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(54) **Fibre condensing device for spinning machines**

Vorrichtung zur Faserbündelung für Spinnmaschinen

Dispositif de condensation pour des machines à filer

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Description

[0001] The present invention relates to a device for condensing the fibres in the sliver in spinning machines, having significant characteristics of novelty and inventive step.

[0002] The device to which the present invention relates is intended to condense the fibre sliver that issues from the draw-frame in spinning machines, significantly reducing the effect of fibres protruding from the sliver, which create the effect known as "hairs" due to faults in the condensing of the sliver.

[0003] By means of the device according to the present invention, improved condensing of the fibres that make up a sliver is possible, and this significantly increases the quality of the yarn produced.

[0004] To achieve more regular and better quality yarns, the present invention provides a system for condensing after drawing and before twisting, by means of an aerodynamic arrangement, of which the degree of condensing depends on the quantity and diameter of the holes in a band or "bag" transporting the bundle of fibres, of which the perforated bag is subjected to suction through one or more grooves, in such a way that, after being drawn and before being twisted, the fibres are placed above the perforated bag which travels at a speed somewhat higher than said first line cylinder or forming cylinder, performs condensing drawing with slight tension of the fibres and helps to orient them longitudinally. One or more grooves that are straight or inclined in the direction of the fibres are connected to a suction source creating a transverse force that condenses the fibres deposited above the perforated bag.

[0005] The width of the fibres is reduced by means of this arrangement, and this reduces and almost eliminates the so-called spinning triangle, and orients and integrates the fibres uniformly in the cross section of the yarn, thus improving the arrangement of the fibres, reducing the quantity of unintegrated fibres, reducing hairiness or fluffiness, reducing variation in the diameter of the yarn through less loss of fibres through suction, and reducing points that are thin, thick, etc. Hence, a cleaner, more regular and better quality yarn may be obtained through the application of the present invention.

[0006] The document EP 1 300 495 A1 discloses a device for condensing according to the preamble of claim 1.

[0007] Following the condensing device of the present invention, the yarn will be twisted, allowing a yarn with very advantageous properties for the spinning process and for the subsequent processes of dyeing, weaving, etc. to be obtained.

[0008] As an explanatory and non-limiting example, the accompanying drawings will assist understanding of the present invention.

[0009] Fig. 1 is a diagrammatic view of the arrangement of rollers of said first, second and third lines in a conventional drawing system.

[0010] Fig. 2 is a diagrammatic view similar to Fig. 1 of a condensing device according to the present invention.

[0011] Fig. 3 is a diagrammatic cross section of the device according to the present invention.

[0012] Fig. 4 is a cross section of the actual device according to the invention.

[0013] Fig. 5 is a perspective view of the actual device according to the invention, from the driving side.

[0014] As illustrated in the figures, in a conventional draw-frame the entering fibre bundle 1 is received by a first roller 2 rotating at low speed, then passes to the second rollers 3 rotating at a slightly higher speed than the roller 2 and performing with respect thereto what is known as preliminary drafting, and then passes to a third roller 4 revolving at a much higher speed of approximately 12 to 80 times the speed of the roller 2 performing the main drawing. The sliver 1 has been reducing to a much narrower, sufficiently parallel sliver 5. On leaving the nip of the roller 4 said spinning triangle 6 is formed, of which the vertex has been produced by the twisting of the yarn 8.

[0015] The present invention provides for the arrangement, after the conventional roller 4, of a condensing device which is formed as shown diagrammatically in Fig. 2 by means of a tubular element 20 connected to a source of vacuum, and has transverse grooves that are inclined or straight 7, single or multiple, and are covered by a band 9 provided with micro-orifices, all of which is shown in more detail in Fig. 3 et seq., so the suction which is produced in the tubular element 20 and transmitted by the single or multiple grooves 7 contributes to condensing of the sliver, making it parallel and preventing the protrusion of transverse fibres, so the spinning triangle, from the point 10 from which the yarn is subjected to twisting 11, is reduced to a minimum value. The tubular element 20 has a concave side adapted externally to a part of the drive cylinder.

[0016] As shown in Fig. 3, the tubular element 20 is of a specific, substantially trapezoidal form, having in its upper gently curved side the grooves 7 over which there runs the perforated band, also called perforated bag 9, which is tensioned and guided by a longitudinal bar 12 provided with small longitudinal recesses, as can be seen in said Fig. 3, for housing the band or bag 9, which is actuated by the cylinder 13. While a roller covered with synthetic rubber 14 rests on the perforated band or bag 9 through the pressure applied by the spring 15.

[0017] The cylinder 13 has a toothed pinion 16 which meshes with the transmission wheel 17 of a transmission shaft 18. Said shaft 18 is connected to the following section of the spinning machine, running along the whole length thereof. A servomotor will actuate the shaft 18, allowing its speed to be changed to achieve optimum condensing drawing. The pinion 16 and the wheel 17 are enclosed inside a surrounding case or housing 19 to prevent the entry of dirt, and guarantee lubrication. In some applications these gears can be replaced by toothed wheels at 45º to perpendicular shafts when there is not

enough space to install the shaft 18 beneath the cylinder 13 and it must be placed behind the drawing entry cylinder.

[0018] As will be seen, through the arrangement of elements described, effective condensing of the fibres in the sliver in spinning machines can be achieved, producing the substantial advantages indicated at the beginning.

[0019] In particular, in the device according to the invention, the driving shaft takes its power directly from the drive shaft of the unit, which helps avoid mechanical problems of breakage of the shaft used in the draw-frames for the normal driving of the rollers, if the device according to the invention is to be incorporated into spinning machines that are already in operation.

[0020] A further important advantage of the device according to the present invention is the low sensitivity of the precise diameter of the levelling rollers, since precision of levelling is not required, given the general arrangement of the device.

[0021] Similarly, as it has an independent actuating shaft, it is possible to adjust the condensing drawing to the most appropriate values.

Claims

1. Device for condensing sliver (5) of fibres in spinning machines that comprises,

   - a tubular element (20) which may be positioned at the outlet of a final pair of rollers (4) of a spinning machine drawing unit which may be

     ◦ positioned parallel to the axis of said rollers (4), and
     ◦ connected to a source of vacuum,

   - the tubular element (20) is provided with multiple transverse grooves (7) for various drawing units of the spinning machine, and
   - bands (9) which run on the tubular element (20),
   - each band (9) is provided with small perforations and in turn may receive, on its surface remote from said tubular element (20), the sliver (5) leaving the drafting unit and performing the transverse condensing of said sliver as it adapts to the empty grooves through the perforated band,
   - the tubular element (20) having a gently curved structure in the adaption region of the perforated band, wherein
   - the device further comprises

     ◦ a drive cylinder (13) inside the perforated bands (9) and
     ◦ an upper roller (14)

     ▪ the drive cylinder (13) receives said tangential upper roller (14)
     ▪ the upper roller (14) has a resilient characteristic, **characterized in that**

   - said bands (9) are mounted in contact

     ◦ with the part of the tubular suction element (20) that has the grooves (7),
     ◦ with a peripheral region of the drive cylinder (13), and
     ◦ with a bar (12) provided with small longitudinal recesses for tensioning and guiding said bands (9),

   - the drive cylinder (13) is actuated by a longitudinal transmission shaft (18) which may be positioned along said various drawing units of the spinning machine,
   - said drive cylinder (13) has a toothed pinion (16) which meshes with a transmission wheel (17) of said transmission shaft (18),
   - said longitudinal transmission shaft (18) is actuated by a servomotor.

2. Device according to claim 1, **characterized in that** the tubular element (20) has a concave side adapted externally to a part of the drive cylinder (13).

Patentansprüche

1. Vorrichtung zum Verdichten eines Faserbandes (5) in Spinnmaschinen, die umfasst:

   - ein rohrförmiges Element (20), das am Auslass eines Endpaars von Walzen (4) eines Streckwerks einer Spinnmaschine angeordnet sein kann, das

     ◦ parallel zur Achse der besagten Walzen (4) angeordnet und
     ◦ mit einer Unterdruckquelle verbunden sein kann,

   - wobei das rohrförmige Element (20) mit vielfachen Quernuten (7) für verschiedene Streckwerke der Spinnmaschine ausgestattet ist, und
   - Bänder (9), die auf dem rohrförmigen Element (20) laufen,
   - wobei jedes Band (9) kleine Perforationen aufweist und es wiederum auf seiner vom besagten rohrförmigen Element (20) entfernten Fläche das Faserband (5) aufnehmen kann, das das Streckwerk verlässt und das Querverdichten des besagten Faserbands durchführt, wenn es sich an die leeren Nuten durch das perforierte Band anpasst,

- wobei das rohrförmige Element (20) einen sanft gekrümmten Aufbau im Anpassungsbereich des perforierten Bandes aufweist, wobei
- die Vorrichtung weiter umfasst:

◦ einen Antriebszylinder (13) innerhalb der perforierten Bänder (9) und
◦ eine obere Walze (14), wobei

▪ der Antriebszylinder (13) die besagte tangentiale obere Walze (14) annimmt und
▪ die obere Walze (14) eine elastische Eigenschaft aufweist,

dadurch gekennzeichnet, dass

- die besagten Bänder (9) montiert sind in Kontakt

◦ mit dem Teil des rohrförmigen Saugelementes (20), das die Nuten (7) aufweist,
◦ mit einem Umfangsbereich des Antriebszylinders (13) und
◦ mit einer Stange (12), an der kleine Längsvertiefungen zum Spannen und Führen der besagten Bänder (9) vorgesehen sind,

- der Antriebszylinder (13) durch eine Längs-Übertragungswelle (18) angetrieben ist, die entlang der besagten verschiedenen Streckwerke der Spinnmaschine angeordnet sein kann,
- der besagte Antriebszylinder (13) ein Zahnrad (16) aufweist, das in ein Übertragungsrad (17) der besagten Übertragungswelle (18) eingreift,
- die besagte Längs-Übertragungswelle (18) durch einen Servomotor angetrieben ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das rohrförmige Element (20) eine konkave Seite aufweist, die außen an einen Teil des Antriebszylinders (13) angepasst ist.

Revendications

1. Dispositif de condensation d'un ruban (5) de fibres dans des machines de filage, comprenant

- un élément tubulaire (20) qui peut être positionné à la sortie d'une paire de rouleaux finale (4) d'une unité d'étirage de machine de filage qui peut être

◦ positionnée parallèlement à l'axe desdits rouleaux (4), et
◦ connectée à une source de vide,

- l'élément tubulaire (20) étant pourvu d'une multiple de rainures transversales (7) pour différentes unités d'étirage de la machine de filage, et
- des bandes (9) agencées sur l'élément tubulaire (20),
- chaque bande (9) étant pourvue de petites perforations et pouvant à son tour recevoir, sur sa surface éloignée dudit élément tubulaire (20), le ruban (5) qui quitte l'unité d'étirage et met en oeuvre la condensation transversale dudit ruban alors qu'il s'adapte aux rainures vides à travers la bande perforée,
- l'élément tubulaire (20) présentant une structure légèrement incurvée dans la région d'adaptation de la bande perforée, dans lequel
- le dispositif comprend en outre

◦ un cylindre d'entraînement (13) à l'intérieur des bandes perforées (9), et
◦ un rouleau supérieur (14),

▪ le cylindre d'entraînement (13) recevant ledit rouleau supérieur tangentiel (14)
▪ le rouleau supérieur (14) présentant une caractéristique de flexibilité,

caractérisé en ce que

- lesdites bandes (9) sont montées en contact

◦ avec la partie de l'élément d'aspiration tubulaire (20) qui comporte les rainures (7),
◦ avec une région périphérique du cylindre d'entraînement (13), et
◦ avec une barre (12) pourvue de petits renfoncements longitudinaux pour tendre et guider lesdites bandes (9),

- le cylindre d'entraînement (13) est actionné par un arbre de transmission longitudinal (18) qui peut être positionné le long desdites diverses unités d'étirage de la machine de filage,
- ledit cylindre d'entraînement (13) comporte un pignon denté (16) qui s'engrène avec une roue de transmission (17) dudit arbre de transmission (18),
- ledit arbre de transmission longitudinal (18) est actionné par un servomoteur.

2. Dispositif selon la revendication 1, **caractérisé en ce que** l'élément tubulaire (20) comporte un côté concave adapté extérieurement à une partie du cylindre d'entraînement (13).

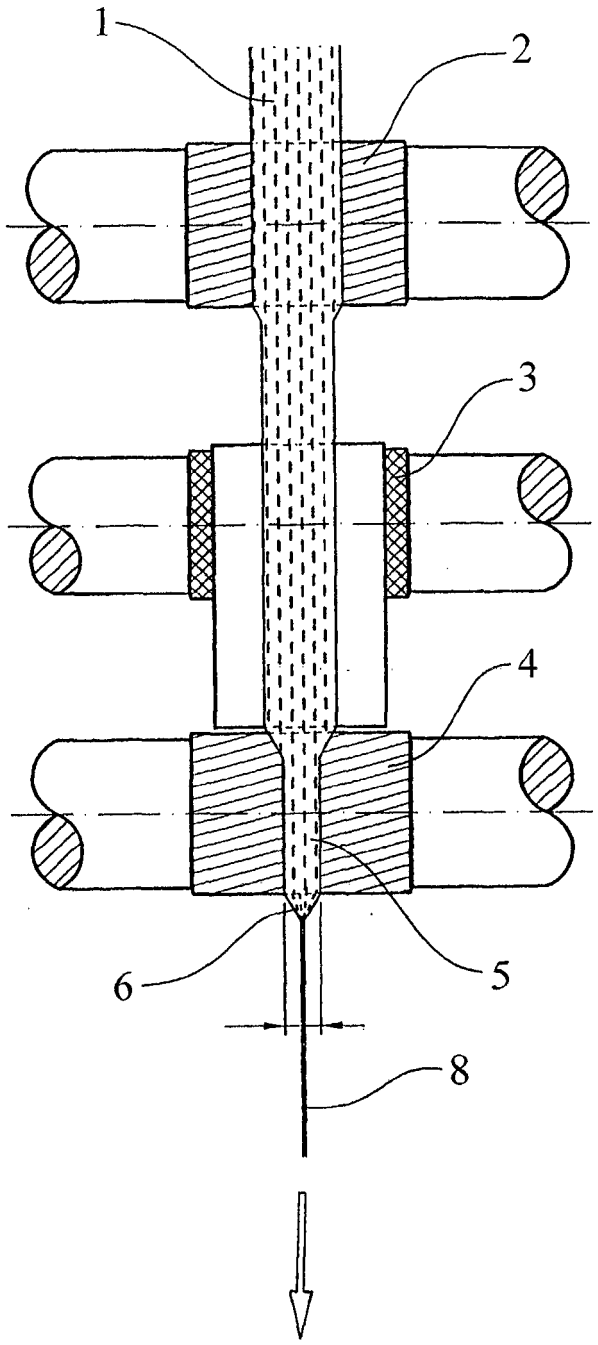


FIG. 1

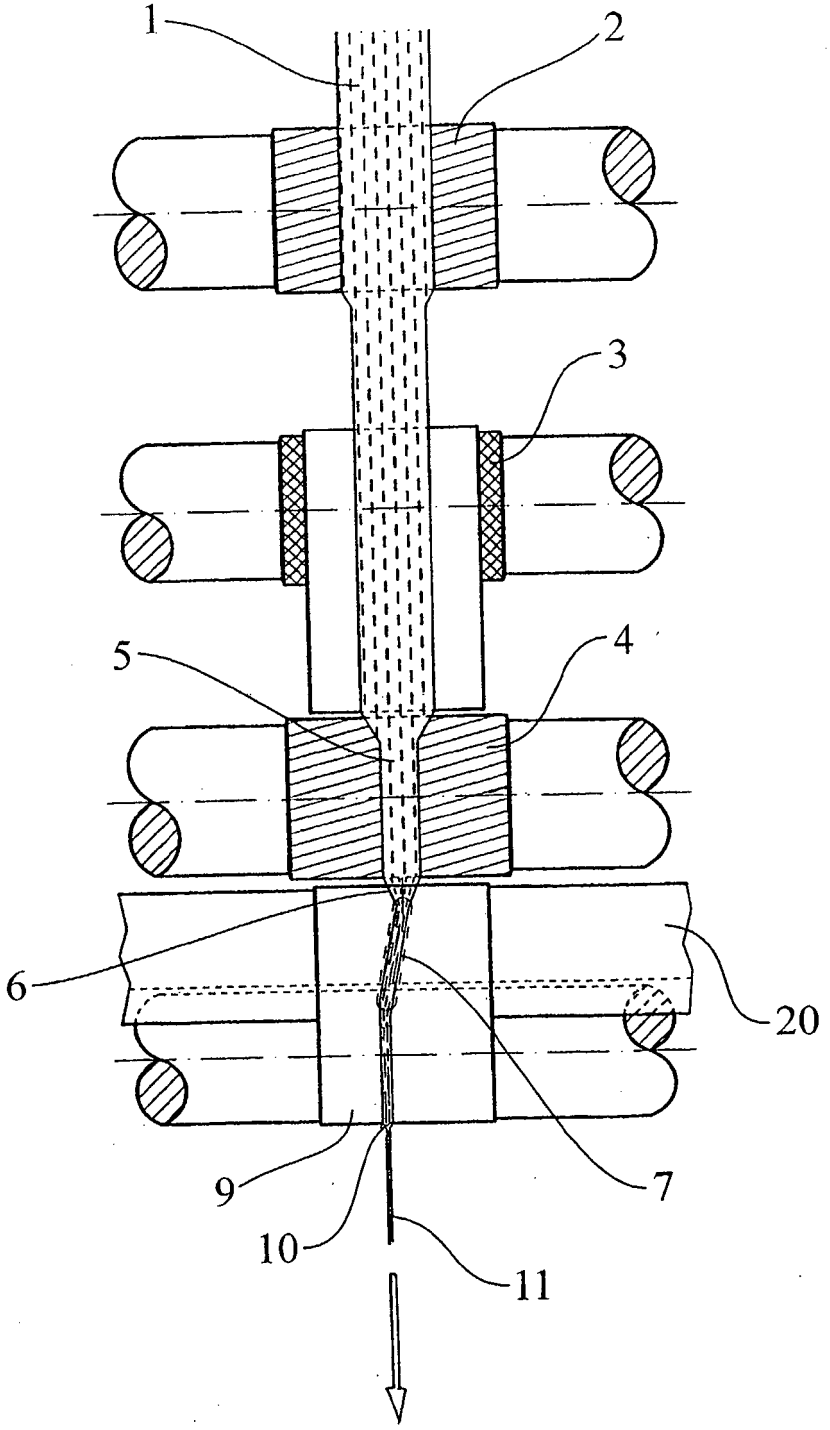


FIG. 2

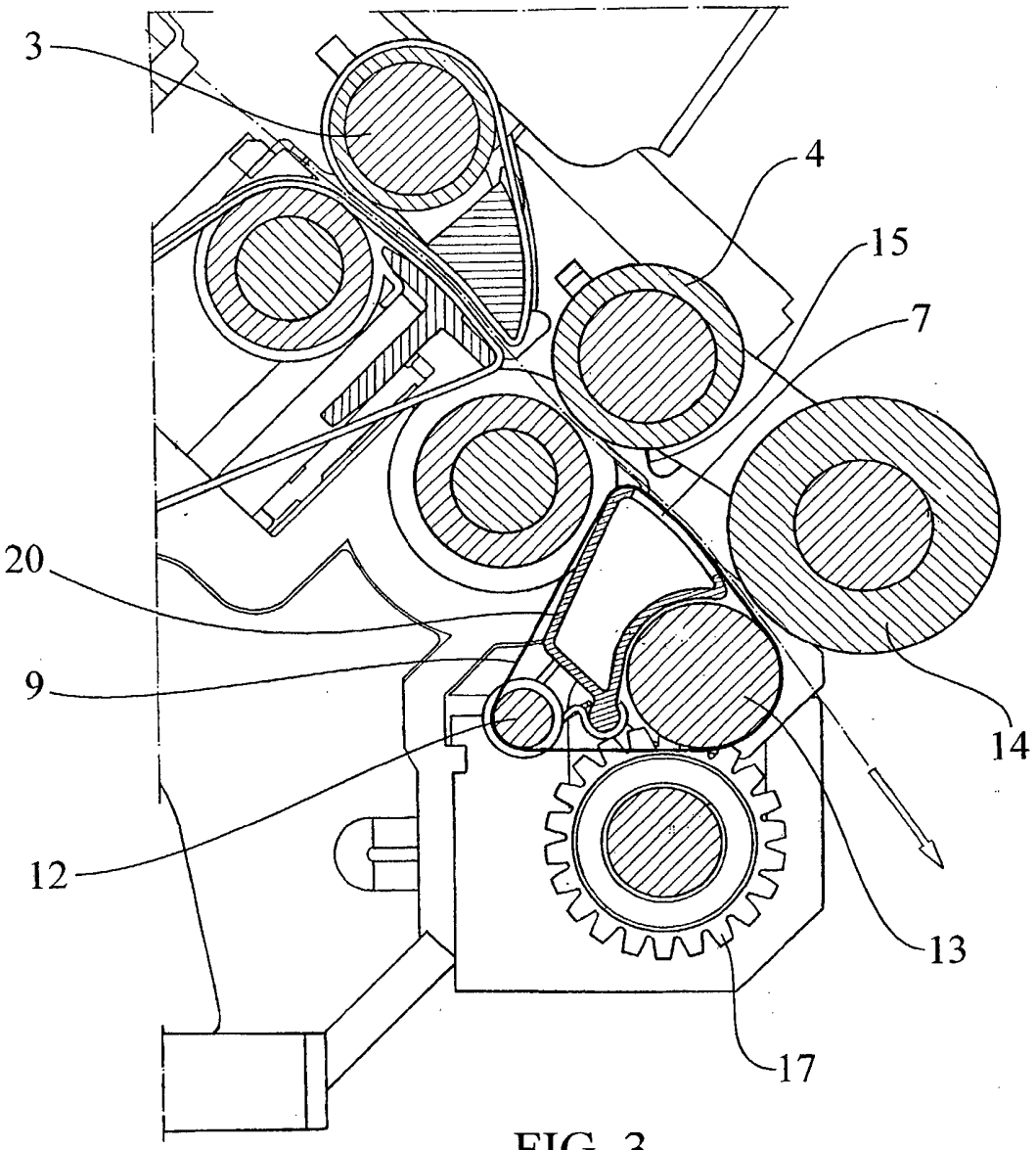


FIG. 3

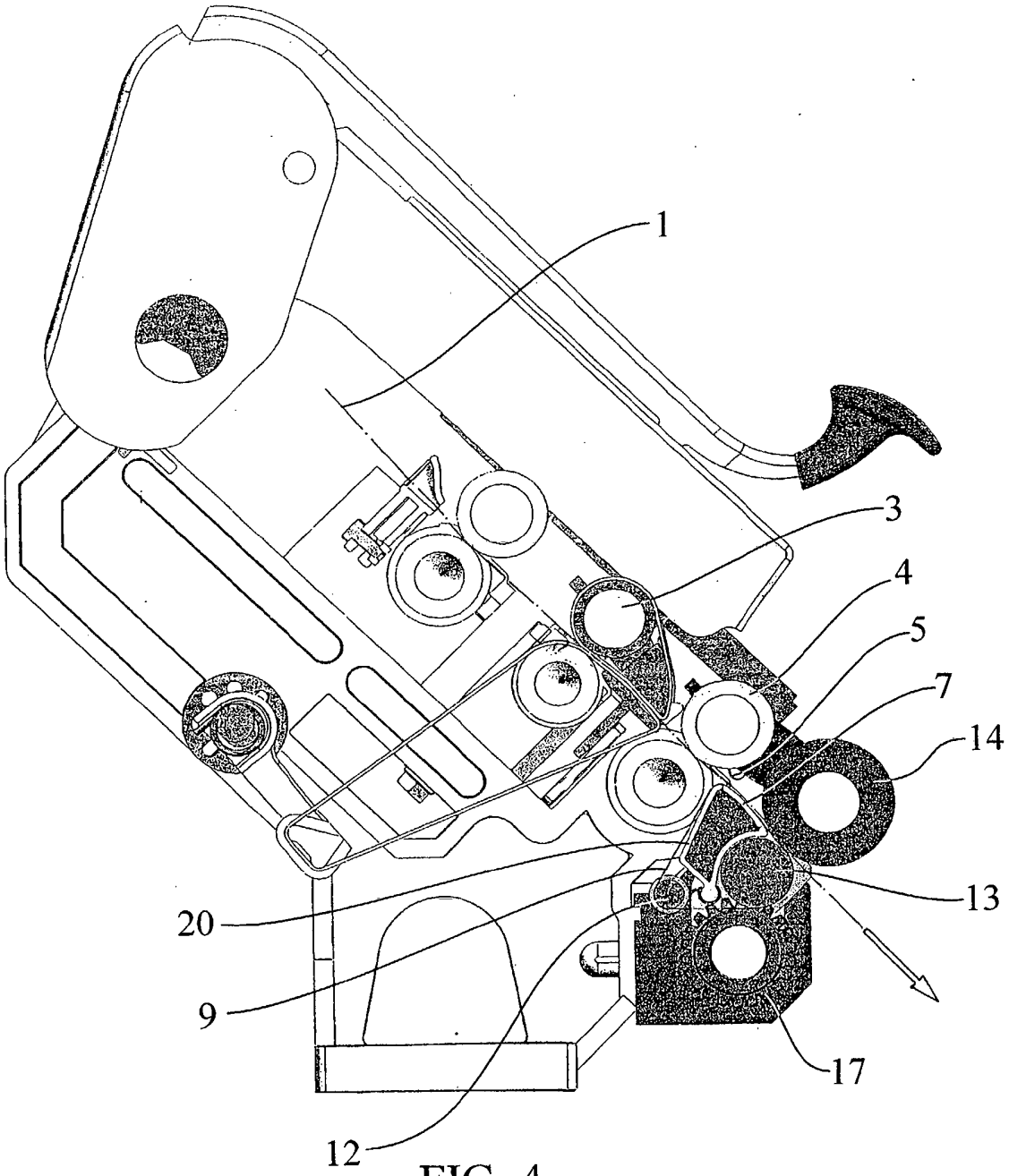


FIG. 4

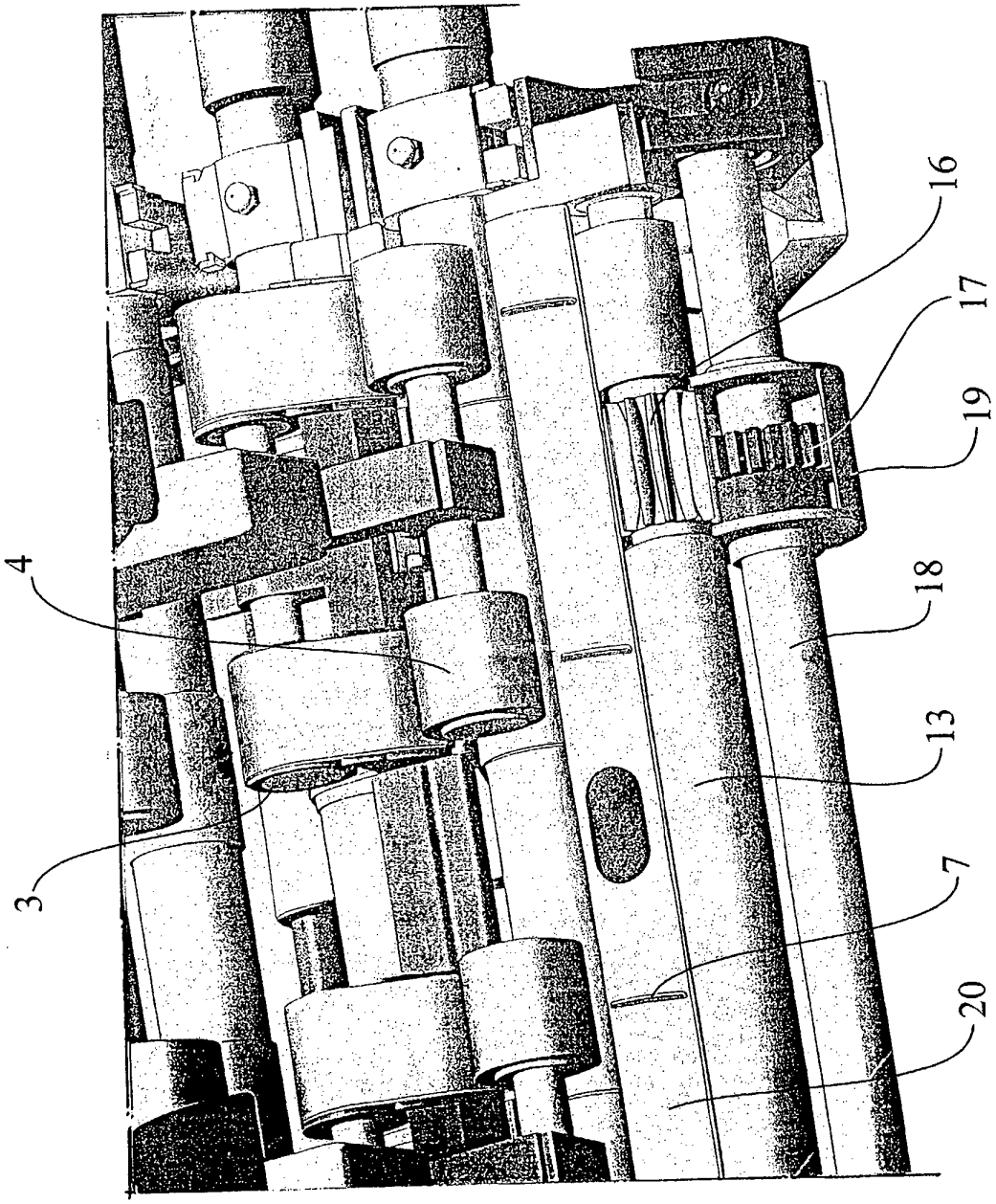


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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