

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 306 691 B1

(12)

EUROPEAN PATENT SPECIFICATION

- (45) Date of publication of patent specification: **15.04.92** (51) Int. Cl.⁵: **D01H 1/06**, D01H 7/22,
D01H 7/66
- (21) Application number: **88112207.1**
- (22) Date of filing: **28.07.88**

(54) **Device to control the piecing-up of yarn on spinning machines.**

(30) Priority: **08.09.87 IT 8345487**

(43) Date of publication of application:
15.03.89 Bulletin 89/11

(45) Publication of the grant of the patent:
15.04.92 Bulletin 92/16

(84) Designated Contracting States:
CH DE GB LI

(56) References cited:
EP-A- 0 225 660
DE-A- 3 606 609
GB-A- 193 131
US-A- 2 833 111

(73) Proprietor: **MASCHINENFABRIK RIETER AG**
Klosterstrasse 20
CH-8406 Winterthur(CH)

(72) Inventor: **Marchiori, Mirko**
Viale Cossetti 18
I-33170 Pordenone(IT)
Inventor: **Lant, Danny**
Via dei Prati 25/4
I-33031 Basiliano (UD)(IT)
Inventor: **Lancerotto, Fabio**
Via D. Compagni 2
I-20131 Milano(IT)
Inventor: **Gerin, Umberto**
Via San Giuliano 37
I-33170 Pordenone(IT)

EP 0 306 691 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description

This invention concerns a device to control the piecing-up of yarn on spinning machines. To be more exact, the device according to the invention is suitable for spinning and twisting machines having a belt-type drive for the spindles.

The device can be employed advantageously, but not only, in spinning systems where the rotary yarn-winding means possesses a given weight and therefore a given inertia to angular acceleration, such as is the case, for instance, in some cap spinning systems, in rotary ring spinning systems and in spinning systems employing a rotary balloon checking device.

Devices are known in the prior art which enable the yarn to be pieced-up after breakage at individual spinning positions.

Such known devices consist of a brake, usually a knee brake, by which the machine operative halts the spindle on which he has to work.

The braking action is applied by pressure on the spindle and lasts for the whole time needed for the piecing-up, in the meanwhile overcoming the drawing force of the drive belt, which slips on the spindle wharve.

As soon as the operative stops the action of thrusting on the brake, the brake shoe is separated at once from the spindle wharve and the drive belt can apply all its available power to the spindle.

The spindle accelerates very quickly and reaches its normal running speed in a very short time.

During this step of strong acceleration there arises in the yarn a tension which depends on the spinning system employed.

No great problems are involved in the ring spinning system since the yarn has to draw with itself a traveller having a low weight, and therefore the tensions which arise are of a low value.

In other systems where the yarn has to set a heavier element in rotation, such as certain cap spinning systems or the spinning system with a rotary ring or the spinning system with a rotary balloon checking device, the re-starting of the spindle is problematical and sometimes impossible with the finest yarns.

The tension created is so great that it very often overcomes the strength of the yarn.

Improved braking devices have been used which are suitable to graduate the start-up of the spindle when piecing-up takes place.

All the known devices entail the drawback that the graduation of the acceleration depends on the sensitiveness of the machine operative. As a result the piecing-up operation has a random nature.

Moreover, during the piecing-up of the yarn the operative is busy all the time with the braking task

and with a gradual start-up of the spindle.

GB-A-193,131 mentions improvements in and relating to stop apparatus for the spindles of spinning and twisting machines.

A semi-rotary disc is therefore mounted on a fixed spindle, which has on its periphery an up-standing cam-shaped projection.

When the disc is partly rotated from its normal position, this projection engages the actuating belt to release it from engagement with the pulley wheel of a rotary tube.

The disc is provided with an integral extension piece or lever to which a wire cord is fastened, which is carried along and connected to one arm of a bell crank.

The bell crank is vertically disposed to the horizontal disc and is employed by foot pressure on a spring pedal connected to the other arm by a wire cord.

This kind of stop apparatus is, however, not apt for controlling the piecing up with modern spinning machines, because of the different force deflections by the levers and the wire cords.

Moreover, the mentioned stop apparatus has only two defined positions, which are defined by the spring pedal.

Any abutments or stops directly related to the disc are not provided.

EP-A-0225660 describes a method and system for spinning with a rotary balloon-checking device.

This checking device or cap can be driven by an independent motor which is moved with a reciprocating vertical motion or be driven by a pulley cooperating with a belt.

Any control mechanism for controlling piecing-up of yarn as in the present invention is not disclosed.

US-A-2,833,111 discloses cap spinning frames and cap twisting frames which are driven by an electromotor.

The upper end of a rotatable vertical spindle is separately driven by another electromotor and projects into the interior of the cap.

For stopping of the cap, preferably controllable direct current or reverse current or eddy current is supplied.

As belt-driven spindles are not described, this reference is no further of interest in respect with the present invention.

The present applicant has designed, tested and embodied a device able to overcome all the shortcomings of the known art.

The device according to the invention consists of an element to distance the drive belt of the spindle from the spindle wharve.

The distancing element is fitted in correspondence with the foot of the spindle and is able to rotate about the axis of the spindle.

This distancing element is worked by the machine operative by hand and has at least three defined working positions:

- a position for the normal drawing of the spindle with full contact between the drive belt and the spindle wharve,
- an intermediate position with a limited extent of contact between the belt and the spindle wharve, and
- a position of complete separation of the belt from the spindle wharve.

When taking corrective action after a yarn breakage, the operative rotates the distancing element at once from the normal drawing position to the position of complete separation of the belt from the spindle wharve, thus halting the spindle.

When the spindle has halted, the operative arranges, as in the known art, a segment of yarn of a length suitable for the piecing-up. He then rotates the distancing element to the intermediate position, waits for some moments and then carries out the piecing-up.

While the piecing-up is being carried out, the spindle gradually reaches its normal running speed and the operative can rotate the distancing element to the position for normal drawing of the spindle without altering the speed of rotation of the spindle. There are therefore no stresses applied to the yarn.

The device provides for the ability to vary the point of the intermediate position and therefore to vary the arc of contact between the belt and the spindle wharve so as to obtain different degrees of acceleration of the spindle.

According to a variant a jet of fluid able to contribute to the drawing of the yarn winding means by the yarn may cooperate momentarily with the element that distances the spindle drive belt.

Such jet of fluid begins working in the neighbourhood of the intermediate position to assist the start-up of the spindle and ends its action when the normal running speed has been reached.

In this variant there is no need for the drive of the spindle to be synchronized with the drive of the yarn winding means since the thrust of the jet of fluid helps in the acceleration of the yarn winding means irrespective of the type of movement imposed on the yarn winding means by the spindle.

The invention is therefore embodied according to the contents of Claim 1 and of the dependent claims.

The attached figures, which are given as a non-restrictive example, show the following:-

Figs.1a, 1b and 1c

give diagrammatic plan views of some embodiments of the prior art;

Fig.2a, 2b and 2c

give diagrammatic plan views of an embodiment

of the device according to the invention;

Fig.3

shows a diagrammatic vertical section of the device of Fig.2 as applied to a spinning spindle, together with a variant of the invention.

Fig.4

shows a cross section of a detail of the variant of Fig.3.

Figs.1a, 1b and 1c show brakes 10 of the prior art acting on a spindle wharve 11 set in rotation by a belt 12 in the direction of the arrow 13.

The brakes 10 are applied by the machine operative in the direction of the arrow 14 and work by the pressure of a rigid brake shoe 15 against the spindle wharve 11.

Resilient deformable elements 16 are employed to graduate the start-up of the spindle and act directly on the spindle wharve 11, or else the pressure of the brake shoe 15 is exerted by means of a spring 17 or other resilient means.

Figs.2a, 2b and 2c show an embodiment of the invention in the position of normal drawing of a spindle, in the intermediate position and in the position of full disengagement of the belt 12 from the spindle wharve 11 respectively.

A device 18 which controls the piecing-up of the yarn consists of a distancing element 19, in this example a sleeve, which is fitted at the foot of, and is coaxial with, a spindle 20 and is able to rotate.

The sleeve 19 comprises an upper body 21 positioned on the outside of the spindle wharve 11. This upper body 21 is lacking along a circumferential portion corresponding to an angle of open space "alpha". This angle of open space "alpha" is greater than an angle "beta" corresponding to the arc of contact of the belt 12 about the spindle wharve 11 when the sleeve 19 is in the position of normal drawing of the spindle 20 (see Fig.2a).

The sleeve 19 comprises an actuation lever 22, which is operated by the machine operative and cooperates with abutment stops 23 and 123 that provide respectively the position of normal drawing of the spindle and the position of full disengagement of the belt 12 from the spindle wharve 11 ("beta" = 0 as in Fig.2c).

The actuation lever 22 bears terminally on its side towards the foot of the spindle 20 a pin 24 cooperating with the outer surface of a second sleeve 25.

An abutment 26 is machined on the second sleeve 25 and determines the intermediate position of the sleeve 19 coinciding with a limited extent of contact between the belt 12 and spindle wharve 11 (angle "beta 1" smaller than "beta" in Fig.2b).

The upper body 21 comprises a surface of a rounded type 28 for contact with the belt 12 so as to keep the belt aligned during disengagement from the spindle wharve 11.

Terminal parts 29 of the upper body 21 correspond with the angle of open space "alpha" and are suitably edged to assist introduction of the upper body 21 between the belt 12 and spindle wharve 11.

Fig.3 shows the application of the sleeve 19 to a spinning spindle, which in this example, is a spindle with a rotary balloon checking device 27.

According to a variant a device 30 providing a jet of fluid, which is advantageously compressed air, is shown with its essential parts in the diagram of Fig.3 and cooperates with the device 18 that controls the piecing-up of the yarn.

The device 30 providing the jet of fluid consists of a timer 31 to time the duration of the jet and is actuated by a cam 32, comprised in the sleeve 19, during the intermediate position of the sleeve (Fig.2b).

The timer 31 actuates a solenoid valve 33 connected to the feed of the fluid under pressure 34.

The fluid under pressure 34 cooperates momentarily through a nozzle 35 with a ring 36 fitted to the upper portion of the rotary balloon checking device 27.

The ring 36 has a very low weight and an outer surface 37 of a type, knurled for instance, which is suitable to assist the tangential thrust of the fluid.

According to a variant the rotary yarn winding means 27 itself comprises an annular portion of knurled surface.

The device 30 providing a jet of fluid comprises also a pressure regulator with a pressure gauge 38 to regulate the thrust of the compressed air 34 suitably on the rotary balloon checking device 27.

Claims

1. Device (18) to control the piecing-up of yarn on spinning machines with belt-driven (12) spindles (20), such spinning machines employing advantageously spinning systems with rotary winding means (27) of a relatively heavy type, consisting of an element (19) to distance the spindle drive belt (12) from the spindle (20), the element (19) being located in correspondence with the foot of and externally coaxial with the spindle (20) and being able to rotate freely, characterized in that the distancing element (19) comprising an upper body (21) positioned on and at least partly surrounding the outside of a spindle wharve (11), and an actuation lever (22) which cooperates with abutment stops (23;123) for defining two working positions, namely:
 - a position for normal drawing of the spindle (Fig. 2a) with the drive belt (12) fully

in contact with the spindle wharve (11), and

- a position of complete separation (Fig. 2c) of the belt (12) from the spindle wharve (11), and further comprising an abutment (2b) determining
- an intermediate position (Fig. 2b) with a limited extent of contact between the belt (12) and the spindle wharve (11).

2. Device (18) as claimed in claim 1, in which the upper body (21) of the distancing element (19) being lacking circumferentially along an angular extent ("alpha").
3. Device (18) as claimed in claim 2, in which the lacking angular extent ("alpha") is greater than the angular extent ("beta") of contact between the belt (12) and the spindle wharve (11) in the position of normal drawing of the spindle.
4. Device (18) as claimed in any claim hereinbefore, in which the actuation lever (22) comprises a terminal pin (24) cooperating with an abutment (26) comprised on a sleeve (25).
5. Device (18) as claimed in any claim hereinbefore, in which the outer surface of the upper body (21) is rounded (28).
6. Device (18) as claimed in any claim hereinbefore, in which the terminal parts (29) of the upper body (21) have an inclined end.
7. Device (18) as claimed in any claim hereinbefore, in which the distancing element (19) cooperates with a means (30) providing a jet of fluid.
8. Device (18) as claimed in any claim hereinbefore, in which the means (30) providing a jet of fluid comprises a timer (31), a pressure regulator (38) to regulate the fluid (34), a solenoid valve (33) and a nozzle (35) to eject the fluid (34) under pressure.
9. Device (18) as claimed in claim 8, in which the timer (31) cooperates with the distancing element (19) during the intermediate position of the latter.
10. Device (18) as claimed in claim 8, in which the nozzle (35) cooperates momentarily with a rotary yarn winding means (27).
11. Device (18) as claimed in any claim hereinbefore, in which a ring (36) having a knurled

surface (37) is fitted to the rotary yarn winding means (27).

12. Device (18) as claimed in any of Claims 1 to 12 inclusive, in which the rotary yarn winding means (27) itself comprises an annular portion of knurled surface.

Revendications

1. Dispositif (18) utilisé pour contrôler la rattaché d'un fil dans des machines à filer ayant des broches (20) commandées par des courroies (12), comme les machines à filer utilisant avantageusement des systèmes de filage ayant des moyens de renvidage rotatifs (27) d'un type relativement lourd, constitué d'un élément (19) servant à distancer la courroie de commande de broche (12) de la broche (20), l'élément (19) étant situé en correspondance avec le pied de la broche et extérieurement coaxial par rapport à la broche (20) et pouvant tourner librement, caractérisé par le fait que l'élément de distance (19) comprend un corps supérieur (21) situé sur une noix de broche (11) et entourant au moins partiellement l'extérieur de celle-ci, et un levier de commande (22) agissant conjointement avec des butées (23; 123) pour déterminer deux positions de travail, qui sont:
 - une position pour la commande normale de la broche (figure 2a) avec la courroie de commande (12) entièrement en contact avec la noix de broche (11), et
 - une position de séparation complète (figure 2c) de la courroie (12) d'avec la noix de broche (11), et comprenant en outre une butée (32) qui détermine
 - une position intermédiaire (figure 2b) ayant une étendue de contact limitée entre la courroie (12) et la noix de broche (11).
2. Dispositif (18) selon revendication 1, dans lequel le corps supérieur (21) de l'élément de distance (19) est manquant circonférentiellement sur une étendue angulaire ("alpha").
3. Dispositif (18) selon revendication 2, dans lequel l'étendue angulaire manquante ("alpha") est plus grande que l'étendue angulaire ("beta") de contact entre la courroie (12) et la noix de broche (11) dans la position de commande normale de la broche.
4. Dispositif (18) selon l'une des revendications précédentes, dans lequel le levier de commande (22) comprend une goupille de fin de cour-

se (24) agissant conjointement avec une butée (26) réalisée sur un manchon (25).

5. Dispositif (18) selon l'une des revendications précédentes, dans lequel la surface extérieure du corps supérieur (21) est arrondie (28).
6. Dispositif (18) selon l'une des revendications précédentes, dans lequel les parties terminales (29) du corps supérieur (21) possèdent une extrémité courbée.
7. Dispositif (18) selon l'une des revendications précédentes, dans lequel l'élément de distance (19) agit conjointement avec un moyen (30) produisant un jet de fluide.
8. Dispositif (18) selon l'une des revendications précédentes, dans lequel le moyen (30) produisant un jet de fluide possède une minuterie de contact (31), un régulateur de pression (38) afin de régler le fluide (34), une vanne magnétique (33), et une buse (35) afin d'éjecter le fluide (34) sous pression.
9. Dispositif (18) selon revendication 8, dans lequel la minuterie de contact (31) agit conjointement avec l'élément de distance (19) pendant que ce dernier se trouve dans la position intermédiaire.
10. Dispositif (18) selon revendication 8, dans lequel la buse (35) agit temporairement conjointement avec un moyen de renvidage de fil rotatif (27).
11. Dispositif (18) selon l'une des revendications précédentes, dans lequel un anneau (36) possédant une surface moletée est fixé sur le moyen de renvidage de fil rotatif (27).
12. Dispositif (18) selon l'une quelconque des revendications 1 à 12 inclusivement, dans lequel le moyen de renvidage de fil rotatif (27) même comprend une partie annulaire de surface moletée.

Patentansprüche

1. Vorrichtung (18) zur Überwachung des Ansetzens eines Garnes an Spinnmaschinen mit durch Riemen (12) angetriebenen Spindeln (20), wie Spinnmaschinen, welche vorteilhafterweise Spinnssysteme mit drehenden Aufwindemitteln (27) eines relativ schweren Typs einsetzen, bestehend aus einem Element (19), um den Spindelriemen (12) auf einem Abstand zur Spindel (20) zu bringen, wobei das Element

(19) in Übereinstimmung mit dem Fuss der Spindel (20) und nach aussen koaxial dazu angeordnet und frei drehbar ist, dadurch gekennzeichnet, dass das Abstandselement (19) einen oberen Körper (21) umfasst, der auf einem Spindelwirtel (11) und das Äussere dieses teilweise umringend vorgesehen ist, und ein Betätigungshebel (22) vorgesehen ist, der mit Anschlägen (23; 123) zusammenwirkt, um zwei Arbeitsstellungen festzulegen, nämlich:

- eine Stellung für den normalen Antrieb der Spindel (Fig. 2a) mit dem Antriebsriemen (12) vollständig in Kontakt mit dem Spindelwirtel (11), und
- eine Stellung der vollständigen Trennung (Fig. 2c) des Riemens (12) vom Spindelwirtel (11), und ferner enthaltend einen Anschlag (2b), der
- eine Zwischenstellung (Fig. 2b) bestimmt, mit einem begrenzten Umfang des Kontakts zwischen dem Riemen (12) und dem Spindelwirtel (11).

2. Vorrichtung (18) nach Anspruch 1, bei welcher der obere Körper (21) mit dem Abstandselement (19) auf dem Umfang über einer Winkelausdehnung ("Alpha") fehlt.

3. Vorrichtung (18) nach Anspruch 2, bei welcher die fehlende Winkelausdehnung ("Alpha") grösser ist als die Winkelausdehnung ("Beta") des Kontakts zwischen dem Riemen (12) und dem Spindelwirtel (11) in der Stellung des normalen Antriebs der Spindel.

4. Vorrichtung (18) nach einem der vorangehenden Ansprüche, bei welcher der Betätigungshebel (22) einen Endstift (24) enthält, der mit einem Anschlag (26) auf einer Muffe (25) zusammenwirkt.

5. Vorrichtung (18) nach einem der vorangehenden Ansprüche, bei welcher die äussere Oberfläche (21) abgerundet (28) ist.

6. Vorrichtung (18) nach einem der vorangehenden Ansprüche, bei welcher die Endteile (2) des oberen Körpers (21) ein gebogenes Ende aufweisen.

7. Vorrichtung (18) nach einem der vorangehenden Ansprüche, bei welcher das Abstandselement (19) mit einem Mittel (30) zusammenwirkt, das einen Fluidstrahl erzeugt.

8. Vorrichtung (18) nach einem der vorangehenden Ansprüche, bei welcher das Mittel (30), das einen Fluidstrahl erzeugt, eine Schaltuhr

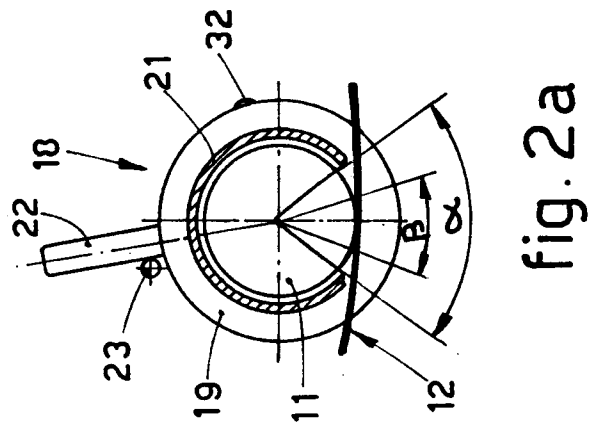
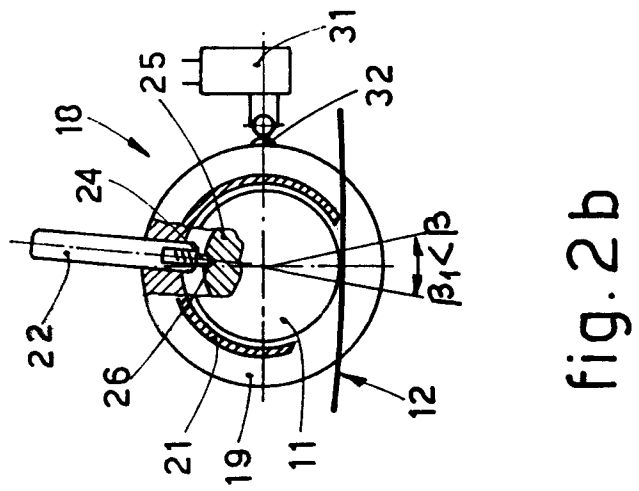
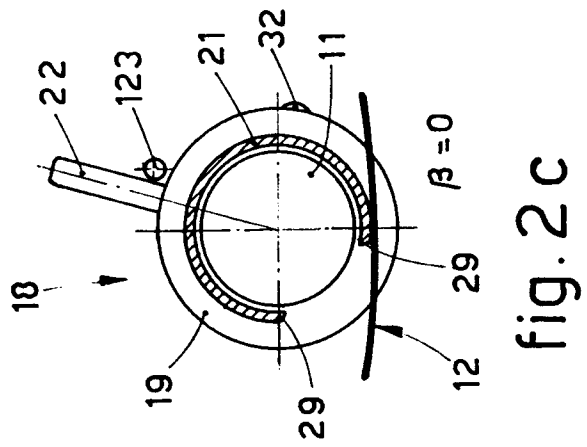
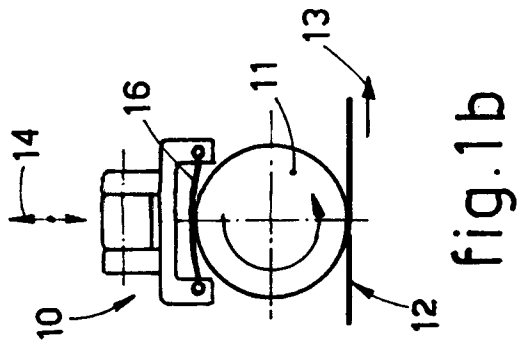
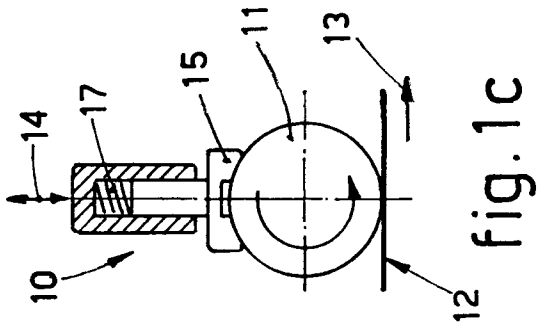
(31), einen Druckregler (38), um das Fluid (34) zu regeln, ein Magnetventil (33) und eine Düse (35) enthält, um das Fluid (34) unter Druck auszustossen.

9. Vorrichtung (18) nach Anspruch 8, bei welcher die Schaltuhr (31) mit dem Abstandselement (19) während der Zwischenstellung vom letzten zusammenwirkt.

10. Vorrichtung (18) nach Anspruch 8, bei welcher die Düse (35) zeitweise mit einem drehenden Aufwindemittel (27) zusammenwirkt.

11. Vorrichtung (18) nach einem der vorangehenden Ansprüche, bei welcher eine geriffelte Oberfläche (37) aufweisender Ring (36) auf dem drehenden Garnaufwindemittel (27) befestigt ist.

12. Vorrichtung (18) nach einem der Ansprüche 1 bis 11 einschliesslich, bei welcher das drehende Garnaufwindemittel (27) selber einen Winkelteil der geriffelten Oberfläche umfasst.



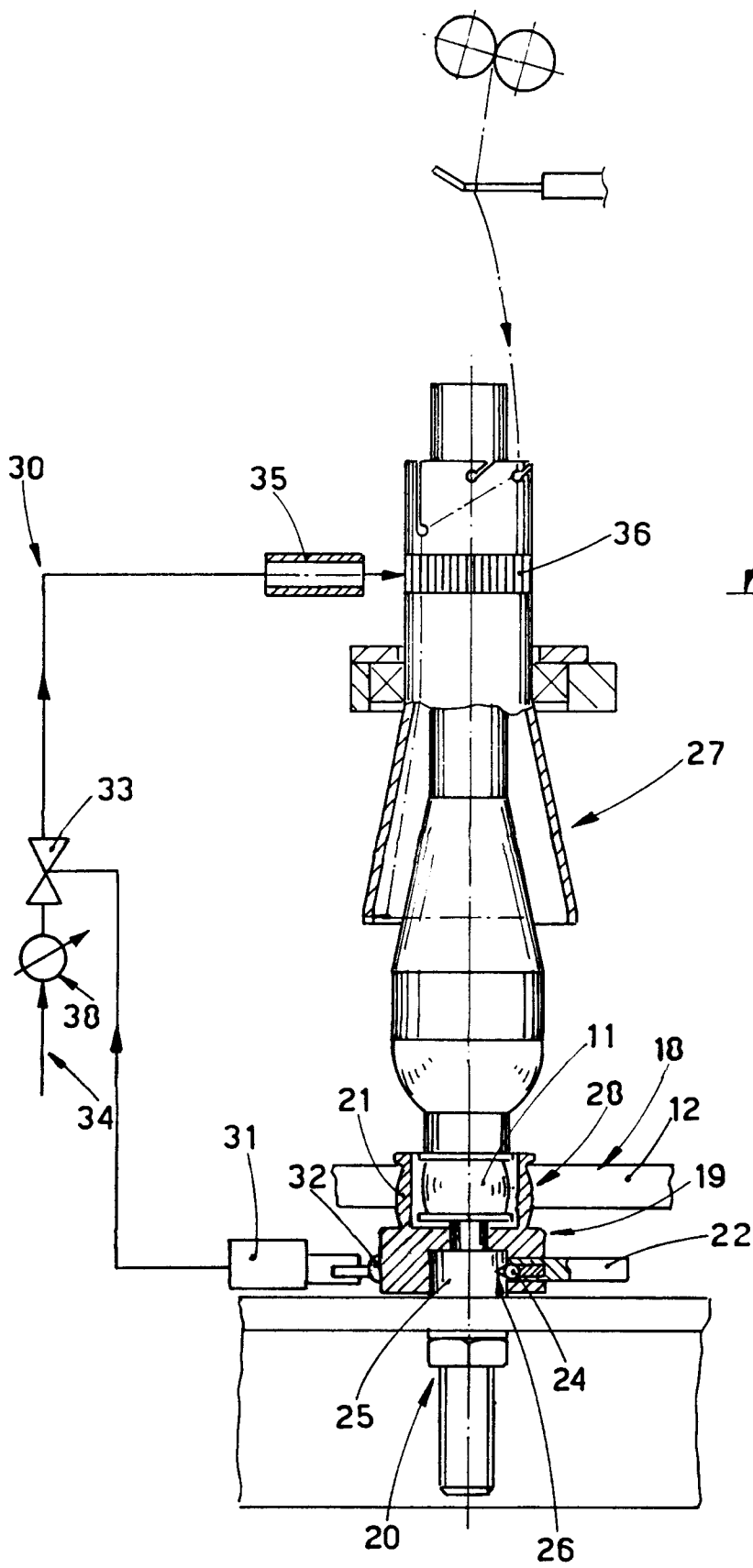


fig.3

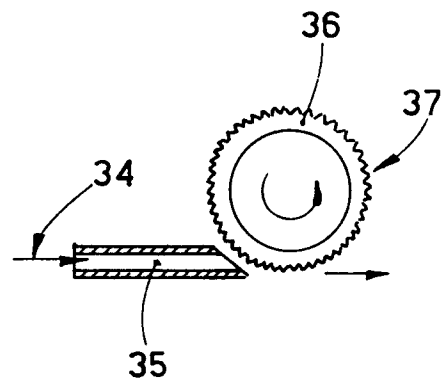


fig.4