June 24, 1969 J. B. SHARP 3,451,207

DEVICE FOR HANDLING AN END OF YARN OR ROVING

Filed Sept. 26, 1966 Sheet 1 of 2

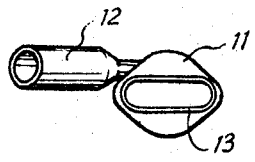

FIG. 1

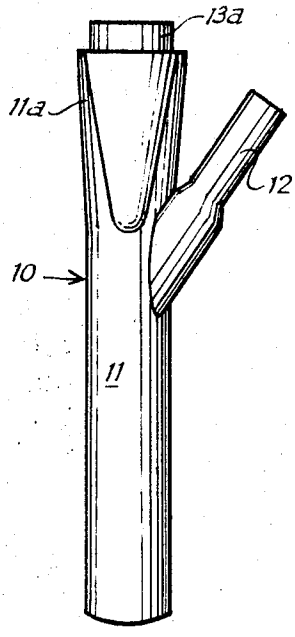

FIG. 2

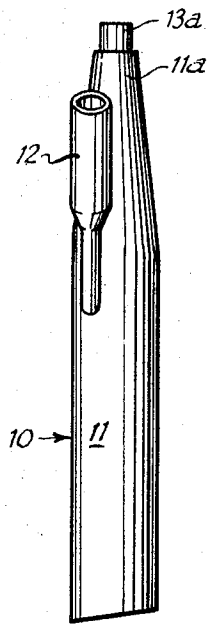

FIG. 3

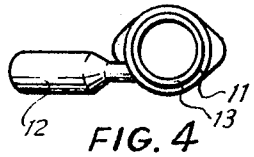

FIG. 4

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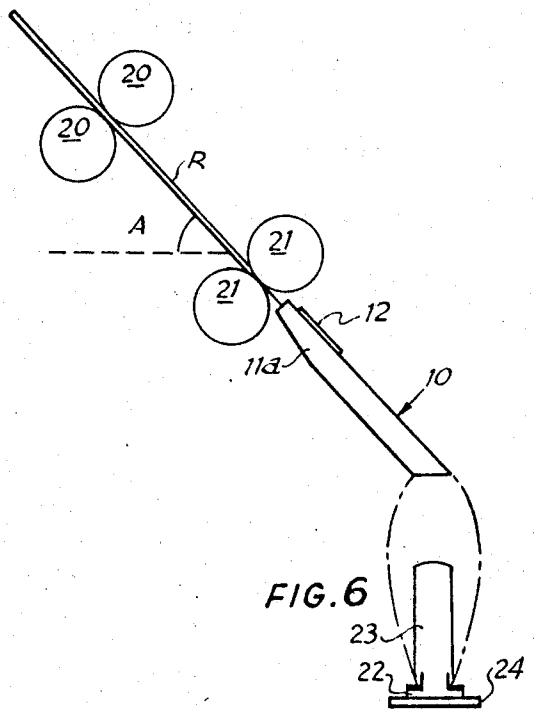

FIG. 6

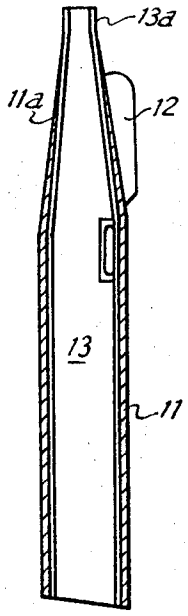

FIG. 5

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DEVICE FOR HANDLING AN END OF YARN OR ROVING

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U.S. Cl. 57—34
9 Claims

ABSTRACT OF THE DISCLOSURE

Yarn end, such as that emerging from the front rollers of a cap spinning frame, is gathered by the suction end of an air current, is twisted by the air current as the latter follows a spiral path, and is delivered such as to a spinning bobbin, by the high pressure end of the air current. Air current may be created in a tube open at both ends by introducing an angled and off-center air jet into the tube near one of its ends through an injection tube inclined to the axis of the open-ended tube.

This invention concerns a device for gathering a free end of yarn or roving and delivering it to a predetermined position while simultaneously introducing twist thereinto, particularly, though by no means exclusively, suitable for practise on cap spinning frames as a means of ensuring automatic continuation of spinning after a yarn break and of automatic joining of the yarn end to the spinning bobbin after a change of bobbin or of roving.

According to the invention an apparatus for gathering a free end of yarn or roving and delivering it to a predetermined position while simultaneously introducing twist thereinto comprises of providing a current of air which follows a spiral path, arranging for the low pressure end of said current of air to be situated in the region whence the end is to be gathered, whereby the end is sucked into the current and conveyed thereby, and arranging for the high pressure end of the current to be directed so as to deliver the end to said predetermined position.

Also according to the invention is a device comprising an open-ended tube or duct of circular cross-section, means for injecting air into the tube adjacent one end thereof in a direction having a substantial component in the direction of the axis of the tube and at a position offset from any diametral plane of the tube, whereby an air current is established through the tube which follows a spiral path at least on the downstream side of said air injecting means.

The invention will be further apparent from the following description with reference to the several figures of the accompanying drawings, which show, by way of example only, one form of device for practising the method of the invention and one manner in which the device may be utilised on a cap spinning frame.

Of the drawings:

FIG. 1 shows a top plan view of the device;

FIG. 2 shows a front elevation of the device;

FIG. 3 shows a side elevation of the device;

FIG. 4 shows a bottom plan view of the device;

FIG. 5 shows an axial section of the device; and

FIG. 6 shows a side elevation of a cap spinning frame incorporating the device of FIGS. 1–5.

Referring now to the drawings, and more particularly FIGS. 1–5, it will be seen that the device, generally indicated by the reference numeral **10** essentially comprises a length of tube **11** of circular cross-section. The upper end of the tube **11** is of tapered form as indicated at **11***a*, for a reason which will be apparent hereinafter.

An air injection tube **12** is provided and communicates with the interior of the tube **11** at a position slightly below the upper end thereof. The tube **12** is inclined to the axis of the tube **11** but nevertheless has a substantial directional component in the direction of the axis of the tube **11**. The tube **12** communicates with the tube **11** at a position offset from any diametral plane of the tube **11**, as clearly seen from FIGS. 1–5.

The cross-section of the tube **12** is restricted at the approach to its junction with the tube **11**, so that air injected into the tube **11** enters the latter through a relatively narrow slot.

A cylindrical sleeve **13** formed from polytetrafluoroethylene (PTFE) is disposed within the tube **11** to form a lining therein. The sleeve **13** extends slightly beyond the tapered end of the tube **11** as indicated at **13***a*, and has an aperture therein which is in register with the slot of the air injection tube **12**.

In use when air is fed into the tube **11** through the injection tube **12** a current of air is established through the tube **11** which provides a suction effect at the tapered end of the tube **11** and which follows a spiral path in that part of the tube **11** downstream from the injection tube **12**, on account of the disposition of the air stream entering the tube **11**.

Referring now to FIG. 6, it will be seen that the cap spinning frame comprises back rollers **20**, front rollers **21** and a bobbin **22** with cap **23**, in known manner, the yarn guide normally located between the front rollers **21** and cap **23** being omitted. It should be noted that the rollers **20** and **21** are so disposed that the angle A between the roving R and the horizontal is that generally used in high angle cap spinning.

The device **10** is disposed between the front rollers **21** and cap **23** in the manner shown on the drawing, with its tapered upper end **11***a* disposed between the rollers **21** adjacent the exit from the nip therebetween. The yarn being spun from the roving R passes from the front rollers **21**, through the tube **11**, which serves as a guide, and onto the bobbin **22**.

At the commencement of and throughout the spinning operation air under pressure is introduced into the tube **11** through the injection tube **12**.

The tube **11** is arranged with one end at the nip as described above, and the other over the cap **23**. Thus air issuing from the lower end of the tube **11** blows almost vertically downwards onto the cap over the bobbin.

The air for the inlet tube **12** may be tapped off a main feed pipe running along the frame behind a series of the devices **10** for all the spinning units on the frame.

Now, at the commencement of spinning or upon occurrence of a break in the yarn the device **10** acts in the following manner. Firstly, it collects the yarn end by suction as it emerges from the front spinning rollers. This avoids lapping of the yarn round the front rollers, spinners doubles or the like. The device **10** then carries this collected yarn end downwards with a motion that tends to gyrate it round the cap. The free end of the yarn is then caught by the part of the bobbin exposed below the cap. Simultaneously with the carrying of the yarn downwards, the device **10** inserts twist into the yarn before it reaches the bobbin. The yarn is then strong enough to withstand the impulses of tension when it is taken up by the bobbin.

Twist is inserted in the yarn, when one end of the yarn is free, by the spiralling rotation of the air down the tube **11**. The flow of air down the tube causes the yarn to be blown downwards over the cap, and the rotation of the air stream tends to wrap the yarn round the bobbin.

If necessary or desirable the air suction and air rotation in the tube could be produced by other methods.

For example, a separate air feed might be used for each requirement. Again these two actions might be produced by placing an inner cylinder inside the tube **11** over a part of its length and by injecting the air stream into the annulus so formed.

To ensure a yarn end being connected to an empty bobbin it may be necessary additionally to roughen the barrel to some extent, the normal bobbin barrel being usually too smooth to catch the yarn, or to provide some means such as a disc of rough material **24** on the bottom of the spindle.

The amount of twist inserted and rotation imparted and the strength of suction at the tube entrance can be adjusted by varying the tube design, the air input, and the angle of the inlet.

The PTFE sleeve **13** reduces friction between the roving or yarn and the inside of the tube **11** and prevents the accumulation of grease in the tube as would otherwise occur when spinning certain yarns such as wool for example.

It will be appreciated that it is not intended to limit the invention to the above example, many variations such as might readily occur to one skilled in the art, being possible, without departing from the scope thereof.

Thus, for example, the tube **11** need not be straight, but could be somewhat curved enabling its use on a cap spinning frame with a lower angle A.

In certain cases, the device, which will normally be made of metal, need not have a lining sleeve, or it could be internally coated directly with a PTFE material. Of course, the device may be formed from materials other than metal such as a nylon material, for example.

When a PTFE lining sleeve is provided in a metal tube such sleeve may be terminated behind the extremity of the downstream end of the tube, and the tube grounded, to prevent the build-up of static.

Again, for example, the device could obviously be used on a centrifugal pot spinner to ensure an automatic continuation of spinning following a break. The device might also be used advantageously on ring spinning frames and flyer frames, though in such cases further auxiliary equipment would be necessary to hold the yarn end connected with the bobbin immediately after occurrence of a break to enable the two ends to be pieced together. In such cases the device **10** might be arranged to convey the end from the front rollers and wrap it round the held end to effect the piecing up automatically.

This device could also be introduced between the delivery and the take up point of a yarn produced by a system of "break spinning."

What I claim is:

1. A device for gathering a free end of yarn or roving and delivering it to a predetermined position while simultaneously introducing twist into it, comprising a tube of circular cross-section open at both ends, means for injecting an air jet into said tube through an aperture in its wall adjacent to one of its ends, the direction of said air jet forming an angle with respect to the longitudinal axis of said tube but said air jet having a component parallel to the tube axis, and said air jet being parallel

to but offset from a diametral plane of said tube, whereby an air current is established through the tube which follows a spiral path at least on the downstream side of said air injecting means, and the upstream end of said tube adjacent to said air injecting means is tapered to provide an elongated generally rectangular entry.

2. A device according to claim **1** wherein said air injecting means comprises an air injection tube communicating with said open-ended tube via said aperture, said injection tube at least at the position of communication being inclined to the axis of said open-ended tube but having a component in the direction of said axis and being offset from and parallel to a diametral plane of said open-ended tube.

3. A device according to claim **1** wherein said tube is formed of metal.

4. A device according to claim **3** including a lining sleeve of PTFE material extending within said tube over at least a part of its length, said sleeve having an opening in its wall in registry with said aperture.

5. A device according to claim **3** including a coating of PTFE material directly on the inner surface of said tube.

6. A device according to claim **1** wherein said tube is straight.

7. A device according to claim **1** wherein said tube is curved.

8. A device according to claim **2** wherein the direction of said injection tube at the position of communication may be resolved into tangential and axial components only.

9. Cap spinning apparatus having front rollers and a spinning bobbin, characterized by the provision of a device according to claim **1** disposed to collect an end of yarn or roving from the front rollers and deliver same to the spinning bobbin.

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U.S. Cl. X.R.

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