

(19)



(11)

**EP 2 516 706 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:  
**18.10.2017 Bulletin 2017/42**

(51) Int Cl.:  
**D01H 1/42 (2006.01) D01H 7/70 (2006.01)**

(21) Application number: **10807431.1**

(86) International application number:  
**PCT/CZ2010/000132**

(22) Date of filing: **16.12.2010**

(87) International publication number:  
**WO 2011/076156 (30.06.2011 Gazette 2011/26)**

**(54) METHOD AND DEVICE FOR SPINDLE SPINNING OR TWISTING**

VERFAHREN UND VORRICHTUNG ZUM SPINDELSPINNEN ODER -DREHEN

PROCÉDÉ ET DISPOSITIF DE FILAGE OU DE RETORDAGE À LA BROCHE

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **23.12.2009 CZ 20090875**

(43) Date of publication of application:  
**31.10.2012 Bulletin 2012/44**

(73) Proprietor: **Technická Univerzita v Liberci**  
**461 17 Liberec (CZ)**

(72) Inventors:  
• **KUBOVY, Vaclav**  
**56203 Usti nad Orlici (CZ)**  
• **BERAN, Jaroslav**  
**46311 Liberec (CZ)**

(74) Representative: **Musil, Dobroslav et al**  
**Zabrdovicka 801/11**  
**615 00 Brno (CZ)**

(56) References cited:  
**DE-A1-102004 029 207 DE-A1-102005 040 902**

**EP 2 516 706 B1**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

### Technical field

[0001] The invention relates to a method of spindle spinning or twisting, at which the yarn or thread is wound on a cylindrical tube, which is mounted on rotating spindle, while the yarn or thread is wound into a package in the form of a cop, during the winding is the balloon limited by rotating balloon limiter, whose inner surface serves for contact with yarn or thread.

[0002] Next to this, the invention relates to a device for spindle spinning or twisting by a method according to the invention comprising frame, on which is mounted the spindle rail, on which there are rotatably mounted spindles for mounting the tubes for winding of the cop, whereas each spindle is coupled with a drive.

### Background art

[0003] Currently there exists a number of known devices for spindle spinning or twisting. For example PV 2003-588 discloses device for loop spinning or twisting, that comprises a vertical spindle and with it axially arranged balloon limiter for feeding the yarn to a tube on rotating spindle. The balloon limiter consists of rotatably mounted and in the same sense as the spindle driven upper part and to it, in a contactless manner, continuing non-rotating lower part. The lower part has a guiding surface for the yarn, which begins on its inner side and finishes on its lower face side. The balloon limiter is encircled with a static cover of a cylindrical shape.

[0004] The cover of package serves to reduce the noise level and to maintain a high quality of textile product through continuous cleaning of the spinning space. The cover of package prevents a strong ventilation during the technological process. By means of the cover of package the ventilation is efficiently directed into a closed space in vicinity of rotating spindle, whereas the cover of package prevents a free exchange of air with surroundings. Through this a suction of static air from surroundings into area of spindle, its acceleration and subsequent tangential blowing-off into surroundings is prevented.

[0005] Solution according to DE 19702678 discloses a cover of package on a ring spinning machine. On its lower surface the ring rail carries the stationary tubes serving as covers for yarn package being created on tubes of spindles. During spinning the tubular covers gradually slip over the created packages and for the most part they cover them, at least in area of the greatest diameter. The spinning process itself is running in area above the cover of package in relatively great distance from the cover.

[0006] Modern textile machines are further equipped with covers of package, which besides their basic function offer a possibility to clean continuously the space in vicinity of technological production process and reduce the noise produced at fast motion of rotating members

and at fast streaming of air. Generally these covers are attached on a spindle rail. The covers may be of a stable size, or they are adjusting to a changing size of space being filled during distribution of the yarn on package.

5 [0007] DE 19548664 discloses a cover of rotating body of centrifuge serving for closing the space between external environment and rotating casing of the centrifuge. This space is sealed and at centrifuge running the air pressure is reduced inside it, by which air turbulence between the fixed and rotating wall is limited, thus ventilation losses at high speeds of centrifuge are reduced.

10 [0008] DE 10 2004 029 207 describes winding of the package in direction from bottom of the tube to the top of the tube, while upper part of the tube is without package and is inserted into the limiter of the balloon and the limiter gradually exposing the free part of the tube for winding next part of the cop. Only in fig. 4 there is showed stationary capsule 10 covering lower part of the tube with the package while the balloon limiter is still covering upper part of the tube. DE 10 2004 029 207 does not show any solution for winding from the top of the tube to the bottom of the tube with rotating cover of the package being gradually inserted into the cover during the winding.

15 20 [0009] The known solutions are structurally complicated, expensive and the covers of package do not reach the immediate proximity of spinning or twisting zones, by which their technological efficiency especially in the sphere of ventilation losses is reduced, hence reduction of noise and power consumption is insufficient. The goal of this invention is to remedy these shortcomings or to reduce them at maximum.

### Principle of the invention

25 30 [0010] The goal of the invention has been achieved through a method according to claim 1. At this method of spinning the cover of package can be positioned in a close vicinity of spinning area, thus reduce the ventilation losses.

35 40 [0011] At the same time it is advantageous, if the cover of package rotates in the same direction as the spindle, which further contributes to reduction of ventilation losses.

45 [0012] Maximum reduction of ventilation losses is achieved, if the cover of package rotates at the same speed as the spindle.

50 [0013] More simple structure may be achieved if the cover of package is formed of a means, whose inner surface is in contact with the processed material, e.g. of the yarn carrier, balloon limiter, cap, etc.

55 [0014] The goal of the invention has also been achieved by a device according to claim 5. Further advantages and features appear from the dependent claims.

### Description of the drawing

[0015] An exemplary embodiment of the device according to the invention is schematically represented in the enclosed drawings, where the Fig. 1 shows axonometric view to operating unit, the Fig. 2 axonometric view to operating unit in embodiment with drive of balloon limiter or of the cap by means of a belt, the Fig. 3 a section through the operating unit in embodiment according to the Fig. 1 at a time when package of the cop is being completed, and the Fig. 4 shows a section of the operating unit according to the Fig. 1 after starting during the course of cop winding.

### Examples of embodiment

[0016] The spindle spinning or twisting machine comprises a number of operating sites, which are arranged side by side usually on both sides of the machine. Each operating site comprises the operating unit and unwinding site of the processed fibre formation 2, for example of roving, yarn or thread, between which there is arranged the feeding mechanism 3 of fibre formation 2, for example at the spindle spinning machines formed of a known drafting mechanism, out of which the delivery rollers are represented in the figures. Each operating unit comprises the spindle 6 which is in a known manner by means of spindle bearing 9 mounted on the spindle rail 5, which is in a known not represented manner coupled with the not represented drive enabling its reverse motion in vertical direction necessary for creating package of the cop. In the lower part the spindle 6 is provided with belt pulley 12, which is by means of a belt coupled with known not represented drive which secures rotation of the spindle 6. In the upper part the spindle 6 is provided with cylindrical mandrel 10, on which during operation of the operating unit of the machine there is installed the tube 7 serving for winding of the produced yarn or thread. The tube 7 is fixed on the spindle 6 by means of fixation means 11, for example by a short cone on lower part of the mandrel 10 or in other known manner.

[0017] Above the spindle 6 in concentric manner with it on the frame 1 of machine there is rotatably in a known manner mounted a carrier 13 of yarn or of thread or a cap or other body with cylindric inner surface or a balloon limiter according to the type of technology of spindle spinning or twisting. These means in this invention create a rotating cover of package, while inner diameter of their cavity is greater than the maximum diameter of package and length of the cavity equals at least to height of package and upper part of the tube. In embodiment according to the Fig. 1 the yarn carrier 13 is encircled by the static cover 20, which is firmly mounted on frame 1 of the machine. The carrier 13 of yarn or of thread or the cap or the balloon limiter are in the upper part provided with hollow cylindric body 15, which is in a known manner mounted in a not represented bearing. Above a hole of the hollow cylindric body 15 on frame 1 of the machine

there is arranged the guide eye 4 serving for shaping of track of the yarn P and for limiting of its amplitude.

[0018] Drive of the carrier 13 of yarn or of thread or the cap or the balloon limiter may be secured by some of the known methods, for example by individual drive or by means of driving belt pulley 16 arranged above the bearing, as it is shown in the Fig. 2, or by a direct drive from the spindle by means of magnetic coupling 17. The magnetic coupling 17 is formed of the driving components 18 arranged in upper part of the spindle 6 and of driven components 19 arranged on the carrier 13 of yarn or of thread or on the cap or on the balloon limiter. Magnetic coupling 17 ensures synchronous rotational linkage between the spindle 6 and the carrier 13 of yarn or of thread or the cap or balloon limiter. The device according to the invention may be applied also on the ring spinning or twisting machines.

[0019] At spinning or twisting the processed fibre formation 2 is fed through the feeding mechanism 3 into the guide eye 4, from which it is directed into the cavity of the cylindric body 15 of the carrier 13 of yarn or of thread or into the cap or into the balloon limiter and it further passes through these means and touches their inner wall, through which it is according to the used technology for imparting the twist either twisted or only guided on this inner wall. Winding of yarn or thread on the tube is started in the upper part of the tube 7, and in a known motion of the spindle rail 5 the package 8 in a shape of cop is created. The package 8 is created in direction from top of the tube 7 to its bottom by reversible motions of the spindle rail 5. Simultaneously with creating of the package the already completed section of the package 8 gradually inserts into the rotating cover of package, which in exemplary embodiment according to the Fig. 3 is formed of the carrier 13 of yarn. The package may be also created in the same procedure, i.e. in direction from the top of the tube 7 to its bottom, but by reversible motions of the carrier 13 of yarn or of thread or the cap or the balloon limiter, on presumption that the spindle rail is not moving in vertical direction.

[0020] At low speeds of spinning or twisting, e.g. at ring spinning or twisting, the cover of package may be stationary. Nevertheless generally it is better, if the cover of package is rotatable and rotates in the same direction as the spindle. At the same time at high speeds of spindles it is advantageous, if the cover of package rotates at the same speed as the spindle.

### Industrial applicability

[0021] The invention is designated for cotton and wool preparation plants and spinning mills of textile industry.

### List of referential markings

[0022]

1 frame

- 2 fibre formation
- 3 feeding mechanism
- 4 guide eye
- 5 moveable spindle rail
- 6 spindle
- 7 tube
- 8 yarn package
- 9 spindle bearing
- 10 cylindrical mandrel
- 11 fixation means
- 12 belt pulley
- 13 yarn carrier
- 15 hollow cylindric body
- 16 driving belt pulley of the cap
- 17 magnetic coupling
- 18 component of magnetic coupling on the spindle
- 19 component of magnetic coupling on the cap
- 20 static cover

### Claims

1. Method of spindle spinning or twisting, by means of a balloon from which the yarn or thread is wound on a cylindric tube (7), which is mounted on a rotating spindle (6), while the yarn or thread is wound into a package (8) in the form of a cop, wherein during the winding the balloon is limited by a rotating balloon limiter, whose inner surface serves for contact with the yarn or thread, **characterised in that, the** yarn or thread is wound on the tube (7) in the direction from the top of the tube (7) to the bottom of the tube (7), while the already finished section of package on the tube (7) is gradually inserted into a rotating cover of package.
2. Method according to the claim 1, **characterised in that, the** cover of the package rotates in the same direction as the spindle (6).
3. Method according to the claim 2, **characterised in that, the** cover of the package rotates at the same speed as the spindle (6).
4. Method according to any of the previous claims, **characterised in that, the** cover of the package is formed of means, whose inner surface is in contact with the processed material.
5. Device for spindle spinning or twisting by a method according to any of the previous claims comprising a frame (1), on which is mounted a spindle rail (5), on which are rotatably mounted spindles (6) for mounting the tubes (7) for winding of the cop, wherein each spindle (6) is coupled with a drive, **characterised in that,** concentric to each spindle (6) on the frame (1) of machine above the spindle (6) is mounted a cover of package (8), the cover being opened

from the bottom wherein the inner diameter of the cover is greater than then diameter of then package, and the length of the cover equals at least the height of the package up to the height of the upper part of the tube (7), wherein the cover of the package and spindle (6) are arranged as being mutually reversibly movable, and after the spinning or twisting has started they enable inserting of a completed section of then package into the cover of package.

6. Device according to the claim 5, **characterised in that, the** cover of the package is mounted rotatably.
7. Device according to the claim 6, **characterised in that, the** cover of the package is coupled with a drive having the same direction as the spindle (6).
8. Device according to the claim 7, **characterised in that, the** drive for the cover of the package is formed of a single electromotor.
9. Device according to the claim 7, **characterised in that, the** drive for the cover of the package is formed of a belt drive.
10. Device according to the claim 7, **characterised in that, the** drive for the cover of the package is formed of a magnetic coupling (17), whose driven part is mounted on the balloon limiter.
11. Device according to any of the claims 5 to 10, **characterised in that, the** cover of then package forms simultaneously the yarn carrier (13) or the cap or the balloon limiter.

### Revendications

1. Procédé de filage ou de retordage sans broche à l'aide d'un ballon à partir duquel le fil est enroulé sur le tube cylindrique (7) qui est montée sur la broche rotative (6), au cours de ce procédé le fil est enroulé dans l'emballage (8) sous la forme d'un cops, tandis que pendant le bobinage le ballon est limité par le limiteur rotatif du ballon, dont la surface intérieure sert de contact avec le matériel pour le fil, **caractérisé en ce que** le fil est enroulé sur le tube (7) dans la direction à partir du haut du tube (7) vers le talon du tube (7), tandis que la section de l'emballage déjà terminée sur le tube (7) insère progressivement dans le couvercle rotatif de l'emballage.
2. Procédé selon la revendication 1, **caractérisé en ce que** le couvercle de l'emballage tourne dans la même direction que la broche (6).
3. Procédé selon la revendication 2, **caractérisé en ce que** le couvercle de l'emballage tourne à la même

vitesse que la broche (6).

4. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le couvercle de l'emballage est formé par le moyen à l'aide duquel sa surface intérieure est en contact avec le matériel en cours de traitement.
5. Dispositif de filage ou de retordage sans broche par le procédé selon l'une quelconque des revendications précédentes, comprenant un châssis (1), sur lequel est monté le banc à broches (5), sur lequel sont montées d'une manière rotative les broches (6) pour le logement des tubes (7) pour l'enroulement d'un ceps, tandis que chaque broche (6) est couplée à la propulsion, **caractérisé en ce que**, coaxialement avec chaque broche (6) sur le châssis (1) de la machine au-dessus de la broche (6), est monté le couvercle de l'emballage ouvert d'en bas (8), tandis que le diamètre intérieur du couvercle est supérieur au diamètre de l'emballage et la longueur du couvercle est égale au moins à la hauteur de l'emballage jusqu'à la hauteur de la partie supérieure du tube (7), tandis que le couvercle de l'emballage et de la broche (6) est agencé comme pouvant être mutuellement réversible et après le commencement de filage ou de retordage, ils permettent d'insérer une partie complète de l'emballage dans le couvercle de l'emballage.
6. Dispositif selon la revendication 5, **caractérisé en ce que** le couvercle de l'emballage est monté rotatif.
7. Dispositif selon la revendication 6, **caractérisé en ce que** le couvercle de l'emballage est couple à la propulsion ayant la même direction que la broche (6).
8. Dispositif selon la revendication 7, **caractérisé en ce que** la propulsion du couvercle de l'emballage est formé par un seul moteur électrique.
9. Dispositif selon la revendication 7, **caractérisé en ce que** la propulsion pour le couvercle de l'emballage est formée par une commande par courroie.
10. Dispositif selon la revendication 7, **caractérisé en ce que** la propulsion pour le couvercle de l'emballage est formée par un embrayage magnétique, dont la partie commandée est montée sur le limiteur du ballon.
11. Dispositif selon l'une quelconque des revendications 5 à 10, **caractérisé en ce que** le couvercle de l'emballage forme simultanément l'entramement de fil (13) ou la cloche ou le limiteur du ballon.

## Patentansprüche

1. Verfahren zum Spindelspinnen oder -zwirnen, mit Hilfe eines Ballons, von dem das Garn oder der Faden auf eine zylindrische Hülse (7) aufgewickelt wird, die auf einer sich drehenden Spindel (6) gelagert ist, bei dem das Garn oder der Faden in die Aufwicklung in der Form eines Kops aufgewickelt wird, wobei der Ballon während der Aufwicklung durch einen rotierenden Ballonbegrenzer begrenzt wird, dessen innere Fläche dem Kontakt mit dem Garn oder Faden dient, **dadurch gekennzeichnet, dass** das Garn oder der Faden auf die Hülse (7) in der Richtung von der Spitze der Hülse (7) zum Fuß der Hülse (7) aufgewickelt wird, wobei der bereits gefertigte Abschnitt der Aufwicklung auf der Hülse (7) in den rotierenden Aufwicklungsdeckel kontinuierlich hineingeschoben wird.
2. Verfahren nach dem Anspruch 1, **dadurch gekennzeichnet, dass** der Aufwicklungsdeckel in derselben Richtung wie die Spindel (6) rotiert.
3. Verfahren nach dem Anspruch 2, **dadurch gekennzeichnet, dass** der Aufwicklungsdeckel mit derselben Geschwindigkeit wie die Spindel (6) rotiert.
4. Verfahren nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der Aufwicklungsdeckel durch ein Mittel gebildet wird, dessen innere Fläche mit dem zu verarbeitenden Material im Kontakt steht.
5. Einrichtung zum Spindelspinnen oder -zwirnen mit dem Verfahren laut einem der vorangehenden Ansprüche, die einen Rahmen (1) aufweist, auf dem eine Spindelbank (5) gelagert ist, auf der die Spindeln (6) zur Lagerung von Hülsen (7) zur Kopsaufwicklung drehbar gelagert sind, wobei jede Spindel (6) mit einem Antrieb verkoppelt ist, **dadurch gekennzeichnet, dass** koaxial mit jeder Spindel (6) auf dem Maschinenrahmen (1) über der Spindel (6) von unten geöffneter Aufwicklungsdeckel (8) gelagert ist, wobei der innere Durchmesser des Deckels größer als der Aufwicklungsdurchmesser ist und die Länge des Deckels der Höhe der Aufwicklung bis zur Höhe des oberen Teils der Hülse (7) mindestens gleich ist, wobei der Aufwicklungs- und Spindeldeckel als gegenseitig umkehrbar verstellbar angeordnet sind und nach der Aufnahme des Spinnens oder Zwirens die Hineinschiebung des fertigen Teils der Aufwicklung in den Aufwicklungsdeckel ermöglichen.
6. Einrichtung nach dem Anspruch 5, **dadurch gekennzeichnet, dass** der Aufwicklungsdeckel drehbar gelagert ist.

7. Einrichtung nach dem Anspruch 6, **dadurch gekennzeichnet, dass** der Aufwicklungsdeckel mit dem Antrieb verkoppelt ist, der dieselbe Richtung wie die Spindel (6) aufweist. 5
8. Einrichtung nach dem Anspruch 7, **dadurch gekennzeichnet, dass** der Antrieb für den Aufwicklungsdeckel durch einen einzigen Elektromotor gebildet wird. 10
9. Einrichtung nach dem Anspruch 7, **dadurch gekennzeichnet, dass** der Antrieb für den Aufwicklungsdeckel durch einen Riemenantrieb gebildet wird. 15
10. Einrichtung nach dem Anspruch 7, **dadurch gekennzeichnet, dass** der Antrieb für den Aufwicklungsdeckel durch eine magnetische Kupplung gebildet wird, deren angetriebener Teil auf dem Ballonbegrenzer gelagert ist. 20
11. Einrichtung nach einem der Ansprüche 5 bis 10, **dadurch gekennzeichnet, dass** der Aufwicklungsdeckel zugleich einen Garnmitnehmer (13) oder eine Glocke oder einen Ballonbegrenzer bildet. 25

30

35

40

45

50

55

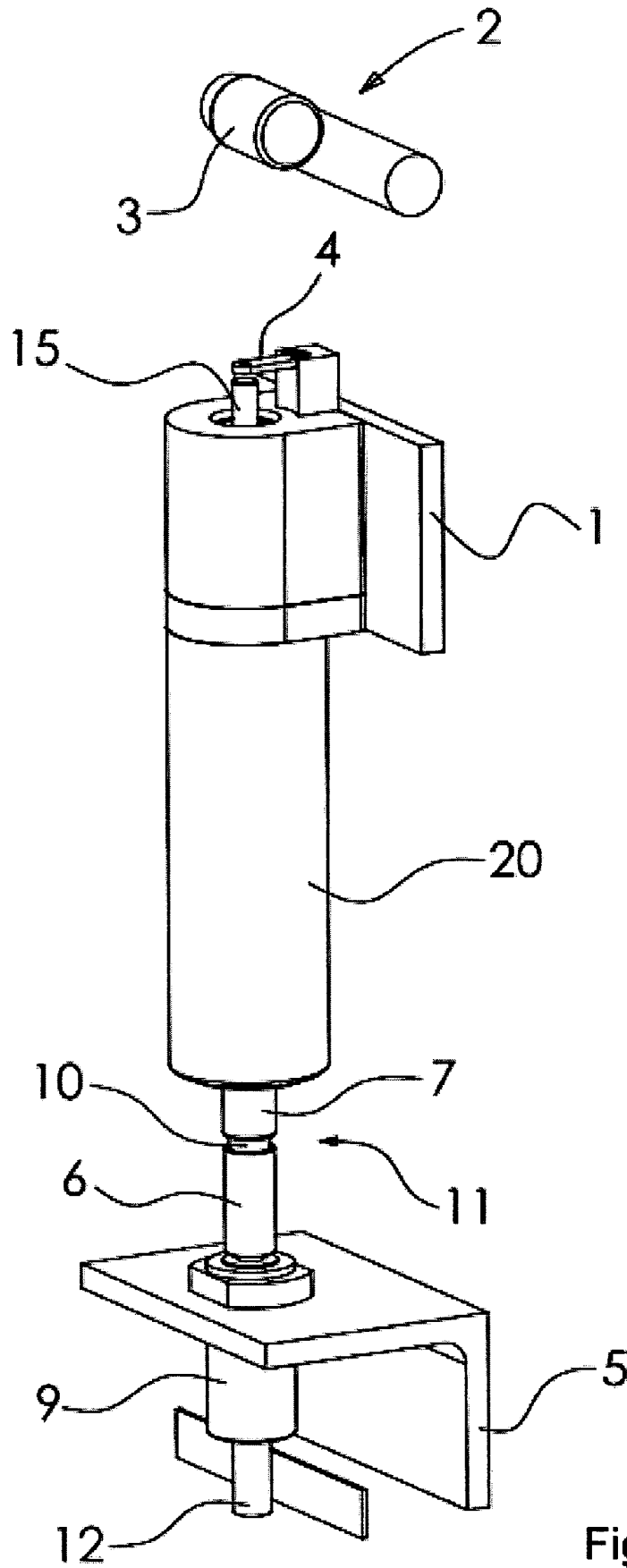


Fig. 1

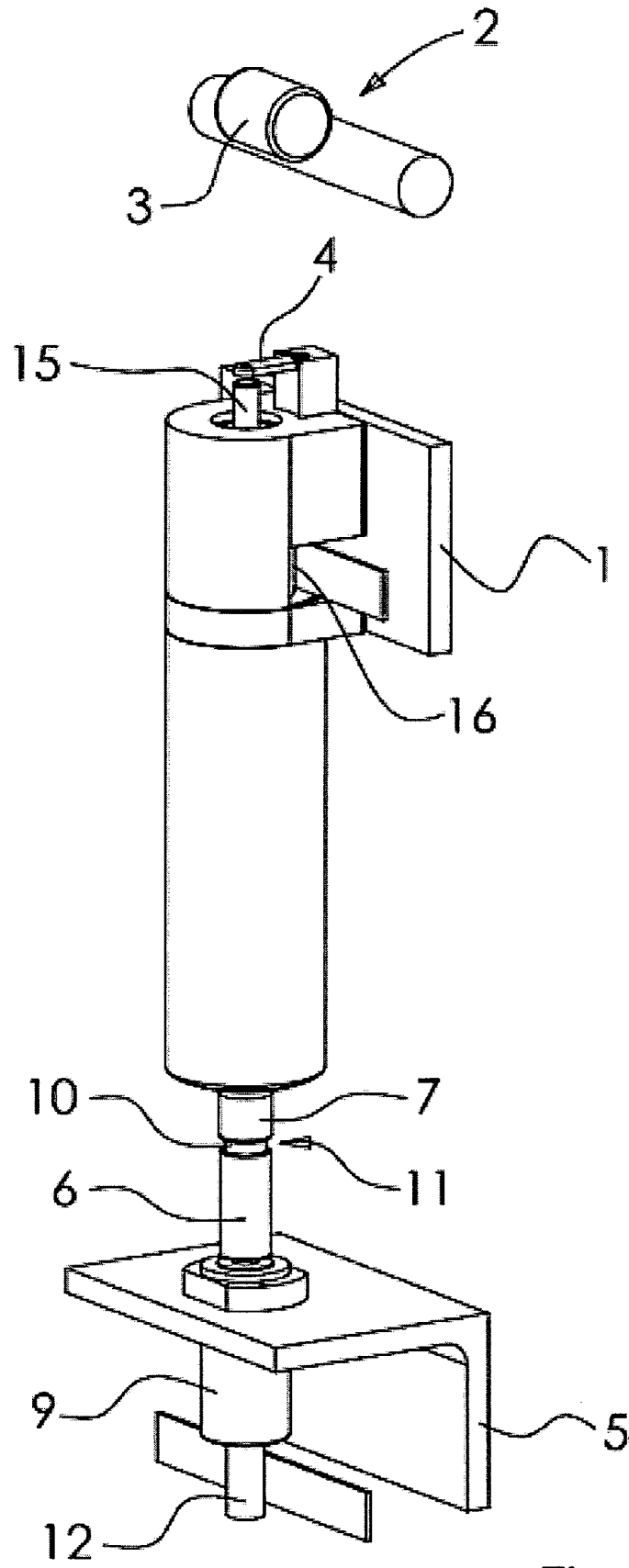


Fig. 2



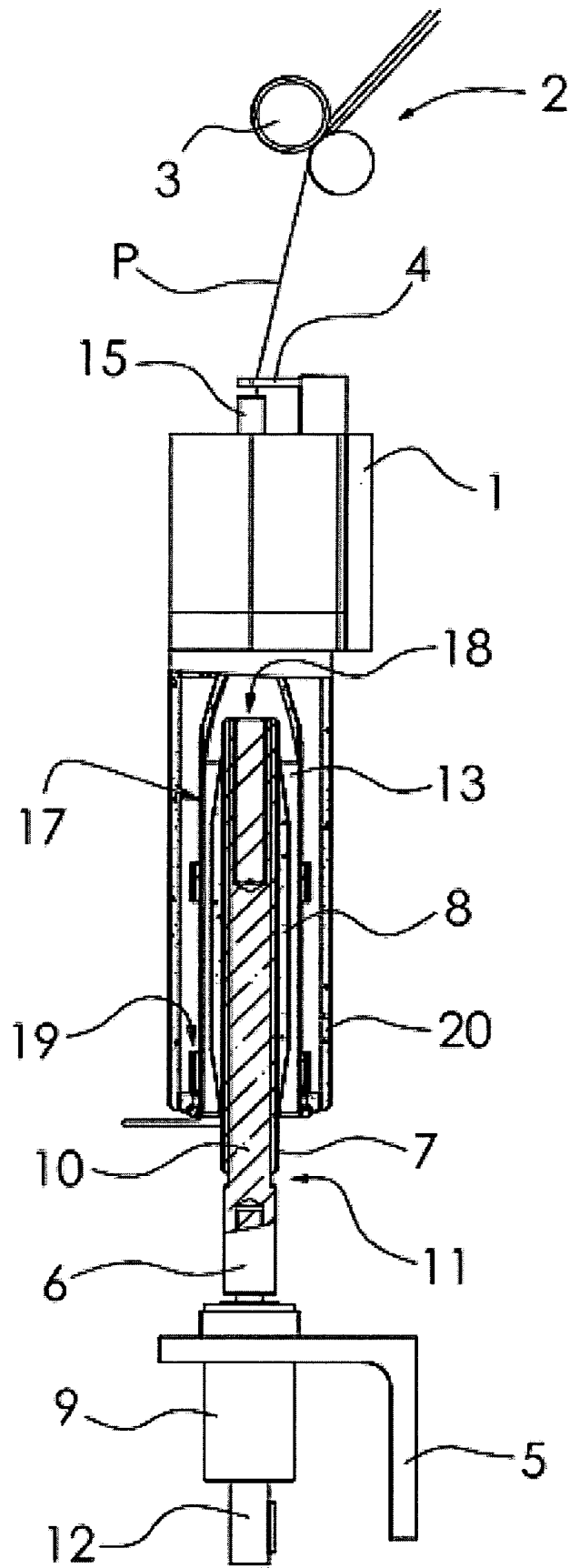


Fig. 3

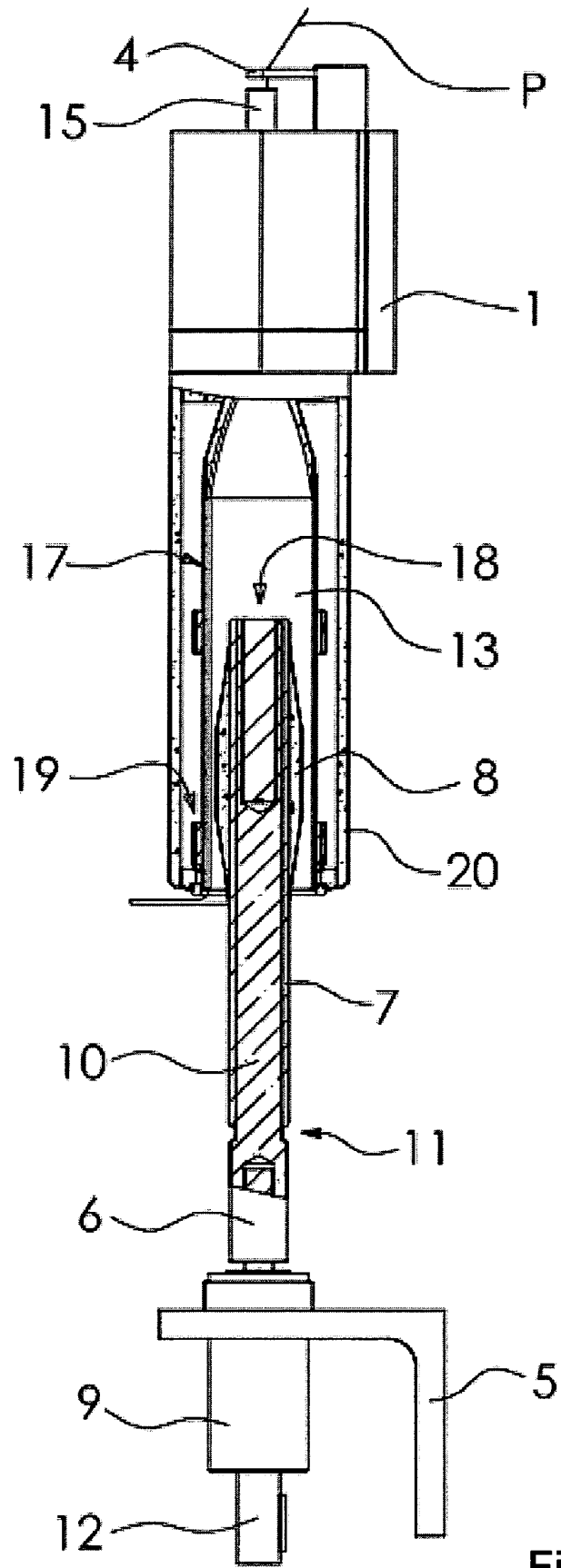


Fig. 4

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- DE 19702678 [0005]
- DE 19548664 [0007]
- DE 102004029207 [0008]