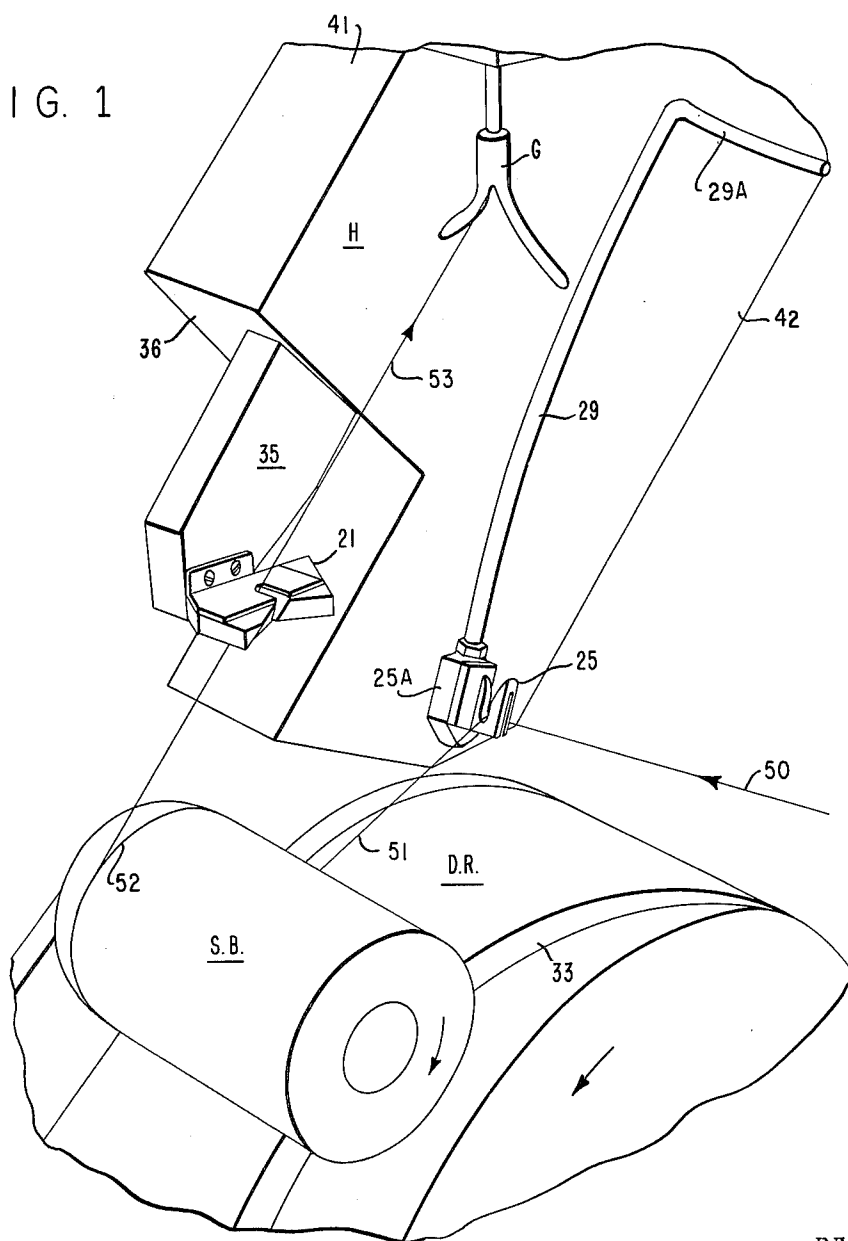


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FIG. 1



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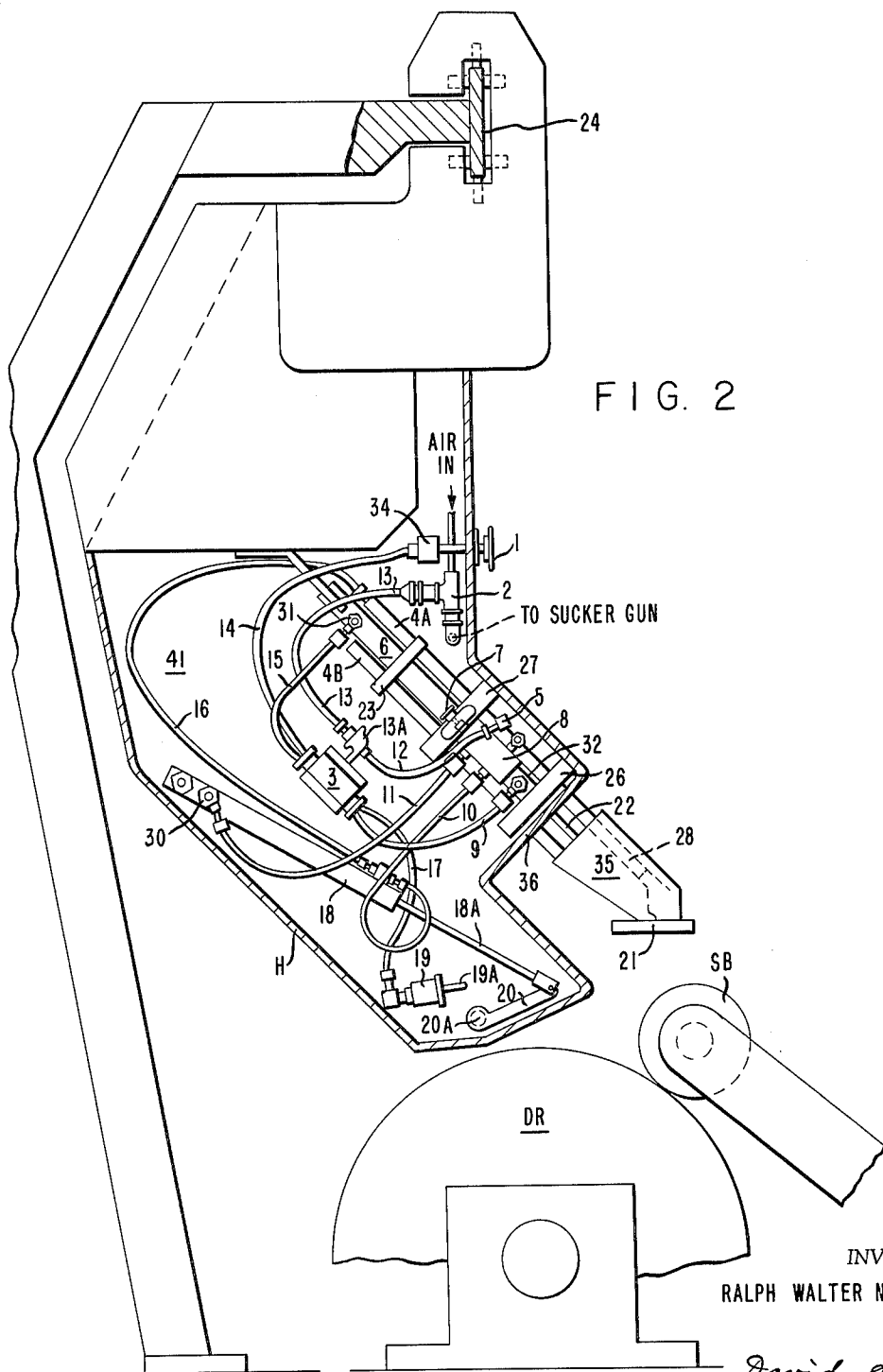
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3,224,692

TRANSFER TAIL WINDING APPARATUS

Filed Oct. 19, 1962

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TRANSFER TAIL WINDING APPARATUS

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FIG. 3

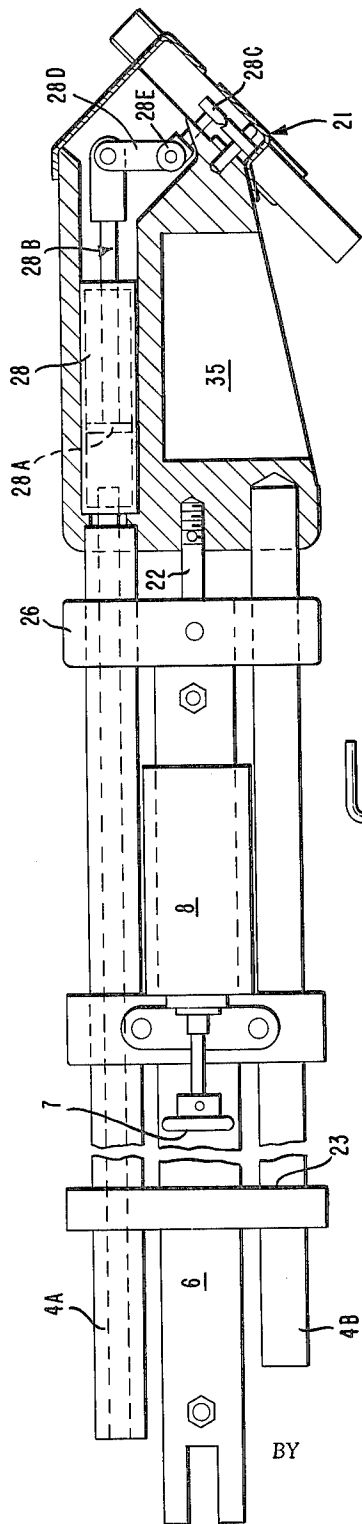
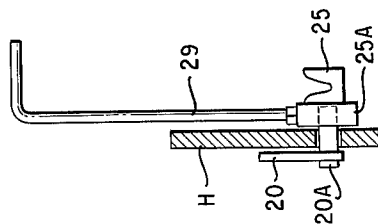


FIG. 4



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TRANSFER TAIL WINDING APPARATUS

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9 Claims. (Cl. 242—19)

This invention relates generally to textile winding apparatus and more specifically to means for controlling the application of a transfer tail to a yarn package.

As commonly understood in the textile art, a transfer tail is a portion of the first yarn wound on a yarn support, which is so disposed as to be positively secured during the winding of the remainder of the yarn package, yet freely available for typing directly to the outer end of the yarn on another yarn package. The purpose of providing a transfer tail is to enable an uninterrupted flow of yarn to be maintained from a depleted yarn package to a full package adjacent thereto, as in a creel or other yarn package holder on which both yarn packages are supported.

Many methods and devices for winding transfer tails on rotating yarn supports are described in the art. However, these methods and devices are mostly applicable to winding machines, such as cone winders, which are employed to rewind yarn which has initially been wound on a spool, bobbin or other support. These methods and devices are therefore not readily applicable to winding transfer tails on yarn supports which are used to wind synthetic yarns on the spinning machine immediately after extrusion. Modern technology has made it desirable to provide transfer tails on the initially wound package either for winding into larger packages before sale or for direct sale of the initially wound package for preparation of fabrics. Also, modern high speed winding has made it difficult to accurately control the transfer tail length, and improvements in this respect are needed.

It is an object of this invention to provide an improved apparatus for winding transfer tails on rotating yarn supports.

Another object is to provide an apparatus adapted for use with synthetic yarn spinning machine windups to provide a transfer tail in a controlled fashion.

A further object is to provide a transfer tail winding apparatus which is adapted for use at high winding speeds.

A further object is to provide a transfer tail winding apparatus which is readily moved from one spinning position to another whereby transfer tails may be wound at any spinning position on any given machine with the same transfer tail winding unit.

Other objects will become apparent from the description and discussion to follow.

These objects are accomplished by an improved transfer tail winding apparatus which is used in combination with yarn windup apparatus and means, such as sucker gun, for temporarily collecting and disposing of a moving yarn as it is forwarded from a yarn source. The improved apparatus comprises

- (a) means for releasably holding the moving yarn line away from a traverse means for a given interval,
- (b) means for cutting the yarn after it has been aligned with and wrapped around an end of an empty bobbin,
- (c) means for releasing the yarn for movement to said traverse mechanism after said cutting has been achieved, and
- (d) means for controlling the length of the time interval between cutting and releasing of the yarn to the traverse mechanism,

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all said individual means being assembled as a single portable unit, in the sense that it can be made to move on a rail device (usually above the level of the bobbin-winding apparatus), so that one assembly can be used to service any of a large number of spinning machines, customarily arranged in a bank or row.

The transfer tail winding apparatus of this invention is particularly adapted to be used in combination with a windup apparatus comprising a surface-driven yarn support where the traversing action is obtained by employing a drive roll with a spiral groove in the surface to traverse the yarn as it wound on the package. Such windup apparatus usually presents a problem for the transfer tail apparatus, because when the latter is used in combination with this type of windup apparatus and particularly when the winding tension is relatively low, it is necessary to provide means for forcing the yarn line into contact with the grooves in the drive roll after it is released as indicated above.

Reference is now made to the accompanying drawings, in which:

FIGURE 1 is a partial perspective view showing a textile yarn windup apparatus showing a preferred embodiment of this invention.

FIGURE 2 is a side view, partly in section, showing the supporting structure, the windup assembly, the yarn cutter and the arrangement of the pneumatically actuated parts of the transfer tail device.

FIGURE 3 is an enlarged detail side view showing elements of the yarn cutting device.

FIGURE 4 is a sectional view through the housing in the vicinity of the pivot 20A of FIGURE 2.

Taking up now the drawings in detail, FIG. 1 shows a compact unit comprising a housing H which is movably supported on a monorail 24 (FIG. 2) above the level of drive roll DR and embraces inside or assembled around it on the outside all the apparatus that is needed to provide a transfer tail on the end of a bobbin in accordance with the principal objects of this invention.

Sucker gun G is attached to the outside of this housing, while cutter 21 is supported on a movable sub-unit 35 which can slide forward and back on a straight line with respect to shoulder 36 of said housing, said sucker gun and cutter being aligned in a vertical plane so that when the yarn is passed around the bobbin from the supply source and thence to the sucker gun, the yarn passes through the slot in the yarn cutter. The yarn is held out of contact with the traversing groove of the drive roll by passing it through U-shaped guide 25, which together with the sucker gun, also serves to position the yarn at the end of the bobbin.

Referring now to FIGURE 2, air under pressure is supplied to T 2 where it is separated into two streams, one passing to the sucker gun and the other passing through tube 13 to elbow 13A from which point air pressure is supplied through tube 12 and L fitting 5 to four-way valve 8. From valve 8 air pressure is supplied through tube 11 to cylinder 18 where the pressure holds piston rod 18A in the normally extended position. Air pressure from elbow 13A is also supplied to four-way valve 3. Pressure from valve 3 is transmitted to pressure release valve 34 by tube 14. Pressure from valve 3 is supplied to cylinder 6 by tube 9 to hold yarn cutter 21 in normally retracted position. Pressure is also supplied from valve 3 to three-way valve 19 by tube 17. In operation, yarn is brought manually through U-guide 25, under and around the bobbin for about 1½ turns, and then passed to the sucker gun. In this position the yarn is automatically positioned between the cutter blades located in cutter head assembly 21, which are normally

separated. Push button 1 is then pressed, releasing pressure in tube 14. This activates valve 3 to divert pressure from tube 9 to tube 15. The air pressure supplied to the end of cylinder 6 by tube 15 acts to push the piston (not shown), attached piston rod 22 and cutter assembly 21 downwardly into a position immediately adjacent the spin bobbin SB. Cutter assembly 21 is also supported by hollow steel rods 4A and 4B which are slideably engaged and supported by guideways in supporting bars 26 and 27. The downward motion of the cutter assembly 21 is controlled by stop bar 23 attached to rods 4A and 4B. When stop bar 23 contacts push button 7, the downward motion of the cutter assembly is halted and depression of the push button activates valve 8, diverting the air pressure from tube 11 to tube 10. From tube 10, air pressure is transmitted to tube 16, and via rod 4A to miniature air cylinder 28, shown in FIGURE 3, thereby forcing piston 28A and piston rod 28B into an extended position, whereby cutter blade 28C is forced into a closed position by linkage 28D, which rotates about fixed pivot 28E. Air pressure from tube 10 also enters cylinder 18, forcing the associated piston (not shown) upwardly, causing rod 18A to retract, thus rotating arm 20 about pivot 20A. Arm 20 is rigidly connected to pivot 20A. The latter in turn passes freely through a circular hole (not shown) in the wall of housing H and extends beyond said wall to form an axis on which block 25A, which carries both U-guide 25 and bent arm 29, is rigidly mounted. Accordingly, rotation of arm 20 through about 90° (counterclockwise, as viewed in FIG. 2) causes both the U-guide and the bent arm to rotate (clockwise, as viewed in FIG. 1) until they assume essentially horizontal positions. Thread 50 then automatically slips out of the U-notch and assumes a position slanting from the location of the transfer tail 52 (on the left of spin bobbin SB) toward the source of the threadline (which usually arrives from a point behind drive roll DR in FIG. 1 and to the right of the plane defined by the U-guide and sucker gun, when viewed as in FIG. 1), but the upper segment 29A of arm 29 now presses down upon the threadline and forces it into contact with the surface of the drive roll, where it eventually finds its way into traversing groove 33. Finally, rotation of arm 20 results in bringing this arm down upon plunger 19A of valve 19, urging the plunger downwardly to release the pressure from tube 17. This activates valve 3, which diverts pressure from tube 15 back to tube 9, causing cutter 21 to retract into its normal position. Retraction of the cutter assembly acts to release push button 7, thus diverting air pressure from tube 10 to tube 11, causing piston rod 18A to return to its normal extended position.

The time interval between the cutting of the yarn and deflection of the yarn line into contact with the traversing groove in the drive roll, i.e., the time interval which controls the length of the transfer tail, is primarily controlled by the rate of retraction of piston rod 18A when pressure is applied at the bottom of cylinder 18. This rate of retraction is regulated by adjustment of a needle-type exhaust valve located at 30. Needle valves to permit escape of air from cylinder 6 are located at 31 and 32. These valves are adjustable to permit control of the speed of upward and downward motion of the cutter assembly.

After the winding of a transfer tail at one spinning position is completed, the apparatus is readily movable to any other spinning position on a given machine by simply pulling it manually along the supporting monorail to the desired position. Air pressure is supplied by means of an air hose attached near the top of the apparatus. The waste yarn withdrawn by the sucker gun is suitably stored in a small compartment just below the monorail.

The transfer tail winding apparatus of this invention enables the winding of transfer tails on winding yarn supports in a simple and controlled fashion. It is adapted for use on synthetic yarn spinning machines and is par-

ticularly suitable for use with surface driven yarn supports. It is further especially adapted for use with the type of windup apparatus which employs a grooved drive roll for traversing the yarn. It is especially useful at high winding speeds where control of the length of the transfer tail is difficult. The length of the transfer tail is readily and simply accomplished by adjustment of a needle valve.

I am aware of U.S. Patent No. 3,097,804 (issued July 16, 1963), which deals with a transfer-tail winding device. My invention, however, distinguishes thereover in the following two essential features:

(1) My apparatus is transportable, and can be used from one winding position to another in a plant which contains a plurality of such positions.

(2) My apparatus is operated by pneumatic means, which simplifies the entire structure thereof, and permits all the essential parts to be assembled in a single unit for the sake of achieving the first mentioned essential feature.

More particularly, the device of this invention consists of parts assembled around or within a housing unit which comprises (1) an inner chamber 41 having a floor portion 36 and a flat, outer, essentially vertical sidewall portion 42; (2) a sucker gun G carried by said housing on the outside of said sidewall portion 42; (3) a U-notched yarn guide 25 supported on the outside of said sidewall on a shaft rotatably supported in an opening through said sidewall 42 and extending inwards into said inner chamber 41; (4) a cutting device supported on the outside of said housing on slideable shafts 4A and 4B which pass freely through openings in said floor portion 36 and which extend inwards into said inner chamber 41, whereby the cutting device can be moved on the outside of said chamber away from and toward said floor portion 36, and (5) a pneumatic mechanism supported within said inner chamber 41.

The U-guide, sucker gun and cutting device are aligned in a single essentially vertical plane, whereby segments 51, 52, 53 of a thread passing through the U-guide, around the edge of the rotating blank (or "bobbin"), through said cutting device and into the mouth of said sucker gun are travelling essentially in a single plane; and said pneumatic mechanism within the chamber comprises in combination:

(a) Means (such as duct marked "AIR IN" in FIG. 2) for connecting said pneumatic mechanism to an outer source of compressed air whereby to maintain the parts of said mechanism in a predetermined pattern of pressure distribution when the mechanism is in the state of rest (as discussed more fully hereinabove with reference to FIG. 2);

(b) A valve 34 actuatable from the outside of the housing (e.g., push button 1) for disturbing for a controllable time interval said pressure distribution of the state of rest (illustrated above by releasing the pressure from tube 14);

(c) Pneumatic means in said inner chamber, responsive to said valve actuation for promptly sliding the cutting device downwards from said floor portion to a position close to said rotating blank;

(d) Pneumatic means in said inner chamber for actuating the cutting means to effect cutting of the thread promptly after sliding it into position by said means (c);

(e) Pneumatic means for effecting rotation of said rotatable shaft 3 following said cutting of the thread, whereby to rotate said U-guide into a position where the moving yarn will automatically slip out of said U-notch;

(f) Pneumatic means for interposing a predetermined time interval between said cutting of the thread by means (d) and said turning of the shaft by means (e) (illustrated by needle valve 30 in piston 18), and

(g) Pneumatic means for retracting said cutting device 4 and for returning said rotatable shaft 5 to their positions of rest.

It will be understood that the details above set forth

may be varied widely within the skill of those engaged in this art, without departing from the spirit of this invention.

I claim as my invention:

1. An apparatus for providing transfer tails on bobbins in equipment which winds onto such bobbins synthetic yarn coming in a continuous line directly from a spinning machine and which normally includes a yarn traverse means, said apparatus comprising in combination:

- (a) means for releasably holding the incoming yarn line away from said traverse means,
- (b) pneumatic means for automatically cutting the yarn after it has been aligned with and wrapped around an end of an empty bobbin,
- (c) pneumatic means for automatically releasing the yarn for movement to said traverse mechanism after said cutting has been achieved, and
- (d) means for controlling the length of the time interval between cutting and releasing of the yarn to the traverse mechanism, and
- (e) means for achieving the operations of cutting and releasing the yarn, in automatic sequence and within said controlled time interval, by actuating a starting device after the yarn has been put into said releasable holding means (a),

all said means being assembled in operative positions in and about a single housing unit, whereby the entire assembly becomes movable as a unit for service from one bobbin winding machine to another.

2. An apparatus as in claim 1, said apparatus including a sucker gun supported in a fixed position on the outside of said housing unit and a cutting device supported slideably with respect to a floor portion of said housing unit and being adapted to move in closely to the bobbin for the cutting operation, said cutting device and sucker gun being aligned in a vertical plane, whereby the movement of said cutting device will not break or cut the yarn line prematurely.

3. An apparatus as in claim 1, said yarn traverse device being in the form of a groove cut into the surface of the driving roll of said yarn winding equipment, and said means (c) of claim 1 including means for directing the yarn line into said groove after the cutting operation has been achieved.

4. An apparatus as in claim 3, said yarn directing means comprising a bent arm whose one end is supported swingably on a pivot passing through the wall of said housing and actuatable by pneumatic means located inside said housing.

5. In combination with a high-speed winding machine for winding a yarn package from a continuous yarn supply onto a rotating blank, a transportable apparatus for the preliminary laying off on the edge of said rotating blank a transfer tail of predetermined length, said apparatus comprising in combination, in a single unit,

- (1) a housing comprising an inner chamber having a floor portion and an outer, essentially vertical sidewall portion,
- (2) a sucker gun carried by said housing on the outside of said sidewall portion,
- (3) a U-notched yarn guide supported on the outside of said sidewall on a shaft rotatably supported in an opening through said sidewall and extending inwards into said inner chamber,
- (4) a cutting device supported on the outside of said housing on slideable shafts which pass freely through openings in said floor portion and which extend inwards into said inner chamber, whereby the cutting device can be moved on the outside of said chamber away from and toward said floor portion, and
- (5) a pneumatic mechanism supported within said inner chamber;

said U-guide, sucker gun and cutting device being aligned in a single essentially vertical plane, whereby a thread passing through the U-guide, around said rotating blank, through said cutting device and into the mouth of said

sucker gun will be travelling essentially in a single plane; said pneumatic mechanism within the chamber comprising in combination:

- (a) means connecting said pneumatic mechanism to an outer supply of compressed air, whereby to maintain the parts of said mechanism in a predetermined pattern of pressure distribution when the mechanism is in the state of rest,
- (b) a valve actuatable from the outside of said housing for disturbing for a controllable time interval said pressure distribution of the state of rest,
- (c) pneumatic means in said inner chamber, responsive to said valve actuation for promptly sliding the cutting device (4) downwards from said floor portion to a position close to said rotating blank,
- (d) pneumatic means in said inner chamber for actuating the cutting means to effect cutting of the thread promptly after sliding it into position by said means (c),
- (e) pneumatic means for effecting rotation of said rotatable shaft (3) following said cutting of the thread, whereby to rotate said U-guide into a position where the moving yarn will automatically slip out of said U-notch,
- (f) adjustable pneumatic means for interposing a predetermined time interval between said cutting of the thread by means (d) and said turning of the shaft by means (e), and
- (g) pneumatic means for retracting said cutting device (4) and for returning said rotatable shaft (5) to their positions of rest,

said unit being supported by means independent of said high-speed winding equipment whereby the apparatus unit can be transported from one to another of a plurality of winding positions.

6. An apparatus for providing transfer tails on bobbins in high-speed winding equipment which winds onto such bobbins synthetic yarn coming in a continuous line directly from a spinning machine and which normally includes a yarn traverse means, said apparatus comprising in combination:

- (a) means for releasably holding the incoming yarn line away from said traverse means,
- (b) cutting means for cutting the yarn after the yarn has been aligned with and wrapped around an end of an empty bobbin,
- (c) pneumatic means for automatically actuating said cutter means into cutting action and for automatically moving said cutter means from a retracted position in relation to the bobbin to a cutting position and back again to said retracted position, said cutting position being situated in relatively close proximity to said bobbin,
- (d) pneumatic means for automatically releasing the yarn for movement to said traverse mechanism after said cutting action has been achieved,
- (e) means for controlling the length of the time interval between cutting and releasing of the yarn to the traverse mechanism, and

all said means being assembled in operative positions in and about a single housing unit, said unit being mounted independent of said high-speed winding equipment, whereby the entire assembly becomes movable as a unit for service from one bobbin winding machine to another.

7. An apparatus as in claim 6, said apparatus including a sucker gun supported in a fixed position on the outside of said housing unit and a cutting device supported slideably with respect to a floor portion of said housing unit and being adapted to move in closely to the bobbin for the cutting operation, said cutting device and sucker gun being aligned in a vertical plane, whereby the movement of said cutting device will not break or cut the yarn line prematurely.

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8. An apparatus as in claim 6, said yarn traverse device being in the form of a groove cut into the surface of the driving roll of said yarn winding equipment, and said means (c) of claim 1 including means for directing the yarn line into said groove after the cutting operation has been achieved.

9. An apparatus as in claim 8, said yarn directing means comprising a bent arm whose one end is supported swingably on a pivot passing through the wall of said housing and actuatable by pneumatic means located inside said housing.

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