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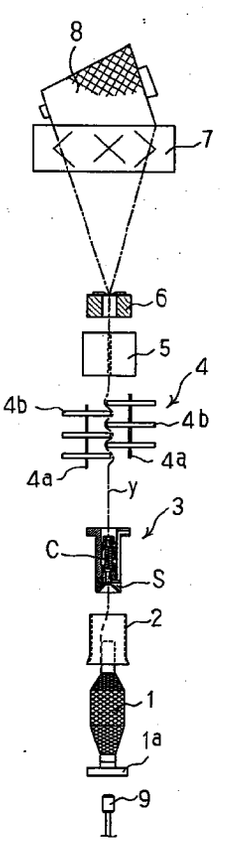
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(54) Auto winder

(57) The present invention relates to a hairiness control device in an auto winder that rewinds yarn Y which has been wrapped around a supply bobbin 1 into a package 8, said auto winder provided with a friction disk-type false-twisting device located on a yarn path between a supply bobbin and a package.

The hairiness of the spun yarn wrapped into the package can be suppressed and controlled. Further, during high-speed winding (in excess of 1000m / minute), it is possible to wind a cone package and control hairiness without negatively effecting the winding process.

FIG. 1



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Description

The present invention relates to an auto winder that reduces the hairiness around the surface of spun yarn when the yarn is rewound.

A winder that controls the hairiness of spun yarn by providing the yarn with a false twist through a pair of soft, barrel-shaped rotating drums positioned so as to intersect and form a nip point in the yarn path is disclosed in Patent Laying Open No. Heisei 8-188332. The rotation speed of the soft, barrel-shaped rotating drums in this kind of conventional winder, however, is limited, and the winder thus has difficulty winding at speeds over 1000m/minute.

When yarn is run at high speeds, hariness control devices for spun yarn which employ barrel-shaped rotating drums have the problem of frequuent yarn breakage. This is due to variations in yarn tension which cannot be remedied since the yarn is nipped. Because of this problem, conventional automatic winders with barrel-shaped rotating drums must be set at low winding speeds, and their productivity is thus limited.

Further, since the pair of rotating drums that nip the yarn and provide the false twist function as a kind of feed roller that actively feeds out the yarn at a fixed speed, they pose problems for winders that form a cone package wherein the yarn speed must differ at the opposite ends of the wound package.

It is an object of the present invention to propose an auto winder that resolves the aforementioned problems of the conventional technology as well as improves the operability of functions like yarn splicing.

In order to accomplish this object, the present invention comprises 1) an auto winder that unwinds yarn which has been wound around a supply bobbin and rewinds it into a wound package, said auto winder provided with a friction disk-type false twisting device located in the yarn path between the supply bobbin and the wound package, 2) a control member provided with a surface that comes into contact with the yarn and positioned on the supply bobbin side of the friction disk-type false twisting device, 3) said control member composed from a capsule tensor and a holding member which holds the tensor capsule, and 4) a friction disk in which at least the outer circumference that comes into contact with the yarn is made out of ceramics.

In a friction disc type false twisting device, since the yarn slips on the surface of the disc when it is wound at high speeds, yarn high tension can be released. Consequentially, even if, for example, periodic variations in yarn tension arise when winding the yarn into a cone package, the yarn does not break, and winding speeds in excess of 1000m/minute can be achieved, resulting in increased spun yarn processing capacity over conventional hairiness control devices.

Further, in order to accomplish the above-mentioned object, the present invention 5) is provided with a hairiness control member formed as a capsule member and a container member which comprises a movable holding member that holds the top part of the capsule; 6) is provided with a balloon control tube that can move the moveable holding member; and 7) during a threading operation, creates an air current in an upward direction to the hairiness control member such that the capsule member is floated upwards inside the hairiness control member.

FIG. 1 is an outline of a frontal view of an auto winder according to the present invention.

FIG. 2 is a lateral cross-section diagram of a hairiness control member arranged in an auto winder according to the present invention.

FIG. 3 is an outline of a diagonal cross-section of the hairiness control member arranged in an auto winder according to the present invention.

FIG. 4 is a lateral cross-section diagram of a hairiness control member when it is inside a balloon control member, said hairiness control member arranged an auto winder according to the present invention.

The present invention will now be explained in reference to the accompanying drawings, but to the extent that it does not exceed the limits of the essence of the invention, the present invention is not limited to the foregoing preferred embodiment.

1 is a supply bobbin like a spinning bobbin inserted into something like a bobbin tray 1a; 2 is a vertically moveable balloon control tube; 3, as explained in detail below, is a hairiness control member comprised of a capsule member C which is allowed to contact the yarn (spun yarn) unwound from the supply bobbin 1, and container member S, which houses the capsule member C; 4 is a friction disk-type false twisting device in which three vertical shafts 4a are arranged at points forming an equilateral triangle, each of said vertical shafts attached to a plurality of friction disks 4b, said friction disks 4b arranged such that each is on a different plane. Moreover, when seen in a planar view, one part of said disk may be overlapped. Further, in FIG. 1, a third vertical shaft with attached friction disks, located in the middle behind the two vertical shafts 4a shown in the diagram, has been omitted. The false-twisting device is arranged such that by rotating the three vertical shafts in the same direction, yarn y, which snakes zig-zag-like between the friction disks 4b, is imparted a false twist. The outer surface of friction disc 4b which contacts the yarn y should preferably be comprised of low-friction materials like ceramics in order to prevent hariness.

5 is an automatic yarn-splicing device; 6 is a yarn clearer; 7 is a traverse drum; and 8 is a cone-shaped wound package. It should be noted that the type of wound package 8 is not limited to cone packages; it is also possible to wind yarn y into a cheese package, or various other types of packages, as well. These parts are arranged in an auto winder, from the supply bobbin 1 to the wound package 8 in the following order: the balloon control tube 2, the hairiness control member 3, the

friction disk-type false twisting device 4, the auto yarn-splicing device 5, the yarn clearer 6, and the traverse drum 7. 9 is an air ejection nozzle arranged below the supply bobbin 1, and functions, by discharging air from air ejection nozzle 9, to blow the tip of yarn y inserted inside the hole of newly supplied supply bobbin 1 upwards toward the hairiness control member 3. It should also be noted that the yarn clearer 6 may be positioned in front of the automatic yarn-splicing device 5, in reverse of the order indicated in FIG. 1.

Next, the hairiness control member 3 which comprises capsule member C and container member S that houses the capsule member C, and is positioned on the supply bobbin 1 side of the friction disk-type false twisting device 4, will be explained.

s1 is an outer tube provided with a flange section s2 on the upper end, and into the lower end of which the small-diameter upper end section s5 of yarn guiding member s4, in which tapered yarn guide hole s3 which gradually widens in a descending direction is formed, fits and is engaged. Further, slit s6 which extends to the upper end of outer tube s1 is formed in flange section s2. s7 is a tubular holding member provided with tapered hole s8 that widens as it extends in an upward direction, and which is inserted into outer tube s1.

s9 is a vertically moveable holding member inserted into slit s6 formed in the above-described outer tube s1 and flange s2. Moveable holding member s9 is comprised of beam-shaped stopper s10 of which said beam is slightly longer than the outer radius of the outer tube s1, and more-or-less tubular shaped holding tube s11 which is affixed to about the center of stopper s10. The inner yarn passage s15 inside the holding tube s11 is comprised of tapered opening s12 which widens as it extends in a downward direction, tubular opening s13 which is located below and connects to the large diameter section of tapered opening s12 above, and tubular opening s14 which is located above and connects to the small diameter section of tapered opening s12 below.

s16 is an air hole opened in a vertical direction and running between the guiding member s4 and the flange section s2 of outer tube s1. Lateral air hole s17, opened in flange section s2 and connected to air hole s16, is provided with a pipe that is connected to high pressure air supply source (not shown in the diagram). Further, lateral air hole s18, opened in guiding member s4 and connecting to air hole s16 is provided with exit hole s18' which exits facing in the direction of capsule member C held in container member S. Thus, air holes s16, s17, and s18 together form air ejection passage s19 inside container member S, as described above.

Capsule member C comprises an upper capsule body c1 and lower capsule body c2 which fit one inside the other, and a coiled spring (elastic member) c3 which applies force in opposing directions against upper capsule body c1 and lower capsule body c2. Upper capsule body c1 and lower capsule body c2 are arranged so as to be able to slide against each other, and the upper end of upper capsule body c1 and the lower end of lower capsule body c2 each form hemispheres.

Capsule member C is contained inside the outer tube s1 of the container member S. The lower part of the lower capsule body c2 is inserted into the holding member s7 on the inside of outer tube s1 formed by tapered hole s8. Further, after the capsule has been inserted inside the container member S on the inside of outer tube s1, moveable holding member s9 is inserted into slit s6 which is formed in outer tube s1 and flange section s2 such that the tapered hole s12 and the tubular hole s13 that form the inner yarn path s15 of the holding member s11 the top part of capsule member C. Thus, the capsule member C contained inside the outer tube s1 of the container member S is formed such that the holding member s6 and holding member s9 inserted inside the slit s6 fit into each other and engage inside outer tube s1.

As described above, capsule member C contained inside container member S on the inside of outer tube s1 is held by holding member s7, which itself is engaged with the inside of outer tube s1, and moveable holding member s9 which in turn is inserted inside slit s6. A curved interstice is formed between the outer surface of capsule member C and the moveable holding member s9, and between the outer surface of capsule member C and the inner surface of outer tube s1 such that the yarn is able to pass through. Capsule member C which is stored inside the container member S on the inside of outer tube s1 is arranged such that moveable member s9 which is inserted into slit s6 and holding member s7 engaged with the inside of outer tube s1, functions to compress coil spring c3 which is arranged between the upper capsule body c1 and the lower capsule body c2. Consequentially, the lower part of lower capsule body c2 comes into contact with the slanted surface s7' formed by tapered hole s8 of the holding member s7 which itself is engaged with the inside of outer tube s1. Further, the upper part of the upper capsule body c1 comes into contact with the slanted surface s12' formed by tapered hole s12 of moveable holding member s9 of holding member s11.

Yarn y is led from tapered yarn guide hole s3 of yarn guiding member s4, between the slanted surface s7' which is formed in the hole s8 of the holding member s7 and the bottom of the lower capsule body c2 of the capsule C which is in contact with the slanted Surface s7' through the weight of the coil spring arranged inside the capsule member C and the weight of the capsule member C itself. Next, the yarn y passes the tubular passage 10, and then between the upper part of the upper capsule body c1 of capsule member C which is in contact with the slanted surface s12' of hole s12 formed in the moveable holding member s9 of holding member s11, said contact induced by means of coil spring c3 arranged inside the capsule member C, and slanted surface s12' . The yarn is then passed out above moveable holding member s9.

The yarn y drawn out from supply bobbin 1 passes through the balloon control tube 2 and the hairiness control member 3, and supplied to the friction disk-type false twisting device 4 located above the hairiness control member 3. After passing through the hairiness control member 3, the yarn is then passed through the yarn-splicing device 5 and the yarn clearer 6, and is wound into a package 8 as it is traversed by way of traverse drum 7.

By way of friction disk-type false twisting device 4, which is provided in the yarn path between the supply bobbin 1 and the wound package 8, the running yarn is imparted a false twist which spreads downwardly from the false twisting device 4. In this region, yarn y is twisted in a fixed direction, but the downward spread of this twist from the false twisting device is controlled by the hairiness control member 3 (meaning that the hairiness control device 3 also functions as a twist transmission-stopping member), thus enabling yarn Y to be effectively twisted. Hairiness is thus prevented through the imparting of a false twist to yarn y, whereby the hairiness on the surface of yarn Y is twisted into the yarn.

Next the means for threading the yarn through the hairiness control member 3 after a supply of yarn from a supply bobbin has been cleared and a new supply bobbin has been positioned will be explained.

After the yarn y has been cleared from supply bobbin 1, balloon control tube 2 is raised, and as shown in FIG. 4, hairiness control member 3 fits into the balloon control member 2. Since stopper s10 of moveable holding member 9 is in contact with balloon control tube 2, the moveable holding member s9 arranged inside the hairiness control member 3 is also lifted.

Moveable holding member s9, at the point where it is not pulled completely out of slit 6, after moveable holding member s9 is lifted, stops the rise of balloon control tube 2. Thereby, the lifting of moveable holding member s9 causes an interstice to be formed between the slanted surface s12' of the tapered hole s12 of the holding tube s11 of the moveable holding member s9 and the upper capsule body c1 of capsule C such that the yarn y can pass through.

Next, the air ejection nozzle 9 arranged below the supply bobbin 1 is activated, causing the end of the yarn which has been inserted into the hole of the supply bobbin 1 to be blown upwards from the top of the hole of the supply bobbin 1 . By supplying high-pressure air to the air ejection hole s19 opened in container member S from a high-pressure air supply (not shown in the diagram), air is ejected from exit hole s18' in the direction of the capsule member C, thus creating an upward air current inside hairiness control member 3.

Consequentially, the yarn blown upwards from the top hole of supply bobbin 1 is passed through the interstice between the bottom of the lower capsule body c2 of the capsule member C which is floated up by the high pressured air, and the slanted surface s7' of the holding member s7 inserted in outer tube s1. The yarn is then passed through the tubular passage 10 and then through the interstice formed between the slanted surface s12' of the tapered hole s12 formed in the holding tube s11 of the moveable holding member s9, and the upper capsule body c1 of the capsule member C. The yarn then is drawn out of the top of the hairiness control member 3, completing the passage.

The yarn passed out from hairiness control member 3, after being sucked into an intermediary pipe (not shown in the diagram) located above the hairiness control member 3, is then led to automatic yarn-splicing device 5. At this time, the fluff collected in places like the rounded interstice 10 of hairiness control member 3 is passed on the air flow along with the yarn Y and sucked into the intermediary pipe, and collected in a dust box (not shown in the diagram).

In the present embodiment, when the yarn is passed through hairiness control member 3, yarn passage through the hairiness control member 3 occurs by the supply of high pressured air from the high pressured air supply source (not shown) through the air ejection hole s19 opening into the container member S, but the air supplied through air ejection hole s19 can be low pressure air, and by creating an upward flow of air at the the tubular passage 10 of hairiness control member 3, fluff that has collected in the hairiness control device 3 can still be removed.

The embodiment described above is arranged such that the balloon control tube 2 is raised into the moveable holding member s9 when a new supply bobbin 1 is supplied, but the present invention can also be arranged such that the moveable holding member s9 is raised without the balloon control tube 2 being raised, using a completely separate mechanism, like a lever member.

The present invention when arranged as described above, achieves the following results.

According to a first aspect of the present invention, it is possible to reduce, and eliminate the hairiness of spun yarn wrapped into a package. Further, the present invention enables a cone package to be wound at high speeds (above 1000m/ minute) while still preventing hairiness, and without negatively effecting the winding process. Still further, the friction disk-type false twisting device allows for easy yarn threading, which permits automatic yarn splicing. Further still, the present invention enables the yarn tension to be controlled without the need for providing a separate yarn tensor.

According to another aspect, the present invention allows for the effective reduction of hairiness. Further, a third aspect of the present invention allows for the hairiness to be even more effectively reduced at high winding speeds, and yarn threading during yarn splicing is made easier. A fourth aspect of the present invention allows for high speed winding.

Since the capsule member is held by the moveable holding member, by moving the movable holding member when the yarn is passed through the hairiness control member, moving the capsule member becomes

easy, and consequentially, the passing of the yarn through the hairiness control member is accomplished rapidly and reliably.

Since the moveable holding member is moved by the balloon control tube, it is unnecessary to supply a special separate moving device, and it becomes possible to move the moveable holding member when the yarn is passed through the hairiness control member.

When yarn is passed through the hairiness control member, by creating an air flow in an upward direction through the inside of the hairiness control member, the capsule is forced to float upwards, creating an interstice inside the hairiness control member through which the yarn can pass. Consequentially, it is possible to automate the passage of yarn through the hairiness control member. Furthermore, using this air flow, clearance of the fluff accumulated inside the hairiness control device whenever the supply bobbin is changed is enabled, allowing for cleaning of the hairiness control member each time, and reliably preventing decrease in the machine's performance.

Claims

1. An automatic winder in which a yarn unwound from a supply bobbin is rewound onto a package characterized in that a friction disk-type false twisting device (4) is provided in the yarn path extending from the supply bobbin to the package.

2. Automatic winder according to claim 1, characterized in that a hairiness control member (3) is provided between the false twisting device and the supply bobbin.

3. An automatic winder comprising a friction-type false twisting device (4) characterized by

   a hairiness control member (3) on the false twisting device side of a supply bobbin (1) wherein the hairiness control member (3) has a capsule tensor (C) elastically contacting surrounding surfaces (s7', s12') forming together at least partially a yarn path.

4. Automatic winder according to claim 3, characterized in that

   the capsule tensor (C) is contained in an outer tube (S1) of a container member (S).

5. Automatic winder according to claim 4, characterized in that

   the lower part of the capsule tensor (S) is seated in a tubular holding member (7) inserted into the outer tube (S1) and having a tapered hole (s8) that widens inwardly and the upper part of which is contacted by a vertically moveable holding member (s9) having a tapered opening (s12) which widens inwardly.

6. Automatic winder according to claim 5, characterized in that

   the holding member (s9) is inserted into a slit (s6) formed in the outer tube (s1).

7. Automatic winder according to claim 5 or 6, characterized in that

   the moveable holding member (s9) comprises a beam-shaped stopper (s10).

8. Automatic winder according to claims 4 to 7, characterized in that

   the capsule tensor (C) is comprised of two capsule bodies (c1, c2), fitting into each other, being relatively movable and containing an elastic member.

9. Automatic winder according to claim 8, characterized in that

   the elastic member is a coil spring (c3).

10. Automatic winder according to claims 6 or 7, characterized in that

    the holding member (s9) projects out of the outer tube (s1).

11. Automatic winder according to claims 4 to 10, characterized by

    an air channel (s17, s18, s18', s19) opening into the lower part of the capsule tensor (C).

12. Automatic winder according to claim 10, characterized by

    an up and downwardly moveable balloon control tube (2) between the hairiness control member (3) and a supply bobbin (1) having an inner diameter sufficient to contain the hairiness control member (3) and co-operating with the projecting, vertically moveable holding member (s9).

13. Automatic winder according to claim 1, characterized in that

    at least the outer circumference of the friction disk of the false twisting device (3) that comes into contact with the yarn is made of ceramics.

FIG. 1

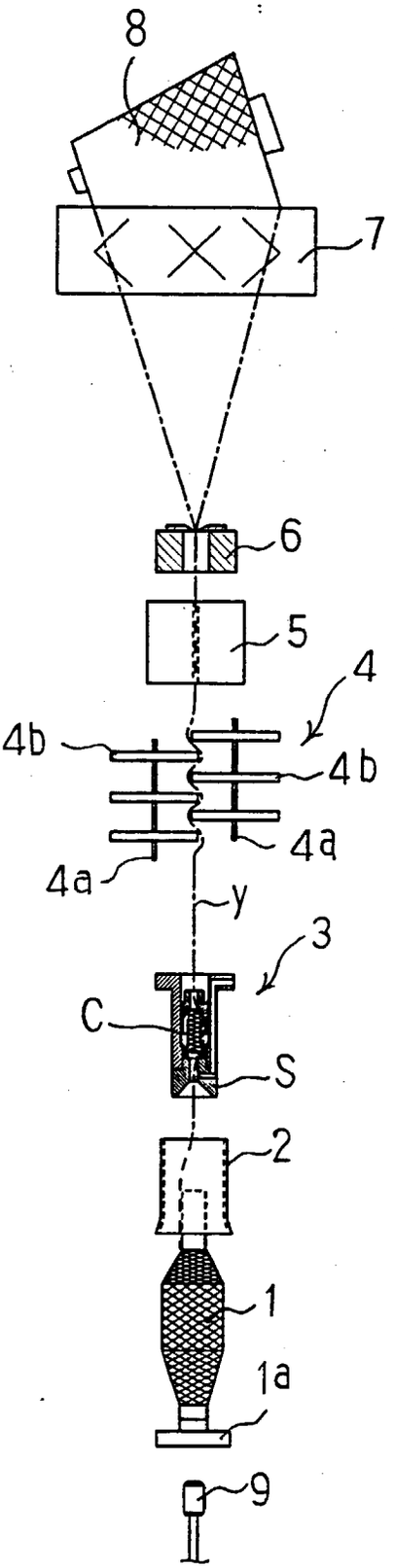


FIG. 2

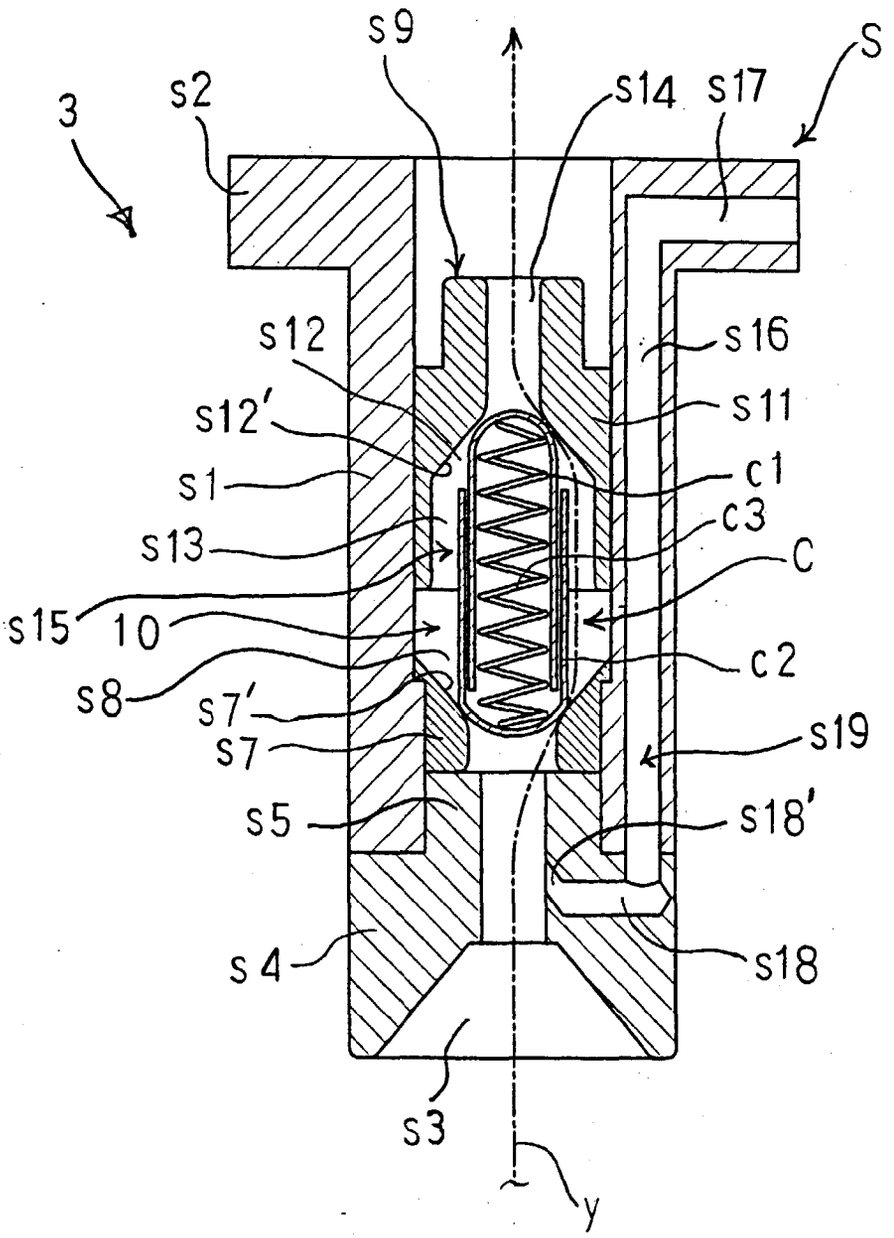

s9
S
s2
s14
s17
3
s12
s16
s12'
s11
s1
c1
s13
c3
C
s15
10
c2
s8
s7'
s19
s7
s5
s18'
s4
s18
s3
y

FIG. 3

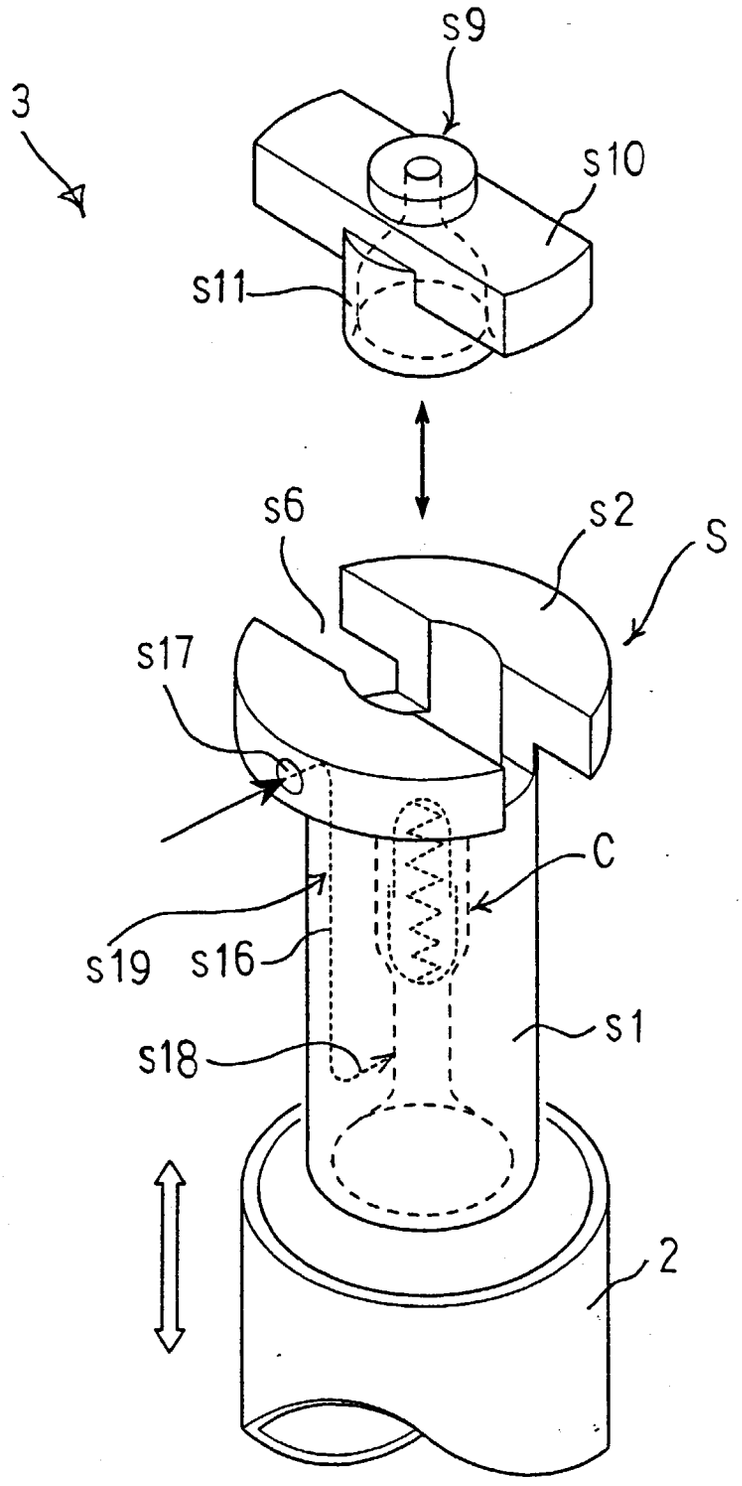
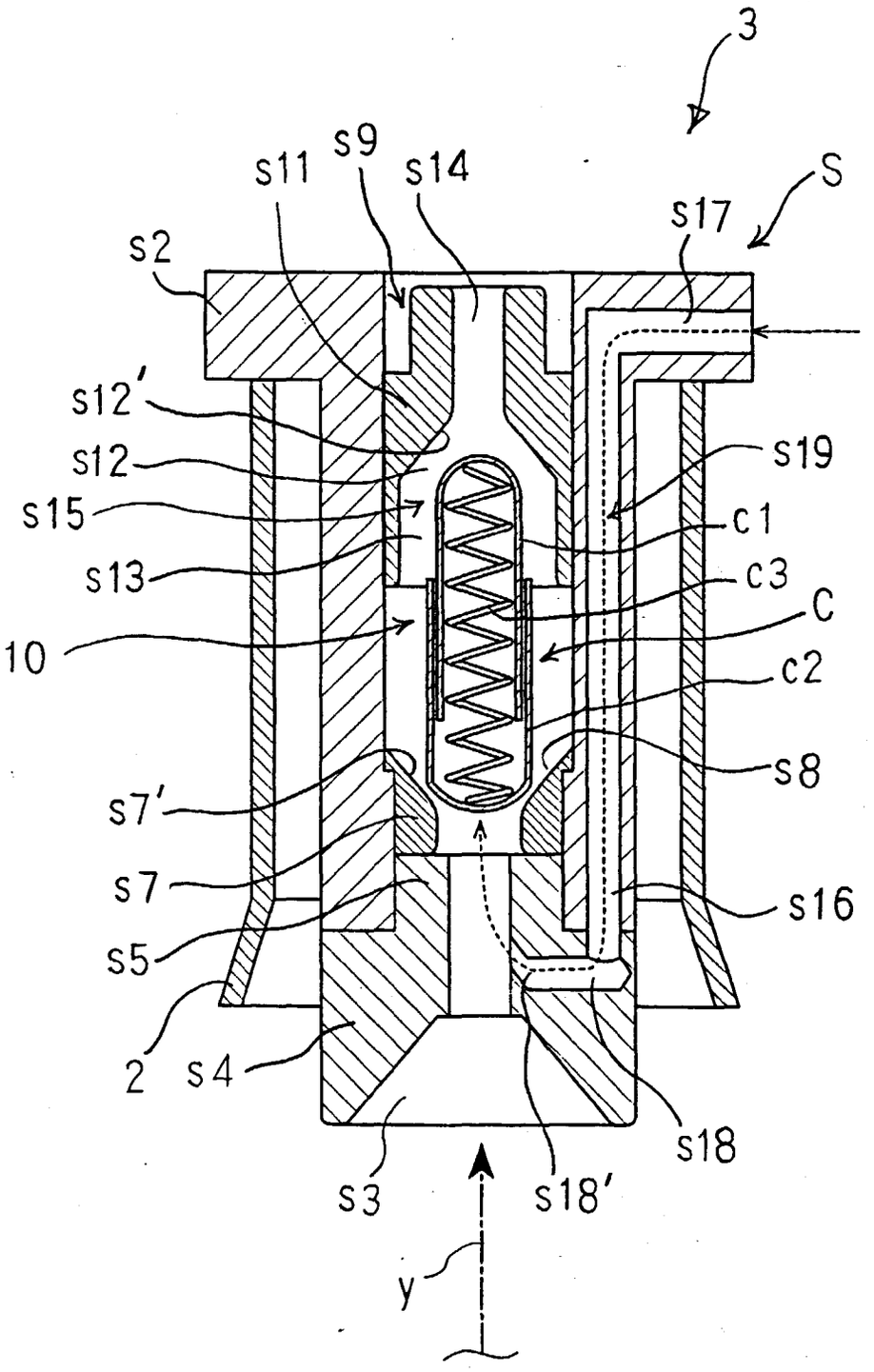


FIG. 4


3
s11
s9
s14
S
s17
s2
s12'
s12
s19
s15
c1
s13
c3
C
10
c2
s8
s7'
s7
s16
s5
2
s4
s18
s3
s18'
y