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

(11) Publication number: **0 420 348 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90202539.4**

(51) Int. Cl.5: **D01H 5/72**, B65H 51/16

(22) Date of filing: **25.09.90**

(30) Priority: **29.09.89 IT 2190089**

(43) Date of publication of application:
03.04.91 Bulletin 91/14

(84) Designated Contracting States:
BE CH DE ES FR GB GR LI

(71) Applicant: **SAVIO S.p.A.**
Via Udine 105
I-33170 Pordenone(IT)

(72) Inventor: **Sartoni, Sandro**
Via Pendini 1/A
I-40026 Imola, Bologna(IT)
Inventor: **Minguzzi, Eraldo**
Via Golfari 3
I-48012 Bagnacavallo, Ravenna(IT)
Inventor: **Quarantini, Oscar**
Via XXV Aprile 14
I-40027 Mordano, Bologna(IT)

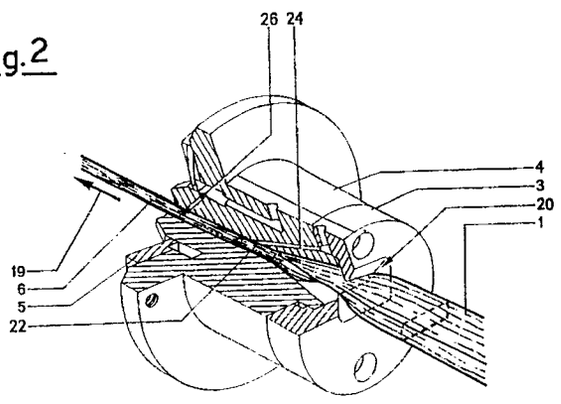
(74) Representative: **De Carli, Erberto et al**
ING. BARZANO' & ZANARDO MILANO S.p.A.
Via Borgonuovo, 10
I-20121 Milano(IT)

(54) Device for obtaining the roving in a finisher.

(57) This invention relates to a device for compacting a bundle of fibres into a roving at the delivery side of the drafting assembly of a finisher, wherein said device comprises in its front part a condensing slot for the bundle of fibres and said slot ends with a semi-circular profile, from which extends a spindle, around which the bundle of fibres winds and wraps itself so that it assumes a substantially circular shape. In the slide duct for the bundle of fibres, immediately following the said spindle around which the fibres wind, there are provided two or more nozzles which inject air into the slide duct for the fibres in a very sloping direction in the feed direction of the ring of fibres and in the tangential direction with respect to the axis of the said slide duct, thereby substantially effecting the axial feed of the said ring of fibres.

In the end part of the slide duct for the bundle of fibres, following the said nozzles, there are two or more nozzles which inject air in a slightly sloping direction in the feed direction of the roving of fibres and in the substantially radial direction with respect to the axis of the said slide duct in order to compact the ring of fibres into a roving suitable for being supplied to the cop being formed, on to which it is wound.

Fig.2



EP 0 420 348 A2

This invention relates to a device for compacting a flat bundle of fibres into a roving at the delivery side of the drafting assembly of a horizontally extending finisher which operates like a machine adapted for the final passage of the spinning preparatory processes, assembling the roving into a package in order to form a cop used in feeding the ring spinning machine.

As is known, a finisher produces a roving consisting of a bundle of discontinuous fibres, which must be of such a consistency that it can withstand the subsequent spinning operation without undergoing false drafts or irregularity of cross section, much less interruptions to the feed of the ring spinning spindles. The bundle of fibres emerging from the drafting assembly is given a consistency of this kind by means of a rubbing action imparted by pairs of rubbing aprons of a known design.

The said rubbing aprons are arranged one at the top and one at the bottom and each rubbing apron is mounted rotatably on rollers, which impart the rate of feed of the bundle of fibres by their rotation and are also capable of a crosswise reciprocating motion, so that the said bundle of fibres passing through the centre of the said rubbing aprons winds around itself first to the right and then to the left, so as to produce a roving of compact fibres, as has been well known to the expert for some time.

The roving of fibres passing between the external surfaces of the lower and upper aprons acquires a certain consistency, this being sufficient if it receives an average of from 8 to 10 strokes per linear metre from the rubbing aprons. However, all that is also known to the expert. The general trend is to improve the productivity of the machine, increasing the rate of collection of the roving of fibres on the cop. As far as the rubbing aprons are concerned, this trend involves several disadvantages, in that when the rate of collection of the roving of fibres exceeds a certain value, the reciprocating motion of the rubbing aprons reaches too high a frequency, unacceptable for the mechanical resistance of the said rubbing assembly. In fact, the considerable loads in reciprocating motion, if moved at the required rubbing frequency, would give rise to inadmissible stresses on the whole assembly.

The usual method of imparting false twists to the roving of fibres is not free from other drawbacks and disadvantages, which are known, moreover, simply by intuition. Among these, firstly, is the fact that long shafts are necessarily required, generally consisting of segments connected together by means of couplings, extending along the entire length of the machine in a complex construction, this being difficult to reconcile with the modern trend of increasing the length of the machine as much as possible with a view to including the greatest possible number of working groups or teams. Moreover, if it becomes necessary to replace the rubbing aprons, constituting the parts of the rubbing finisher most susceptible to wear, it is necessary to carry out lengthy operations requiring the assistance of very qualified personnel.

The object of this invention is to obviate these disadvantages, and so to increase considerably the productivity of the finisher without mechanical limits. This particular invention moreover proposes a device adapted to form the roving of fibres in a simple, easy and economical manner and also proposes a device which, as a whole, occupies less floor space. This latter characteristic allows for easy access to the relevant parts for all inspection and maintenance operations by service engineers. The abovementioned problems are solved by the device of this invention, in that said device comprises:

- in its front part, a condensing slot converging in the direction of movement of the bundle of fibres and said slot ends with a semi-circular profile, from which extends a spindle, around which the bundle of fibres winds and wraps itself so that it assumes a substantially circular shape.
- in its central part, two or more air injection nozzles which open into the slide duct for the ring of fibres, substantially effecting the feed of the said ring of fibres;
- in its end part, two or more air injection nozzles, the action of which compacts the ring of fibres into a compact roving adapted to be assembled on the cop being formed, on to which it is wound.

The said spindle around which the bundle of fibres winds, extends longitudinally inside the slide duct for the fibres and in its front part is in the shape of a flattened truncated cone which is connected, gradually tapering towards the front, to a final cylindrical pin, around which the fibre band winds, assuming a circular shape. The said flattened part of the front truncated portion is advantageously a flat surface portion which is a continuation of the flat portion of the profile of the condensing slot and which is, however, substantially tangential with respect to the final cylindrical pin.

The said air injection nozzles disposed in the central part inject air into the slide duct for the fibres in a very sloping direction in the feed direction of the ring of fibres and in the substantially tangential direction with respect to the axis of the said slide duct.

The said air injection nozzles disposed in the end part also inject air into the slide duct for the fibres in a slightly sloping direction in the feed direction of the roving of fibres and in the substantially radial direction with respect to the axis of the said slide duct.

Other characteristics and advantages of this invention will be clear from the following description with reference to the accompanying drawings, which illustrate one non-limiting embodiment by way of example, and in which:

Fig. 1 is a diagrammatic axonometric perspective illustrating the device of this invention disposed after the drafting assembly and before the assembly for collecting the roving;

Fig. 2 is a diagrammatic axonometric view of the device of this invention in part section in the axial direction along the slide duct for the fibres;

Fig. 3 is a diagrammatic axonometric view of the essential elements, the union of which forms the device of this invention, these essential elements being illustrated by means of part sections, and

Fig. 4 represents in diagrammatic form the progression of the shapes assumed by the bundle of fibres from the entry side to the delivery side of the device of this invention.

For the sake of simplicity, in the drawings, identical elements or elements with identical functions have been given identical reference numerals.

The devices and works of the finisher, as a spinning preparation machine which operates in mutual cooperation with the device of this invention, are not illustrated and the operation thereof is not described, as these are already known, and also as they are not relevant to the operation of this invention. Thus, e.g. the drafting assembly is not illustrated in its entirety, and the driving means of the various drive shafts of the said drafting assembly and the collecting assembly disposed after the device of the invention are not shown.

In the drawings, 1 designates the bundle of fibres emerging from the drafting assembly 10 having a supporting structure 7. 19 designates the arrow indicating the direction of feed and movement of the bundle of fibres 1 and of the roving 6. 9 designates any fixed eyelet for guiding the roving 6. 2 designates the device of this invention disposed at the delivery side and thus after the drafting assembly 10 and before the assembly for collecting the roving 6 on the cop. 3 designates the disc having a condensing slot 20 for the bundle of fibres 1. The said slot 20 starts with a profile of a substantially rectangular shape and ends, gradually tapering, with a substantially semi-circular profile.

A longitudinal spindle having a cylindrical portion 22 and a truncated portion 30 is rigidly connected to the disc 3 so that they form one unit. This latter portion is advantageously connected, by means of its flat surface portion 30a, to the flat portion of the semi-circular end profile of the condensing slot 20. The element formed by uniting the said disc 3 and the said spindle is firmly connected by screw means or similar means to the cylindrical element 4. In this connection, the disc 3 also acts as a closure and sealing element for the air injected in the direction of the arrow 23 into the cylinder 4 in order to pass into the oblique openings 24. 4 designates the central cylindrical element of the device 2 of this invention.

The said cylindrical element 4 has a central opening in the shape of a truncated cone in the front portion and of cylindrical shape in the end portion 28. The said front cylindrical portion 27 has a diameter greater than the diameter of the cylindrical portion 22 of the said spindle. The said truncated portion 27 has a width greater than the truncated portion 30 of the said spindle. The said cylindrical element 4 moreover comprises, in its interior, a series of oblique openings with respect to the longitudinal axis of its central opening for injecting air into the cylindrical duct 28. The oblique openings 24 are at the front of the cylindrical duct 28 and are distributed in a substantially equidistant manner along the circumference. The oblique openings 26 are in the vicinity of the end part of the cylindrical duct 28 and are also distributed in an equidistant manner along the circumference. 5 designates the flange firmly connected by screw means or similar means to the cylindrical element 4 in the end part of the device 2 of this invention. The function of the said end flange 5 is to act as a closure and sealing element for the air injected into the cylinder 4, the direction of which is indicated by the arrow 25, in order to pass into the oblique openings. 1a, 1b, 1c, 1d and 1f represent in diagrammatic form (see Fig. 4) the progressive sequence of shapes assumed by the flat bundle of fibres 1 along the truncated portion 27 of the cylindrical element 4. The bundle of fibres 1 in fact gradually winds itself in increasingly circular shapes around the truncated portion 30 of the spindle made integral with the disc 3. This gradual winding takes place in the circular space existing between the truncated outer surface 27 of the central opening of the cylindrical element 4 and the truncated portion 30 of the said spindle. In this connection, the circular space is substantially in the form of a channel in the shape of a circular crown with a decreasing diameter. 6f, 6d, 6c, 6b and 6a represent in diagrammatic form the progressive sequence of circular shapes of the bundle of fibres winding itself around the cylindrical portion 22 of the said spindle (see Fig. 4) before emerging from the device 2 in the form of a compact roving 19 suitable for being assembled on the cop being formed. 21 designates the supporting and retaining plate of the device 2. 8 designates an element of substantially spiral shape already known in the art, and it helps to reinforce the roving, imparting a slight false twist thereto before assembling it on the cop being formed.

The said element 8 is made integral with the translational element 12. 12 designates the element 19 for guiding the roving, fixed as one unit to the shaft 11 which moves in a periodic reciprocating motion, by means already known in the art. 16 designates the fluted cylinder fitted flush to the drive shaft 14, and the said cylinder 16 rotates the cop being formed on the tube 18 disposed between the retaining and supporting brackets 15.

The operation of the device of this invention, illustrated clearly in the accompanying drawings, is simple to understand.

The bundle of fibres 1 emerging from the drafting assembly 10 is advanced with the support of guide elements (not shown) to the mouth of the condensing slot 20, which compacts the bundle of fibres from a flat shape into a semi-circular shape. The said semi-circular form, moved in the direction 19, begins to wind itself gradually around the spindle having a truncated front portion 30 and a cylindrical end portion 22. The progressive shapes 1a, 1b, 1c, 1d and 1f are effected without false draft by the presence of the portion in the shape of a flattened truncated cone 30 which is completely connected to the flat portion of the semi-circular profile of the end part of the condensing slot 20 (see Fig. 3). The compressed air injected into the openings provided in the disc 3 and in the cylinder 4 in the direction of the arrows 24 and 23 moves tangentially at a comparatively high speed into the slide duct 28 for the bundle of fibres, contributing substantially to the feed of the ring of fibres coming from the winding of the cylindrical portion 22 of the spindle.

The injection of air into the duct 28, through the oblique openings 24 and 26, in fact helps, by means of its axial component, to drive the bundle of fibres in the feed direction 19, and thus to cross the device 2, and thus also, by means of its radial component, helps to compact the ring of fibres 6f, 6d, 6c, 6b and 6a into a compact roving 6 suitable for winding itself around the tube 18 for the formation of a roving cop used in the subsequent spinning operation.

Of course, the expert may make variations, modifications and additions to the characteristics of the device without thereby going beyond the general scope of this invention.

Claims

1. Device for compacting a flat bundle of fibres into a roving at the delivery side of the drafting assembly in a finisher which operates like a machine adapted for the final passage of the spinning preparatory processes, assembling the roving into a package in order to form a cop used in feeding the ring spinning machine, said device being characterised in that it comprises:
- in its front part, a condensing slot converging in the direction of movement of the bundle of fibres and said slot ends with a semi-circular profile, from which extends a spindle, around which the bundle of fibres winds and wraps itself so that it assumes a substantially circular shape;
- in its central part, two or more air injection nozzles which open into the slide duct for the ring of fibres, substantially effecting the feed of the said ring of fibres;
- in its end part, two or more air injection nozzles, the action of which compacts the ring of fibres into a compact roving adapted to be supplied to the cop being formed, on to which it is wound.

2. Device for compacting a flat bundle of fibres according to claim 1, characterised in that the spindle around which the bundle of fibres winds extends longitudinally inside the slide duct for the fibres and in its front part is in the shape of a flattened truncated cone which is connected, gradually tapering towards the front, to a final cylindrical pin, around which the fibre band winds, assuming a circular shape, the said flattened part of the front truncated portion advantageously being a flat surface portion which is a continuation of the flat portion of the profile of the condensing slot and being, however, substantially tangential with respect to the final cylindrical pin.

3. Device for compacting a flat bundle of fibres according to claim 1, characterised in that the air injection nozzles disposed in the central part inject air into the slide duct for the fibres in a very sloping direction in the feed direction of the ring of fibres and in the substantially tangential direction with respect to the axis of the said slide duct.

4. Device for compacting a flat bundle of fibres according to claim 1, characterised in that the air injection nozzles disposed in the end part inject air into the slide duct for the fibres in a slightly sloping direction in the feed direction of the roving of fibres and in the substantially radial direction with respect to the axis of the said slide duct.

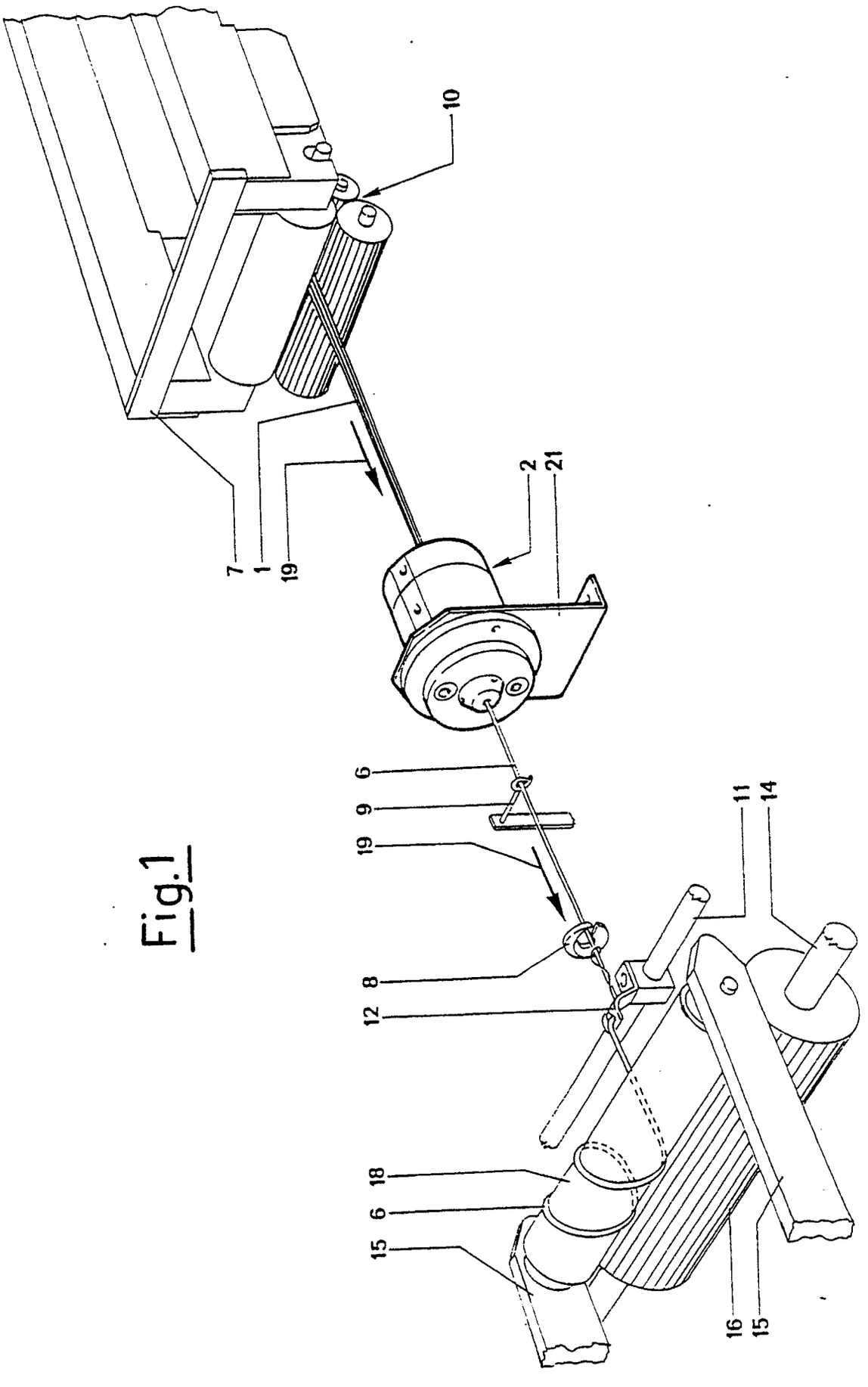


Fig.1

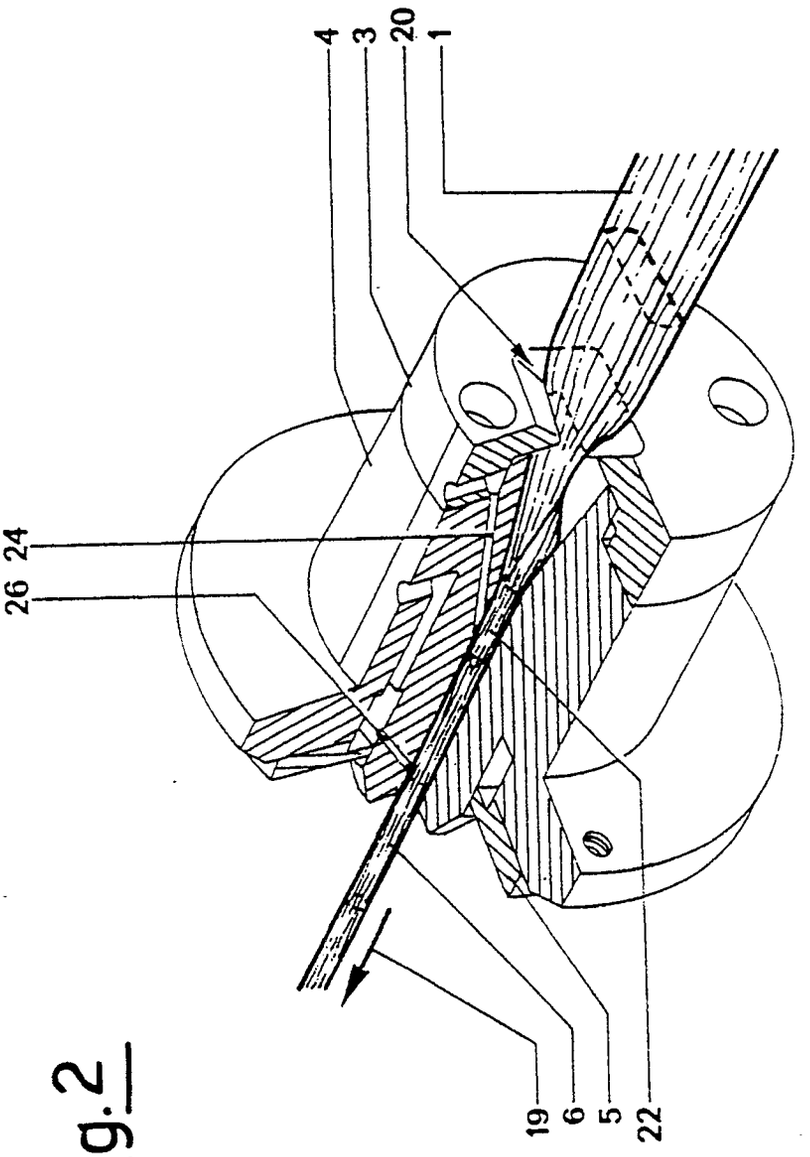
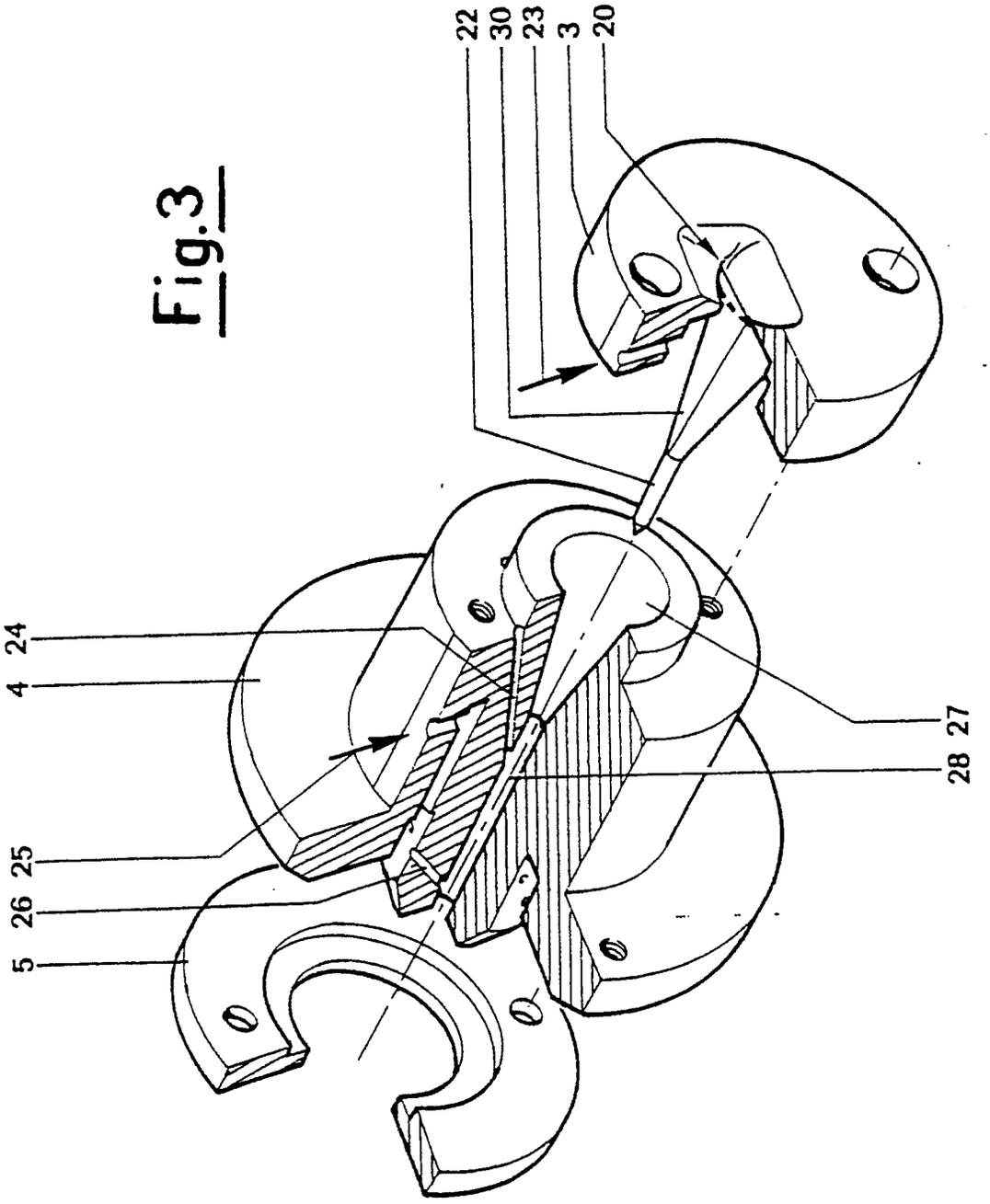


Fig.2

Fig.3



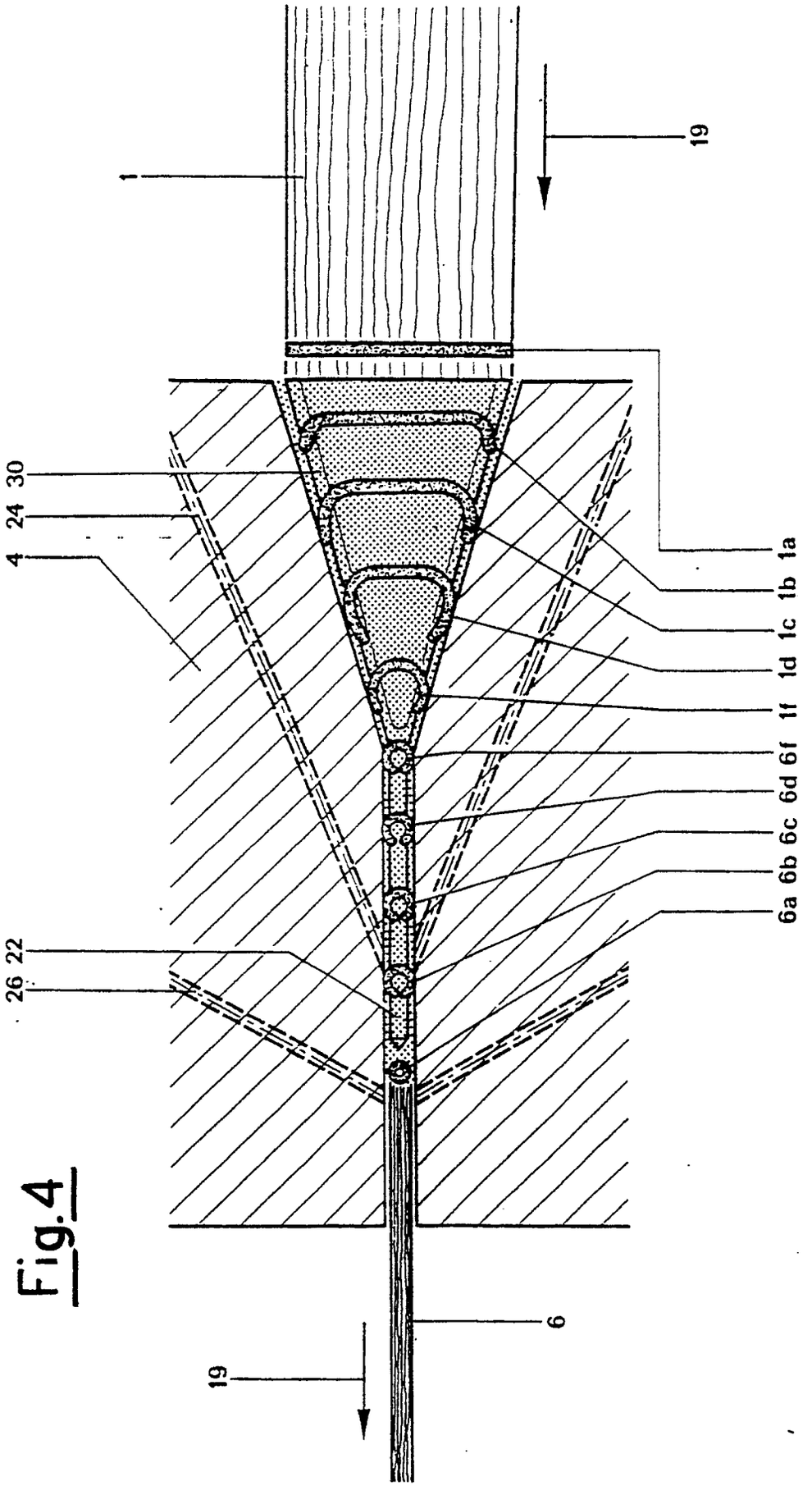


Fig.4