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[33] **Switzerland**

[31] **2418/69**

[50] Field of Search.....57/34.5, 59,
34, 51.5, 52, 77.33, 106; 226/7, 91, 92, 97

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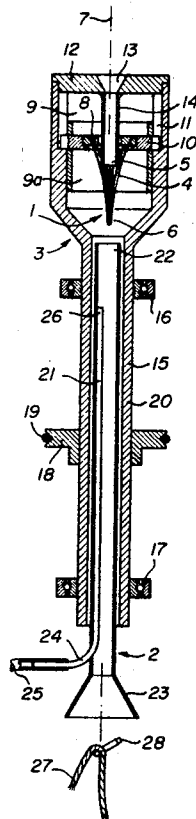
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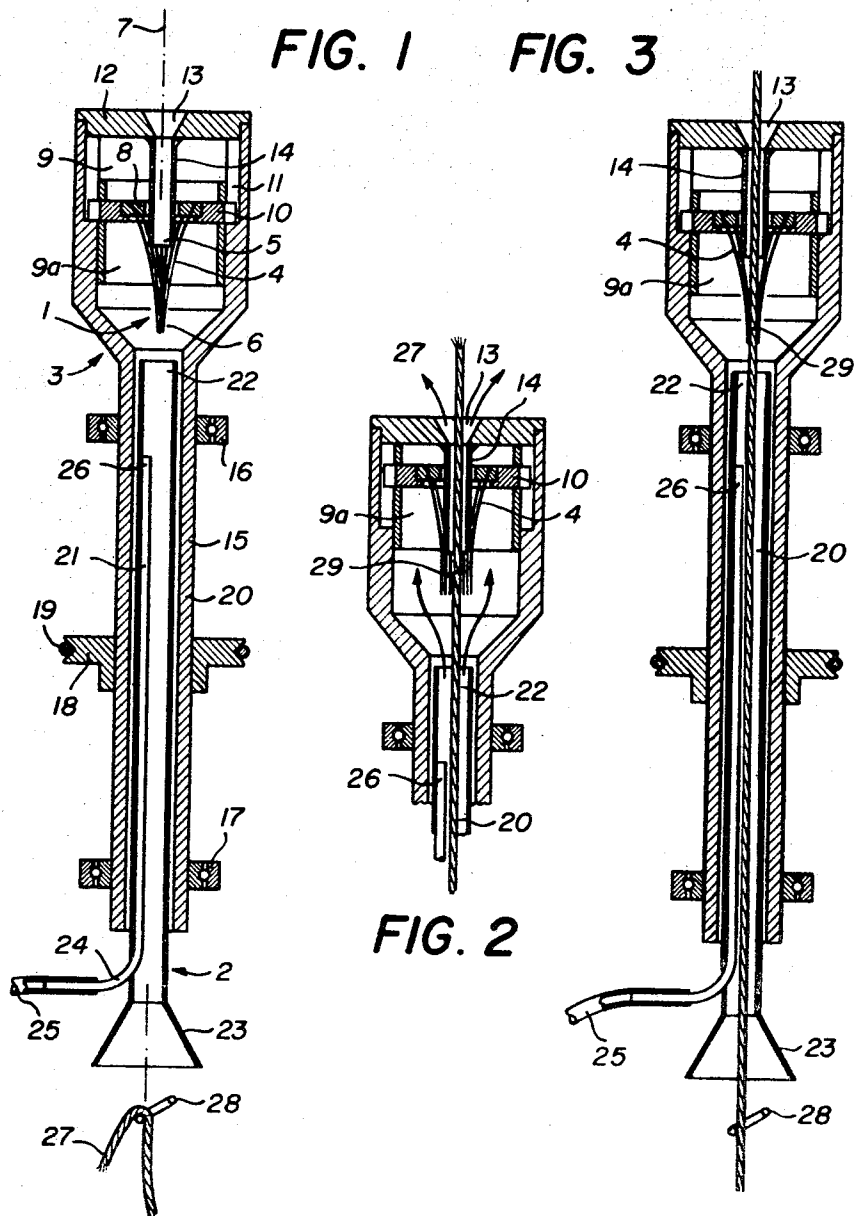
[54] **TWISTING HEAD FOR TEXTILE MACHINE**
9 Claims, 6 Drawing Figs.

[52] U.S. Cl..... **57/77.33,**
57/34, 57/59, 57/106

[51] Int. Cl.....**D01g 23/08,**
D01h 7/92, D01h 15/00

ABSTRACT: A supporting and driving head for a radially clamping grip having a venturi-type member in axial alignment for use in threading a yarn into the grip through its outlet end.





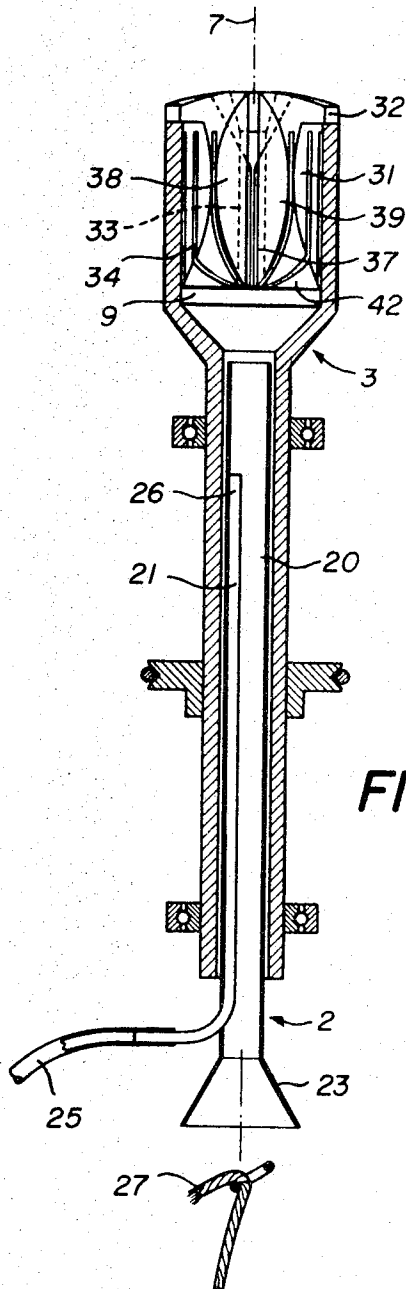


FIG. 4

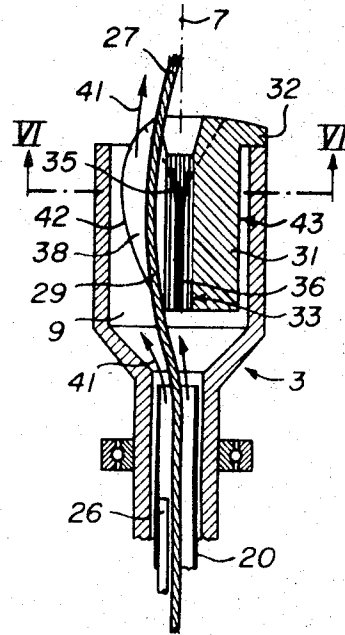


FIG. 5

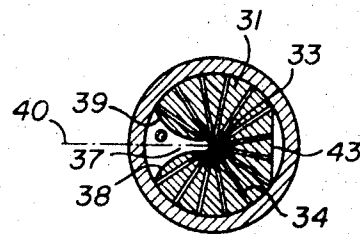


FIG. 6

TWISTING HEAD FOR TEXTILE MACHINE

BACKGROUND OF THE INVENTION

This invention relates to a textile machine twisting head for twisting a continuously moving yarn. More particularly it relates to a radially clamping grip for manufacturing yarn by the open-end spinning method in which loose fibers are individually conveyed by aerodynamic or electrical means from a discharge member to the loose end of a formed yarn held and rotated by the clamping grip. This invention discloses a clamping grip for open-end spinning which has unitary means for simplifying the process of threading the end of formed yarn into the grip.

Because of there being no direct connection between the source of fibers, such as roving, and the end of formed yarn, it has been possible to use a so-called "false twist" member to twist the fibers and thus to replace the ring and traveler system used in conventional spinning methods. A known type of "false twist" member is that by which the yarn, as it is twisted and formed, is clamped radially by various means and is allowed to slide axially through the member in a continuous motion. Insertion of the end of formed yarn into the clamping member for the purpose of threading up, when starting the machine or following a yarn break, has been a difficult and time-consuming operation. This has been so, mainly because the insertion has to be done in the direction opposite to that in which the yarn travels during operation. There have been various special devices for opening the clamping grip and for drawing the yarn end through by means of suction. The known devices have usually required three steps for threading the yarn, such as, introducing the device, inserting the yarn, and withdrawing the device. This three-step operation, which requires mechanical insertion and withdrawal movements, cannot be automated without giving rise to numerous complications and also is time consuming, neither of which being desirable with such high-output machines as open-end spinning frames.

SUMMARY OF THE INVENTION

The present invention provides a twisting head not having the above disadvantages which enables the yarn to be inserted rapidly without requiring any mechanical movements, and which lends itself readily to automation of this insertion operation. This twisting head comprises a sliding grip having an inlet for the raw textile material and an outlet for the twisted yarn with internal means for radially clamping yarn while permitting it to slide axially in a continuous manner toward the outlet. A pneumatic insertion device, having an inlet for drawing in the loose yarn by suction forces and an outlet for ejecting the yarn, is disposed to form an extension of, and in alignment with, the outlet of the sliding grip. The outlet of the insertion device is contiguous to the outlet of the sliding grip. A rotary grip holder has a chamber for containing the sliding grip for coaxial rotation therewith and has a tubular terminal member surrounding at least the outlet of the insertion device. The grip holder is supported for rotatively driving the sliding grip.

It is the general object of the invention to devise a twisting head for the radially clamping grip of open-end type spinning machines which may be threaded up more conveniently than those heretofore and which will lend itself for use with automated operation.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be described by reference to specific embodiments thereof as illustrated in the accompanying figures of drawing, wherein:

FIG. 1 is an axial section of the first embodiment,

FIG. 2 shows a portion of the device in FIG. 1 in the position for yarn insertion,

FIG. 3 shows the device of FIG. 1 with yarn inserted,

FIG. 4 is a view of a second embodiment shown partially in elevation and partially in section,

FIG. 5 is an axial section seen at right angles in relation to FIG. 4 showing the yarn position during insertion, and

FIG. 6 is a cross section taken on line VI-VI of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The sliding grip of this invention is the radially clamping type by which a length of yarn or other filiform object is permitted to slide axially through the grip while being held in axial alignment by a series of centripetal forces radially applied. In FIG. 1 the twisting head of the invention is illustrated in cross section with the three major components broadly designated as follows: the sliding grip 1, the pneumatic insertion device 2, and the rotary grip holder 3. The grip 1 radially clamps a sliding object by spring forces exerted by a plurality of flexible filaments which are arched so as to form together a bow net 4 at the inlet end 5 of the grip 1. The flexible filaments lie in a bunch 6 at the outlet end of the grip 1 and have their fixed ends substantially equiangularly arranged about the axis 7. Each of the flexible filaments is secured at its outlet end 5 to a ringlike crown 8 with the inlet 5 and outlet end 6 defining an aperture along the axis 7 of the grip 1. In FIG. 3 it will be seen that the flexible filaments of the grip provide radial clamping forces upon the length of yarn 29 while permitting it to slide axially through the outlet end. It is because of the sliding movement of the yarn lengthwise that the grip is called a sliding grip.

The grip holder 3 has a chamber 9 in which the sliding grip 1 is housed for rotation therewith. The crown 8 is secured to a mobile member 10 of pistonlike formation capable of axial movement only, being restricted angularly by a number of grooves 11 in the grip holder 3. Chamber 9 is closed off by a front wall 12 having a central hole 13 directly opposite the inlet end 5 of the grip 1. A hollow cylinder 14 is secured to the wall 12 axially of the hole 13 to project toward the inlet end 5. The length of the hollow cylinder 14 and the length of axial movement afforded the mobile member 10 are such that when the grip is in its uppermost position (FIG. 2) the cylinder 14 will enter the bow net 4 in such a manner as to move the flexible filaments apart and will open the outlet end 6 of the grip, and such that when the grip is in its lowermost position (FIG. 1) the cylinder 14 will be disengaged from the bow net 4 so that the flexible filaments may move freely toward one another. The grip holder 3 has a tubular terminal section 15 which partially surrounds the insertion device 2. The terminal section 15 is mounted for high-speed rotation on roller bearings 16 and 17 about the axis 7 under the action of a pulley 18 and a driving belt 19.

The pneumatic insertion device 2 comprises a suction tube 20 inside of which extends a propulsion tube 21. The outlet 22 of suction tube 20 is surrounded by the terminal member 15 of the grip holder 3, whereas the inlet 23 of suction tube 20 is shaped as a funnel. The outer end portion 24 of the propulsion tube 21 is fitted to a flexible pipe 25 for connecting with a source of air under pressure (not shown). The space provided between the suction tube 20, which is stationary, and the tubular terminal section 15 is large enough to allow rotation without causing friction, but is sufficiently small to prevent excessive leakage of air when introduced from the inner end portion 26 of the propulsion tube 21 out of the outlet 22 of the suction tube 20. As a result, when air under pressure is released through the end portion 26, the lower portion 9a of the chamber 9 is pressurized causing the pistonlike member 10 to be thrust upward to the position shown in FIG. 2. The bow net 4 is thereby forced over the hollow cylinder 14, which separates the flexible filaments at the outlet end 6 and enlarges the aperture therebetween.

In operation, when yarn is to be inserted, either for priming the head or following a yarn break, the device will be unthreaded as seen in FIG. 1, where a loose end 27 of a length of formed yarn is supported on an eyelet 28. Air under pres-

sure is fed in through the flexible pipe 25 which will slightly pressurize the lower portion 9a of the chamber 9 and thrust the pistonlike member 10 upward so that the bow net 4 and the outlet end 6 of the bunch of filaments are opened and will allow air to escape rapidly through the aperture (FIG. 2). The rapid movement of air upwardly builds a negative pressure in the suction tube 20 which will cause outside air to be drawn in by venturi effect through the inlet funnel 23. The moving air will lift the yarn end 27 upwardly through the aperture between the flexible filaments, as well as through the hollow cylinder 14 and central hole 13. Upon interrupting the flow of compressed air, the pressurization of the lower portion 9a of the chamber ceases, and under the elastic action of the flexible filaments, the grip moves to the position of FIG. 3, allowing the flexible filaments to apply clamping forces upon the yarn 29. The pull that is exerted upon the yarn 29 when spinning is in progress helps to release the bow net 4 from the hollow cylinder 14.

With this embodiment the yarn insertion is effected by a purely axial movement. The advantage is that it is not necessary to interrupt the rotation of the grip holder to insert yarn since the hollow cylinder 14 and the grip 1 are angularly fixed relative to one another, their only relative movement being the axial displacement of the grip 1.

In the second embodiment shown in FIGS. 4—6, the pneumatic insertion device 2 is identical to that shown in FIGS. 1—3 and the rotary grip holder 3 only differs in that it has no grooves 11. In this embodiment the grip has no movement in relation to the grip holder and does not slide within the enclosing chamber. It comprises a body 31 which has at its upper end a supporting shoulder 32 and which has a hole 33 extending therethrough. The body 31 has a series of meridian slots, such as slot 34, which serve to guide the flexible filaments of clamping member. The flexible filaments are arched and arranged around the axis 7 of the body 31 (FIG. 5) so as to form an inlet bow net 35 extended by a bundle 36 which is housed in the axial hole 33. In the body 31 is cut a semimeridian groove 37 which extends from the periphery of the body to the axial hole 33. Unlike the slots 34 which do not extend through the shoulder 32, the groove 37 extends throughout the full length of the body 31 and shoulder 32. The groove 37 is defined by sides 38 and 39 (FIG. 6) which are so profiled as to have a divergent shape and which in regard to shape and position are mutually symmetrical in relation to its mean plane 40.

In operation air under pressure is fed through pipe 25 to be ejected at high speed by the inner end 26 of the propulsion tube 21, thus causing, by a venturi effect, a negative pressure to be set up in the suction tube 20, which negative pressure, draws in outside air through the funnel 23. The upward flow of air escapes from the chamber 9 of the grip holder 3 by passing axially along groove 37, as indicated by the arrows 41 in FIG. 5 and carries along with it the end 27 of yarn. Once the end 27 has projected above shoulder 32, the inflow of compressed air may be interrupted and an axial pull applied to the yarn 29. This will cause the yarn 29 to move laterally into the groove 37 and pass between the flexible filaments in the region of the bow net 35. The yarn is thus engaged in the grip and the spinning operation can begin. This embodiment resorts to lateral engagement of the yarn and requires interruption of the rotational movement of the grip holder 3, unlike the first embodiment where the engagement is effected by axial movement.

It may be of advantage to profile the body 31 by providing an engagement surface 42 (FIGS. 4—5) in the form of a ruled or developed surface whose generatrices are perpendicular to the mean plane 40. It is further recommended to round off the junctions of the sides 38—39 with the outer surface of body 31 and with the engagement surface 42 whereby the sharp edges on which the yarn might catch will be made to disappear.

As the grip is intended to rotate at high speed around the axis 7, it is essential to balance it at least statically, for example, by machining a counterbalancing flat surface 43 on the side of body 31 opposite groove 37.

In either of the embodiments just described, the twisting head enables the yarn to be rapidly inserted without resorting to special tooling. All that is required is to actuate a valve (not shown) which controls the flow of a compressed gas through pipe 25. In this specification the gas has been referred to as compressed air, however, other gasses could be used as well.

The embodiments of the invention in which I claim an exclusive property or privilege are defined as follows:

1. In an open end spinning machine, a twisting head for twisting a normally continuously moving yarn comprising:

a. a radially expansible and contractable yarn grip having a central through aperture having an inlet and an outlet and adapted to radially clamp the periphery of a yarn therein while allowing axial sliding motion of the yarn therethrough, the trailing end of such yarn being normally disposed anterior to said grip inlet, and

b. a normally inoperative yarn insertion device having a through passage in axial alignment with said yarn grip adjacent said yarn grip outlet and through which the yarn normally passes from said yarn grip, said insertion device being operable to retrieve the trailing end of a length of yarn which has passed through said grip and said insertion device incident to the interruption of proper yarn spinning and to restore said yarn to a position in which it extends through said grip and said insertion device and its trailing end is again anterior to said grip inlet end.

2. The twisting device defined in claim 1 further comprising means for expanding the through aperture of said yarn grip prior to the retrieval and restoration action of said yarn insertion device and for permitting contraction of said yarn grip once the trailing end of the yarn length has been restored to its position anterior to said grip inlet end.

3. The twisting device defined in claim 1 wherein said yarn grip has a side entry slot through which yarn may be moved radially inwardly into said grip central aperture and through the radially outer portion of which slot yarn can be moved axially by said yarn insertion device during its restoration action.

4. The twisting device defined in claim 2 wherein said insertion device is pneumatically operable.

5. The twisting device defined in claim 3 wherein said insertion device is pneumatically operable.

6. The twisting device defined in claim 4, further comprising a rotary grip holder having a chamber for containing said yarn grip and including a tubular terminal section positioned so as to surround at least that portion of said insertion device adjacent said yarn grip outlet, said grip holder being adapted to rotate coaxially with said yarn grip and to drive the latter.

7. The twisting device defined in claim 6 further comprising:

a. A pistonlike mobile member slidably retained in said chamber having said yarn grip centrally mounted thereon,

b. said yarn grip including a plurality of flexible filaments secured equiangularly to form said through aperture, said filaments being arched as a bow net at said inlet end,

c. said expanding means including a hollow cylindrical member fixed axially of said yarn grip adjacent said bow net,

d. said mobile member being axially slidable toward said cylindrical member by the force of air ejected by said pneumatic insertion device,

e. said cylindrical member being adapted to expand said aperture by penetrating said bow net and separating said flexible filaments.

8. The twisting device defined in claim 5 further comprising a rotary grip holder having a chamber for containing said yarn grip and including a tubular terminal section positioned so as to surround at least that portion of said insertion device adjacent said yarn grip outlet, said grip holder being adapted to rotate coaxially with said yarn grip and to drive the latter.

9. The twisting device defined in claim 8 wherein said yarn grip is fixedly secured relative to said chamber and further includes:

a. a body,

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b. a plurality of arched flexible filaments defining a bow net and an axially extending bundle which defines said through aperture within said yarn grip,

c. said side entry slot providing lateral access from the periphery of said body to said through aperture.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,593,511 Dated July 20, 1971

Inventor(s) CLAUDE GUIGNARD

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 62, change "grip" to read "grips".

Column 2, line 22, change "outlet" to read "inlet";
line 23, after "inlet" insert ---end---

Signed and sealed this 25th day of April 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents