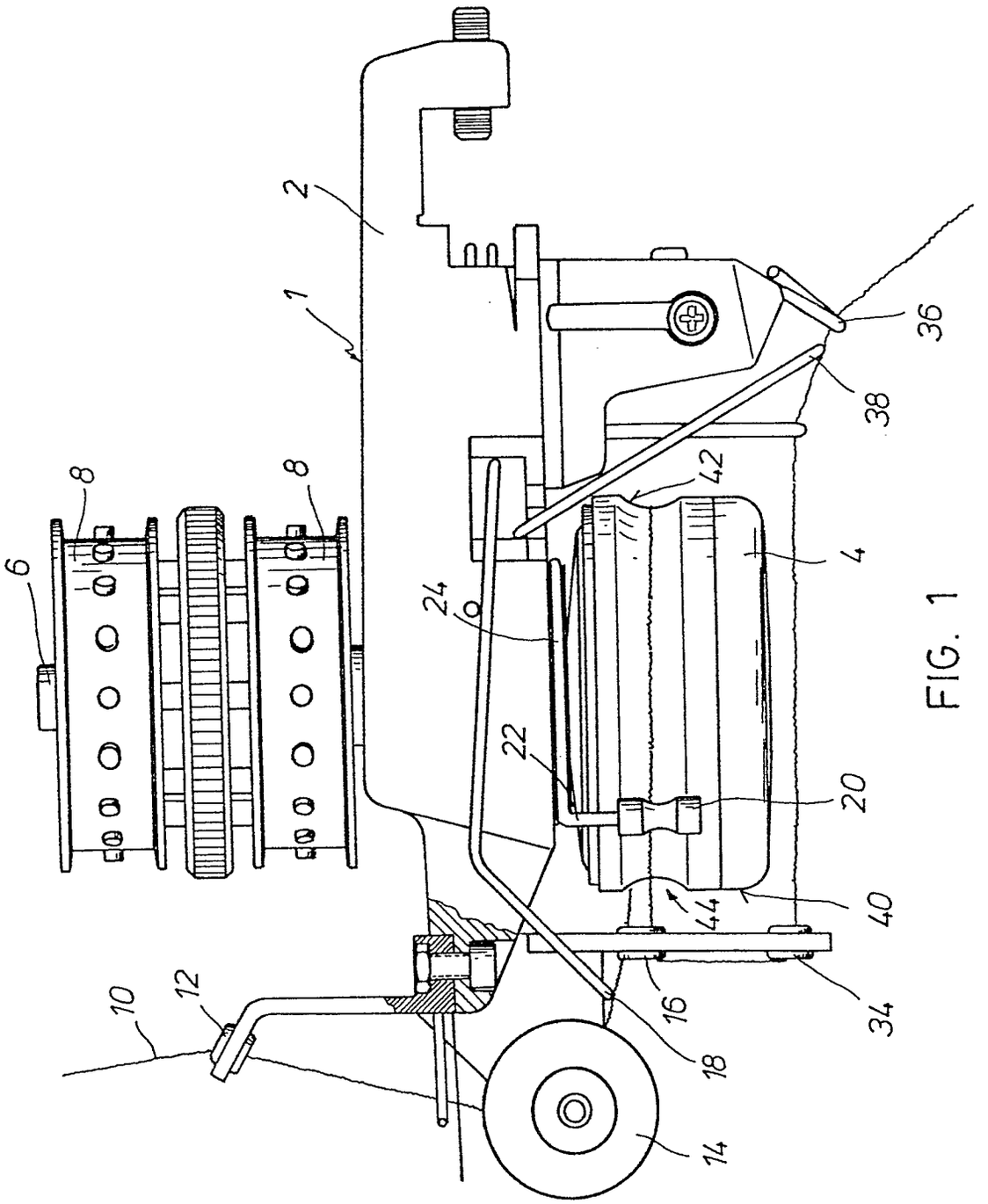

FIG. 1

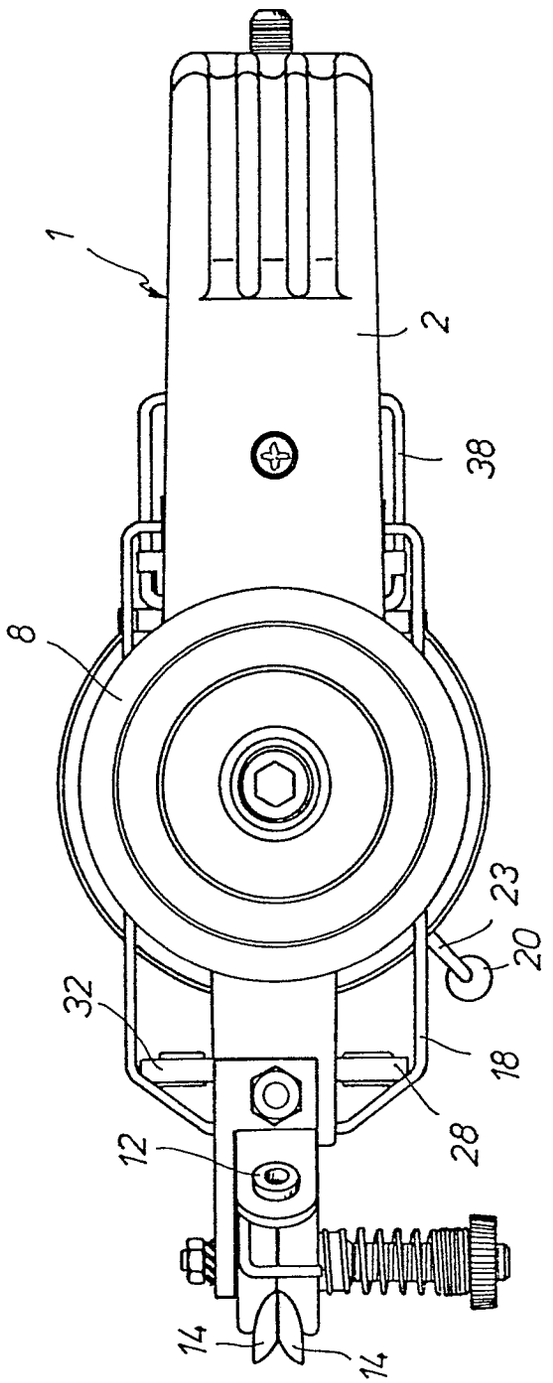

FIG. 2

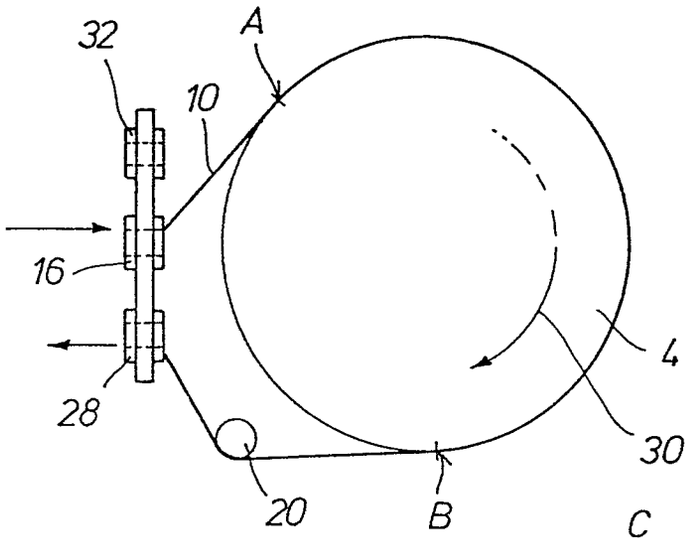

FIG. 3

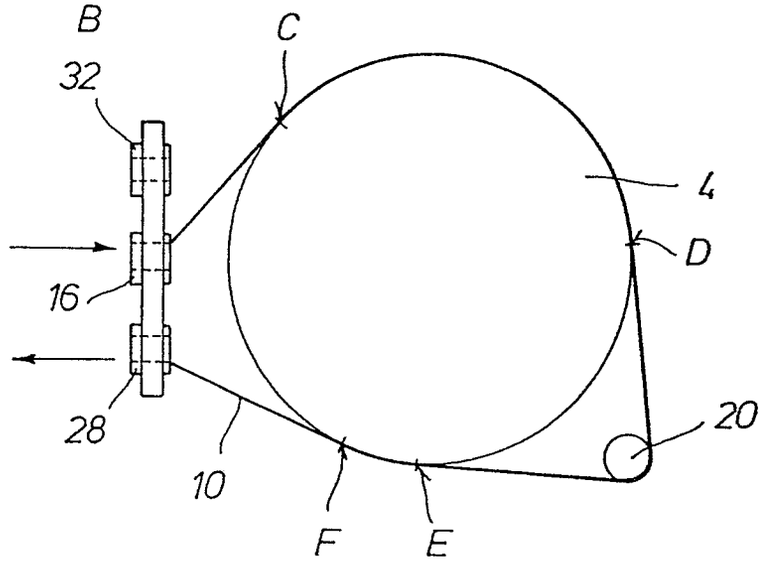

FIG. 4

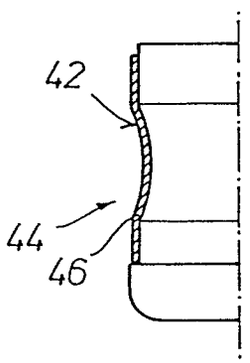

FIG. 5

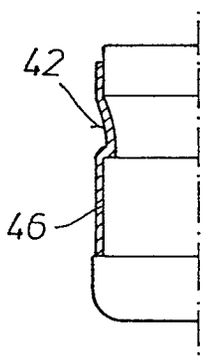

FIG. 6

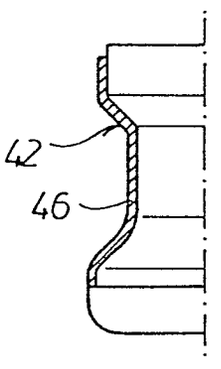

FIG. 7

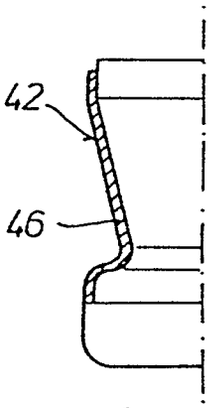

FIG. 8

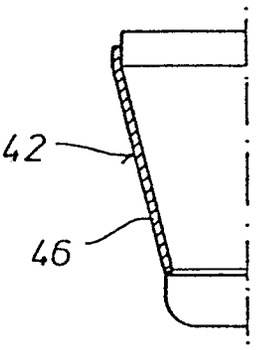

FIG. 9

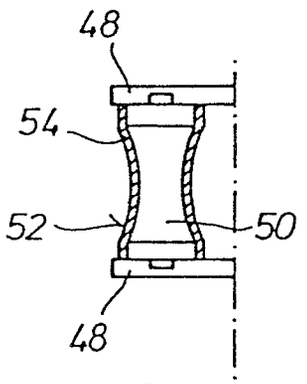

FIG. 10

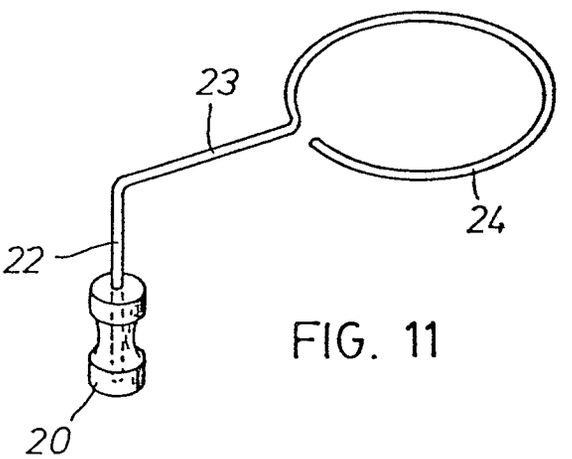

FIG. 11

FIG. 12

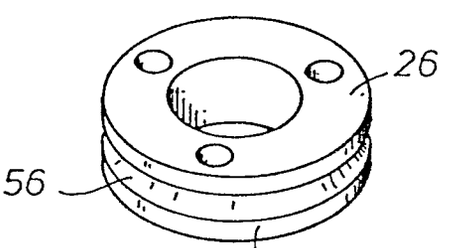

FIG. 14

FIG. 13

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 50 0122

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.4)
X	GB-A-2156867 (SIPRA PATENTENTWICKLUNGS- UND BETEILIGUNGSGESELLSCHAFT MBH) * page 2, line 64 - page 3, line 33 * * page 3, line 64 - line 74; figures 1, 2, 4 * ---	1, 2, 4, 5, 7, 10, 12	D04B15/48 B65H51/08
A	FR-A-1431200 (PALITEX PROJECT-COMPANY GMBH) ---		
A	FR-A-2112833 (STEIN) ---		
A	FR-A-1133959 (G. STIBBE & CO LTD) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

D04B

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 MARCH 1989	VAN GELDER P.A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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