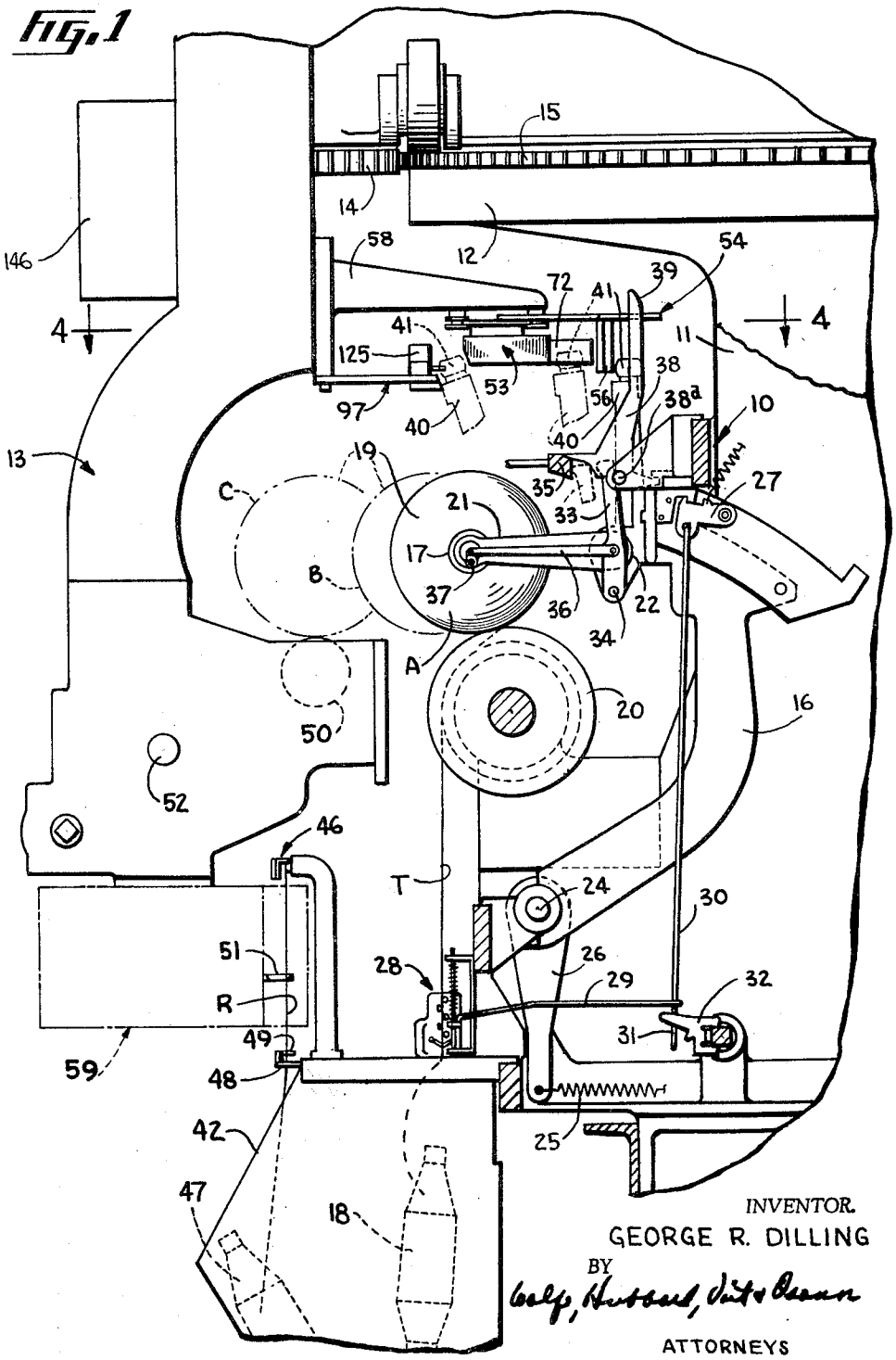
March 16, 1965 G. R. DILLING 3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY IN MULTIPLE UNIT WINDING MACHINES

Filed May 7, 1962 7 Sheets-Sheet 1

FIG. 1



INVENTOR.
GEORGE R. DILLING
BY
Cobb, Husband, Dutro & Quinn
ATTORNEYS

March 16, 1965 G. R. DILLING 3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY IN MULTIPLE UNIT WINDING MACHINES

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FIG. 2

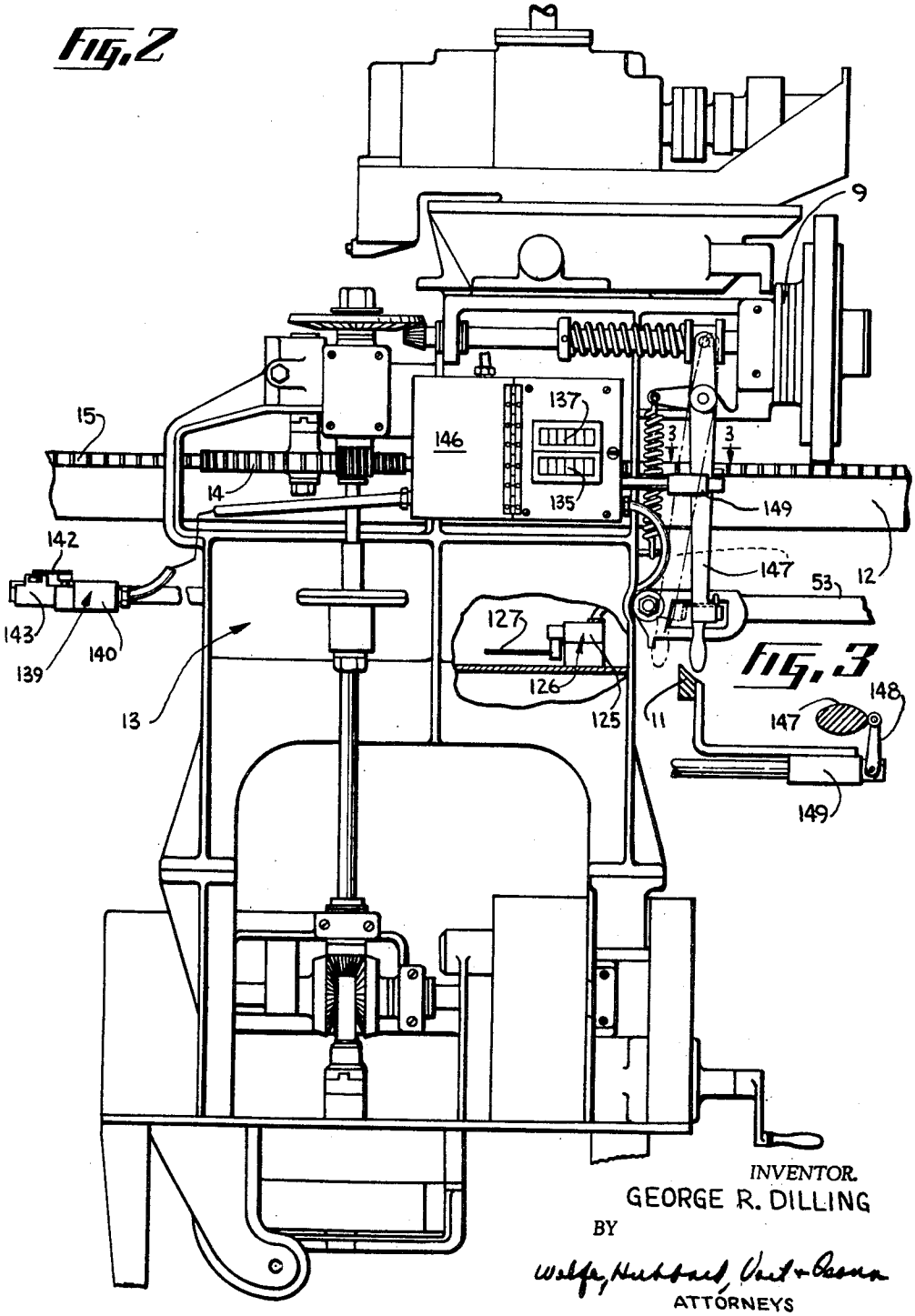


FIG. 3

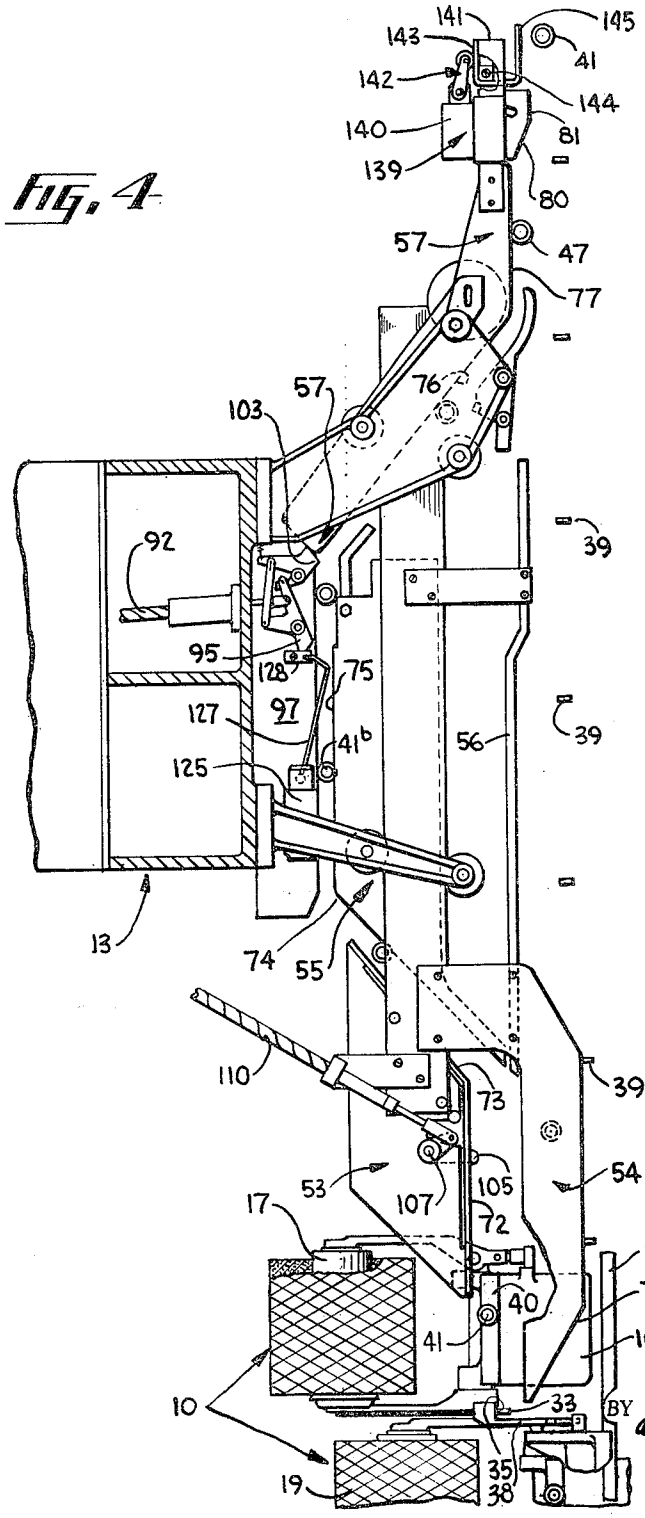
INVENTOR.
GEORGE R. DILLING
BY
Wolfe, Hubbard, Voit & Osann
ATTORNEYS

March 16, 1965 G. R. DILLING 3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY IN MULTIPLE UNIT WINDING MACHINES

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FIG. 4



INVENTOR.
GEORGE R. DILLING
BY Wolfe, Hubbard, Voit & Osann
ATTORNEYS

March 16, 1965 G. R. DILLING 3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY IN MULTIPLE UNIT WINDING MACHINES

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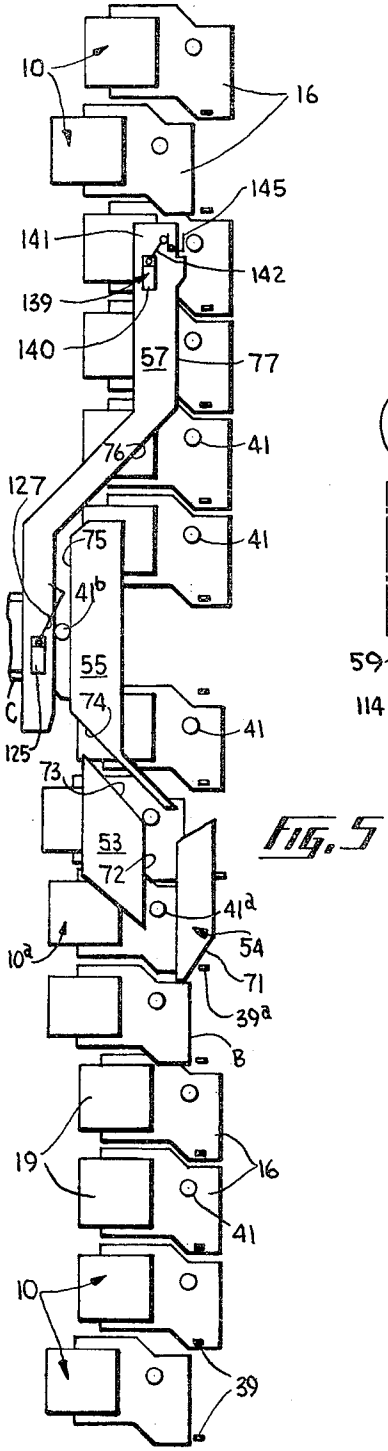
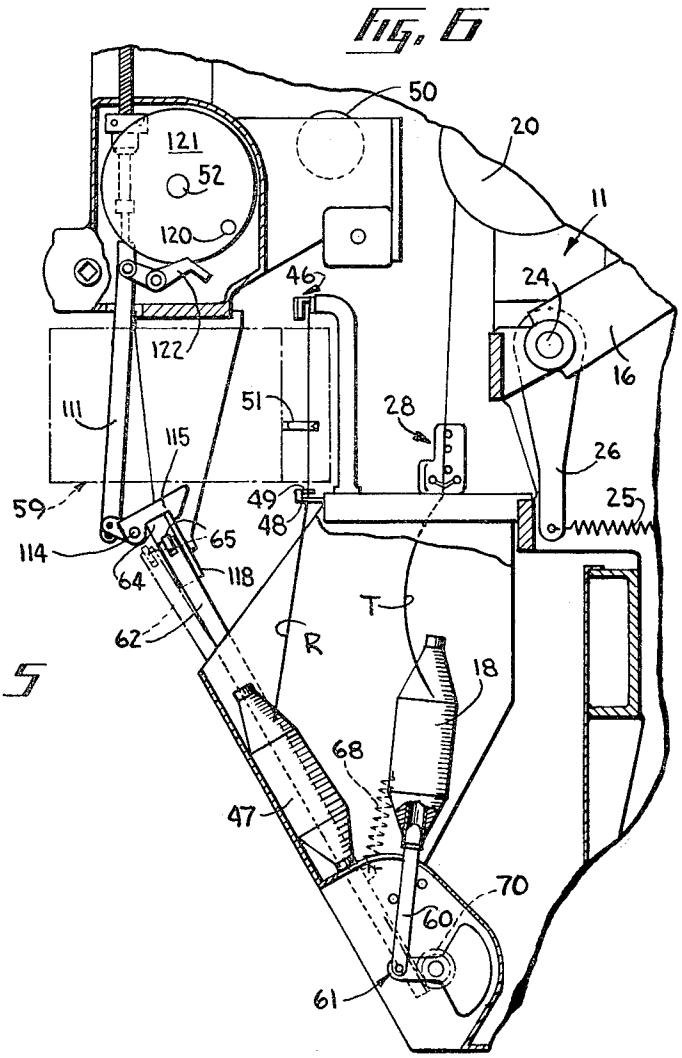


Fig. 5

Fig. 6



INVENTOR.
GEORGE R. DILLING
BY
Wolfe, Hubbard, Voit & Osann
ATTORNEYS

March 16, 1965 G. R. DILLING 3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY
IN MULTIPLE UNIT WINDING MACHINES

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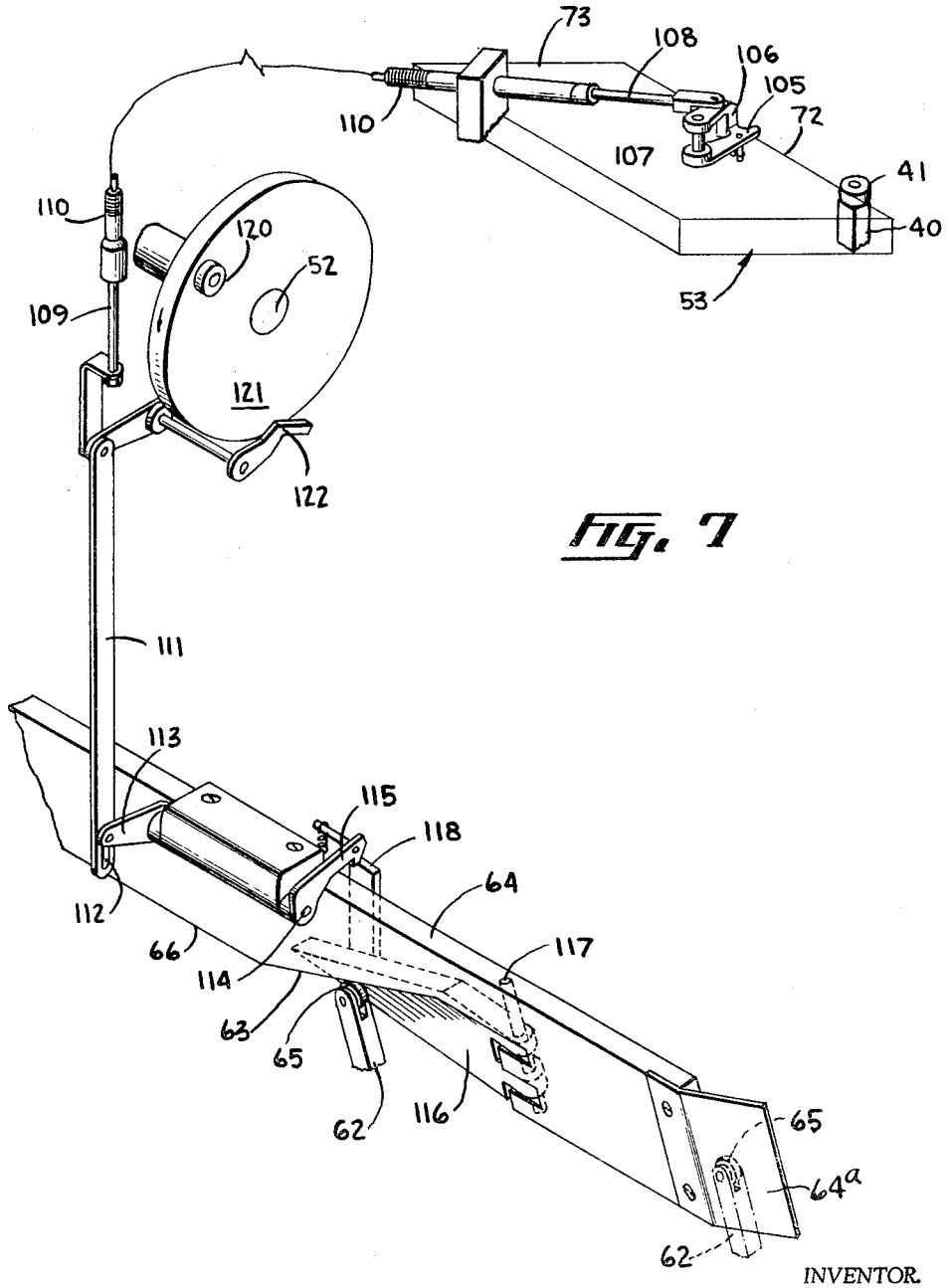


FIG. 7

INVENTOR.
GEORGE R. DILLING
BY
Wolfe, Hubbard, Voit & Osann
ATTORNEYS

March 16, 1965 G. R. DILLING 3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY IN MULTIPLE UNIT WINDING MACHINES

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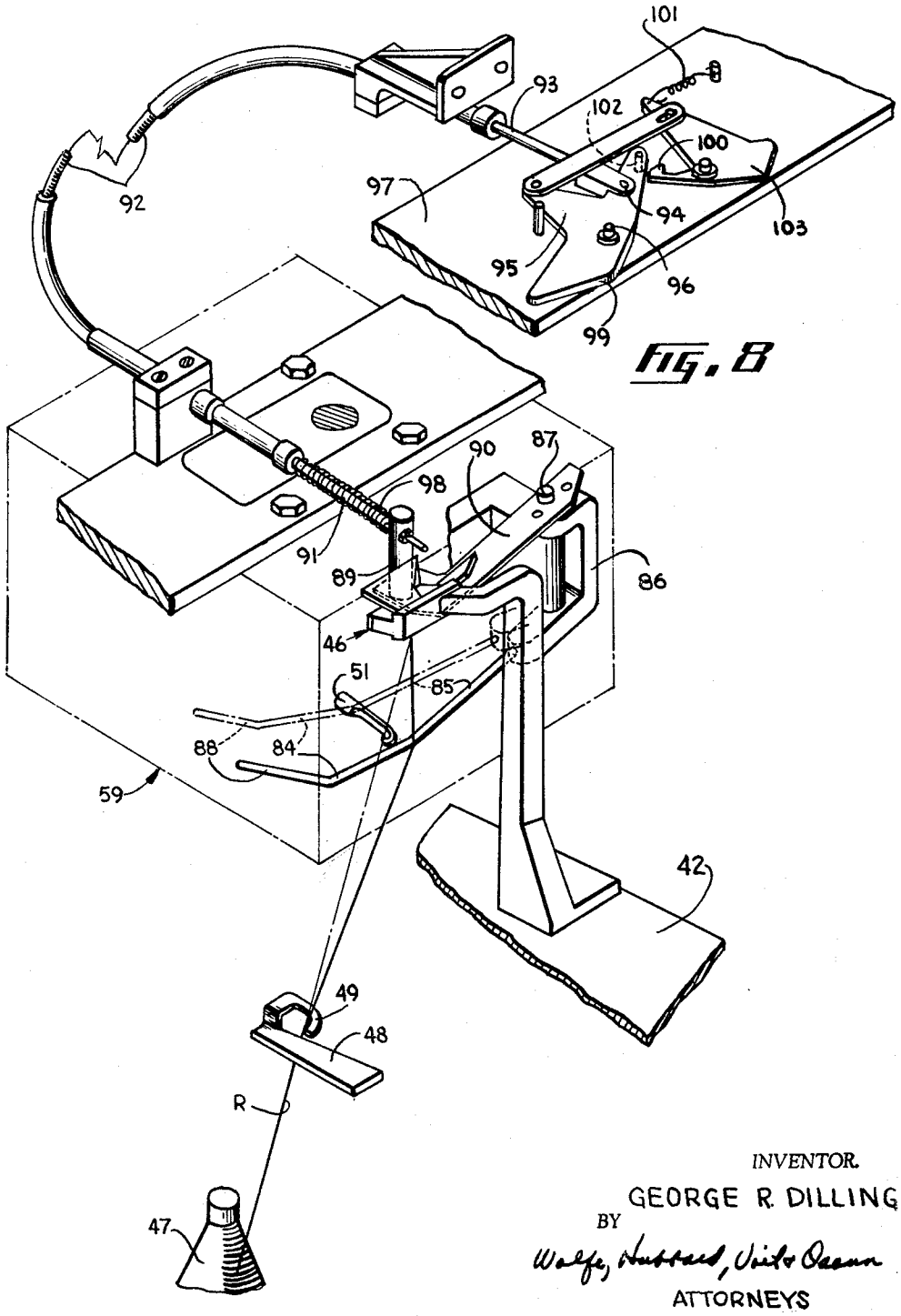


FIG. 8

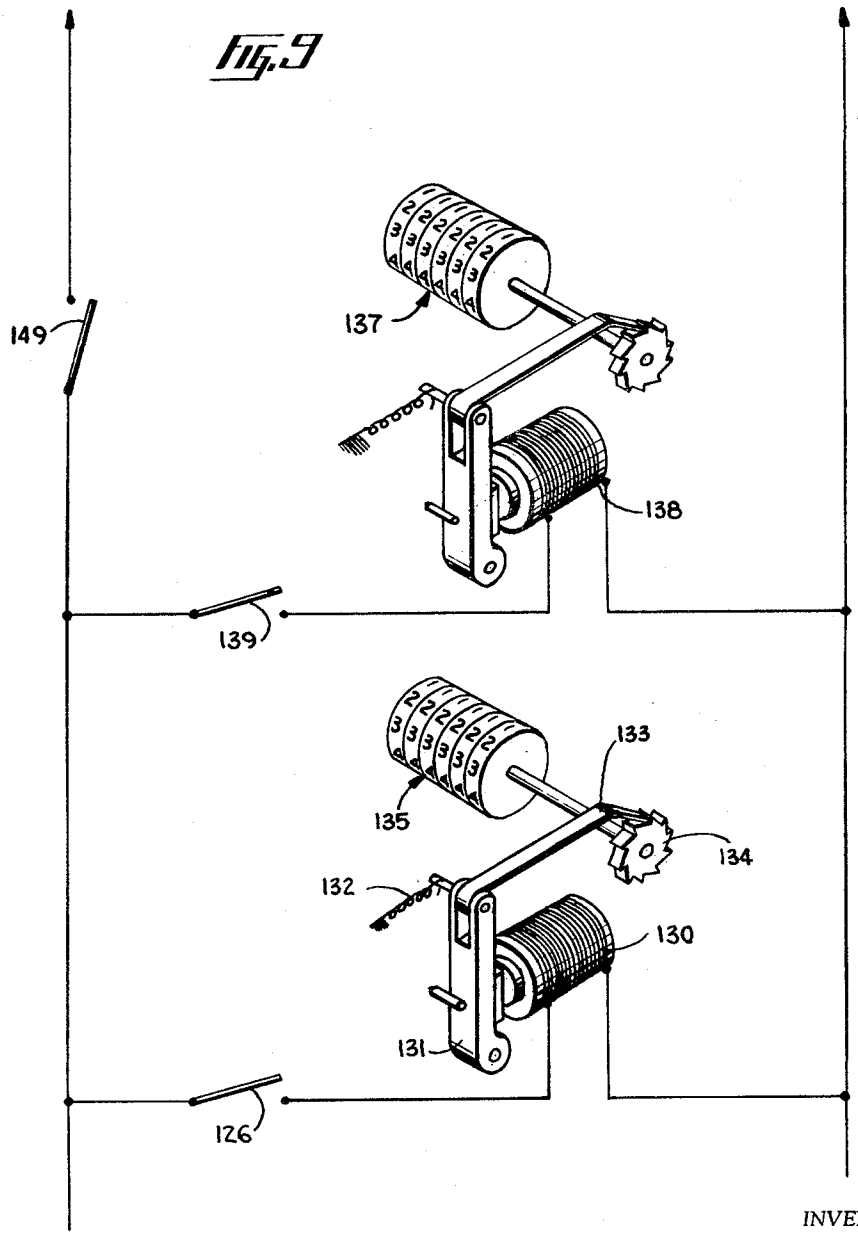
INVENTOR.
GEORGE R. DILLING
BY
Wolfe, Hubbard, Voit & Osann
ATTORNEYS

March 16, 1965 G. R. DILLING 3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY IN MULTIPLE UNIT WINDING MACHINES

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FIG. 9



INVENTOR.
GEORGE R. DILLING
BY
Wolfe, Hubbard, Voit & Osann
ATTORNEYS

United States Patent Office 3,173,622 Patented Mar. 16, 1965

3,173,622

MECHANISM FOR DETERMINING OPERATOR EFFICIENCY IN MULTIPLE UNIT WINDING MACHINES

George R. Dilling, Rockford, Ill., assignor to Barber-Colman Company, Rockford, Ill., a corporation of Illinois

Filed May 7, 1962, Ser. No. 192,843
8 Claims. (Cl. 242—35.6)

This invention relates to multiple unit winding machines of the patrolling traveler type such as the Barber-Colman spooler shown in Patent No. 2,757,874. In such machines, the traveler or knot-tying and winding restart mechanism is brought into operative association with successive winding units at repeated intervals which are substantially shorter than the time required to empty the bobbins. If the thread of any active bobbin is broken or exhausted, the traveler finds the thread on the package, ties it to the hung-up thread of a reserve bobbin, and restarts the winding. Any winding unit which is running properly when the traveler arrives is by-passed without contact with the traveler. As a result, the over-all efficiency of the spooler is determined by the success of the knot-tying operations which in turn depend on the care exercised by the operator in placing new or reserve bobbins in the individual winding units and properly hanging up the threads thereof.

The general object of the present invention is to provide a mechanism for determining the number of tying operations successfully performed by the patrolling traveler and therefore afford a basis for incentive pay and an inducement for the operator to contribute to high operating efficiency of the spooler.

Accordingly, it is a primary aim of the invention to determine the condition of each winding unit not only when the traveler comes into operative association with such unit but also when it leaves the same and to count these conditions so that the difference represents the number of successful tying operations.

Another object is to determine the active or idle conditions of each winding unit by selectively operable sensing devices carried by the traveler itself and controlling the operation of counting mechanism also carried by the traveler.

A further object is to utilize the position of the thread package of each winding unit as an indication of the conditions to be sensed in the different positions of the traveler in moving past such unit.

Still another object is to sense the number of knot-tying attempts made by the traveler and compare the same with the number of failures to successfully tie the knots and resume the winding operations.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which—

FIGURE 1 is a fragmentary vertical sectional view of a Barber-Colman spooler similar to FIG. 4 of the above mentioned patent and incorporating a counting mechanism embodying the novel features of the present invention, certain parts in this and other figures which do not involve the present invention being omitted.

FIG. 2 is a fragmentary elevational view of the traveler taken from the left of FIG. 1.

FIG. 3 is a fragmentary section taken on the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary section taken along the line 4—4 of FIG. 1.

FIG. 5 is a schematic view similar to FIG. 4 showing the relation of the winding units and the traveling tying unit.

FIG. 6 is a fragmentary view of a part of FIG. 1 adding the bobbin doffing mechanism thereto.

FIG. 7 is a fragmentary perspective view of the mechanism controlling the by-passing of the doffing mechanism.

FIG. 8 is a fragmentary perspective view of the mechanism for controlling the by-passing of the reserve threads.

FIG. 9 is a schematic view and wiring diagram of the counting mechanism.

For purposes of illustration, the invention is shown in the drawings incorporated in a winder of essentially the general construction disclosed in the aforesaid patent to which reference may be had for further details. In general, individual winding units **10** are mounted on and disposed side by side as shown in FIG. 4 and schematically in FIG. 5 along an upright frame **11** having an overhanging top **12** supporting and guiding a tying unit or so-called traveler **13** which is advanced along a horizontal path past the successive winding units by turning a pinion **14** (FIG. 1) meshing with rack teeth **15** on the frame and driven from the traveler motor (not shown) through a clutch **9** and the gearing shown in FIG. 2.

Each winding unit includes an upright swingable carrier **16** (FIG. 1) carrying arms **21** which support a rotatable core **17** on which a thread T drawn from an active supply bobbin **18** is wound to form a larger yarn mass such as a cheese **19**. Such winding takes place when the cheese is resting as shown in FIG. 1 on a drum **20** of conventional construction rotated continuously and having a helical groove receiving the thread and traversing the same back and forth along the cheese. The cheese core is detachably journaled on the free ends of the arms **21** which project horizontally from and fulcrumed at **22** on the upper end of the carrier **16** which, in this instance, is pivoted at **24** to permit the cheese to be carried forwardly from the winding position A shown in full in FIG. 1 to an intermediate position B indicated in dotted outline and then on to a tying position C shown by dot-dash lines. Thus, a winding unit is idle whenever it is disposed out of its normal winding position A.

As fully described in said patent, the cheese carrier **16** of each winding unit is moved to the intermediate position by a spring **25** acting on an arm **26** of the carrier upon release of a latch **27** in response to breaking or exhaustion of the running thread T as sensed by a detector **28**. Such a thread break results in endwise movement of a horizontal rod **29** connected to a pull wire **30** suspended from the latch, such movement carrying an eye **31** on the wire into the path of a continuously oscillating rocker **32** which, on its next downward stroke, pulls the wire to release the latch. This allows the carrier **16** to move outwardly under the action of the spring **25** until the upper end of an arm **33** pivoted at **34** on and upstanding from the upper end of the carrier **16** comes against a stop **35** as shown in phantom in FIG. 1 and, through a link **36** actuates a lever **37** for expanding a brake to stop the cheese. The stop **35** is on a bell-crank **38** fulcrumed at **38a** on the frame **11**. The cheese **19** and its arm **21** are thus disposed in the braking position B to await the arrival of the traveler **13**, the weight of the two being sustained by a pawl and ratchet (not shown) as described in the aforesaid patent. In this movement of the cheese, an arm **40** carrying a roller **41** and rigid with and upstanding from the carrier **16** near the fulcrum thereof is swung from the full line position to the dotted line position shown in FIG. 1.

The active bobbin **18** is supported in a pocket **42** mounted on the frame **11** and below the path of the traveler **13** and also supporting a reserve bobbin **47** manually loaded into the pocket by the spooler attendant who, after drop-

ping in the reserve bobbin, draws the loose end of the thread R thereof upwardly around a thread guide **48** and into and through a guide hook **49** and finally laterally between the jaws of a friction clamp **46**. The care exercised by the attendant in hanging up the reserve thread contributes to the success of the traveler in tying the reserve thread onto the cheese and resuming operation of the winder thus determining the over-all operating efficiency of the spooler.

As disclosed more fully in Patents 1,267,977 and 1,657,977, the traveler or mobile tying unit **13** includes rolls including a roll **50** for supporting the cheese during the tying operation and reversing the rotation of the cheese to take up and restart the winding, a knotter indicated generally at **59** including a horizontally projecting hook **51** extending across the vertical plane of the hung-up reserve thread R, various thread positioning and clamping devices, and cams on a continuously rotating shaft **52** for operating the various parts in proper timed relation in a cycle which is also controlled by cam surfaces on horizontal plates **53** to **57** (FIGS. 1, 4 and 5) secured to bracket arms **58** on the traveler frame and overlying the winding units **10** but adapted for engagement with the upper ends of upstanding arms **39** on the bell-cranks **38** and with rollers **41** on the upper ends of arms **40** on the cheese carriers **16**.

The active bobbin **18** is mounted on a skewer **60** (FIG. 6) which, through a mechanism **61** fully disclosed in Patent 1,686,102, releases the active bobbin to permit doffing thereof, swings the skewer into alinement with and inserts the same into the bore of the reserve bobbin **47**, and swings the latter to the winding position while the traveler **13** is performing its tying cycle on the idle winding unit. The doffing cycle takes place during the movement of a plunger **62** slidable in the pocket **42** and movable downwardly by an incline **63** on a cam bar **64** (FIG. 7) rigid with the traveler frame and engageable with a roller **65** on the upper end of the plunger which is held depressed as the roller rides along a cam surface **66** whose trailing end (not shown) allows the plunger to rise under the action of a spring **68** (FIG. 6). At the time that the reserve bobbin is swung into active position, the reserve thread will have been carried out of the thread guide **49** and thus freed for movement into normal winding position. For a purpose to appear presently, the plunger is normally held by a spring **68** in the position shown in full in FIG. 6 but is swingable outwardly about a pinion **70** as a fulcrum and to the position shown in phantom in which the roller **65** is offset outwardly from the plane of the cam bar **64**.

When the traveler arrives at one of the winding units which is idle due to breakage or exhaustion of the thread of the bobbin **18** and positioned as indicated at **10a** in FIG. 5, an inclined surface or plow **71** (FIGS. 4 and 5) on the cam plate **54** engages the upstanding end, indicated at **39a** in FIG. 5, of the bell-crank **38** rocking the latter clockwise (FIG. 1) to raise the stop **35** and release the cheese carrier **16** for outward movement. At this time, the roller **41a** of the associated winding unit **10a** will have passed the leading end of the plate **53** whose surface **72** limits the outward movement of the cheese carrier as shown in dotted outline in FIG. 1. Movement of the cheese outwardly to the C position shown in dot-dash outline in FIG. 1 is continued under the action of the spring **25** when the roller **41** reaches and rides along the surface **73** to carry the cheese toward the tying position. The force of the spring **25** is dissipated before this position is reached so that the roller **41** engages and is cammed outwardly by the surface **74** on the plate **55** as shown in FIG. 4. In passing this surface, the roller follows along a surface **75** as indicated at **41b** (FIGS. 4 and 5), the cheese and its carrier being maintained in a fixed position during finding of the threads, tying the same together, and initiating turning of the cheese in the winding direction.

After completion of the tying cycle, the roller **41** encounters an inwardly inclined surface **76** on the plate **57** and together with the cheese carrier is cammed reversely and inwardly. As the roller **41** encounters the surface **77** in the continued movement of the traveler, the cheese again comes into driving contact with the drum **20** thus continuing the unwinding of thread off from the new bobbin provided that the thread uniting cycle has been successful.

In the continued advance of the traveler, the roller **41** of the winding unit rides up an incline **80** on the trailing end of the plate **57** which incline moves the cheese carrier **16** farther and inwardly far enough to permit reengagement of the latch **27** and reactivation of the thread break detector **28** in controlling the cheese position. If the tying has been successful, the carrier will remain in latched position and the winding will continue after the surface **80** and its extension **81** have passed out of engagement with the roller **41** of the winding unit then in operative association with the traveler.

While the by-passing of the active winding units **10** may be achieved in the manner disclosed in the aforesaid Patent 2,757,874, such patrolling action is accomplished in the present instance through the provision of separate mechanisms controlling the engagement of the knotter hook **51** and the reserve thread R and the doffing and replacement of the bobbin **18**. A mechanism fully disclosed in an application Serial No. 804,516, filed April 6, 1959, by Robert J. Mahoney, now Patent No. 3,042,328, may be used to control the position of a deflecting device **84** (FIG. 8) for allowing the hung-up reserve thread R to remain in the path of the oncoming knotter hook **51** if the associated winding unit **10** is idle due to a thread break but to remain in the position shown in full and cam the thread inwardly away from the passing hook if the winding unit is active. Herein, the deflector comprises an arm **85** projecting from a yoke **86** fulcrumed at **87** on the traveler frame, the arm being disposed adjacent the level of the knotter hook and projecting in the direction of advance of the traveler with the free end portion **88** of the arm bent laterally and outwardly.

Coupled at **89** to an arm **90** rigid with the yoke **86** is a rod **91** slidable on the traveler and coupled through a flexible link **92** to a rod **93** pivotally connected at **94** to a lever **95** fulcrumed intermediate its ends at **96** on a plate **97** on the traveler frame and normally urged by a spring **98** to the full line position shown in FIG. 8. In this position, an incline **99** on the lever is disposed inwardly beyond the edge of the plate **97** and therefore is adapted for engagement by the roller **41** of an idle winding unit **10** disposed opposite the plate surface **75**. The roller thus acts to rock the lever **95** clockwise and move the deflector **88** into the out of the way position shown in phantom in FIG. 8. In this position, a latch **100** biased by a spring **101** engages a pin **102** on the lever to maintain the deflector out of the way as the knotter hook **51** passes the reserve thread R, the latter thus being engaged by the passing hook and tied onto the cheese in the conventional way. After the knotter has passed the reserve thread position, the roller **41** encounters a projection **103** on the latch **100** and swings the latter counterclockwise to release the lever **95** and allow the same to return to normal position under the action of the spring **98**.

If the winding unit being passed by the traveler is active, the roller **41** thereof will be spaced inwardly from the cam surface **74** and the deflector **85** will remain in full line position (FIG. 8). Accordingly, the reserve thread R of such unit will be engaged by the end **88** of the deflector, bent laterally, and held out of the path of the knotter bill **51** as the latter passes this thread.

A similar mechanism, also adapted to be operated by the roller **41** of each winding unit passed by the traveler, causes the traveler to by-pass and not operate the doffing mechanism of the unit if the latter is active. Referring to FIGS. 4, 6 and 7, the arm **105** of a bell-

crank lever 106 fulcrumed at 107 on the plate 53 of the traveler frame normally projects beyond the edge of this plate and is positioned as shown in FIG. 4 for engagement by the roller 41 about the time that the inclined leading end 64a of the cam bar 64 reaches the roller 65 of the doffing plunger 62 as shown in phantom in FIG. 7. The lever 106 is coupled through slidable rods 108 and 109 and a flexible shaft 110 to a link 111 having a lost motion connection 112 with an arm 113 on a rockshaft 114 journaled on the plate 64. Fast on this shaft is a latch 115 normally engaging a lug 118 upstanding from a gate 116 fulcrumed at 117 on the traveler bar 64 and urged by gravity into the plane of the bar where it is normally held by the latch (see FIG. 6).

As the traveler reaches each winding unit 10, the plow 64a engages the upper end of the plunger 62 as shown in phantom in FIG. 7. The lever 106 is coupled through slidable rods 108 and 109 and a flexible shaft 110 to a link 111 having a lost motion connection 112 with an arm 113 on a rockshaft 114 journaled on the plate 64. Fast on this shaft is a latch 115 normally engaging a lug 118 upstanding from a gate 116 fulcrumed at 117 on a traveler bar 64 and urged by gravity into the plane of the bar where it is normally held by the latch (see FIG. 6).

As the traveler reaches each winding unit 10, the plow 64a engages the upper end of the plunger 62 as shown in phantom in FIG. 7 and cams the plunger of each winding unit laterally and outwardly to the position shown in phantom in FIG. 6. In the continued advance of the traveler, the plunger rides along the outer side of the bar 64, past the pivot 117, and into engagement with the outer side of the gate 116. If the gate is latched as it passes the plunger, it will continue to hold the plunger in the offset position so that the plunger passes by the cam incline 63 and slides along the outside of the bar without being depressed to doff the bobbin 18. On the other hand, if the winding unit is idle when the traveler approaches, the roller 41 of such unit engages the lever 105 camming the latter laterally and, through the flexible shaft 110, raising the latch 115 as shown in FIG. 7 to release the gate 116, the latch position being maintained by friction in the actuating linkage. Then, when the gate reaches the plunger 62, the spring 68 swings the plunger and the gate laterally as shown in full in FIGS. 6 and 7 thus locating the roller 65 for engagement by the cam incline 63. In passing the roller, the cam 63 depresses the plunger to initiate a doffing cycle which is completed as the cam bar passes the plunger. Thereafter, a pin 120 (FIGS. 6 and 7) on a cam 121 carried by the traveler cam shaft 52 operates on a follower 122 to swing the latch 115 down into engagement with the lug on the gate which is returned to normal position as soon as the plunger passes.

The structures thus far described are conventional in Barber-Colman patrolling type spoolers. The present invention contemplates the incorporation in such a spooler of a novel mechanism which, in spite of the random by-passing of the active winding units 10 by the traveler 13, determines the actual number of successful tying operations performed by the traveler and therefore the efficiency of the machine and the operator attending the same. For this purpose, sensing devices carried by the traveler are spaced along the frame of the latter and adapted to determine the condition of each winding unit approached and passed by the traveler and also the condition of such unit as the traveler leaves or passes out of operative association therewith, these devices controlling the actuation of the counting mechanism for comparing the conditions sensed by the two devices thereby indicating or enabling the total number of successful tying operations to be ascertained.

Various conditions of the winding units may be sensed to derive the desired count. For example, the number of the winding units which are active when the traveler arrives may be counted and compared with the number of units running as the traveler leaves, the difference in the counts indicating the number of tying operations completed successfully. As an alternative and to achieve simplicity of the mechanism involved, location of the winding units in the idle positions B and their engagement with the cam surface 71 when the traveler arrives is utilized to measure the number of attempts made by the traveler to tie up and restart the winding units. These are compared with the number of tying failures indicated by the number of units which are idle as the traveler leaves the units, the difference between such attempts and failures indicating the successful tying operations and the efficiency of the spooler.

To sense the condition of a winding unit when the traveler arrives, a casing 125 mounted intermediate the ends of the traveler frame contains a normally open switch 126 (FIGS. 2, 4 and 9) arranged to be actuated by outward rocking of a lever 127 fulcrumed on the switch casing and normally disposed as shown in FIG. 4 for engagement with and outward camming by the rollers 41 of the idle winding units passed by the traveler and guided by the surface 74 of the plow 55 outwardly and into the track 75. After the roller passes, the switch arm 127 which may be supported by a suitable guide 128, is returned to its normal position by the usual spring built into the casing 125.

Each closure of the switch energizes a magnet 130 whose armature 131 is attracted and moved against the force of a spring 132 to actuate a pawl 133 and advance a ratchet wheel 134 one step. The wheel is on the shaft of a dial type counter 135 such as a Veeder-Root counter No. 1205, for registering the number of energizations on its several dials.

While a reversible type of counter may be employed and the number of tying failures subtracted by turning the dials in a direction opposite to the registration of the tying attempts, it is preferred to register such failures by a separate counter 137 having similar dials advanced step by step in response to successive energizations of a magnet 138 each produced by closure of a switch 139. The casing 140 of the latter is mounted on a bar 141 (FIGS. 4 and 5) constituting an extension of the plate 57 and located at the trailing end of the traveler frame. The rocker arm 142 by which the switch is actuated, is urged against one arm 143 of a bell-crank lever fulcrumed at 144 on the bar and having a second arm 145 extending parallel to and offset outward slightly beyond the trailing end of the last surface 81 normally engaged by the rollers 41 in restoring the cheese carriers to the control of their respective latches 27 after operation thereon by the passing traveler.

The counters 135 and 137 are mounted within a casing 146 in a convenient location on the traveler frame with their dials readily visible. To prevent tampering with the counters and falsely registering tying attempts as by manipulating the switch arm 127 after the traveler has been stopped, provision is made for disabling the switch 126 automatically as an incident to such stopping which is usually accomplished by swinging a lever 147 (FIG. 2) to disengage the clutch 9 through which the traveler drive pinion 14 is rotated. In the movement of the lever to the disengaged position shown in full, the arm 148 of a switch 149 (FIGS. 2 and 9) is actuated to open this switch and thus interrupt the circuit (FIG. 9) through which the counter 135 is actuated in response to successive closures of the switch 126.

It will be apparent that if a tying operation has been successful, the latch 27 of the unit involved will remain effective to hold the associated cheese 19 on its drum 20, the winding will continue, and the lever arm 145 (FIG. 4) will pass by the roller 41 of the unit without engagement therewith. Thus, the switch 139 remains open and the counter is not actuated. On the other hand, if due to

improper hanging up of the reserve thread R or otherwise, the tying operation of the traveler is unsuccessful, interruption of the running thread will be sensed by the detector **28** and the latch **27** will be held released. Then, when the roller **41** of the winding unit passes beyond the traveler surface **81**, the cheese carrier **16** including the roller **41** will move outwardly under the action of the spring **25** and actuate the lever **145** to close the switch **139**. As a result, the counter **137** is advanced to register a failure of the traveler to execute a successful tying operation.

The failure readings registered on the counter **137** are usable in determining the general efficiency of the spooler, that is, the ability of the individual winding units to continue operation to exhaustion of each bobbin. The difference between the attempts and failures registered by the respective counters **135** and **137** is an accurate indication of the efficiency of the attendant and the care exercised in properly hanging up the reserve threads R so as to increase the likelihood of successful tying operations by the traveler.

I claim as my invenition:

1. The combination of, a plurality of thread winding units spaced side by side and a traveler supported for relative movement along a predetermined path into operative association with the successive units, each unit having condition indicating means movable relative to said path to positions indicative of active and idle conditions of the winding unit, mechanism on said traveler operable to pass idly by the active units but operate on the thread package of each idle unit, tie the thread thereof to a reserve thread, and initiate restarting of the winding by such unit, a first sensing device mounted on said traveler and engageable with and actuated by said indicating means when the indicating means is in a position to indicate a predetermined one of said conditions of a winding unit during association of the traveler with such winding unit but before said restarting thereof, a second device on said traveler spaced from said first device along the traveler longitudinally of said path and engageable with and actuated by said indicating means when the indicating means is in a position to indicate said predetermined condition of such winding unit during association of the traveler with the unit and after the attempted restarting thereof, and mechanism for counting the actuations of the two sensing devices whereby the difference in the counts indicates the changes in the condition of the winding units passed by the traveler and constitutes a measure of the number of tying operations successfully performed.

2. A multiple unit winding machine as defined in claim 1 including a coupling selectively engageable and disengageable to start and stop said relative movement of the traveler and said winding units, and means operable as an incident to such stopping to disable said counting mechanism.

3. A multiple unit winding machine as defined in claim 1 in which each winding unit incorporates a member movable relative to said path between first and second positions indicative of active and idle conditions of the winding unit, and said first and second sensing devices are engageable with and actuated by said member.

4. The combination of, a traveler, a plurality of thread winding units disposed said by side and spaced along a predetermined path of relative movement between the traveler and said units, each unit having a member movable back and forth across said path to idle and active positions as an incident to starting and stopping of the associated winding unit, said traveler remaining idle as it comes into operative association with the active ones of said units but operating on the thread package of each idle unit to tie the thread thereof to a reserve thread and restart the winding, a counting mechanism associated with said traveler for counting and comparing the number of attempts of said traveler to tie a knot and the failures of the traveler to tie a knot successfully, said mechanism having two actuators, a sensing device mounted on said traveler and engageable with said member of each winding unit when in an idle position to energize one of said actuators and thereby register any attempt of the traveler to tie a knot, and a second sensing device mounted on said traveler for operative association with said member of each winding unit at a time subsequent to the tying of a knot by the traveler and normal restarting of the winding thereby, said second device, when engaged by said member in an idle position, energizing said second counter actuator to thereby register a failure of the traveler to successfully tie a knot.

5. A multiple unit winding machine as defined in claim 4 in which the starting and stopping of each winding unit is accompanied by movement of the thread package of such unit into and out of engagement with a driving drum, and said counter actuating member comprises a part movable in unison with the thread package and is disposed in the path of the sensing devices on the traveler while the latter passes by an idle winding unit.

6. In combination with a spooler having a plurality of winding units spaced side by side along a predetermined path and each having a member supporting a thread package and movable transversely of said path from a winding position into and out of an idle position in which said package is disposed after a thread break and in the course of tying a reserve thread thereto, a traveler movable along said path and operable to pass idly by the active ones of said winding units but to move an idle package and unite the thread thereof to a reserve thread and then return the package to its winding position, a device on said traveler for sensing the disposal of the package of any winding unit in an idle position while the traveler is passing such unit, means controlled by said device for counting and recording such attempts of said traveler to perform a knot-tying operation, and mechanism on said traveler spaced behind and operable after each of said attempts to sense the success of the knot-tying operation and to count and record the failure to successfully resume the operation of the winding unit.

7. A multiple unit winding machine as defined by claim 6 in which said counting means includes two registers separately operated to respectively indicate the number of said attempts and failures.

8. The combination of, a plurality of thread winding units spaced side by side and a traveler supported for relative movement along a predetermined path, each unit having condition indicating means movable relative to said path to positions indicative of active and idle conditions of the winding unit and said traveler being operable to pass idly by the active units, first and second sensing devices mounted on and spaced along said traveler longitudinally of said path and respectively engageable with and actuated by said indicating means when the indicating means is in a position to indicate the same position of a winding unit during association of the first and second devices successively with such winding unit, mechanism for counting the actuations of the two sensing devices, and mechanism on said traveler operable automatically in the advance thereof to tie the thread of such unit to a reserve thread and after association of said first sensing device with said indicating means of an idle one of said units to restart the winding by the unit before said second sensing device is brought into association with the indicating means of such unit.

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