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(54) **MECHANISM AND THE METHOD TO REVERSING THE TUBULAR TEXTILE**

(57) A mechanism and the method for reversing a tubular textile, such as sock, is performed when the plaiting process is finished and removed from the needles of the knitting machine for open-end closure.

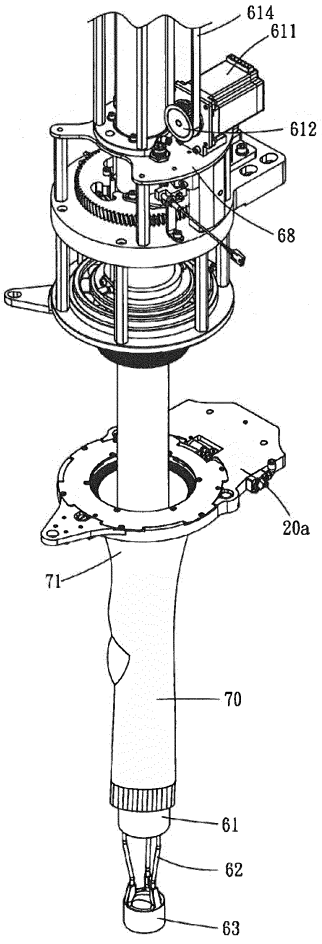

FIG. 3

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention herein relates to a mechanism and its method for reversing a tubular textile, especially concerns to sucks plaited by a knitting machine. Once the plaiting process is completed the tubular textile is removed from the knitting needles and sewed off the open-end by the knitting machine. The disclosed mechanism and the method is applied to reverse the textile before and after sewing off the open-end.

2. Description of the Related Art

[0002] A tubular textile with open-ends on both sides, such as sock, is sewed off and then took off from the needles of the knitting machine to be transferred for open-end closure no the sewing station, as mentioned in Patent No. EP23777979. Because the exposure of the suture part and the redundant thread affect socks selling and appear a voice of improvement. Therefore, the manufacture thinks of a mechanism and the method for reversing the tubular textile automatically which has the advantage of costing down. Nevertheless, the solutions for reversing textile has been revealed in the known Patent No. US5052196 and WO02070801 but are considered complex and expensive.

SUMMARY OF THE INVENTION

[0003] The invention aims to provide a mechanism and the method for efficiently reversing the knitted fabric, especially suitable for a tubular textile.

[0004] To realize it, the invention provides a mechanism for reversing the tubular textile comprising: a vertical extending air suction hose, the air sucking means connecting to the air suction hose for air sucking, said mechanism for reversing further composing a driving source to mobilize the air suction hose up and down, a guide means mounted inside of the air suction hose and protruding out of the lower end of said hose, and a vertical extending hold means for receiving the tubular textile.

[0005] A preferable embodiment is that the guide means includes at least two vertical extending rods arranged coaxially inside of the air suction hose, and a collar located at the lower ends of the rods.

[0006] A preferable embodiment is that the hold means is an elongate rods with an axis projecting to the center of the collar.

[0007] This invention further reveals a knitting machine for producing a tubular textile including a bracket and aforementioned reversing mechanism.

[0008] This invention further reveals a method for reversing the tubular textile with the steps comprising: a) take the tubular textile off from the needles of the knitting machine; b) turn said textile outside in by the adoption of the reversing mechanism as mentioned above; c) sew off the open end of the textile; d) turn said textile inside out by the adoption of the reversing mechanism.

[0009] In short, the invention of this reversing mechanism is suitable for the reversing the tubular textile before or after the toe closure process automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 is a schematic view of the reversing mechanism;
FIG. 2 is a schematic view of the reversing mechanism showing the statue before reversing the tubular textile;
FIG. 3 is a schematic view of the reversing mechanism showing the air suction hose and the guide means passing through the suck;
FIG. 4 is a schematic view of the reversing mechanism showing that the air suction hose is breathing in the suck;
FIG. 5 is a schematic view of the reversing mechanism showing that the suck is sucked into the air suction hose;
FIG. 6 is a schematic view of the reversing mechanism showing that the hold means is leaving from the air suction hose;
FIG. 7 is a schematic view of the reversing mechanism showing that the hold means lines up the air suction hose;
FIG. 8 is a schematic view of the reversing mechanism showing that air suction hose is downward moving and is lined up by the hold means;
FIG. 9 is a schematic view of the reversing mechanism showing that the hold means receives the suck after toe closure;
FIG. 10 is a schematic view of the reversing mechanism showing the hold means received the overturned suck after toe closure;
FIG. 11 is a perspective view of the FIG. 2;
FIG. 12 is a perspective view of the FIG. 3;
FIG. 13 is a perspective view of the FIG. 4;
FIG. 14 is a perspective view of the FIG. 5;
FIG. 15 is a perspective view of the reversing mechanism showing that the toe opening has been sewed off;
FIG. 16 is a perspective view of the reversing mechanism showing that the hold means lines up to the air suction hose;
FIG. 17 is a perspective view of the reversing mechanism showing that the hold means receives the suck after toe closure;
FIG. 18 is a perspective view of the reversing mechanism showing that the hold means has received the overturned suck after toe closure at the last phase.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0011] Hereinafter, an example is elaborated for further understanding the mechanism of this invention and shall not be used to ground the performance thereof.

[0012] This invention provides an embodiment of a reversing mechanism and its method which is capable of turning over the textile and hide the redundant thread inside after open-end closure stitched by the knitting machine.

[0013] As mentioned in Patent No. EP2377979, when the plaiting process is completed by the knitting machine, the stocking has an open-end with thread remaining on the knitting needles, and the knitting needles having a multiple pairing members composed of strip members and transfer members for sewing off the tiptoe and located in two opposite bracket facing each other deployed on the knitting machine.

[0014] As shown in FIG. 1, this invention reveals a reversing mechanism (60) including a vertical extending air suction hose (61), an air sucking means connecting to the air suction hose (61) for generating air suction, a guide means (62) mounted below the air suction hose (61), and a hold means (64) deployed under the guide means (62) which is adequate to be adopted to any steps after the plaiting process as the suck is removed with an open-end status. To be more specifically, when the last-to-knit rank of the thread knots is disposed on the transfer elements or when the suck is still placed on the sewing station. In this embodiment, the suck with an open-end is turn over when still disposed on the transfer elements, and then turn over again after sewed off the open-end on the sewing station.

[0015] As shown in FIG. 2, the suck (70) with open-end is disposed on the bracket (20a) deployed with transfer elements as mention in EP2377979. In fact, the strip elements, disposed on two different brackets, are aligned each other as mentioned in EP2377979. To avoid confusion, there are still the other strip members disposed on the other brackets not shown in the drawing.

[0016] Firstly, the bracket (20a) moves the suck (70) down below the air suction hose (61) and the guide means (62), wherein the air suction hose (61) is expelled up and down by the drive source (611) To ensure the air suction hose (61) is linked to the body (67) as shown in FIG. 1, the body (67) is equipped with a first pulley (612) connected to the output shaft of the drive source (611), a secondary pulley (613) deployed on a position high above the body (67) and away from the drive source (611), and an array of rack on the timing bell (614) disposed on between the first pulley (612) and the second pulley (613) is engaged to the gear of air suction hose (61) for power transmission. Besides, for the air suction hose (61) making an up and down movement, the technique adopted in the embodiment is replaceable by the other known skills.

[0017] The guide means (62) deployed inside of the air suction hose (61) extends an appropriate length along the axis of the air suction hose (61). In this embodiment, the guide means (62) mounted inside the air suction hose (61) make no relative movement along with the air suction hose (61).

[0018] In this embodiment, the guide means (62) comprises three rods coaxially arranged inside of the air suction hose (61), and the quantity of said rods may be at least 2 and probably be four or five...etc.

[0019] In this embodiment, the guide means (62) protruding out of the lower end of the air suction hose (61) may be deployed with a collar (63) on the lower end of aforementioned rods, where a gap lies between the collar (63) and the lower ends of the air suction hose (61) as shown in FIG. 3. When the air suction hose (61) moves down, its lower end may be lower than that of the suck. As the length of the suck is predetermined, the downward distance of the air suction hose (61) may be preset by a control unit.

[0020] When the lower end of the air suction hose (61) arrives at the open-end of the suck, the air suction starts air inhaling, said air suction means may be an independent vacuum pump or a valve equipped on a vacuum tube of the knitting machine. Meanwhile, as the air suction hose (61) starts moving upward and its lower end aligns with the open-end of the suck, the suck is breathed in as shown in FIG. 4. As long as the upward movement carries on, the rest portion of the suck is sucked in accordingly but for the open-end because it is engaged to the transfer means of the bracket (20a). Thus, the suck (70) is disposed between the air suction hose (61) and the guide means as shown in FIG. 13. In the next step, the suck (70) is transferred to the sewing station for stitching and the guide means (62) is still remained inside of the suck with toe closed as shown in FIG. 15.

[0021] As shown in FIG. 8 to 15, the hold means (64) having a stick outlook vertically elongates down beneath the sewing station, and rotationally approaches or away from the sewing station. In the other embodiment, the hold means (64) comes near to or moves away from the sewing station following a vertical direction instead of a spiral route.

[0022] The lower end of the hold means (64) is connected to a vertical elongated holding support (641) hinged on a shaft (642), the shaft pivots to a lower support (644) equipped with a drive source (643) for rotating the shaft (642), and said drive source (643) may be, and shall not be limited, a Pneumatic cylinder.

[0023] Once the toe closure is completed, the hold means (64) is rotationally shifted to another position as shown in FIG. 7 or 8. In this situation, the longitudinal length of the hold means (64) directs to, or at least points to, the axis of the collar (63). Then, the air suction hose (61) is moving down as the air suction means shuts down, the suck (70) is released then retained on the hold means (64) with inside out and leaves the thread inside.

Claims

1. A mechanism for reversing a tubular textile with an open-end comprises: a vertically extending air suction hose, an air suction means connected to the air suction hose for generating air suction which is **characterized in that**:
its including a drive source for moving the air suction hose up and down, a guide means mounted inside of the air suction hose and protruding down beneath a lower end of the air suction hose as a passage for the textile, and a vertical elongating hold means disposed down below the air suction hose for receiving the textile from the guide means.

2. A reversing mechanism as defined in claim 1, wherein the guide means comprises at least two vertical extending rods coaxially arranged inside of the air suction hose.

3. A reversing mechanism as defined in claim 2, wherein the guide means further comprises a collar deployed on a lower end of the rods.

4. A reversing mechanism as defined in claim 3, wherein the hold means is a prolonging rods projecting to the center of the collar.

5. A reversing mechanism as defined in claim 1, wherein the hold means is a longitudinal rods directing to an axis of the collar.

6. A reversing mechanism as defined in claim 1, wherein the hold means has a shaft for pivoting movement.

7. A reversing mechanism as defined in claim 1, wherein the hold mean makes a vertical movement.

8. A reversing mechanism as defined in claim 1, wherein the air suction hose is movably deployed on a body equipped with a drive source in charge of moving the air suction hose.

9. A reversing mechanism as defined in claim 8, wherein there are two pulleys disposed between the body and the drive source, and a timing belt connected to the pulleys for power transmission.

10. A knitting machine for producing a tubular textile includes a bracket, and a reversing mechanism as defined in claim 1.

11. A knitting method for reversing a tubular textile includes following steps:

    a) take off the tubular textile from a needle of a knitting machine;
    b) reverse the tubular textile by operation of a reversing mechanism as defined in claim 1;
    c) sew off the open-end of the tubular textile on a sewing station; and
    d) overturn the tubular textile by using the reversing mechanism.

12. A reversing method as defined in claim 11, wherein the step b) reversing process be carried on before transferring to the sewing station or operated on the sewing station.

13. A reversing method as defined in claim 11, wherein the step b) includes following steps:

    b1) an air suction hose of the reversing mechanism passes through a lower end of the textile and moves downward;
    b2) the air suction hose moves downward until reaches a position lower than the open-end of the textile;
    b3) activate an air suction means of the reversing mechanism;
    b4) the air suction hose moves upward; and
    b5) the textile is sucked into the air suction hose for reversing process.

14. A reversing method as defined in claim 11, wherein the step d) includes the following steps:

    d1) a hold means is shifted beneath the textile with the open-end closed;
    d2) the air suction hose moves downward tag along the textile with the open-end closed; and
    d3) the textile is released from the air suction hose but retained by the hold means.

15. A reversing method as defined in claim 15, wherein the step d3) includes upward moving the hold means.

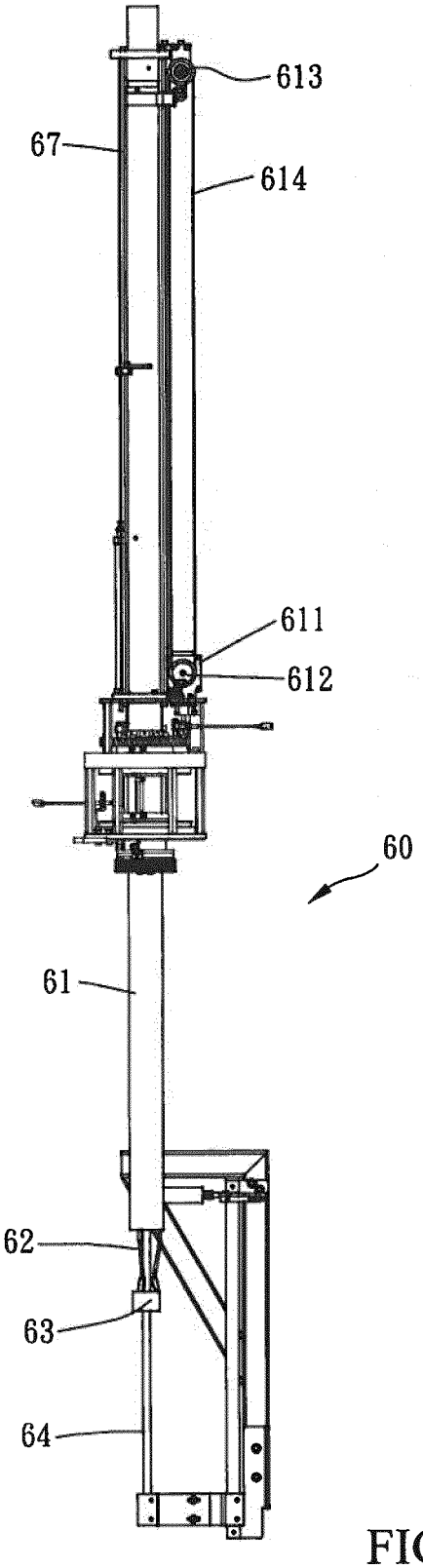

FIG. 1

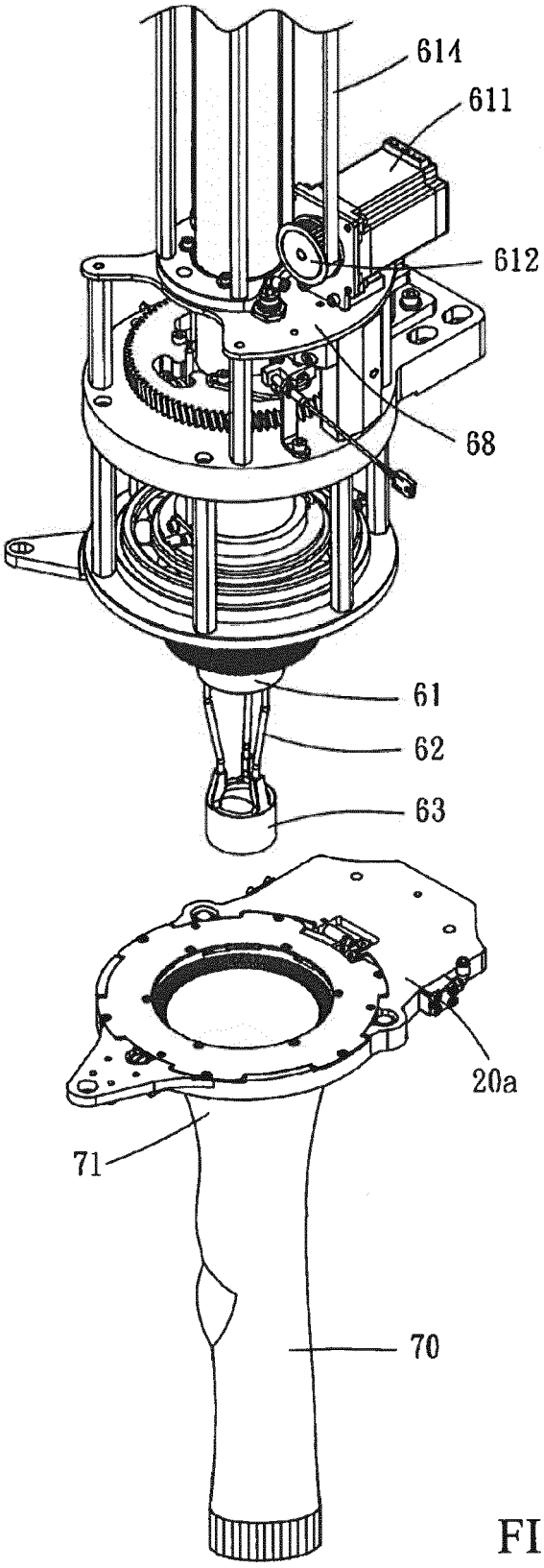

FIG. 2

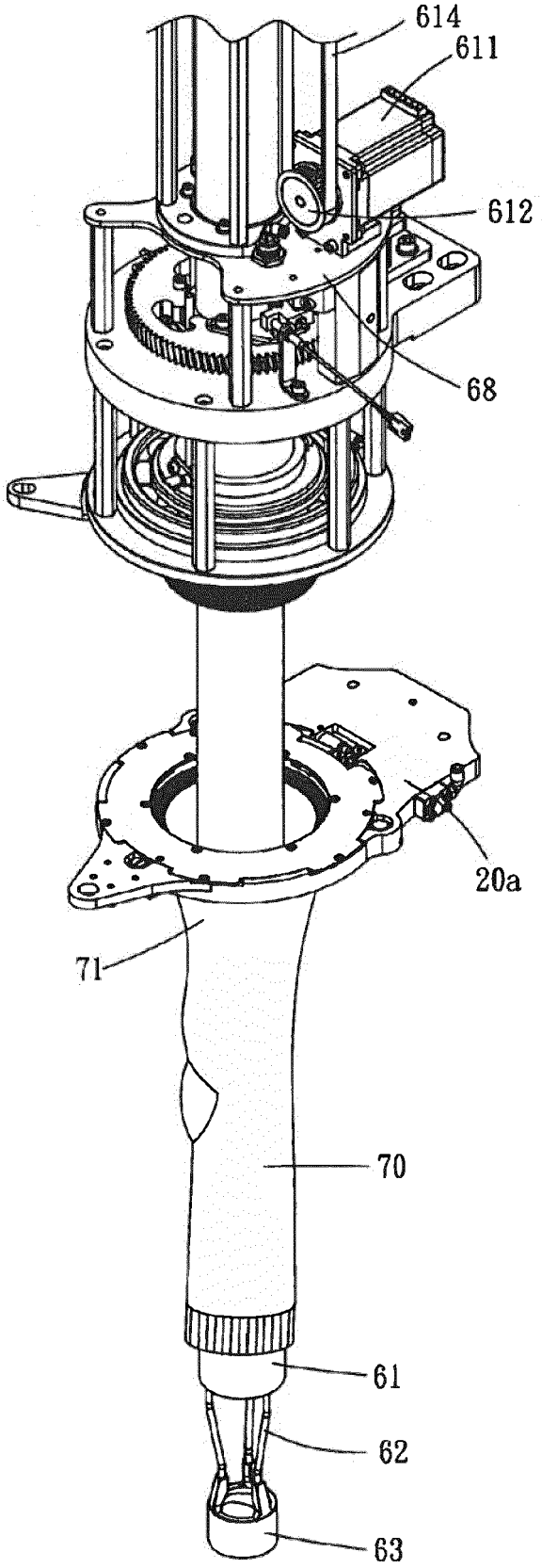

FIG. 3

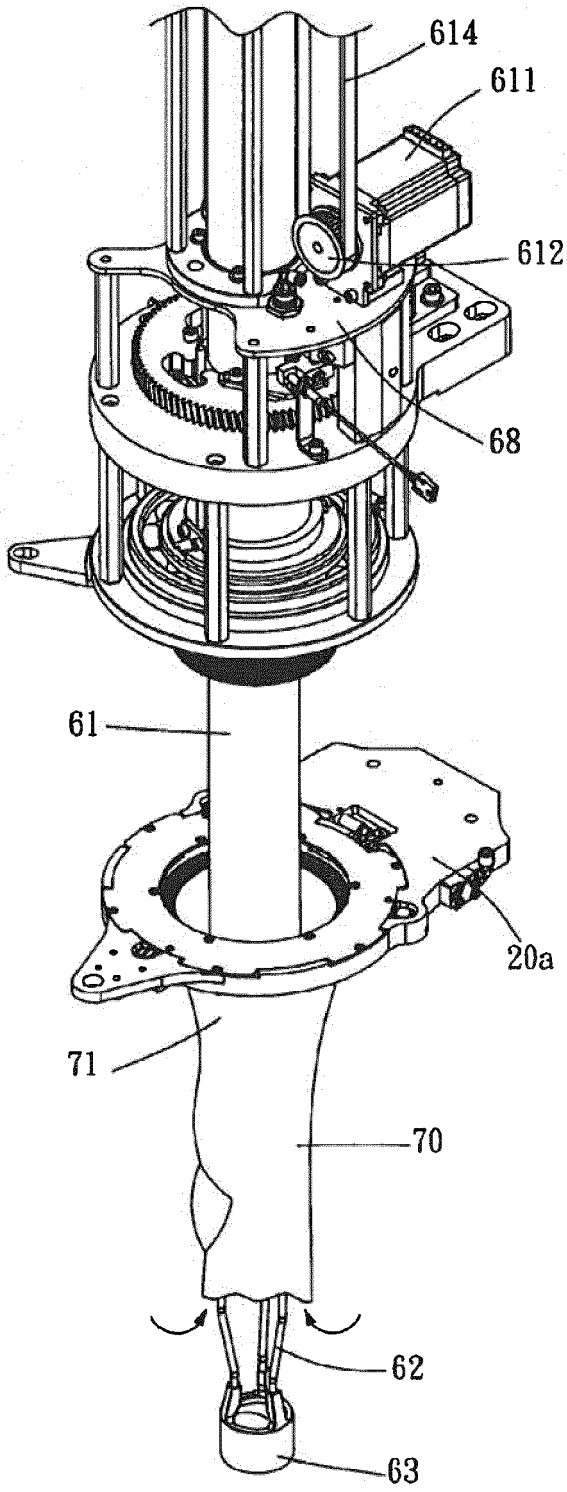

FIG. 4

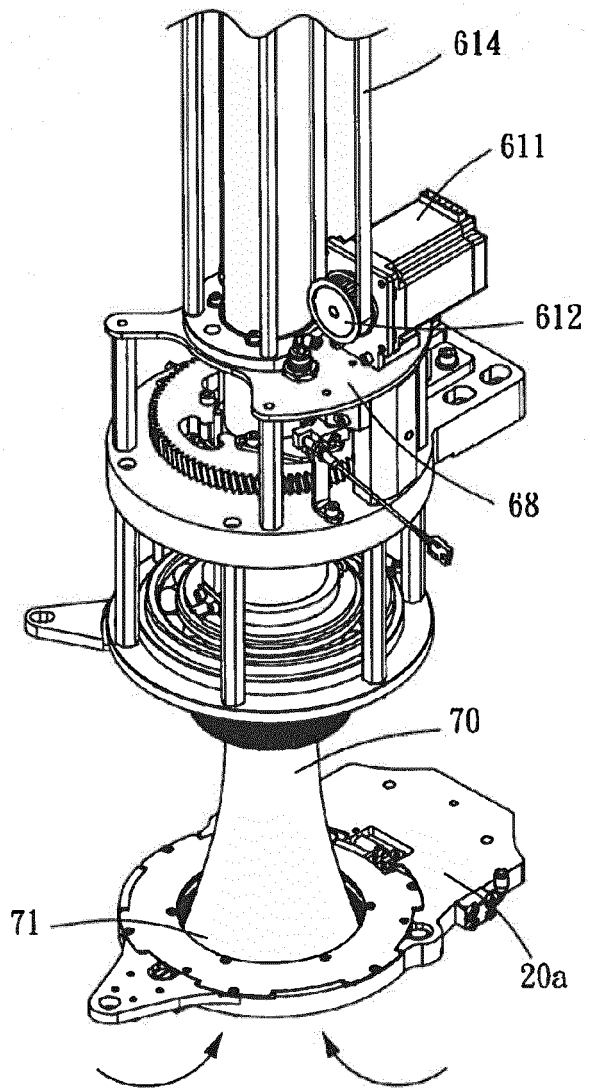

FIG. 5

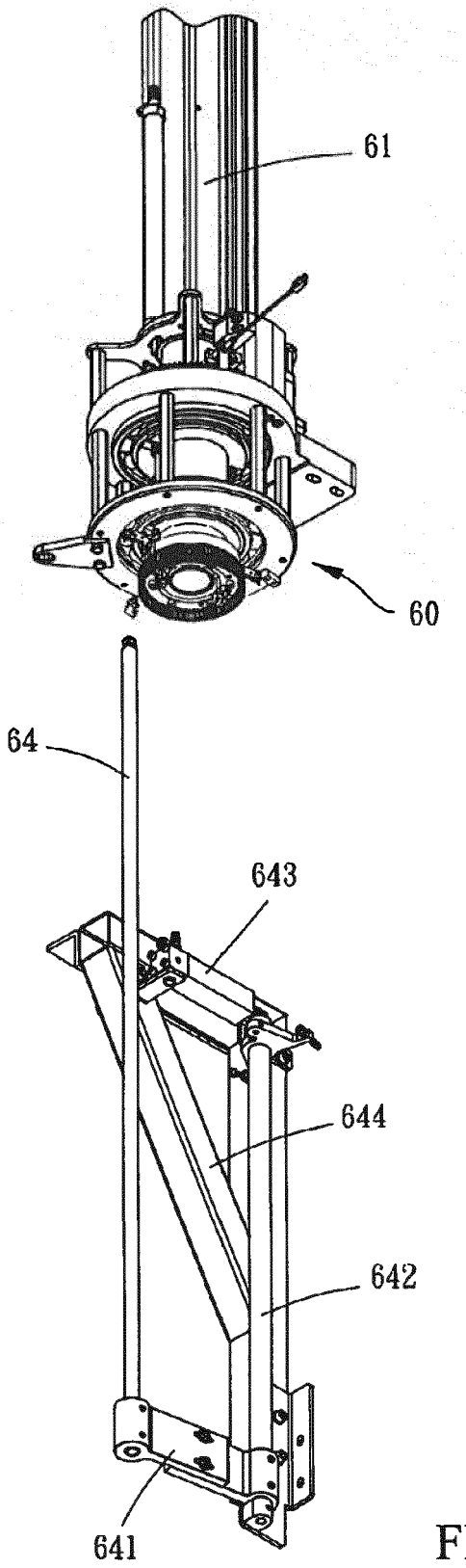

FIG. 6

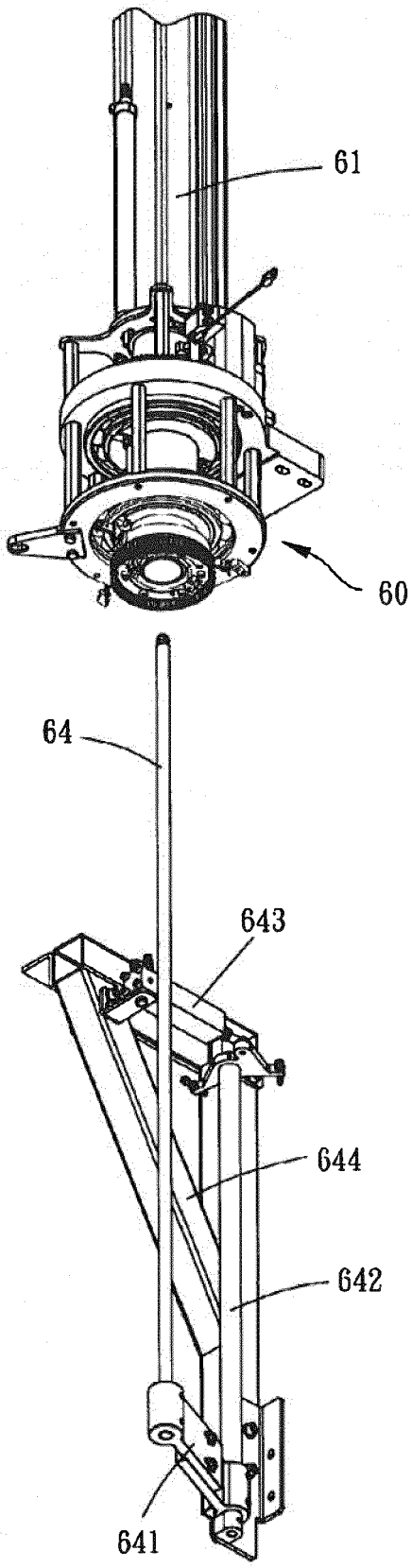

FIG. 7

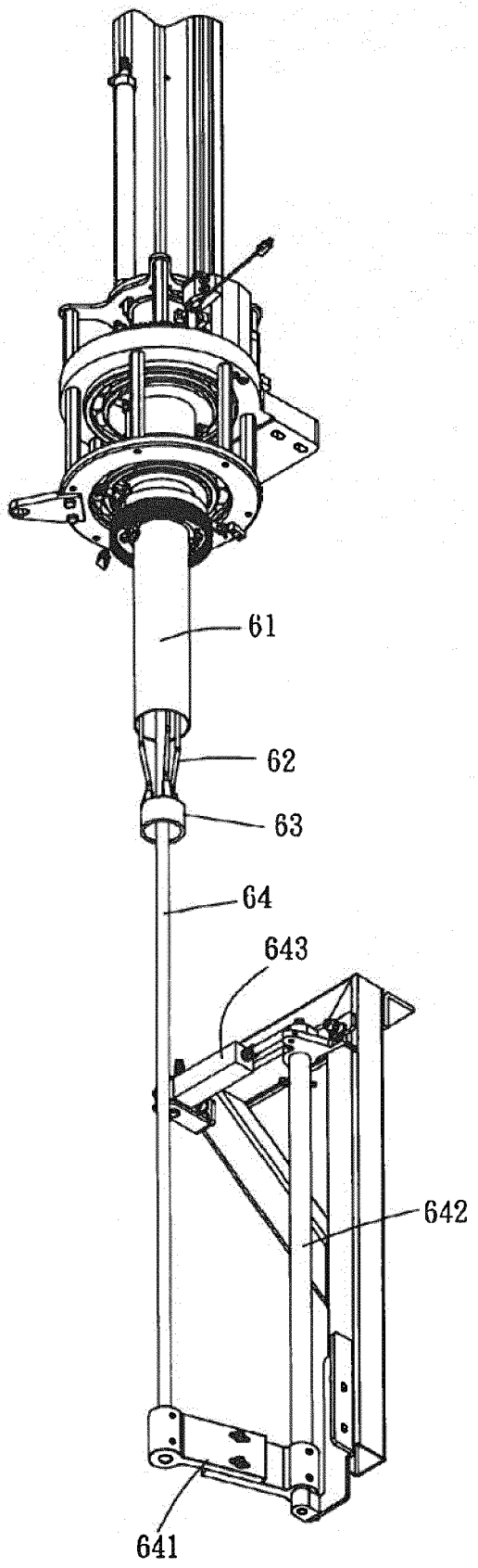

FIG. 8

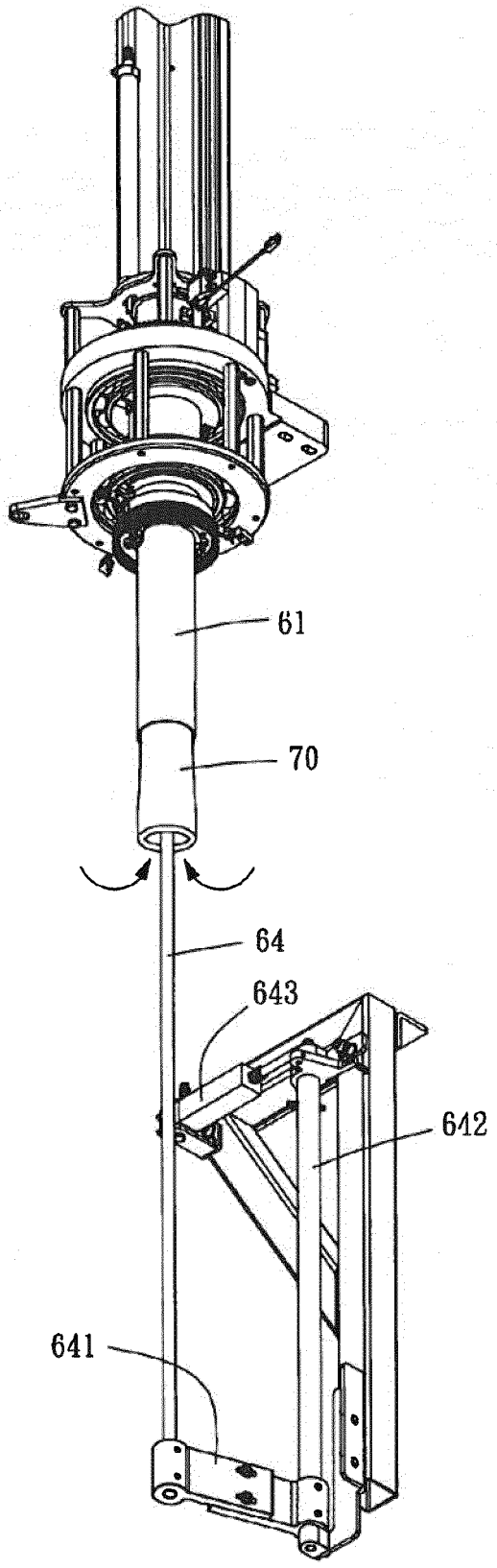

FIG. 9

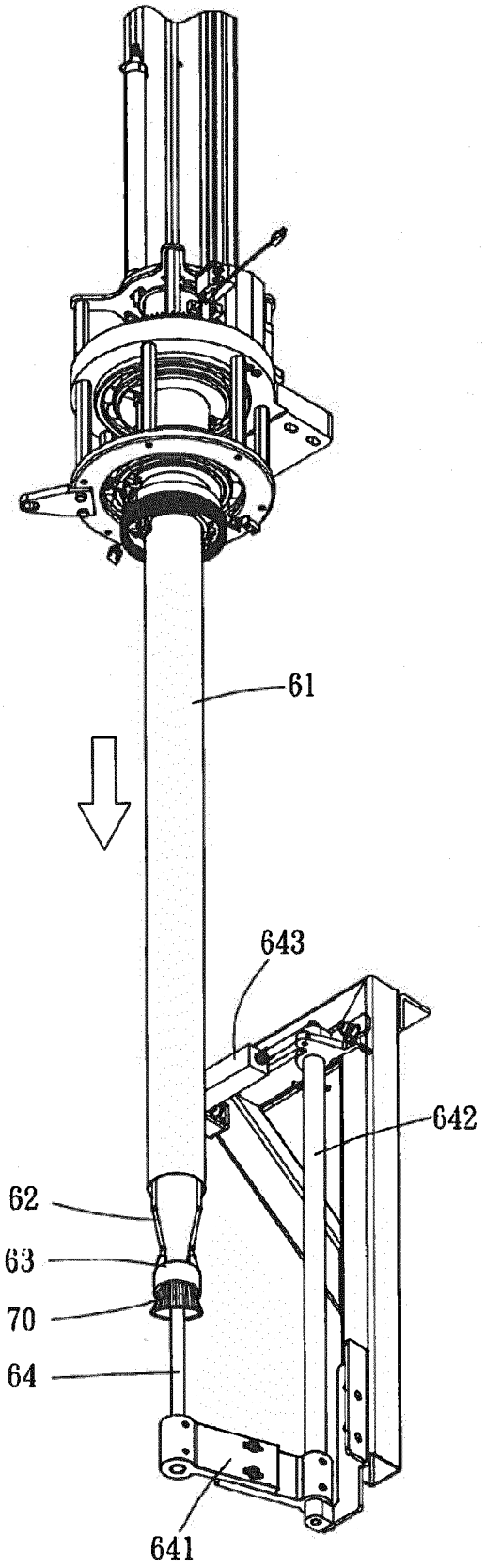

FIG. 10

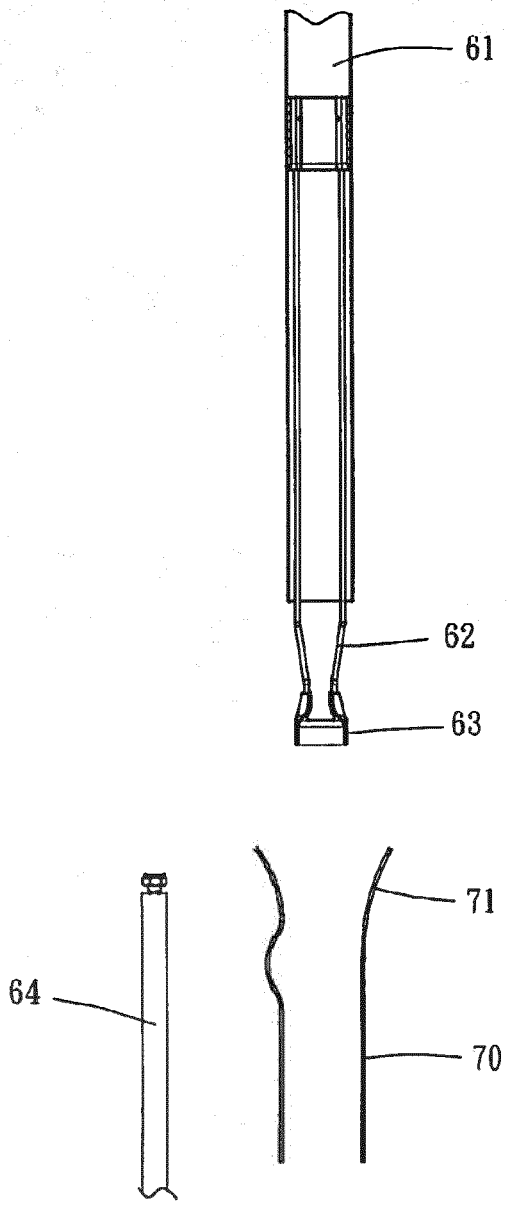

FIG. 11

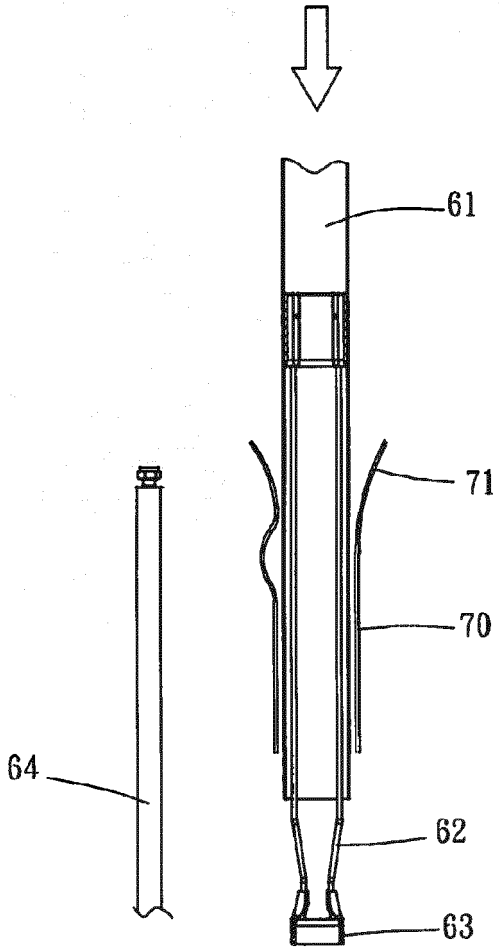

FIG. 12

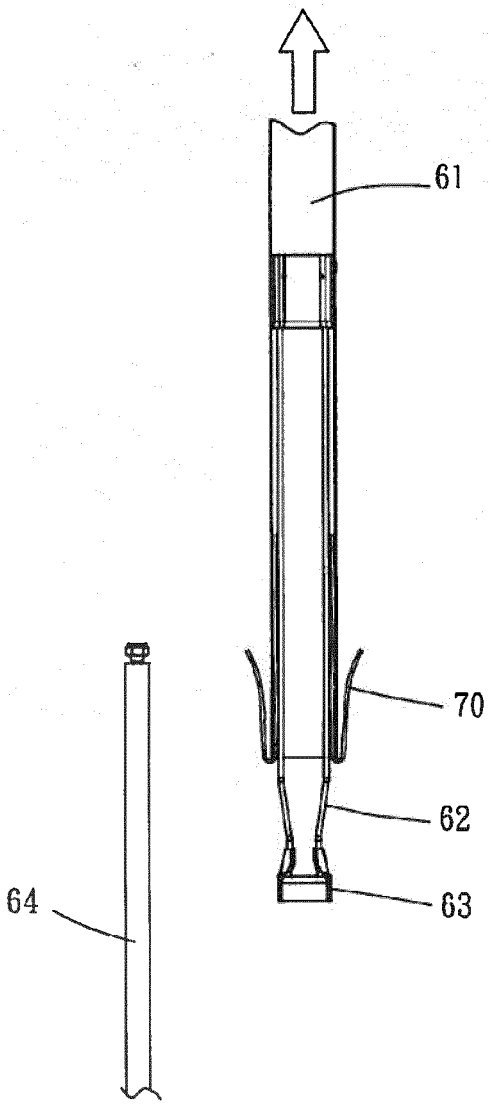

FIG. 13

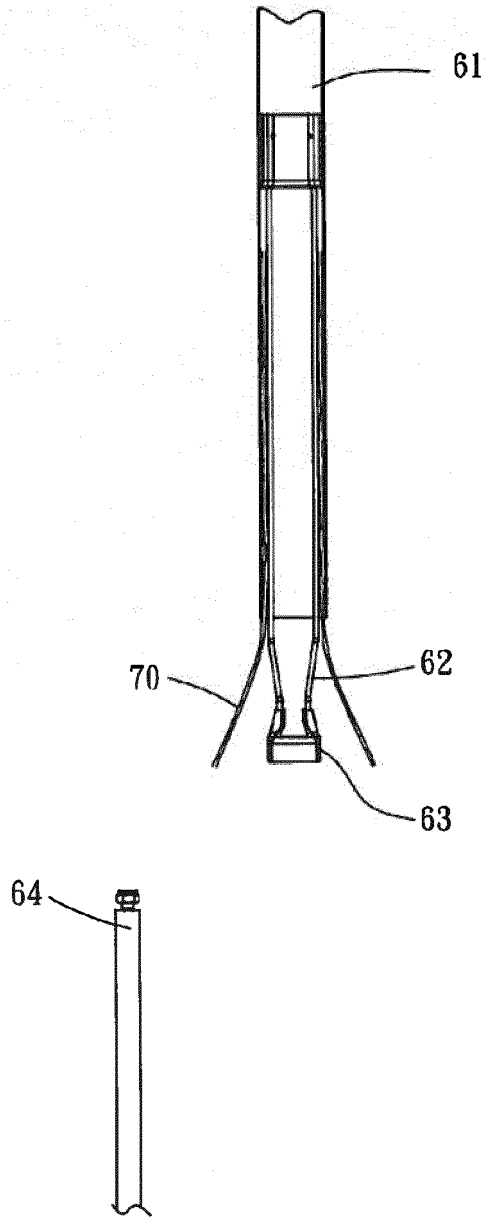

FIG. 14

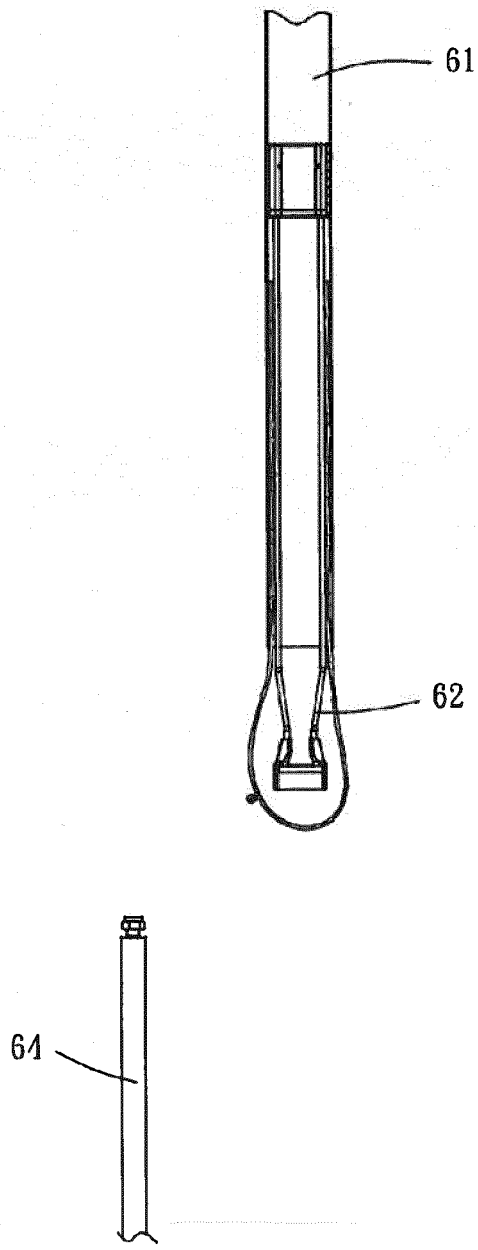

FIG. 15

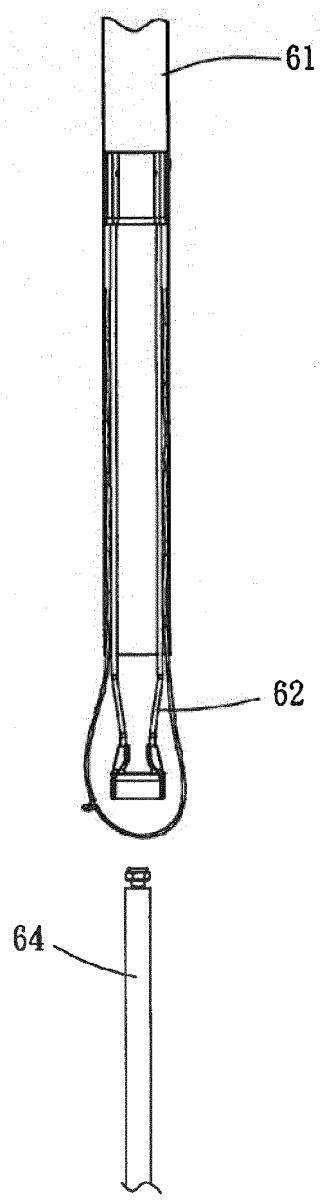

FIG. 16

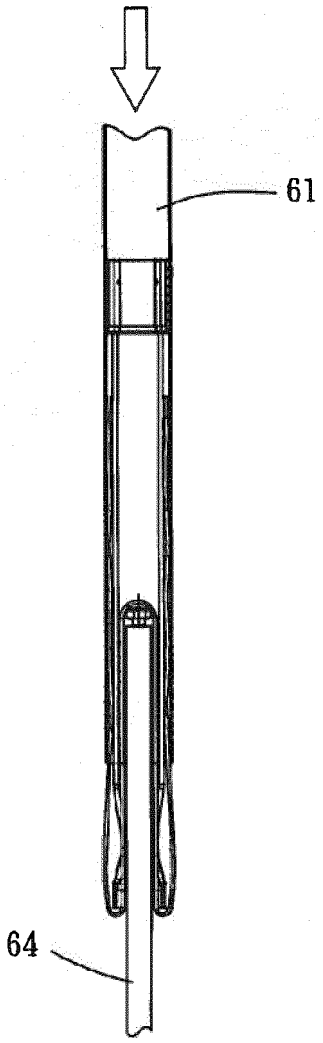

FIG. 17

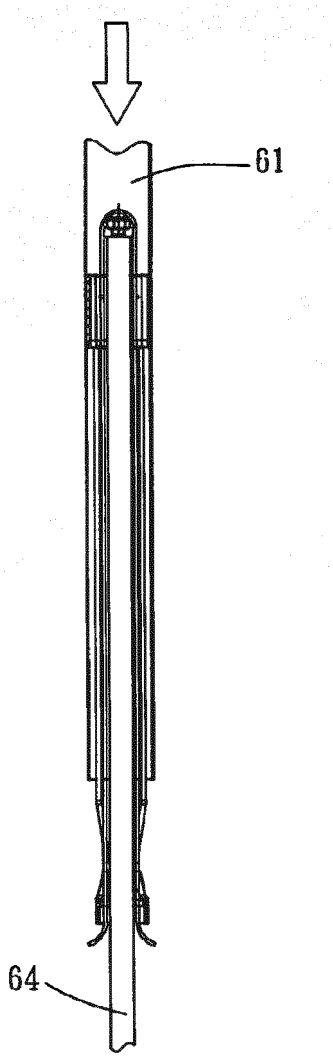

FIG. 18

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EUROPEAN SEARCH REPORT

Application Number
EP 19 16 6483

DOCUMENTS CONSIDERED TO BE RELEVANT

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A	WO 2014/126539 A2 (SAHINKOC HALIL AHMET [TR]) 21 August 2014 (2014-08-21) * page 2, lines 3-7 * * figures 1-9 * * page 3, line 7 - line 13 *	1-15	
A	US 5 551 260 A (FRULLINI ALBERTO [IT] ET AL) 3 September 1996 (1996-09-03) * column 6, line 39 - line 50; figures 10-15 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) D04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 July 2019	Messai, Sonia

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 16 6483

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02-07-2019

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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