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

(11) EP 1 726 692 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.11.2006 Bulletin 2006/48

(51) Int Cl.:
D01G 19/20 *(2006.01)*

(21) Application number: **06114307.9**

(22) Date of filing: **22.05.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **26.05.2005 IT MI20050975**

(71) Applicant: **MARZOLI S.p.A.**
25036 Palazzolo Sull'Oglio,
Brescia (IT)

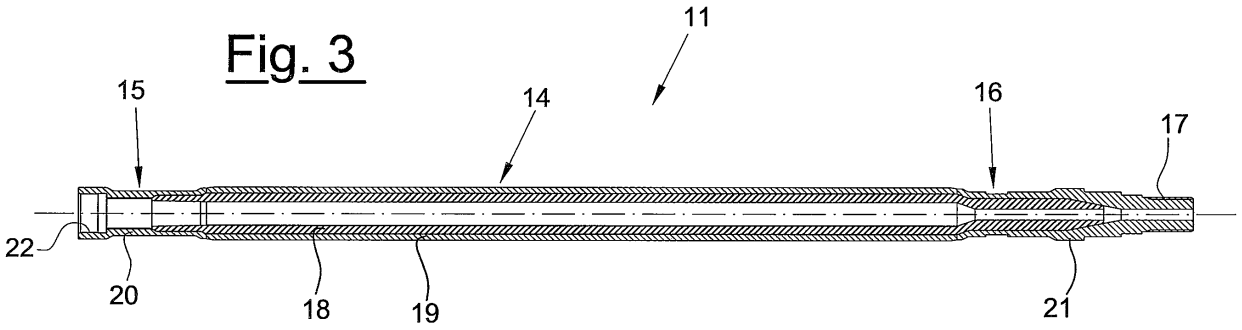
(72) Inventor: **Buccio, Giulio**
25039, Travagliato (Brescia) (IT)

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

(54) Detaching roll for a combing machine

(57) The invention regards a detaching roll (11) for combing machines of textile fibres, composed of a central segment (14) of cylindrical shape, equipped with an outer surface which is scored and resistant to wear, the ends of which form a female coupling component (15) and a male coupling component (16), complementary with each other, to join all of the detaching rolls of the same combing machine into a single bar with central drive, made internally hollow and preferably as a plurality of pieces assembled together, made with light materials.

Fig. 3



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Description

[0001] The present invention relates to the combing operation of textile fibres, during which time fibres in the form of a thin matt, usually called lap, rolled into a roller package obtained by joining and drawing of several fibre bands produced by carding, are worked with intermittent and synchronous motion by a series of bodies, advancing rolls, pinching means, circular and rectilinear combs, and others. These cooperate with each other to select and transfer long, drawn, combed and extended fibre tufts from said rough lap feeding to a new lap which constitutes a product of greater value, with more parallel fibres and with a smaller content of short fibres, of "neps" and micro-impurities, which are separated during the treatment. The laps produced by means of combing procedure are therefore made of cleaner, more regular and more resistant combed fibres. The short fibres are instead separately recovered and constitute a sub-product which may be used for articles of lesser value. Greater details regarding combing operations and machines employed for undertaking them are related in the European patent No. 573.121 by the same applicant.

[0002] Generally, the combing machines are composed of several combing stations or "heads", with ten heads per machine. The laps treated by the combing heads of the machine are then united to form a web or belt of combed fibres. The combing heads of the combing machine are generally equipped with common drives and controls, which are jointly started and stopped.

[0003] The fundamental combing operations, which in the more recent embodiment machines take place at the rhythm of 450 - 500 strokes per minute, may thus be summarised:

- intermittent feeding of the lap;
- combing the top of the fringe, by means of a rotating comb with one of its circular sectors equipped with points; the fringe is held firm by means of a two-jaw nippers;
- combing the end by means of a rectilinear comb;
- joining the top of the fringe to the web, already combed in the previous cycle, which is for such purpose withdrawn by the detaching rolls during their retrograde direction rotation,
- detachment and drawing of the combed tuft by the detaching rolls during their rotation in the advancing direction.

[0004] It is evident that the stress of the moving parts, which are subjected to repeated stops and restarts, constitutes one of the critical design aspects of the combing machines. In particular, the detaching rolls are subjected to peaks of tangential acceleration which reach tens of thousands of radians per second squared (rad/s^2), and their driving and stopping is particularly burdensome for the machine's drive and control devices.

[0005] In particular, detaching rolls are arranged in couples, each couple being composed of a first roll in metallic material, with scored surface, whose motion is driven by control means, and by a second roll in an elastic material, preferably of hard rubber, with smooth surface, led in rotation by said metallic roll, with respect to which it is in contact with pressure. In particular, said two rolls will be identified in the following description as the motorised detaching roll and idle detaching roll, respectively.

[0006] To simplify the combing machine, the motorised detaching rolls of the combing heads of the combing machine are firmly joined to each other to form a bar, the motorised detaching rolls of all combing heads being then connected and operated by a single, common drive body. One drawback of this device is the multiplication of the inertial load which this single driving body must counter both in regular operation and in the starting and stopping steps of the detaching rolls.

[0007] The invention therefore involves the reduction of the mass inertia moment of the motorised detaching rolls, with the goal being to lessen the stress on the respective control devices.

[0008] The solution of this problem must take into account particular structural bonds of the motorised detaching rolls, set by their particular function. Indeed, the surface of the (metallic) motorised detaching rolls must be resistant to wear and preferably treated for hardening. Moreover, due to the pressure load which acts on these rolls due to the idle detaching rolls, the rod composed of the succession of motorised detaching rolls connected with each other is subjected to bending forces. To overcome this drawback at least in part, at least one smooth portion is prearranged on the detaching rolls, which serves as a support for the intermediate support bearings foreseen on the different combing heads.

[0009] One object of the present invention is therefore to make a motorised detaching roll with reduced inertia in rotation.

[0010] A second object of the present invention is to make a motorised detaching roll with sufficient rigidity to ensure that the rod composed of the succession of detaching rolls does not bend due to the pressure exerted on it by the idle detaching rolls.

[0011] A further object of the present invention is to ensure a greater productivity of a combing machine through a greater operating factor.

[0012] The objects according to the present invention are attained by making a detaching roll as set forth in claim 1.

[0013] Further characteristics of the detaching roll are foreseen in the dependent claims.

[0014] The present invention will now be described in an illustrative but not limiting manner, according to one of its preferred embodiments, with particular reference to the figures of the attached drawings, wherein

- Figure 1 illustrates the operation of the combing machine,
- Figure 2 shows a side view of a motorised detaching

roll,

- Figure 3 shows a section view of a motorised detaching roll according to a first embodiment of the present invention,
- Figure 4 shows a section view of the different components of the motorised detaching roll of figure 3,
- Figure 5 shows a section view of a motorised detaching roll according to a first embodiment of the present invention, and
- Figure 6 shows a section view of the different components of the motorised detaching roll of figure 5.

[0015] With reference to figure 1, a combing head is schematically shown. In particular, a package 1 of unwinding lap is shown, resting on unwinding rollers 2 which make it rotate in counter-clockwise direction. The strip 3 of unwound lap first passes over the upper face of the strip junction body 4, which during normal operation remains inactive and acts as a simple support, and is brought downstream with the motorised drive roller 5. The lap strip 3 is guided with the adjustable guide 6, is drawn by the feeding roll 8 and enters into the actual combing step.

[0016] The bodies which carry out the actual combing are the nippers group 7, the feeding roll 8 of the lap, the rectilinear comb 9, the rotating comb 10, the detaching rolls 11, 12 and the counter-roller cleaner 13.

[0017] In particular, the nippers group 7 has two jaws which open and close with alternating motion during the different combing steps, and in particular are closed while the rotating comb 10, rotating, combs the top of the fringe with one of its circular sectors equipped with points, and are open while the detaching rolls 11, 12 make the tuft advance, whose end is simultaneously combed by the rectilinear comb 9.

[0018] The detaching rolls 11, 12 of alternating clockwise - counter-clockwise motion, rotating in one direction or in the other permit in a first step the junction of the top of the fringe with the web which was already combed in the preceding cycle, which is for such purpose withdrawn, and a second step the detaching and drawing of the combed tuft.

[0019] Finally, the counter-roller cleaner 13, made in soft material, maintains clean the surfaces of the idle detaching rollers 11, 12.

[0020] With reference to figure 2, a motorised detaching roll 11 is shown in detail, whose central segment 14 has a cylindrical surface scored with a helical design, to better detach out the lap and to permits its combing and subsequent rejoining, and is slightly tapered (in a manner which cannot be perceived from the drawing), with conical progression respectively proceeding from the centre towards the two ends. The particular shape of the central segment 14 of the detaching roll 11 renders the cylinder itself less susceptible to bending.

[0021] At the two ends of the central segment 14, a female coupling component 15 and a male coupling component 16 are respectively arranged, whose main function is to permit the sequential mounting of two detaching rolls 11 by means of coupling of the respective complementary elements. At the same time, to the two detaching rolls mounted together it will be possible to add an additional detaching roll 11, until a bar is formed which unites together the detaching rolls of all of the combing heads of the same machine.

[0022] In particular, the female coupling component 15 and the male coupling component 16 have a smooth outer surface, the terminal part 17 of the male coupling component 16 being threaded for the coupling with the master thread of the female coupling component with a second detaching roll 11.

[0023] Figure 3 and figure 4 show in section a detaching roll 11 according to the present invention in a first embodiment according to which said cylinder is composed of a plurality of pieces mounted together, respectively showing the detaching roll 11 in its entirety and in exploded view. In particular, figures 3 and 4 show a detaching roll 11 comprising a structural core 18, composed of a substantially cylindrical hollow body with tapered ends. On the cylindrical portion of the core 18, which corresponds with the central segment 14 of the detaching roll 11, a central bush 19 is mounted whose outer surface has said scored and biconical form and whose mechanical characteristics are those typical of metallic materials treated for hardening. The two tapered ends of the structural core 18 are respectively covered by a female bush 20, which forms the female coupling component 15, and by a male bush 21, which forms the male coupling component 16. Both the female bush 20 and the male bush 21 are in turn hollow, the female bush foreseeing a master thread 22 for the screwing with the threaded part 17 of the male bush 21 of a second detaching roll 11.

[0024] The detaching roll 11 showed in figures 5 and 6, entirely similar to that shown with reference to the figures 3 and 4, differs for the presence of a master thread 23 made inside the two ends of the central bush 19 for the respective coupling with a secondary thread 24 present on the female bush 20 and a secondary thread 25 present on the male bush 21.

[0025] It is evident that the overall hollow conformation of the detaching roll 11 permits considerably lightening its mass and, consequently, diminishes its inertia.

[0026] This effect is much more evident if one considers that the realisation materials of the different components of the detaching roll 11 may conveniently be different. In particular, if it is true that the operating modes require the central bush 19 to be made with metallic materials which are resistant to wear (preferably steel treated for hardening), the female bush 20 and the male bush 21 may also be made with a light metal, such as aluminium, or with a light metallic alloy, or even with a metallic matrix composite material. Moreover, the structural core 18 is conveniently made in light materials with high modulus, such as light metals and metallic alloys or composite materials, whether or not in metallic matrix.

[0027] The central bush 19, the female bush 20 and

the male bush 21 may be mounted on the structural core 18 according to the known assembly techniques (gluing, welding or interference coupling), or they may be mounted by screwing (as in the example shown in figures 5 and 6). In particular, the assembly with gluing constitutes the preferred embodiment according to the present invention.

[0028] The obtained structure permits accomplishing its technical functions while ensuring a mechanical behaviour entirely similar to that of the detaching rolls according to the prior art, made solid however and entirely in steel.

[0029] It is also evident that the obtained structure has a smaller inertial mass, attaining the objectives which had been set out.

[0030] The present invention was described as illustrative and not limiting according to its preferred embodiments, but it should be understood that variations and/or modifications which may be produced by men skilled in the art without, for this, departing from the related protective scope, as defined by the attached claims.

Claims

1. Detaching roll (11) for combing machines of textile fibres, composed of a central segment (14) of cylindrical shape, equipped with an outer surface which is scored and resistant to wear, the ends of which form a female coupling component (15) and a male coupling component (16), complementary with each other, to join all of the detaching rolls of the same combing machine into a single bar with central drive, **characterised in that** it is hollow inside.

2. Detaching roll (11) according to claim 1, **characterised in that** it is made of a light material.

3. Detaching roll (11) according to claim 2, **characterised in that** it is made of light metal, light metallic alloys, composite materials of light metallic matrix.

4. Detaching roll (11) according to claim 1, **characterised in that** it is composed of a hollow structural core (18) resistant to bending, on which an outer central bush (19) is mounted having an outer surface which is cylindrical, scored, metallic and resistant to wear, and at the ends of which a female bush (20) and male bush (21) are mounted, complementary to each other.

5. Detaching roll (11) according to claim 4, **characterised in that** said structural core (18) is made in high modulus light material, such as light metals, light metallic alloys or composite materials.

6. Detaching roll (11) according to claim 4, **characterised in that** said female bush (20) and said male bush (21) are made with light metals or their alloys, or with metallic matrix composite materials, adapted to be mechanically worked for their coupling.

7. Detaching roll (11) according to claim 4, **characterised in that** said core (18) and said bushes (19, 20, 21) are coupled by gluing, welding, interference coupling or screwing.

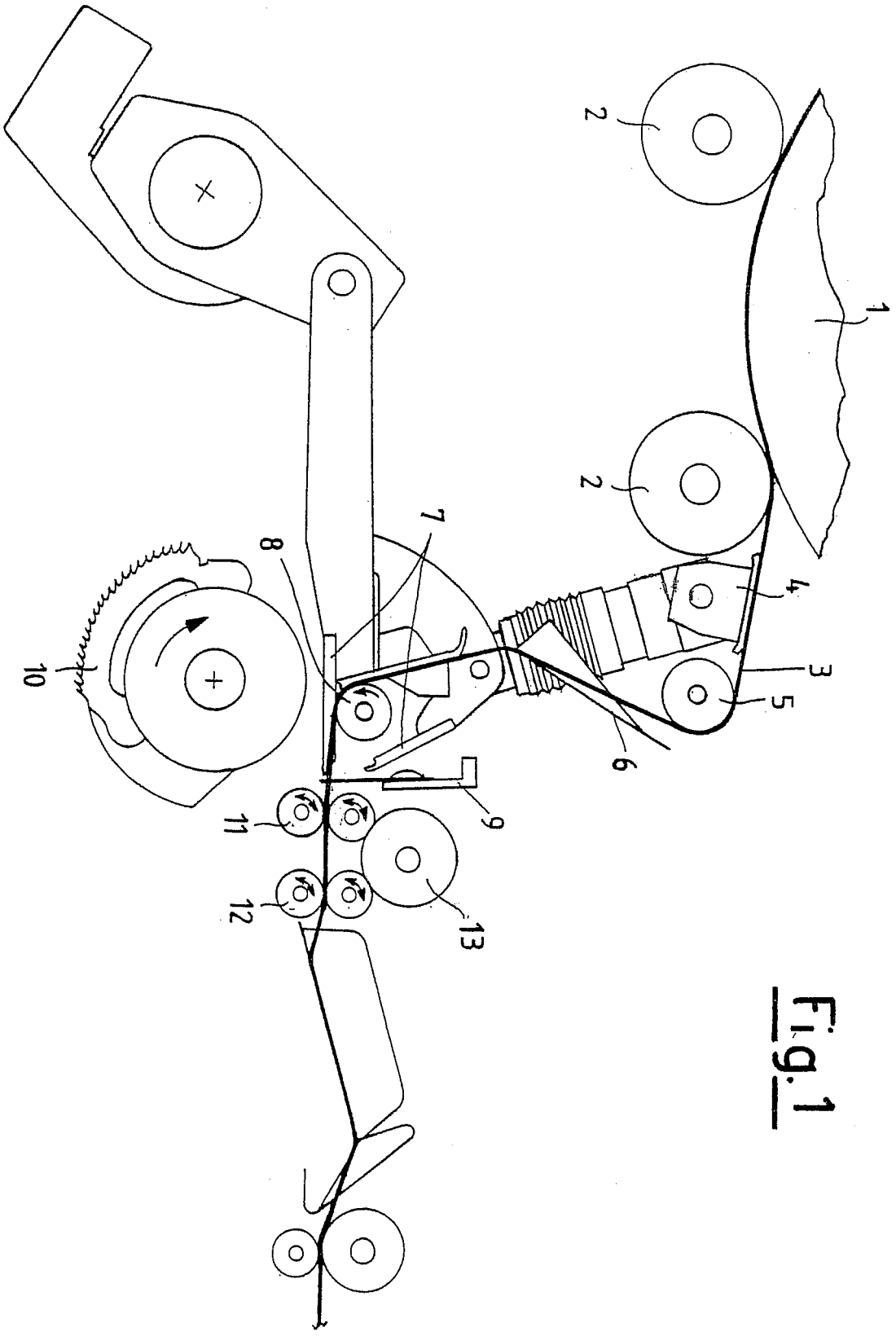

Fig.1

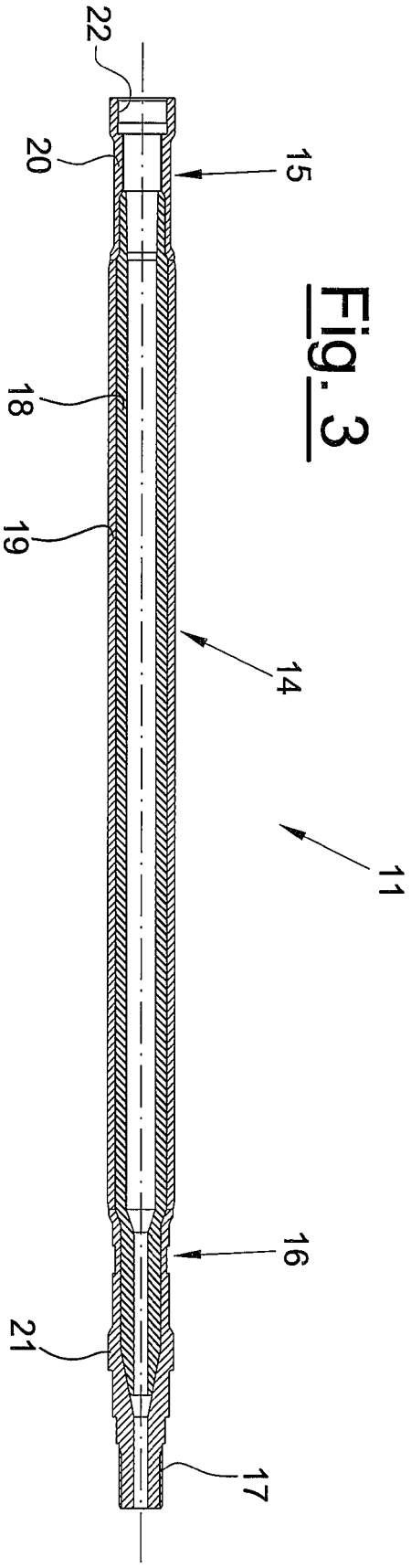

Fig. 3

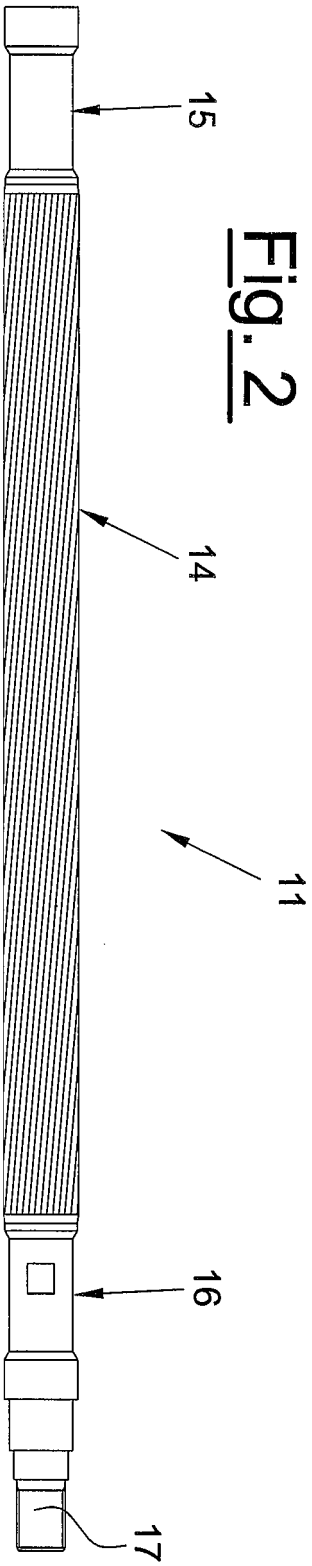

Fig. 2

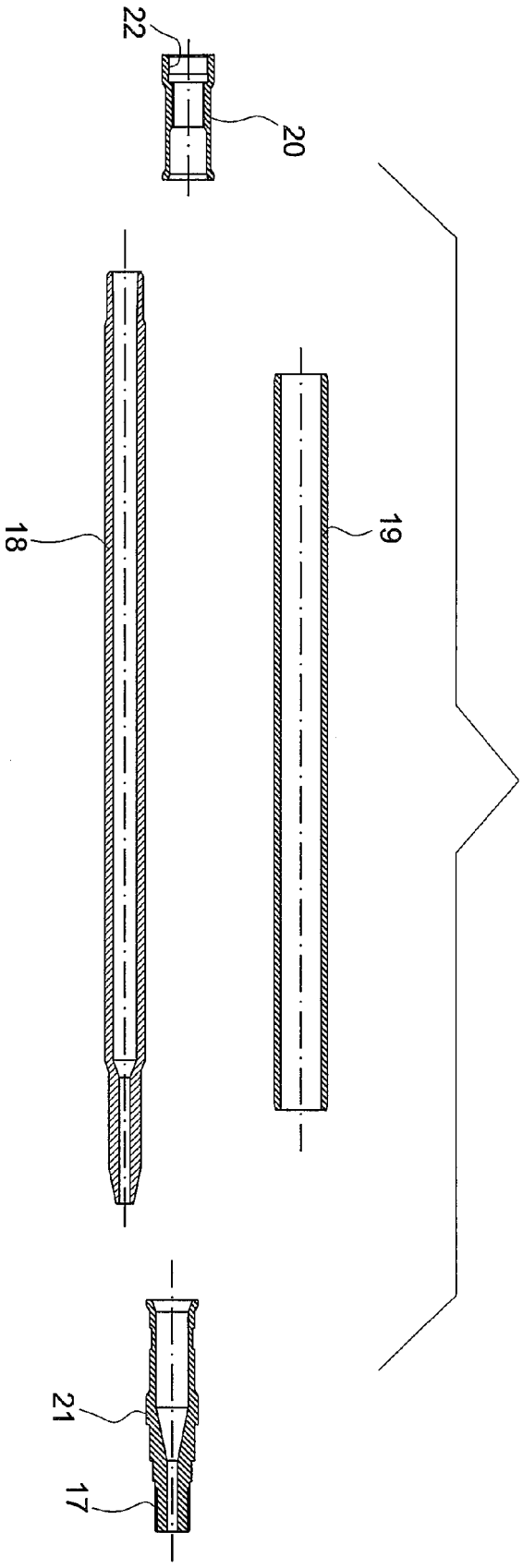

Fig. 4

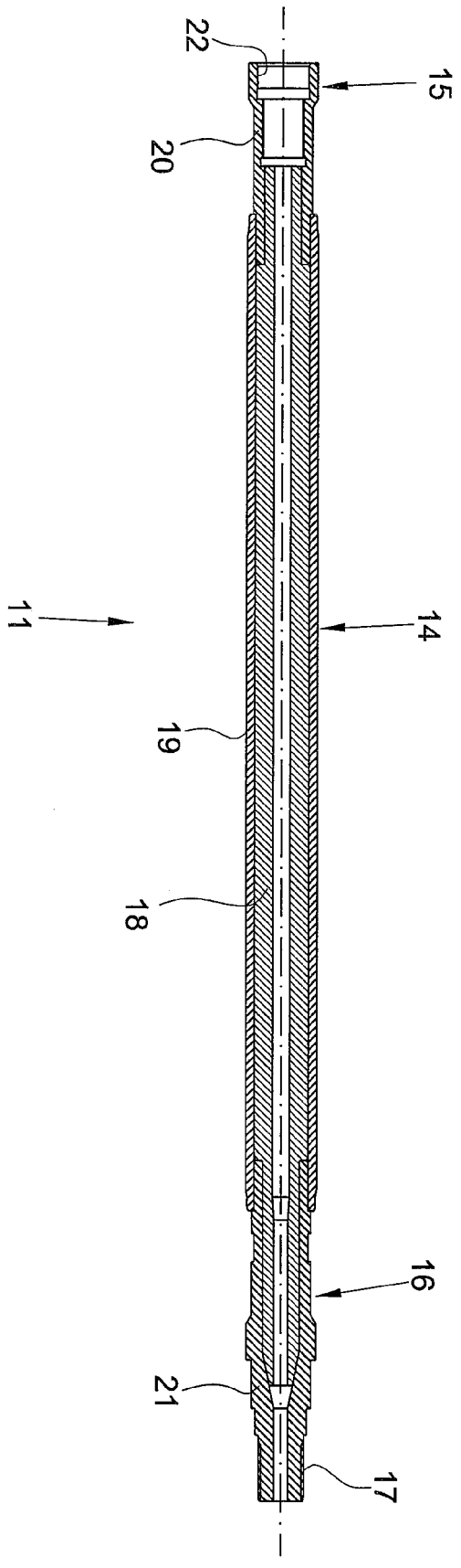

Fig. 5

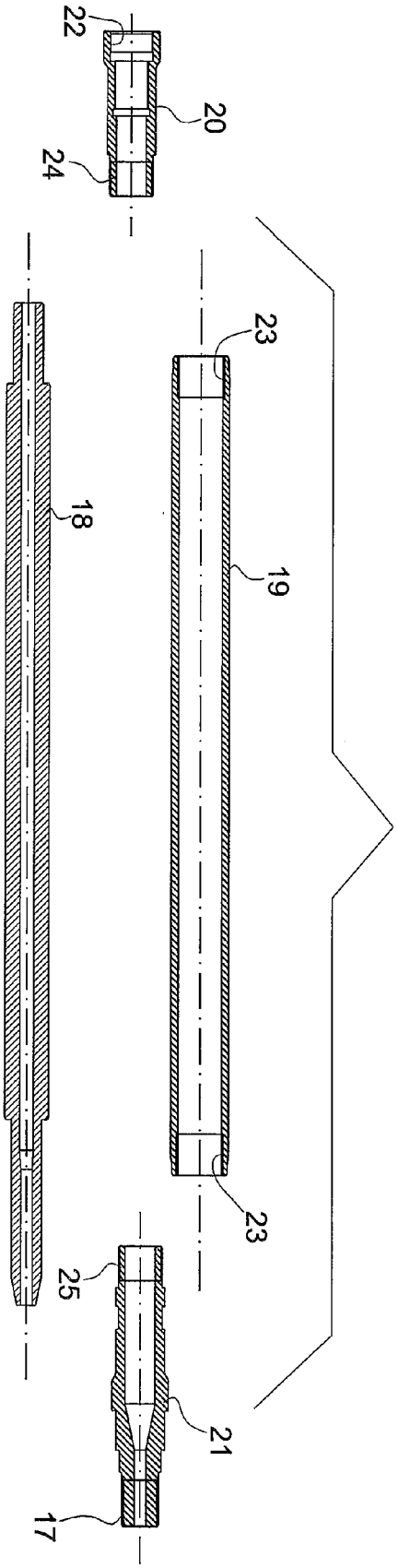

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 4307

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 August 2006	D'Souza, J

CATEGORY OF CITED DOCUMENTS

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