Jan. 22, 1963 S. FÜRST 3,074,660

METHOD AND MEANS FOR FABRICATING TEXTILE THREADS

Filed July 23, 1958 3 Sheets-Sheet 1

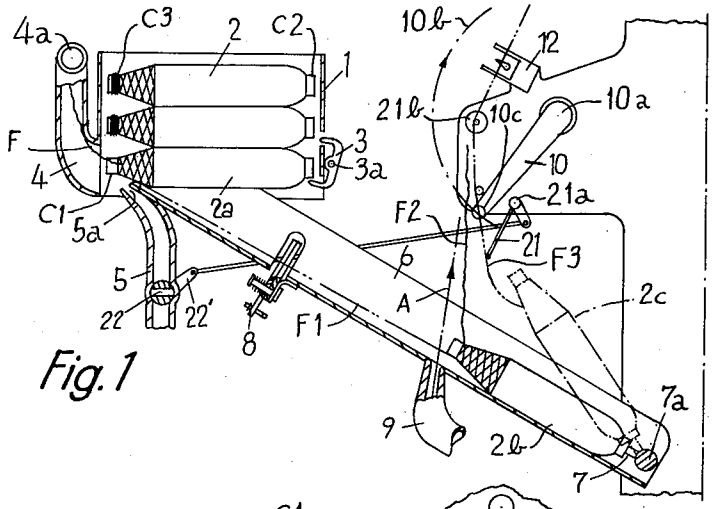

Fig. 1

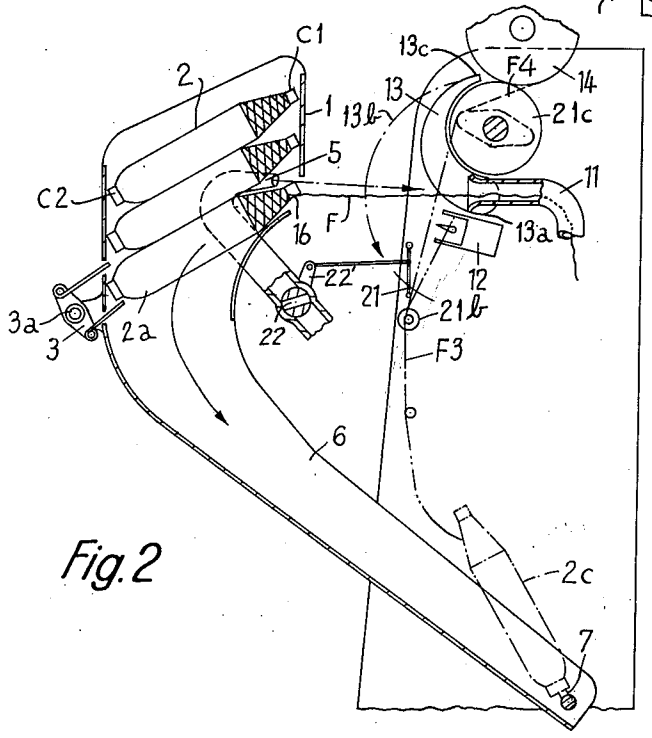

Fig. 2

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METHOD AND MEANS FOR FABRICATING TEXTILE THREADS

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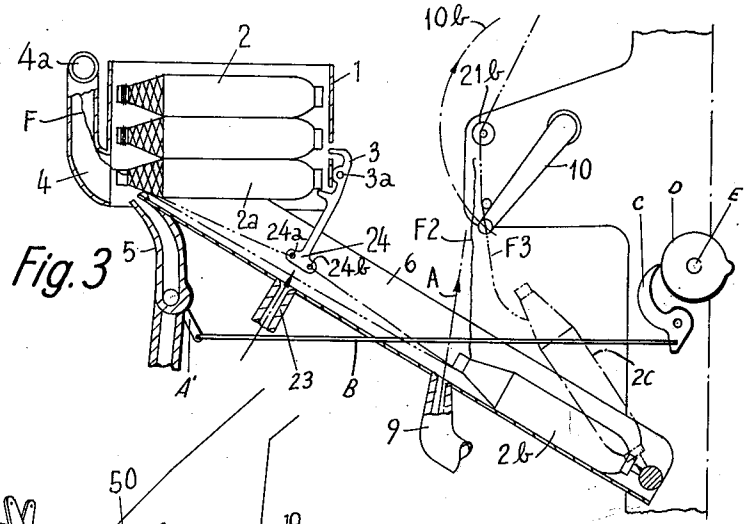

Fig. 3

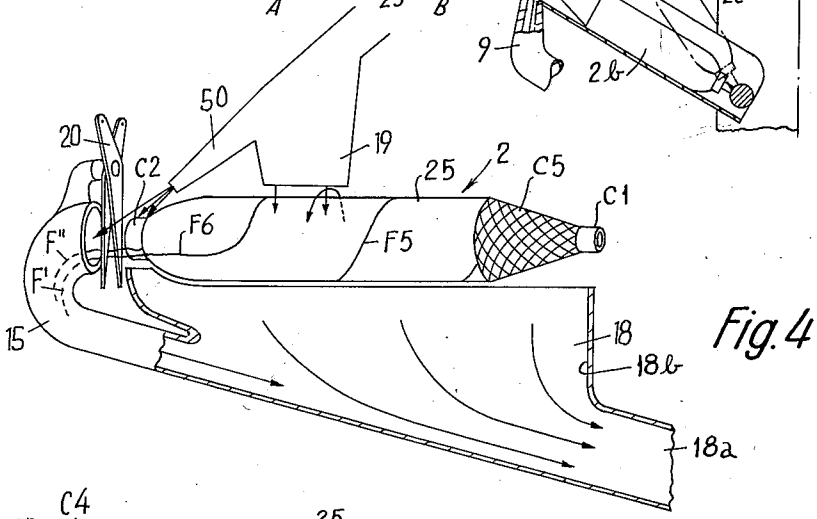

Fig. 4

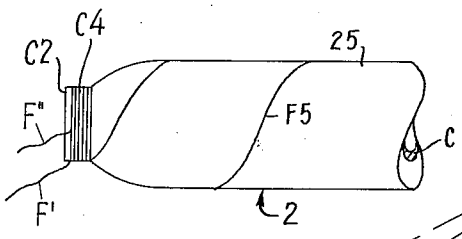

Fig. 5

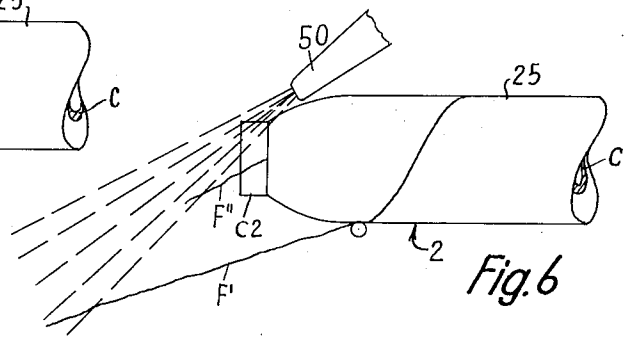

Fig. 6

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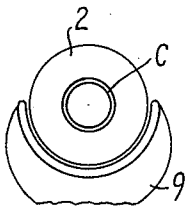

Fig. 7

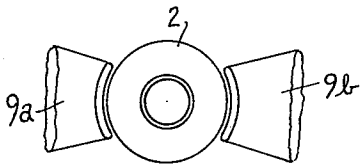

Fig. 8

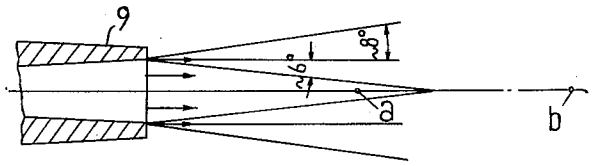

Fig. 9

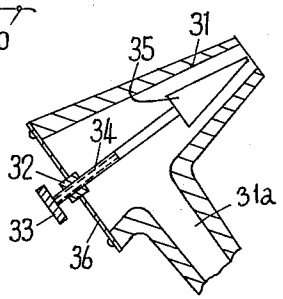

Fig. 10

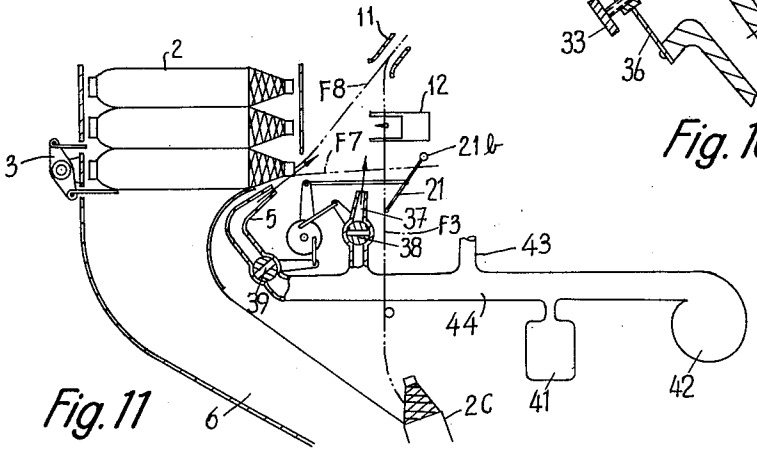

Fig. 11

United States Patent Office 3,074,660 Patented Jan. 22, 1963

3,074,660

METHOD AND MEANS FOR FABRICATING TEXTILE THREADS

Stefan Fürst, Monchen-Gladbach, Germany, assignor to Walter Reiners, Monchen-Gladbach, Germany

Filed July 23, 1958, Ser. No. 750,382
Claims priority, application Germany Aug. 3, 1957
19 Claims. (Cl. 242—35.6)

My invention relates to textile fabricating operations and machinery, and more particularly to method and means for applying a mechanical force or motion to yarn or other thread material, usually available in the form of a coiled-up bobbin, cop or other yarn package.

The present invention has wide utility in many operations in the textile industry. For example, after the yarn produced in a spinning machine is wound up to form a spinning cop, further use of the yarn in textile manufacture, particularly in automatic machinery such as rewinding machines, often requires that the yarn be first subjected to mechanical processing for such purposes as cleaning, eliminating dust or lint, thinning or severing the yarn, or may simply require moving the yarn end portion for seeking, seizing, threading or conveying the yarn ends, for keeping the yarn ends in a given ready position, or similar tasks. All such operations are included in, and generally referred to hereinafter as mechanical processing or fabricating of the yarn.

Such fabricating operations heretofore have been performed primarily with the aid of mechanical yarn-engaging mechanisms. Although currents of suction air have been used per se for the seeking of yarn ends or for cleaning the yarn, however, the conveying or other mechanical processing of yarn with the aid of air suction leaves much to be desired because a current of air entering into a suction nozzle has a very narrow range within which it can act with appreciable and effective intensity. This is because ambient air being drawn into a suction nozzle does not flow in a given, preferred or predetermined direction but enters the nozzle opening from all sides, thus greatly limiting the effective action range of the suction current. A suction nozzle, acting alone therefore, must be moved into very close proximity to the yarn to be acted upon. This places exacting and restricting requirements upon the design and operation of such devices. Furthermore, since a suction current has no appreciable effect in depth, its proper and effective functioning is secured only if the yarn is introduced by some other means so that it enters into the active intake range of the suction current directly in front of the suction nozzle.

It is an object of my invention to provide a method and means for performing operations of the above-described kind with the aid of simpler means that are less costly in design and operation while securing an intensified and more reliable performance.

To this end, and in accordance with a feature of my invention, I subject the yarn for any of the above-mentioned mechanical processing purposes, to a directed jet of air and/or a locally limited outwardly flared free jet of blowing air, but preferably to the "core zone" of such a combined jet, the yarn in each case being supplied either coiled-up or partly unwound from a yarn supply package, depending upon the particular task to be performed.

In mechanics of fluid flow, relating to a free jet issuing from a nozzle, a distinction is made between an inner core zone and an outer zone of the jet. The inner core zone, as seen from the blowing nozzle, tapers forwardly and inwardly toward the jet axis within an angle of approximately 6° from the axis. The outer zone of the jet surrounds the core and is limited by a cone which

widens outwardly, seen from the nozzle opening, at an angle of approximately 8° relative to the jet axis.

By directing the yarn to enter into the jet core zone or, conversely, by moving the core zone toward the yarn, the intensity of the desired effect can be controlled and varied in dependence upon the penetrating depth of the yarn into the core of the jet stream.

For example, if a thread is to be weakened, disintegrated, or severed by the jet, then that part of the yarn is passed through the core of the jet as close as possible to the jet axis. However, if the yarn is to be merely conveyed from one place to another, it suffices if only a portion of the jet core impinges upon the yarn; then the yarn, entrained by the jet, is bent or deflected by the outer zone and, as the case may be, also by part of the inner jet core, in the direction of the target.

Thus, for example, it is possible according to the invention to shoot a length of yarn or thread from some distance into a keep-ready suction nozzle. Such operation is particularly advantageous in an automatic coil-winding machine in which a yarn package of relatively large volume is produced from yarn coming from a number of successively depleted supply coils or spools. After depletion of a supply coil, the starting end of the next following supply coil must first be conveyed to a knotting device which ties this end together with the yarn end of the take-up package. In such a machine, according to another feature of my invention, a suction nozzle operating as a catcher, is located above the knotter, and the yarn end coming from the supply coil is "shot" into the catcher nozzle by means of the above-mentioned, directed jet of blowing air. This can be done during a moment when a yarn seeker is already activated to seize the yarn end from the take-up spool turning temporarily in the unwinding direction. At this time the new supply coil may still be located in the magazine. When this coil thereafter drops into the unwinding position beneath the knotter, the yarn end therefrom enters automatically into the knotter. After completion of the knotting operation, the protruding yarn ends are cut off and are sucked away by the suction nozzle so that they cannot impair the further operation.

According to another feature of the invention, also relating to automatic coil winding machines, the supply coil is first placed into unwinding position beneath the knotter and the yarn end of that supply coil, if desired after shortening it to proper length, is shot upwardly by an air jet into the active range of a conveyor arm. This is particularly favorable if the conveyor arm operates by suction because then the yarn, when passing through the target point is subjected to an amplified air current and is blown into the suction nozzle of the conveying arm, where it is then kept by the suction effect.

According to still another feature of my invention, the return movement of the seeker nozzle for locating and entraining the yarn end coming from the take-up spool may also be utilized for conveying the yarn end of the new supply coil to the knotting device.

According to another modification the yarn reserve portion, which may be located either at the tip or at the foot of the supply coil, is unwound while the supply coil is still located in a magazine, and the unwound length of reserve yarn is then blown by means of an air jet into a suction tube operating as a keep-ready device.

In order to make the jet of air particularly effective, the strength of the air jet can be varied in accordance with the particular task to be performed. For example, if the yarn is to be first severed at a particular location, then the air jet directed at that location can be given maximum intensity. When the yarn end is to be subsequently conveyed to a given target point, for example, after unwinding the yarn reserve or unwinding the next

following portion of yarn, then a considerably smaller jet intensity may be sufficient. For similar purposes it may be desirable to vary the velocity of the air jet. For some purposes it is also advantageous to change the direction of the air jet stream in order to displace the yarn subjected to the jet stream. Particularly in cases where the yarn is to be severed by the jet, a continuous change in jet direction considesirably accelerates the weakening and destruction of the yarn, that is, when the yarn is placed into the particularly intense inner core zone of the free jet issuing from the nozzle, because the side of the yarn directly impinged upon by the jet is rapidly disintegrated, provided the jet is sufficiently strong.

The effect can be further augmented by letting the change in jet pressure or jet direction occur impulse-wise and suddenly. However, if the effect is to be less vigorous, it is preferable to apply a gradual change at a linear or sinsusoidal rate. Aside from varying the jet intensity or velocity, it is useful for some purposes to provide for temporary interruption of the jet so that its action upon the yarn is intermittent. It is particularly favorable to shut off the jet during the inactive periods of the machine member that is to receive, or to cooperate with, the jet-conveyed yarn.

In devices according to the invention, the action of the jet can be made effective upon the yarn or can be intensified by displacing or introducing the yarn into the core zone of the jet. However, the reverse operation is equally well applicable. That is, the core zone of the jet can be shifted into the range of the yarn location. This can be done by increasing the pressure of the jet with the effect that the length of the jet core zone is expanded to a greater distance from the nozzle orifice than obtaining at lower pressure.

According to a further feature of my invention, I subject the yarn to the effect of several air-pressure jets operating simultaneously or successively.

In cases where it is desired merely to convey the yarn or to place it in a given ready position, a single jet of compressed air, aimed at the conveying target, is sufficient if the required space is available. According to another feature of my invention, however, a plurality of jets can be used which operate in series or sequential relation so that the conveying action of one jet moves the yarn into the active range of the second jet which then takes care of displacing the yarn to the target. In this case the jets may be oriented in angular relation to each other or they may operate serially in the same direction. In such cases too, the yarn may be displaced into the range or core zone of a jet, or conversely the core zone of the jet may be moved to enter into the yarn path as described in the foregoing.

If a particularly vigorous action is desired, it is preferable to have the jet acting upon the yarn in a perpendicular or approximately perpendicular relation thereto. However, when the jet serves conveying purposes, then a unilaterally free yarn end will place itself automatically into the direction of the beam, at least after commencement of the jet action.

The foregoing and more specific objects, advantages and features of my invention will be apparent from, and will be mentioned in, the following detailed description in conjunction with the drawings in which:

FIG. 1 illustrates partly in section a portion of an automatic coil winding machine;

FIG. 2 illustrates partly in section a modified coil winding machine according to the invention;

FIG. 3 is a part sectional view similar to that of FIG. 1, illustrating a modified detail of the same machine;

FIG. 4 illustrates, partly in section, a device according to the invention for preparing a spinning cop for subsequent use in an automatic coil winding machine;

FIG. 5 is a partial view of a spinning cop as it comes from the spinning machine, having a reserve winding located on the foot of the cop;

FIG. 6 shows the same spinning cop as in FIG. 5 subjected to the action of a blowing nozzle for unwinding the reserve winding portion of the yarn;

FIGS. 7 and 8 illustrate two respective modifications of blow nozzles applicable in apparatus according to the invention;

FIG. 9 is explanatory and represents the fluid flow conditions in front of the opening of a blowing nozzle;

FIG. 10 illustrates in cross section a modified blower nozzle of self-regulating type; and

FIG. 11 illustrates shematically and partly in section a portion of a coil winding machine provided with a plurality of blow nozzles for conveying yarn from one location to another.

The same reference characters are used throughout the respective figures to designate functionally similar elements.

The winding machine illustrated in FIG. 1 comprises a magazine container 1 which accommodates a number of yarn supply coils 2 located one above the other. The supply coils 2 are retained in the magazine by means of a lock 3. When lock 3 is reciprocated once about its pivot 3*a*, it releases the lowermost coil from position 2*a* which coil then drops into an inclined chute or slider trough 6 to position 2*b*, while the other supply coils in the magazine advance one step downward whereupon the newly arrived lowermost coil is then retained in position 2*a* by the lock 3.

The illustrated supply coils 2 consist of spinning cops as they may come from a spinning machine. Each cop contains a limited length of yarn which is to be wound into a larger yarn package such as, for instance, a cross-wound coil or "cheese." Each cop has an elongated tubular core or quill C (FIGS. 5, 6) whose tip C1 (FIGS. 1, 2, 4) protrudes out of the yarn body. The opposite end of the tubular core forms a foot C2 of larger diameter than the tip C1. The body of yarn wound onto the core C forms a conical portion C5 (FIG. 4) near the tip C1 and terminates into a length of yarn which forms a reserve winding located either on the tip shown at C3 in FIG. 1 or on the foot shown at C4 in FIG. 5. The purpose of the reserve winding C3, C4 is to make a given length of yarn readily available which can be rapidly removed from the cop without disturbing the main body of yarn, for the purpose of conveying the yarn end to a knot-tying device or to other locations, as will be more fully understood from the following.

As afore-mentioned, in the embodiment shown in FIG. 1, the reserve winding C3 of each cop is located on its tip C1. When the cop 2 is in the lowermost position 2*a* in the magazine 1, the tip C1 is located opposite the intake opening 4 of a suction tube 4*a* and also in the vicinity of the outlet opening 5*a* of a blowing nozzle 5. As soon as a cop reaches the position 2*a* or before the cop is to be released into the slider trough 6, a current of blowing air is made to issue from the nozzle 5 and is directed onto the tip C1. As a result, the reserve winding C3 is unwound and the portion of yarn thereof passes into the suction opening 4. The suction current pulls the released yarn end portion F into the tube 4, while the other end of the yarn remains attached to the balance of the yarn on its cop. When now the lowermost cop is released from position 2*a* by movement of the lock 3, it slides downward along trough 6 and is speared up on a thorn 7 mounted on a shaft 7*a*. The terminus of yarn end portion F, however, is retained within the suction tube 4*a* and part of unwound length thereof now extends along the slider trough 6 as shown at F1.

Located near the lower portion of slider trough 6 is another blower nozzle 9 which, by blowing in the direction of arrow A serves to blow the yarn end upwardly toward position F2. For facilitating this operation and securing a proper positioning of the yarn within the jet of air from nozzle 9, a cutter 8 operates to sever the yarn portion F, still located in the suction tube 4*a*, from the

lower portion F1. The upper end, cut off by the cutter, is then removed and exhausted away by the suction tube 4*a*, and the remaining yarn end F1 is blown upwardly to extend in approximately a vertical direction by the jet issuing from nozzle 9. The yarn end thus passes into the position F2 where it is located within the operating range of a yarn-seeking and conveying arm 10. The arm 10 is essentially a suction tube having an intake opening 10*c*, rotatable in an arc 10*b* about a pivot portion 10*a* which is joined with a source of vacuum or suction. The intake opening 10*c* located near the yarn end position F2 forms a suction nozzle which seizes the yarn end and, during subsequent clockwise rotation of arm 10 through arc 10*b*, conveys this yarn end into the operating range of a knotter 12 where this end is tied together with the yarn end of the take-up spool 14 (FIG. 2), the latter yarn end having in the meantime been seized and conveyed to the knotter 12 in a similar manner, as will be further described hereinafter with reference to FIG. 2.

After the knotting operation is completed, the shaft 7*a* turns the thorn 7 clockwise sufficiently to place the supply coil from position 2*b* into the unwinding position 2*c*. The yarn then passes along path F3 from coil 2*c* across a yarn guard or feeler 21 and in engagement with a tensioner 21*b*, past knotter 12, to a rotating, drum-type yarn guide 21*c* (FIG. 2) from which it passes on to the take-up spool 14 which is peripherally driven by the yarn guide 21*c*.

The yarn guard or feeler 21 is provided to engage the yarn end F3 and in the event of yarn breakage or absence of yarn performs clockwise movement about its pivot 21*a* with the effect of initiating, by such deflecting movement, the yarn-knotting or supply-coil exchanging operation in a known manner. In the embodiment of FIG. 1 the same yarn feeler 21 serves to control the opening and closing of a valve 22 thus coordinating the performance of the blowing jet from nozzle 5 relative to the cycle of coil-exchanging operation. The speed of the valve opening and/or the shape and area given to the cross section of the nozzle or nozzle conduit provides for either slow or rapid increase in blowing intensity and hence lower or greater blowing pressure, depending upon the particular requirements. The lever 22′ (FIG. 1) is the driving lever for the valve 22. Whether the opening of the valve 22 and thus the commencement of a jet of air occurs suddenly or gradually, depends upon how fast the movement of lever arm 22′ takes place. For example, if the lever 22′ is only very short and the lever arm 21*a* at the yarn guard 21, which moves the control rod connected to lever 22′, is long, then a slight movement of the yarn guard 21 is sufficient to rapidly and fully open the valve actuated by the lever 22′. However, if the lever ratio at the valve and at the yarn guard is the reverse, then the opening of the valve takes place slowly or gradually.

In the embodiment illustrated in FIG. 2, the outlet of blow nozzle 5 is located on the magazine side facing the knotter 12 and is directed to blow the yarn end portion F which was contained in the reserve winding of the tip C1 into a suction nozzle 11 disposed above the knotter 12. A yarn-end seeking member 13 functions to seize the yarn end F4 coming from the take-up spool 13. The member 13 is essentially a suction nozzle operating in the same manner as described above with reference to member 10 in FIG. 1. That is, after the yarn end F4 from take-up spool 14 has passed into the intake nozzle 13*c* of hollow suction member 13, this member rotates about its pivot 13*a* counterclockwise through arc 13*b* and places the yarn end F4 in front of the knotter 12. When thereafter the lowermost cop is released from position 2*a* in the magazine 1 by opening of the lock 3, the yarn end portion F of this cop remains movably retained within the suction nozzle 11. The cop then passes down slider trough 6 onto the thorn 7 while the yarn end F, passing first outwardly through a slot 16 of the magazine 1 enters into the knotter 12 during the downward travel of the cop to position 2*c* with the yarn in position F3. Thereafter the two yarn ends, F3 and F4, now both located in the knotter 12, are tied together in a known manner.

The cutter 8 in the embodiment shown in FIG. 1 is of the scissors type. In the modification illustrated in FIG. 3 another blowing nozzle 23 is substituted for the cutter. In the latter embodiment, a depressor 24 is joined with the lock 3. The depressor 24 is provided with two spaced pins 24*a*, 24*b*, which in the position of lock 3 illustrated in FIG. 3, are respectively located on each side of nozzle 23 and rest against the yarn F when the yarn F is blown upward, thus serving to keep the yarn within the inner core zone of the jet issuing from nozzle 23. The vigorous air current from this jet thus disintegrates the yarn into fibers at the zone between pins 24*a* and 24*b*, with the effect of severing the yarn at this location. The upper yarn end is then removed by the action of the suction current in tube 4*a*, whereas the air jet of nozzle 9 blows the lower yarn end upward toward the position F2 and into the range of conveying arm 10 as described above with reference to FIG. 1. The nozzle tube 5 of FIG. 3 is turned by means of an arm A′ moved by a rod B. The rod B is driven by a feeler lever C resting against a cam disc D. The cam D is entrained by a shaft E which controls the coil exchange. Due to the forward and return movement of the nozzle, the yarn is properly seized and blown off with utmost reliability.

The device illustrated in FIG. 4 serves for preparing the spinning cops that are to be subsequently used as yarn-supply coils in automatic winding machines of the kind described in this specification with reference to FIGS. 1, 2, 3, and 11. A preparatory processing of the spinning cops is needed for the following reasons. The particular cops used in the illustrated winding machines come from the spinning machine in the following condition. The yarn portion first wound onto the core C of a cop in the spinning machine lies adjacent to the core body and is covered by the main quantity or body 25 of yarn wound onto the core. This yarn portion first placed onto the cop has an end F″ (FIGS. 5, 6) which protrudes away from the finished cop. When the cop is nearly completely wound, the yarn body forms a conical portion C5 (FIG. 4) near the core tip C1, and the yarn extends from that conical portion in a few steeply pitched helical turns F5 (FIGS. 4, 5) about the outer peripheral surface of the yarn body 25 toward the foot C2 where some length of yarn is wound onto the foot to form the above-mentioned reserve winding C4 thereon (FIG. 5). The last yarn end issuing from the reserve winding C4 is denoted by F′ (FIGS. 4 to 6). The automatic feeding and coil-exchanging operations in certain automatic winding machines in which the spinning cops are to be used for winding a larger package of yarn such as the cross-wound coil or "cheese" require having the amount of yarn to be initially unwound located in a reserve winding C3 located on the tip C1 of the core (FIG. 1). To accomplish this, it is therefore necessary to first remove the reserve winding C4 from the foot C2 (FIG. 5) of the spinning cop and to rewind a reserve winding on the tip portion C1 of the core; and such preparatory work is done by the device shown in FIG. 4.

In the device of FIG. 4 an individual cop 2 is held in the illustrated position by suitable holder means (not illustrated). The first step of operation to be performed is to seek the yarn end F′ and to unwind the reserve winding C4 from the foot. Thereafter the yarn end F′ is to be conveyed to the tip C1 to be rewound onto the tip to form a new reserve winding C3 (FIG. 1). The first step, namely the unwinding of the original winding C4 on the foot C2 is effected by means of an air jet issuing from a nozzle 50. The jet entrains the yarn end F′ of the reserve winding C4 into a suction nozzle 15, thus removing the reserve winding from the foot C2. During this operation, the cop 2 is preferably kept in rotation in the unwinding holder device (not shown). Such a

holding device for supporting the cop and for rotating it in the unwinding sense and winding-up sense is described in my copending application Serial No. 750,373, filed July 23, 1958.

The pressure jet from nozzle 50 simultaneously also entrains the inner yarn end F'' so that it also enters into the suction nozzle 15. The further processing is facilitated if both ends are cut off and this is accomplished by means of scissors as shown at 20 in FIG. 4 and the loose cut portions are exhausted away through duct 15. The shortened yarn end F'' remaining attached to the cop 2 is now too short to interfere with any further unwinding operation. The remaining yarn end F6, severed from F' is now blown by means of a second air jet issuing from a nozzle 19 having a somewhat broader outlet so that end F6 enters into a longitudinal-slot intake nozzle 18 which is connected with the source of suction and retains the unwound yarn end as well as the yarn portion to which it is attached, namely from helical turns F5. Thereafter the cop 2 is rotated in the winding-direction. During such rotation the unwound portion of yarn from F6 and F5 will be located and guided along the right-hand end 18*b* of the slot nozzle 18 with the terminus of the yarn drawn outwardly through exhaust outlet 18*a*, and as cop 2 is turned in the wind-up sense a new winding reserve is thus wound up on the cop tip C1.

A regulation of the air stream from nozzles 9, 23 of FIG. 3 and likewise from nozzle 50 in FIG. 4 is not absolutely necessary, and the device will also operate if the nozzles 9, 23 and 50 respectively blow an air current continuously.

Instead of using individual jet nozzles in devices according to the invention as described in the foregoing, the nozzle may also have various shapes or location to suit the needs, such as for example an elongated opening, and may extend partially around the periphery of the coil as is shown in FIG. 7 for a blow nozzle 9. A plurality of jet nozzles may also be used, such as in pairs, as is shown for two coactive blow nozzles 9*a* and 9*b* in FIG. 8. These may function concurrently or intermittently to accomplish desired results. Likewise, either or both of the nozzles may be controlled so they act suddenly or gradually, or vary linearly or in a sinusoidal manner.

FIG. 9 serves to illustrate the performance of a jet nozzle according to the invention. During operation of the jet there exists adjacent to the nozzle outlet orifice an inner core zone of the pressure jet which has a conical shape and which extends forwardly from the orifice; tapering away from the nozzle toward the axis of the jet. This core portion of high pressure intensity extends a short distance beyond the point indicated by *a*, the spacing of which from the nozzle orifice for normal use, has been found to be equal to approximately 3½ times the opening width of the nozzle. The jet core zone is particularly suitable for subjecting the yarn to maximum pressure action. The core portion is surrounded by a flared-out surrounding jet portion in which zone the pressure is somewhat reduced by mixing with ambient air but which is still effective as a directional jet to impose a somewhat lesser pressure effect upon the yarn. This surrounding jet zone portion remains effective up to a point *b* spaced from the nozzle opening a distance approximately equal to seven times the nozzle width. This outer jet portion of reduced intensity is better suitable than the core portion for tasks requiring a reduced blowing force such as for conveying purposes, rather than for purposes requiring unwinding, disintegrating or severing of the yarn.

In all illustrated devices, the jet nozzle or nozzles may be given a self-regulating design as is exemplified by the embodiment illustrated in FIG. 10. The nozzle has a conical mouthpiece 31 communicating with an air pressure conduit 31*a* and closed at its back by a diaphragm 36 to whose center a nut 32 is firmly attached. The nut is in threaded engagement with a spindle 34 which carries at its tip a conical nozzle body 35 and the spindle can be adjusted by means of a knurled knob 33 in order to adjust the outlet cross section of the jet nozzle. Under the effect of pressure differences between inner and ambient pressures, the diaphragm 36 deflects to a greater or smaller extent thus displacing the tip 35 to permit the escape of a greater or smaller quantity of air.

FIG. 11, illustrating a portion of an automatic coil winding machine of the type described above with reference to FIGS. 1 to 3, exemplifies the use of a plurality of jets of air for conveying a length of yarn to a given target. The yarn end F7, corresponding to the yarn portion F of FIG. 2, which is blown away from the core tip C1 by the jet issuing from nozzle 5 enters into the range of a second air jet coming from a nozzle 37 and shifts the yarn end to position F8 into a suction nozzle 11. The supply of air under pressure to nozzles 5 and 37 is controlled by respective valves 39 and 38 which in turn are controlled in dependence upon the sensing operation of a yarn feeler 21 which operates in a manner somewhat similar to that described above with reference to FIG. 1. A pressure reservoir 41 is provided and attached to main duct 44 for maintaining a uniform air pressure therein, and consequently in the air nozzles. The reservoir 41 and air duct 44 are connected with a blower or other pressure generator 42 and may also be connected by conduit means 43 with the pressure manifold system which supplies other parts of the same machine or additional coil winding machines with compressed air.

It will be obvious to those skilled in the art, upon studying this disclosure, that my invention permits of a great variety of uses and can be embodied in apparatus of various design other than those particularly illustrated and described herein, without departing from the essential features of my invention and within the scope of the claims annexed hereto.

I claim:

1. The method of processing a coil of yarn, which comprises supporting the coil in a given position, subjecting the coil in said position to a pressure jet of air directed past the coil toward a target area, whereby the yarn end is blown toward said area, and varying during the blowing operation the cross section of the air jet impinging on the yarn for varying the intensity of its effect upon the yarn end, said varying of the cross section comprising first seizing the yarn with a slow air current, and then entraining and conveying the yarn with a relatively faster air current having an increased yarn-pulling force.

2. The method of processing a coil of yarn, which comprises supporting the coil in a given position, subjecting the coil in said position to a pressure jet of air directed past the coil toward a target area, whereby the yarn end is blown toward said area, and varying during the blowing operation the velocity of the air jet impinging on the yarn for varying the intensity of its effect upon the yarn end, said varying during the blowing operation comprising first seizing the yarn with a slow air current, and then entraining and conveying the yarn with a relatively faster air current having an increased yarn-pulling force.

3. The method of processing a coil of yarn, which comprises supporting the coil in a given position, subjecting the coil in said position to a pressure jet of air directed past the coil toward a target area, whereby the yarn end is blown toward said area, and varying during the blowing operation the pressure intensity of the air jet impinging on the yarn for varying the intensity of its effect upon the yarn end, said varying during the blowing operation comprising first seizing the yarn with a slow air current, and then entraining and conveying the yarn with a relatively faster air current having an increased yarn-pulling force.

4. The method of severing and parting a length of yarn at a given location, comprising the steps of directing the inner core zone of a jet current of air transversely against

said location of said yarn, and simultaneously holding said yarn on each side of the path of said core zone of said current of air and in close proximity thereto, until the yarn is disintegrated into fibers and severed at said location and exhausting away at least one of the severed lengths from the other by suction.

5. A machine for the processing of yarn coils, comprising a support for accommodating a coil, an air-jet nozzle located near said support, means having a variable cross section area flow path for controlling the flow of air through said nozzle; said means having a mouthpiece, a flexible diaphragm and a body movably disposed within said mouthpiece, said body being connected to said diaphragm for movement with flexing of the latter to vary the quantity of air passing through said mouthpiece, air pressure supply means connected to said nozzle and communicating with one surface of said diaphragm for flexing said diaphragm in accordance with the difference in pressures prevailing on opposite surfaces of said diaphragm, said nozzle having a nozzle opening directed toward the coil on said support whereby the yarn end is blown away from the coil in the direction of the air jet, and receiving means located in the jet path for retaining the yarn end.

6. A machine for the processing of yarn coils, each having a reserve winding comprising a support for accommodating a coil having a yarn-end portion wound thereon, an air-jet nozzle located near said support, said nozzle having a conical mouthpiece, a flexible diaphragm and a movable body disposed within said mouthpiece, said body being adjustably connected to said diaphragm for movement with flexing of the latter and for adjustment relative to same to adjustably vary the quantity of air passing through said mouthpiece, a source of air pressure connected to said nozzle and communicating with one surface of said diaphragm for flexing said diaphragm in accordance with the difference in pressures prevailing on opposite surfaces of said diaphragm, said mouthpiece forming a nozzle opening for directing an air jet toward the coil on said support so as to unwind and blow away the reserve winding yarn end from the coil, and receiving means located in the jet path for receiving and retaining said yarn end during subsequent movement of said coil.

7. A machine for the processing of yarn coils, comprising a support for accommodating a coil having a yarn-end portion, an air-jet nozzle located near said support, means having a variable cross section area flow path for controlling the flow of air through said nozzle; said means having a mouthpiece, a flexible diaphragm and a body movably disposed within said mouthpiece, said body being connected to said diaphragm for movement with flexiing of the latter to vary the quantity of air passing through said mouthpiece, a source of air pressure connected to said nozzle, and communicating with one surface of said diaphragm for flexing said diaphragm in accordance with the difference in pressures prevailing on opposite surfaces of said diaphragm, said nozzle being movably mounted for changing the direction of the air jet issuing therefrom to direct the movement of said yarn-end portion.

8. A machine for the processing of yarn coils, comprising a support for accommodating a coil having a yarn-end portion, an air-jet nozzle located near said support for acting upon said yarn-end portion, said nozzle having a conical mouthpiece, a flexible diaphragm and a movable body disposed within said mouthpiece, said body being adjustably connected to said diaphragm for movement with flexing of the latter and for adjustment relative to same to adjustably vary the quantity of air passing through said mouthpiece, a source of air pressure connected to said nozzle and communicating with one surface of said diaphragm for flexing said diaphragm in accordance with the difference in pressures prevailing on opposite surfaces of said diaphragm, valve means for controlling and interrupting the flow of air from said jet nozzle, and valve-actuating means for controlling said valve means.

9. A machine for the processing of yarn coils, comprising a support for accommodating a coil having a yarn-end portion, an air-jet nozzle located near said support for acting upon said yarn-end portion, means having a variable cross sectional area flow path for changing the quantity of air flowing through said nozzle, a source of air pressure connected to said nozzle, a movable element responsive to the difference between ambient pressure and the pressure from said source to vary the area of said flow path, valve means for controlling and interrupting the flow of air from said jet nozzle, and valve-actuating means comprising cam means operably connected to said valve means for controlling said valve means in accordance with a predetermined elapsed time cycle.

10. In a machine for the processing of yarn coils and having means for transferring said coils and the yarn-end portions thereof from a storage position to a feeding position, a support for accommodating a coil in its storage position, feeler means contacting said yarn-end portion in feeding position and adapted for actuation when said yarn-end portion no longer contacts said feeler means, suction holding means for entraining said yarn-end portion in said feeding position, an air-jet nozzle located near said support for acting upon a yarn-end portion of said coils and positioned so as to direct the latter yarn-end portion toward said suction holding means, a source of air pressure connected to said nozzle, valve means for controlling the air current flowing to said nozzle from said source, and valve-actuating means operably connected to said feeler means for controlling said valve means in accordance with depletion of supply of the yarn contacting said feeler means.

11. A machine for the processing of yarn coils, comprising a support for accommodating a coil having a yarn-end portion, an air-jet nozzle located near said support for acting upon said yarn-end portion, means having a variable cross section area flow path for controlling the flow of air through said nozzle, said means having a mouthpiece, a flexible diaphragm and a body movably disposed within said mouthpiece, said body being connected to said diaphragm for movement with flexing of the latter to vary the quantity of air passing through said mouthpiece, a source of air pressure connected to said nozzle and communicating with one surface of said diaphragm for flexing said diaphragm in accordance with the difference in pressures prevailing on opposite surfaces of said diaphragm, valve means for controlling and interrupting the flow of air from said jet nozzle, and valve-actuating means comprising a yarn guard responsive to the absence of yarn and having a linkage connecting said yarn guard with said valve means so as to control said valve means gradually.

12. A machine for the processing of yarn coils, comprising a support for accommodating a coil having a yarn-end portion, a movable air-jet nozzle located near said support for acting upon said yarn-end portion and to direct same, means having a variable cross sectional area flow path for changing the quantity of air flowing through said nozzle, a source of air pressure connected to said nozzle, a movable element responsive to the difference between ambient pressure and the pressure from said source to vary the area of said flow path, valve means for controlling the air current flowing to said nozzle from said source, and suction intake means located in the path of air issuing from said jet nozzle in at least one position of the latter to entrain the yarn-end portion directed by said jet nozzle.

13. A machine for the processing of yarn coils according to claim 12, the spacing of the jet nozzle from the point where it impinges upon the yarn being smaller than seven times the opening width of the outlet orifice of said jet nozzle.

14. A machine for the processing of yarn coils according to claim 12, the spacing of the jet nozzle from the point where it impinges upon the yarn being between

three and one-half and seven times the opening width of the outlet orifice of the jet nozzle.

15. The method of removing a reserve winding from a yarn coil having a main winding and a reserve winding on at least one coil end wherein the reserve winding is spaced from but connected to the main winding, which comprises supporting the coil in a given position, subjecting the coil in said position to a pressure jet of air directed away from said main winding onto the reserve winding of said coil and past the coil toward a target area, whereby only the reserve winding is unwound and is blown toward said area, and guiding the unwound yarn in predetermined direction.

16. The method of removing a reserve winding according to claim 15, including the step of varying said pressure jet of air during the blowing operation by first seizing the yarn being unwound with a slow air current, and then entraining and conveying the yarn with a relatively faster air current having an increased yarn-pulling force.

17. In a machine for processing yarn coils, said coils each having a main winding and a reserve winding on at least one coil end and connected to said main winding, a device for unwinding and placing the starting end of the yarn formed by said reserve winding in a ready position for further processing of said coils, said device comprising a support for accommodating a coil, an air-jet nozzle located near said support and directed, when in operation, to blow a jet of air onto a reserve winding of a respective coil and away from the main winding thereof, and air pressure supply means for supplying an air current through said nozzle.

18. A device according to claim 17, comprising control means for regulating the flow of air through said nozzle.

19. A device according to claim 17, comprising severing means spaced from said nozzle a given distance for cutting the unwound length of yarn to a predetermined length.

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