United States Patent

Davidson

[15] **3,693,897**

[45] **Sept. 26, 1972**

[54] **PULL SKEIN WINDER**

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[21] Appl. No.: **102,864**

[52] **U.S. Cl.** .....**242/18 R**, 242/41, 242/18 PW

[51] **Int. Cl.** **B65h 54/02**

[58] **Field of Search** ..... 242/18 R, 18 PW, 41

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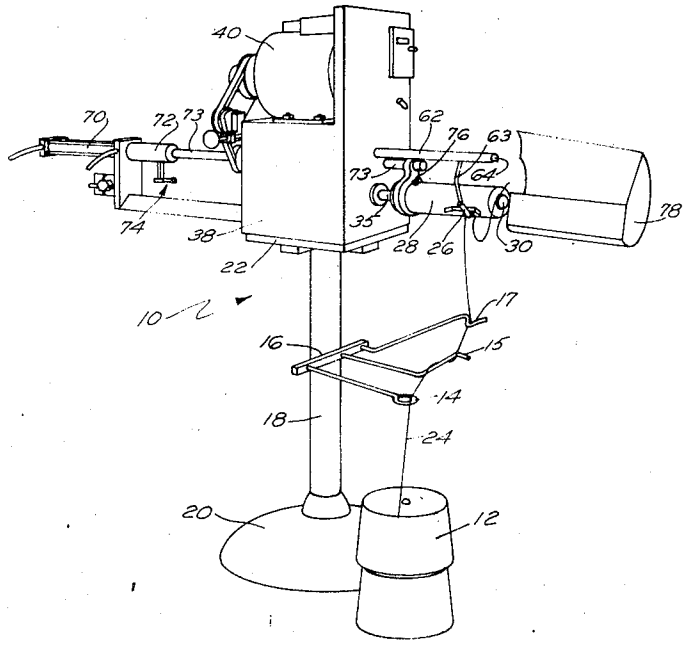
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Primary Examiner—Stanley N. Gilreath
Assistant Examiner—Milton S. Gerstein
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[57] **ABSTRACT**

An electro-mechanical pull skein winder which automatically and sequentially operates 1) the winding mechanism that winds you on a spindle, 2) the doffing means that pushes the wound skein off the spindle, 3) the clamping means that grip the tail end of the skein of yarn just doffed, 4) the cutting means that severs the wound skein from the continuous length of yarn and 5) the ejecting means that deposit the skein at a particular point, and then automatically starts the cycle over again.

4 Claims, 4 Drawing Figures



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SHEET 1 OF 2

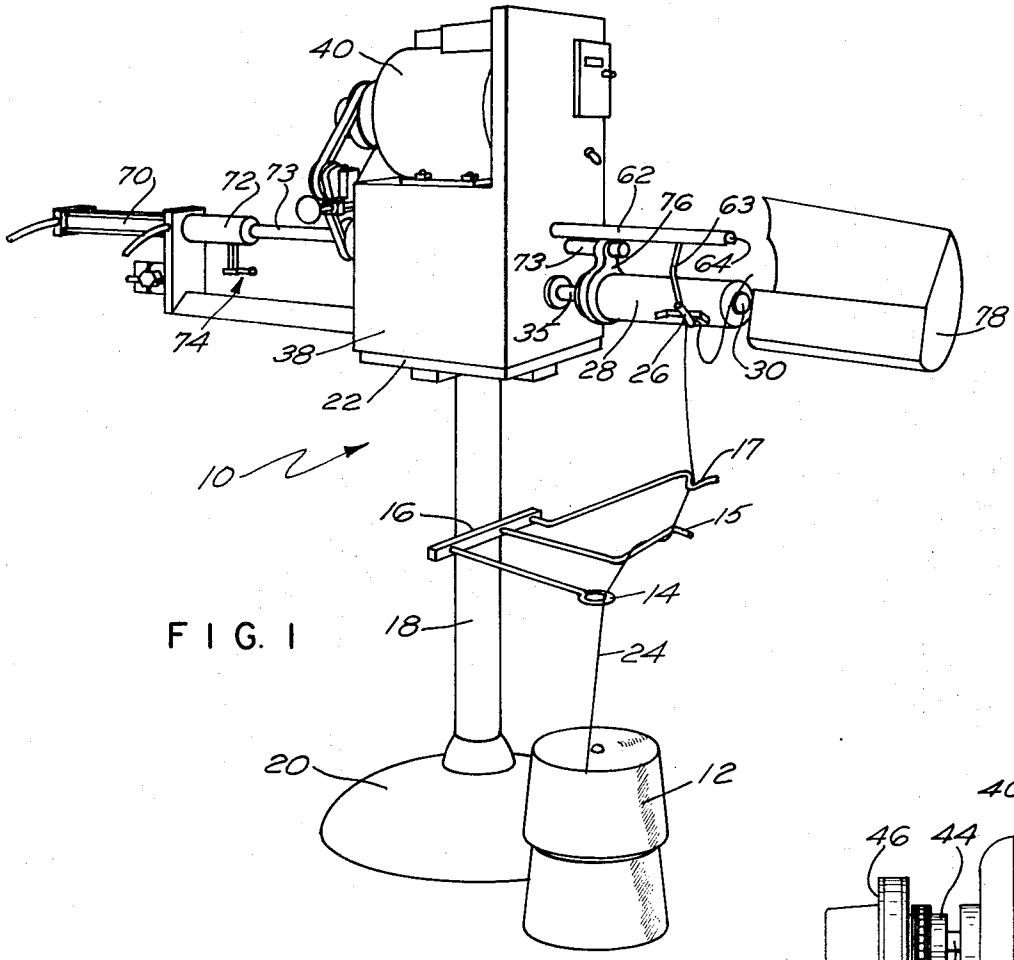


FIG. 1

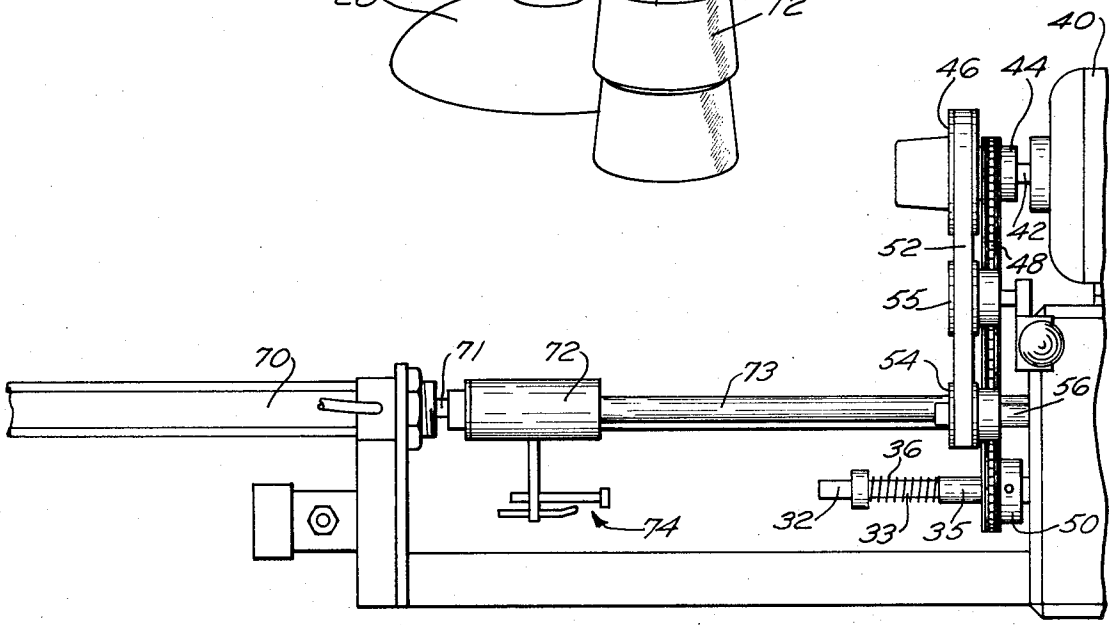


FIG. 2

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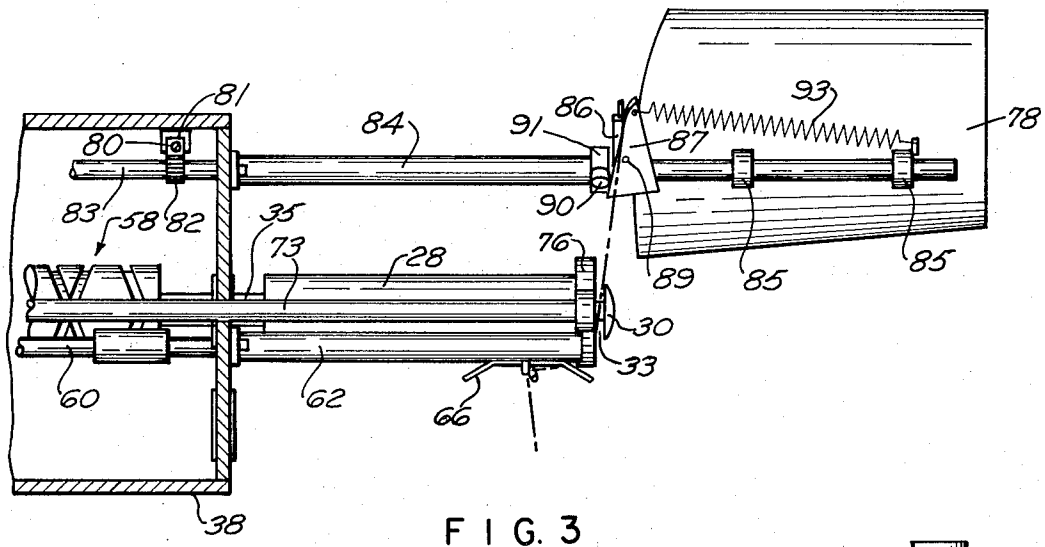


FIG. 3

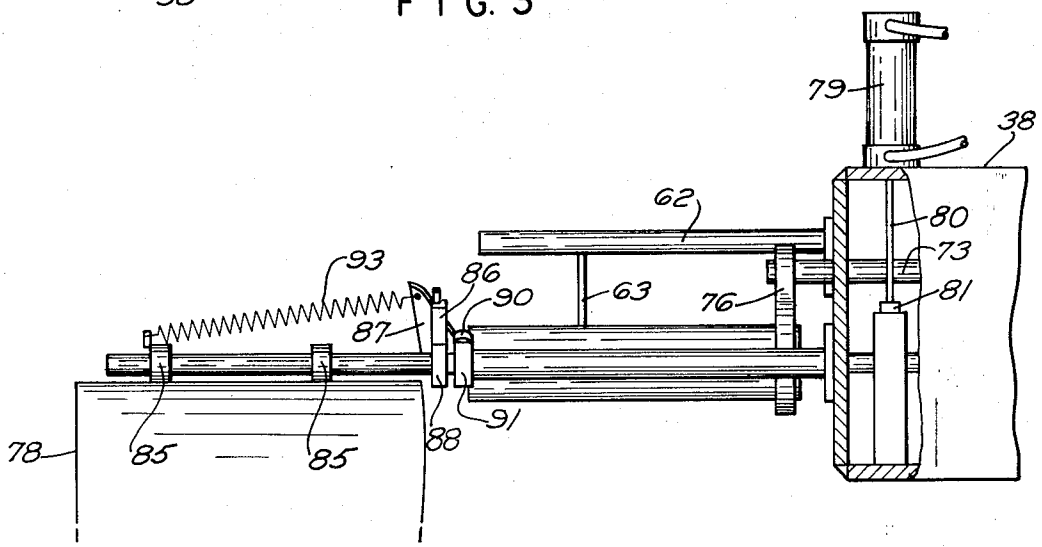


FIG. 4

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PULL SKEIN WINDER

BACKGROUND OF THE INVENTION

The invention relates to a machine for pull skein winding of yarn. In the past this operation has been semi-automatic with the result that the manual operations take far more time to perform than the time needed to wind the yarn into a skein containing a predetermined length of yarn. The most time consuming of the manual operations is that of threadably attaching the lead edge of the yarn to the reel, plug or spindle upon which the pull skein is to be wound. Each end, and there are six in the present machines, has to be threaded through a porcelain eye and through a porcelain candlestick post, over a bail, through a traverse guide and then tied around an arbor. All six spindles start simultaneously by engaging a push button switch. The machine runs for a number of spindle revolutions which is predetermined on an electric clock which electrically stops the machine. Each end of yarn then must be individually cut, tied to the package then doffed from the arbor by hand. Then the operation starts over again when the clock is reset.

SUMMARY OF THE INVENTION

The operation of applicant's novel pull skein winder is basically as follows. The yarn cone is placed in position beside the winder and the lead end of the yarn is threaded through the thread eye and around the tension arms and up to the guide of the traversing mechanism. From the guide, the end of the yarn is taken and laid in the gap formed between the spindle and the clamping head. This gap is produced when the shaft upon which the clamping head is formed is forced against spring pressure to the right. Upon release of the shaft to its original position the tip of the yarn is clamped in place. It is to be remembered that once the machine has been threaded that the skein winder operates automatically until all the yarn on the yarn cone has been exhausted.

The start button is then pushed causing the motor to wind the yarn into a skein on the spindle. As a full skein is formed, the winding operation stops and the doffer ring automatically travels across the spindle and doffs the skein into the doffer tray. At the same time the shaft having the clamping head thereon is again forced against spring pressure to the right to form the gap between the spindle and the clamping head. As other switches of the circuit go into operation the doffing tray is caused to rotate on its shaft through a predetermined arc and the tail of the wound skein of yarn is deposited in the aforementioned gap. At this time the shaft having the clamping head thereon is released to return to its original position and the tail of yarn is clamped to the end face of the spindle. Also the doffing ring is transported back across the spindle to its original positions at this time. Continued rotation of the doffing tray causes the cutting mechanism mounted on the doffing tray shaft to sever the yarn between the clamped tail and the wound skein of yarn in the doffing tray. At the end of its arc the skein is dumped from the doffing tray into a container or onto a conveyor. As the doffing tray rotates back to its original position, the motor is switched on and a new skein is wound on the spindle as a new cycle begins. By automating threading of the yarn on the spindle and severing the tail of the already doffed skein of yarn during one continuous operation, production of the severed skeins of yarn may be increased by as much as 400 percent. This is due to the fact that the actual winding operation is of relatively short duration and the manual operations in the past took up the major portion of the production time.

An object of the invention is to produce consecutively skeins of yarn, placing in each skein the same amount of yarn.

Another object of the invention is to eliminate the time consuming manual re-threading operation previously necessary when each skein of yarn was cut free after it had been wound.

Another object of the invention is to provide a fully automatic pull skein winder once it has been threaded.

A further object of the invention is to provide the type of pull skein winder in which a single worker can effectively tend and operate a battery of these winders.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the automatic pull skein winder;

FIG. 2 is a partial front elevation view of the left end of the automatic pull skein winder with the front cover of the housing removed;

FIG. 3 is a partial top plan view of the right end of the automatic pull skein winder as it unloads the finished skein with the motor and top portion of the housing removed for clarity; and

FIG. 4 is a partial rear elevation view of the left end of the automatic pull skein winder as it unloads the finished skein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Looking now to FIG. 1, the automatic pull skein winder **10** is disclosed in a perspective view illustrating it as it is about to start a cycle of operation. The yarn cone **12** is positioned below the yarn retaining eye **14** mounted on bracket **16**. Post **18** mounted on base **20** supports bracket **16** and the platform **22** upon which the basic operating mechanisms of the skein winder are mounted.

When the automatic pull skein winder is initially threaded, a strand of yarn **24** is taken from the yarn cone and threaded upwardly through retaining eye **14**, looped arm tension about **15** and wound across the V formed in tension arm **17**. Next it is threaded through the elbow formed in guide **26** and between spindle **28** and the clamping head **30**. In order to initially clamp the strand of yarn therebetween, pressure is exerted against bumper cap **32** seen in FIG. 2 causing shaft **33** upon which it is mounted to move to the right. Shaft **33** passes through sleeve **35** and has clamping head **30** attached to its other end. As a gap is formed between the end of spindle **28** and clamping head **30** similar to that illustrated in FIG. 3, the strand of yarn that is laid across shaft **33** and the pressure upon bumper cap **32** to the right is released. Spring **36** which had been under compressive forces returns shaft **33** to the left clamping the yarn between the spindle and clamping head. At this point the rest of the operation is automated.

A start button on housing **38** when pushed actuates motor **40** causing sprocket gear **44** and pulley **46** mounted on drive shaft **42** to rotate. Chain **48** drives

sprocket gear **50** mounted on sleeve **35** causing the spindle **28** to rotate and wind the yarn thereon. At the same time belt **52** drives pulley **54** mounted on cam shaft **56** of the traversing mechanism. Pulley **55** acts as an idler roller for tensioning the belt against pulleys **46** and **54**. As shaft **56** rotates, cam **58** mounted thereon drives the traversing rod **60** in a manner well known in the art back and forth within sleeve **62**. An arm **63** extends laterally from the longitudinal slot **64** in the sleeve and has traverse guide means **66** attached at its tip. As the traverse guide travels back and forth, the yarn is laid on the rotating spindle in a substantially uniform buildup with spring fingers **66** helping to maintain tension on the already wound yarn.

After a predetermined amount of yarn has been wound on the spindle, metering means deactivate the motor to stop rotation of the plug and stop the traversing mechanism. An electrical signal then actuates a valve releasing air into the left end of air cylinder **70** causing a piston therein to drive a coupling member **72** connected to the piston rod **71** and shaft **73** to the right. Doffing ring **76** mounted on shaft **73** moves from the position illustrated in FIG. **1** to the position shown in FIG. **3**. As it travels this route, the fingers of the ring push the already wound skein of yarn off the spindle and into the doffing tray **78**. Also as shaft **73** moves to the right, bumper pin **74** attached to the underside of coupling member **72** travels into contact with bumper cap **32** and pushes shaft **33** a sufficient amount to the right to form a gap between plug **28** and clamping head **30** as seen in FIG. **3**. A switch in the electrical circuit is then automatically actuated to open an air intake valve of air cylinder **79** driving piston rod **80** downwardly and causing rack gear **81** attached thereto to rotate pinion gear **82**. Shaft **83** upon which pinion gear **82** is mounted passes through sleeve **84** and has a doffing tray **78** attached at its end by brackets **85**. The doffing tray is rotated through a predetermined arc just sufficient to empty the just doffed skein of yarn into an awaiting container or onto a conveyor. As the doffing tray begins to rotate, the trailing end of yarn of the wound skein is dragged across shaft **33** in the gap between plug **28** and clamping head **30** and between a V formed by a cutting mechanism mounted as by a collar **88** to shaft **83** comprising stationary knife **86** and movable knife **87**. The cutting mechanism mounted on collar **88** rotates with the doffing tray and as it does so, the movable knife which is attached to the fixed knife by pivot pin **89** has its lower end, as seen in FIG. **3**, forced against the cam pin **90** extending from a bushing **91** on sleeve **84** causing a scissor action as the movable knife has its lower portion cammed to the right.

In sequence the following happens just prior to the yarn being cut: An electrical signal closes a valve (not shown) that had released air into the left end of air cylinder **70** and another valve (not shown) is opened to send air into the right end of the air cylinder to drive the piston therein to the left. This action causes doffer ring **76** on shaft **73** to be pulled across spindle **28** to the left to its original awaiting position. At the same time, the release of the pressure against bumper cap **32** by bumper pin **74** causes shaft **33** to return to the left. The yarn that had been laying in the gap between the plug and the clamping head is thus fixedly held therebetween. Further rotation of the doffing tray causes the yarn to be severed by the scissor action previously described and at the end of its arc the severed skein of yarn is dumped into a container or on to a conveyor belt. Another electrical signal then reverses the flow of air into air cylinder **79** driving piston rod **80** upwardly and accordingly rotating doffing tray **78** back to its original skein receiving position. As the tray rotates to its starting position, spring **93** returns movable knife **87** to its initial position. This completes a whole cycle of operation and the motor would then be automatically switched on to start winding the next skein of yarn on the spindle.

It is to be realized that material, for example such as thread, string, etc., other than yarn could also be wound on the automatic pull skein winder.

What is claimed is:

1. An automatic pull skein winding machine comprising

a. spindle means supported at only one end upon which a skein of yarn is to be wound, said spindle means comprising a spindle having an axial bore, a sleeve extending at least partially into said bore and being fixedly mounted thereon such that rotation of said sleeve causes said spindle to rotate at the same time,

b. means for rotating said spindle means to wind a skein of yarn directly on the outer surface of said spindle,

c. means to lay the yarn directly on the outer surface of said spindle with said means being mechanically connected to traversing means that lay the yarn directly on the spindle along its length as the spindle rotates,

d. means for doffing the skein off the open end of said spindle while the spindle remains fixedly mounted on said sleeve, said means for doffing the wound skein comprising a doffing ring of a diameter slightly larger than the diameter of said spindle,

e. means at the unsupported end of the spindle for clamping the yarn tail of the just doffed skein in a fixed position relative to said spindle,

f. shaft means in said sleeve for actuating said clamping means,

g. means for severing the yarn between the doffed skein of yarn and the clamping means which holds the yarn tail of the just doffed skein.

2. An automatic pull skein winding machine as recited in claim **1** further comprising a doffing tray into which the doffed skein is ejected from said spindle.

3. An automatic pull skein winder as recited in claim **2** wherein said means for severing the yarn comprises a shaft upon which said doffing tray is mounted and means for rotating said shaft through a predetermined arc whereby the yarn tail of just doffed skein is inserted in said clamping means.

4. An automatic pull skein winder as recited in claim **2** wherein said means for severing the yarn comprises scissor knife cutting means mounted on a shaft to which said doffing tray is mounted.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,693,897 Dated September 26, 1972

Inventor(s) Miron Davidson

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

On the front page there should be inserted below the named inventor the following: [73] Assignee: SER CO.

Signed and sealed this 17th day of April 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334