United States Patent [19]

Lombardo

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[54] **AUTOMATIC BAGGING APPARATUS**

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[52] **U.S. Cl.** **53/256;** 53/241

[51] **Int. Cl.** **B65b 5/02;** B65b 43/00

[58] **Field of Search** 53/241, 256

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Attorney, Agent, or Firm—Ostrolenk, Faber, Gerb & Soffen

[57] **ABSTRACT**

An automatic apparatus for forming a transparent plastic bag over a garment that is constructed of a stationary upper section that supports the garment on a hanger opens a flattened tubular web of bagging material while drawing same from a supply. A vertically movable lower section of the apparatus maintains the web open and guides it over the garment until the full length of the garment is covered. Thereafter, transverse cutting means on the upper section is actuated to sever the garment covering end of the web from the remainder thereof, and at this time the severed web part is closed at both the top and bottom by heat sealing means carried on the respective upper and lower sections.

13 Claims, 12 Drawing Figures

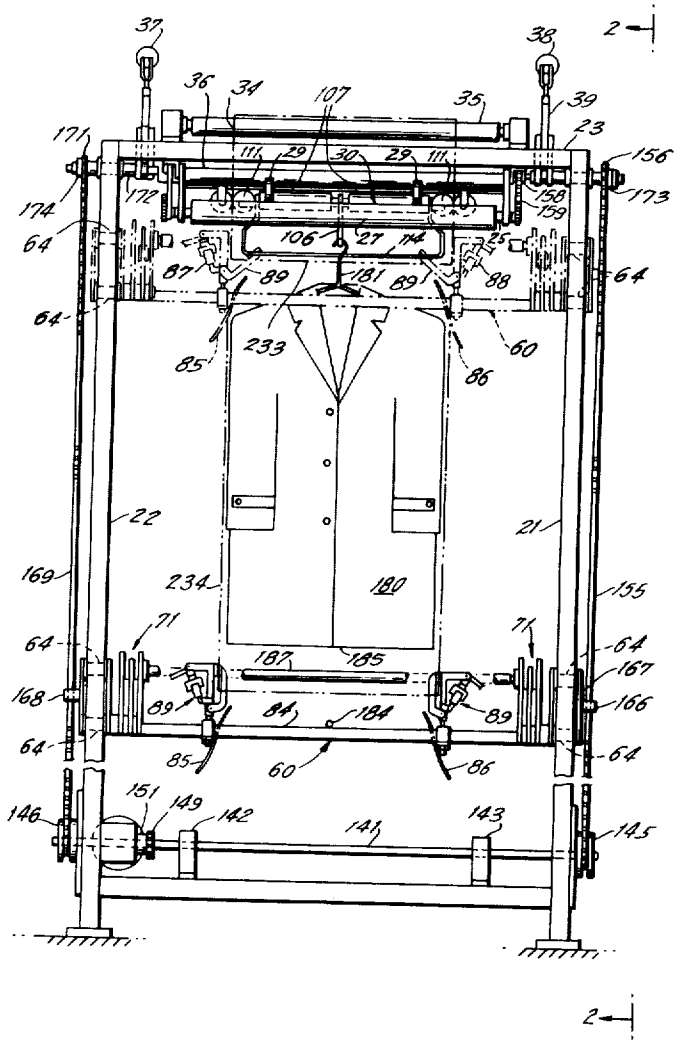

FIG. 1

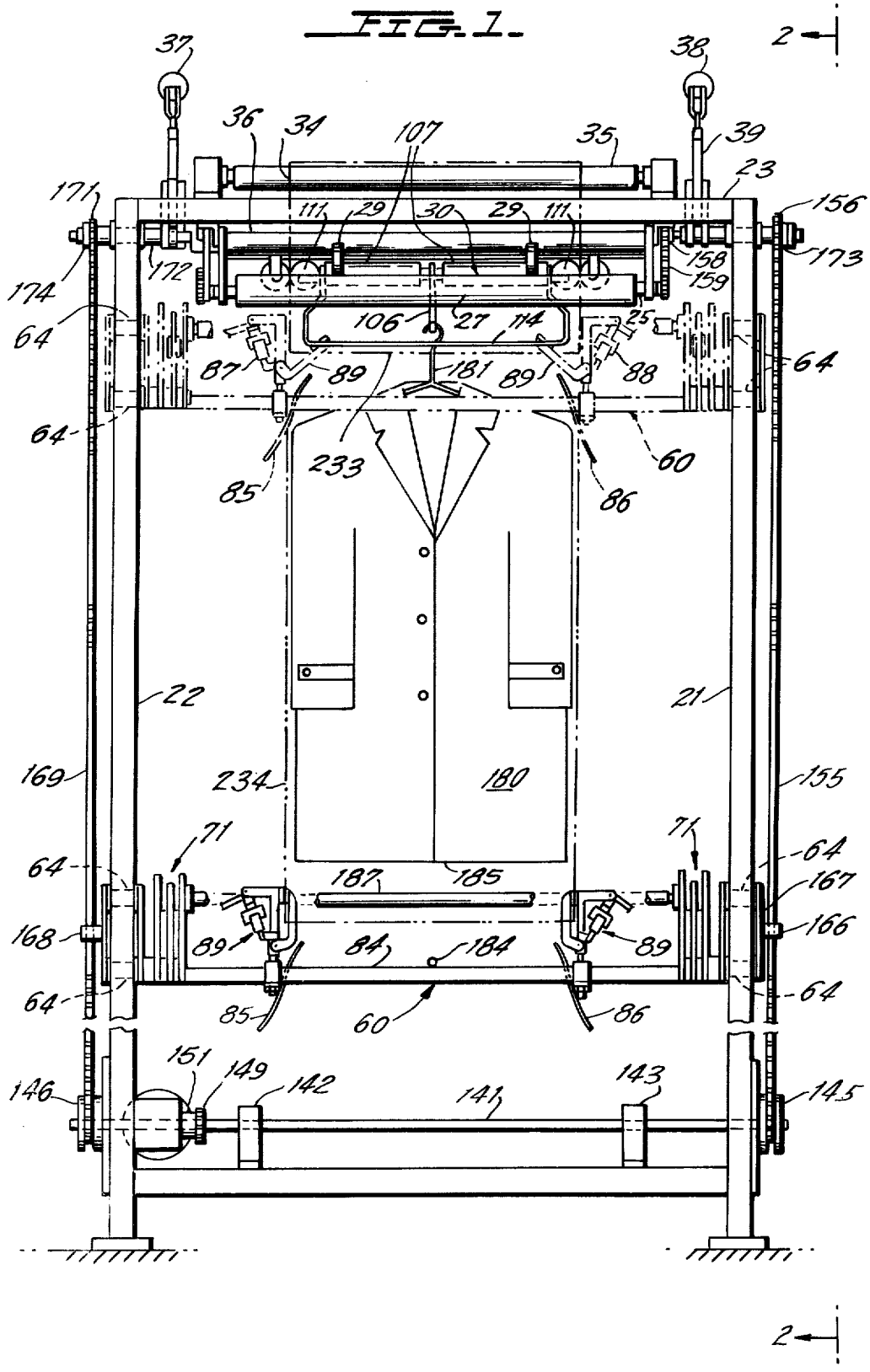
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FIG. 2.

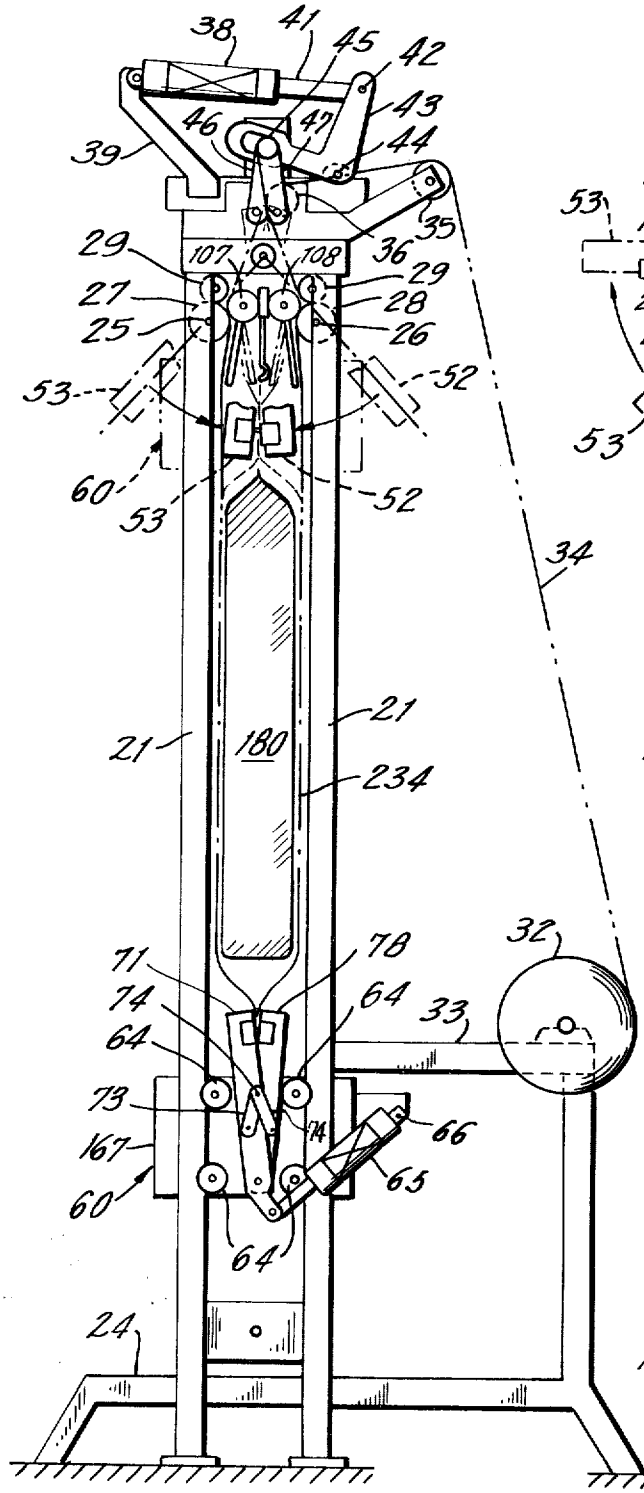
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FIG. 3.

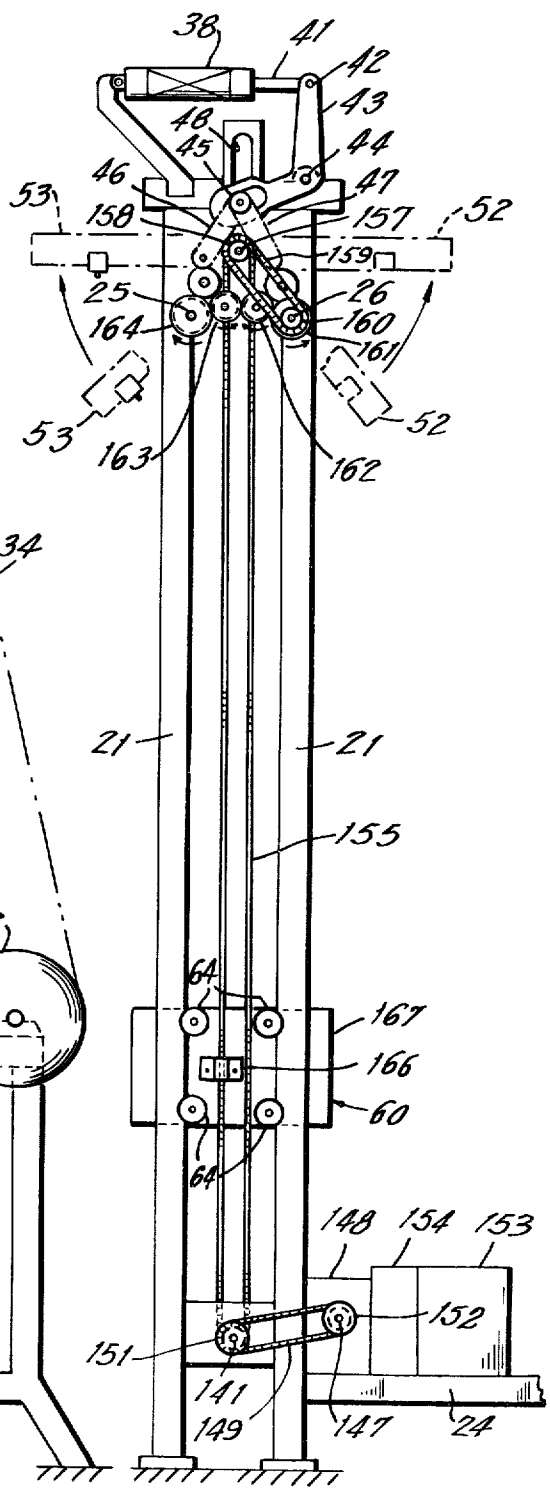
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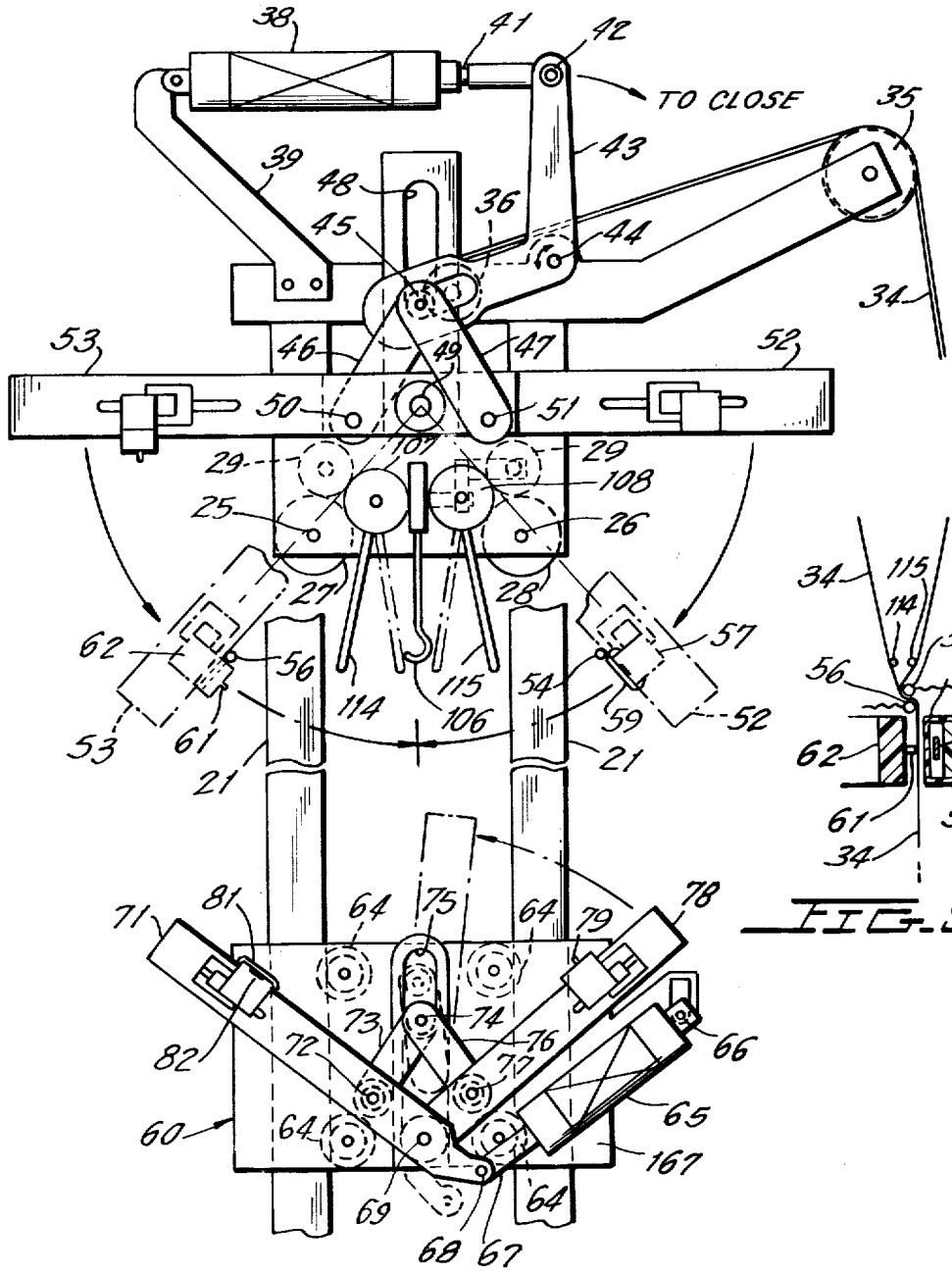
FIG. 4.



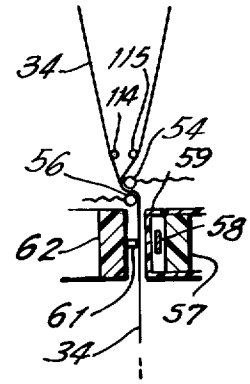
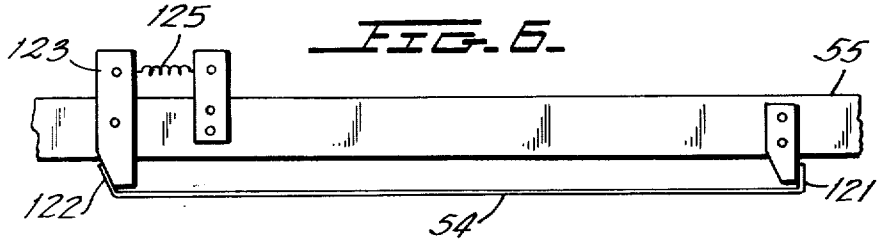


FIG. 5.

FIG. 6.



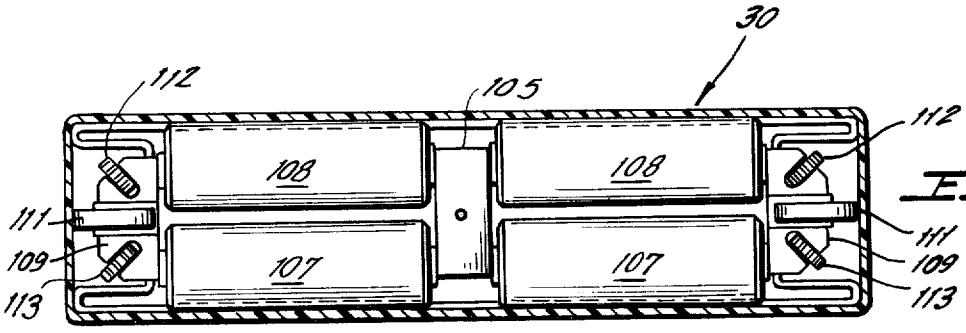


FIG. 8.

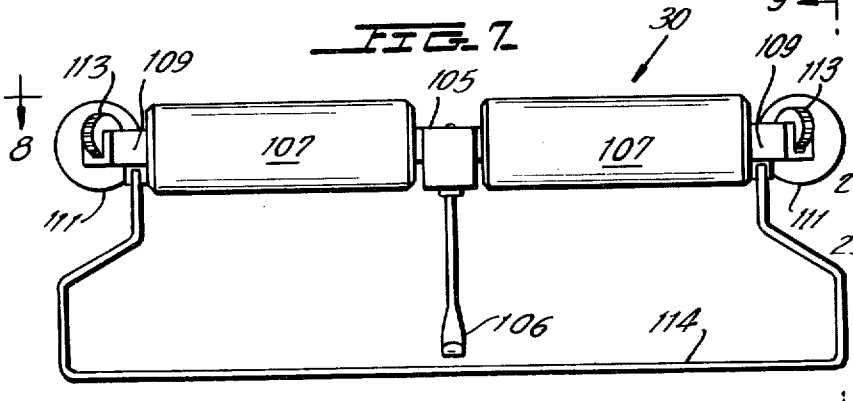


FIG. 7.

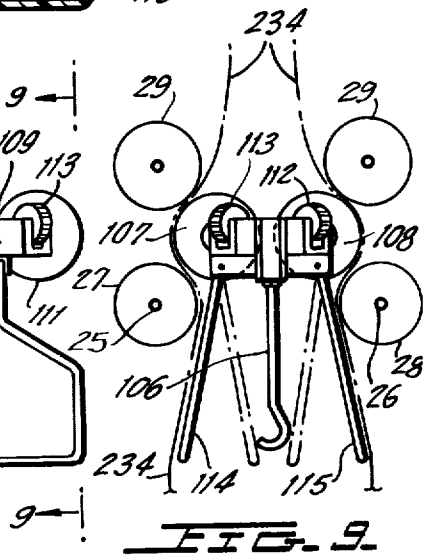


FIG. 9.

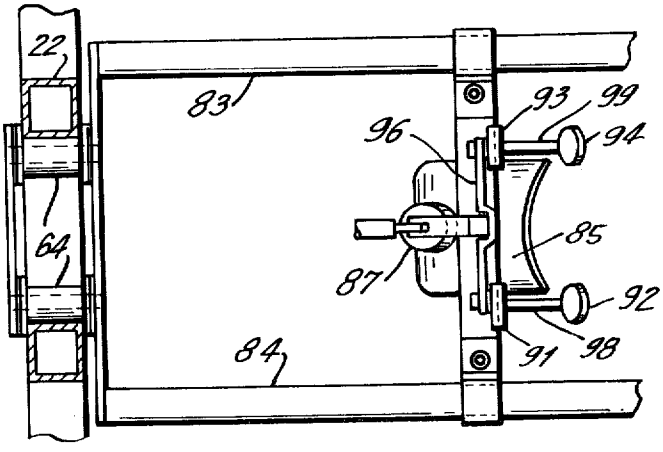


FIG. 11.

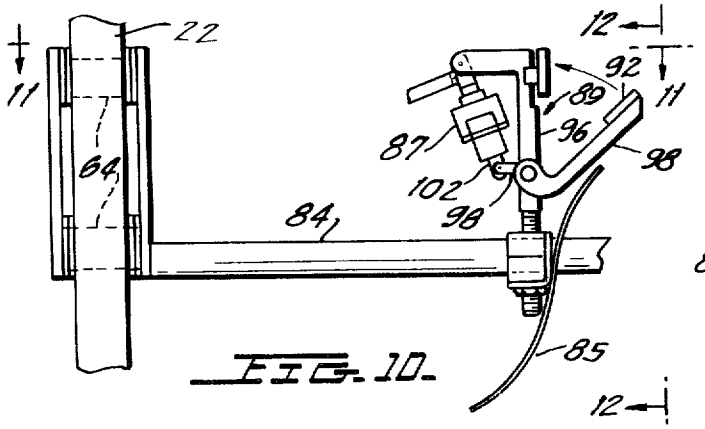
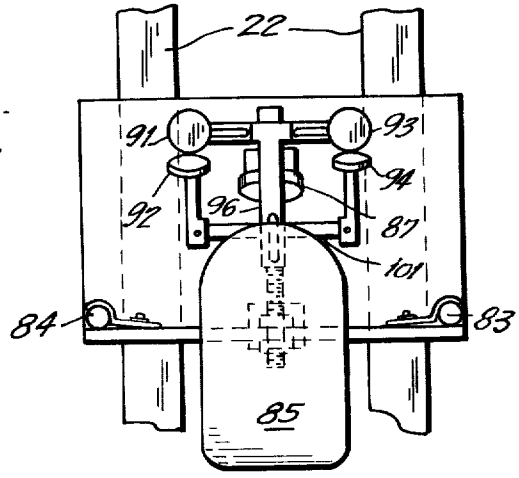


FIG. 10.

FIG. 12.



AUTOMATIC BAGGING APPARATUS

This invention relates to bagging apparatus in general and more particularly relates to apparatus of this type that automatically packages a garment on a hanger in a transparent plastic bag closed thereafter on all sides thereof. Transparent bags constructed of thermoplastic film are often used to cover garments to protect the latter against dirt and provide an inexpensive ready display. It is often desirable to have these garment bags sealed at both the top and bottom to prevent unnecessary handling of the garments.

In the prior art, insertion of garments into preformed bags has proven to be impractical because of high labor costs and low production rates. Another prior art approach, one requiring very costly machinery, forms a flat sheet into a bag around the garment.

Pursuant to the instant invention, automatic means are provided to pull a tube or sleeve of transparent thermoplastic film over a garment supported on a hanger and then automatically bag the garment by sealing the tube using transverse heat seals above and below the garment. At substantially the same time the bag is severed from the tubular stock. The only operation required for the operator is to transfer the garment on a hanger from a rack to the bagging apparatus and to remove the garment after bagging is completed, and even these operations may be performed automatically in synchronization with the bagging apparatus.

The apparatus provided by the instant invention includes drive roll means that opens the tubular stock and draws it from a supply roll where the stock is held flat. A movable frame portion surrounding the garment carries finger-like elements that clamp the bottom of the open tubular stock at strategic locations to hold the tube open as it is drawn over the garment, with the movable frame section and the drive rolls having their speeds coordinated so that there is no unnecessary strain placed on the tubular stock by downward motion of the clamping fingers. Below the drive rollers and inside the tube is a collapsible spreader that is biased to an open or spreading position, but the biasing force is such as to permit automatic collapse as sealing and cutting take place above the garment. The biasing means of the spreader also operates the spreader parts to sever the bag from the tubular stock, and the spreader maintains the tubular stock open above the upper seal so that it may be engaged by the finger-like clamps of the movable frame section.

The movable frame section includes a photoelectric detector to sense that the lower edge of the garment has been reached, so that the moving frame section is stopped automatically, after which the lower end of the tubular stock is heat sealed with a lower heat sealer carried by the movable frame section. The movable frame section also carries formed sheet metal deflectors that engage side edges of the garments to compact the garment and thereby facilitate placing the tubular stock over the garments.

Accordingly, a primary object of the instant invention is to provide novel apparatus for automatically bagging garments mounted on clothes hangers.

Another object is to provide bagging apparatus of this type that provides a bag constructed of tubular stock that is sealed both above and below the garment.

Still another object is to provide bagging apparatus of this type having novel means for severing a newly formed bag from the tubular stock and for automatically opening the stock.

A further object is to provide bagging apparatus of this type having means for compacting the garments during the bagging operation.

A still further object is to provide bagging apparatus of this type that does not require vacuum or air pressure means to maintain the bagging material expanded as it is being placed over the garment.

These objects as well as other objects of this invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIG. 1 is a front elevation of bagging apparatus constructed in accordance with teachings of the instant invention.

FIG. 2 is a side elevation looking in the direction of arrows 2—2 of FIG. 1 at the time seals are being formed in the tubular bagging stock.

FIG. 3 is a side elevation similar to FIG. 2, with the upper sealing jaws shown in their inactive positions.

FIG. 4 is an enlarged side elevation showing the upper and lower sealing apparatus in their inactive positions.

FIG. 5 is a fragmentary end view showing the upper sealing and cutting elements just prior to formation of the upper seal.

FIG. 6 is a plan view of one of the hot wire cutting elements and mounting therefor.

FIG. 7 is a front elevation of the interior assembly idler rolls, spreader frame, and hanger support.

FIG. 8 is a plan view of the elements of FIG. 7, looking in the direction of arrows 8—8 of FIG. 7.

FIG. 9 is an end view of the elements of FIG. 7, looking in the direction of arrows 9—9 of FIG. 7.

FIG. 10 is a fragmentary front elevation showing the clamping fingers and garment compacting elements at one side of the movable frame portion.

FIGS. 11 and 12 are plan and end views, respectively, of the elements shown in FIG. 10 looking in the directions of the respective arrows 11—11 and 12—12.

Now referring to the figures. Bagging apparatus constructed in accordance with the instant invention includes a stationary frame having spaced vertical side sections 21, 22 secured at their lower ends to base plate 24 and connected at their upper ends by transverse frame portion 23. Spaced transverse rods 25, 26 mount the respective rubber-covered elongated delivery or drive rolls 27, 28 at the upper end of stationary frame 21–23. Rollers 27, 28 support idler assembly 30 (illustrated more particularly in FIGS. 7–9) in the position shown in FIG. 4, and four keeper wheels 29 engage assembly 30 from above.

A supply roll 32 mounted to stationary frame 21–23 at rearward extension 33 thereof provides flattened tubular web 34 of transparent thermoplastic stock. Upon leaving roll 32, flattened web 34 engages and is guided by idler cylinders 35, 36 and then spreads to surround idler assembly 30 being pinched between keeper wheels 29 and assembly 30 and also being pinched between drive rolls 27, 28 and assembly 30, for a reason which will hereinafter become apparent.

Mounted on opposite sides of frame 21–23 are a pair of power cylinders 37, 38 that simultaneously operate identical mechanisms so that only the mechanism operated by power cylinder 38 will be described with particular reference to FIG. 4. The left end of power cylinder

38 is fixedly secured to the upper end of upward frame extension 39, and the right end of cylinder 38 is provided with extendable arm 41 connected to end 42 of crank 43 mounted on stationary pivot 44. The other end 45 of crank 43 is connected to a pair of links 46, 47 at their upper ends, with this connecting point 45 being guided for vertical movement in slot 48. Lower ends 50, 51 of the respective links 46, 47 are connected to the respective arms 52, 53 both mounted to stationary pivot 49. Thus, actuation of power cylinder 38 extending arm 41 thereof to the right with respect to FIG. 4 pivots crank 43 clockwise, moving links 46, 47 upward, thereby pivoting arm 53 counterclockwise and pivoting arm 52 clockwise so that the free ends of arms 52, 53 move downward along converging paths.

Cutting wire 54 is mounted to transverse member 55 (FIG. 6) whose ends are connected to arms 52 at both sides of frame 21–23. End 121 of cutting wire 54 is fixed with respect to member 55, and the other end 122 is secured to one end of arm 123 mounted near its midpoint to pivot 124. Tension spring 125 is secured to the other end of arm 123 to urge the latter clockwise with respect to FIG. 6 thereby maintaining wire 54 taut when it is heated. Another heated cutting wire 56 is supported in a similar manner by the pair of arms 53. In addition arms 54 support the opposite ends of transverse insulating bar 57 that mounts backup strip 58 and deflectable insulating cap 59 (FIG. 5) outboard of cutting wire 54. Heated sealing wire or element 61 is mounted to transverse insulating bar 62 having its end secured to arms 53 outboard of cutting wire 56. In the closed position of arms 52, 53 (FIG. 2), sealing element 61 is aligned with backup strip 57 and cutting wires 54, 56 are slightly offset. This offset condition is illustrated in detail in FIG. 5, which also shows sealing element 61 just prior to clamping web 34 against cap 59. It is noted that the cutting condition illustrated in FIG. 5 exists only momentarily since hot wires 54, 56 cut through web 34 very rapidly after which biased spreader elements 114, 115 of assembly 30 open the lower end of the unsevered portion of web 34.

The bagging apparatus also includes lower portion 60 that extends between side frame sections 21, 22 and is mounted thereon for vertical movement guided by wheels 64. Movable section 60 is provided with a pair of power cylinders 65 which operate identical mechanisms in unison so that only one of these mechanisms will be described by particular reference to FIG. 4. End 66 of power cylinder 65 is relatively fixed, and the other end thereof is provided with extension 67 that is projected upon actuation of cylinder 65. Extension 67 is centrally connected at 68 to one end of crank arm 71 that is pivotally mounted at 69 and is connected at point 72 to the lower end of arm 73 whose upper end 74 is guided for vertical movement in slot 75. Point 74 is also connected to the upper end of arm 76, whose lower end is pivotally connected at 77 to arm 78 and is mounted at one end thereof to pivot 69. Thus, when power cylinder 65 is actuated, arm 67 moves to the left with respect to FIG. 6, pivoting arm 71 clockwise. This drives connecting point 74 upward so that arm 76 pivots arm 78 in a counterclockwise direction, bringing heated cutting element 79, near the free end of arm 78, into clamping engagement with yieldable insulating cover 81 over backup strip 82 near the free end of crank 71.

Adjustably mounted to transverse bars 83, 84 of movable section 60 are a pair of identical compacting elements 85, 86 and a pair of power cylinders 87, 88 that operate identical finger-like clamping mechanisms 89. With particular reference to FIGS. 10–12, it is seen that clamping mechanism 89 includes spaced stationary pads 91, 93 secured to support 96 that is mounted to transverse members 83, 84 for adjustment therealong. Movable pads 92, 94 that cooperate with the respective stationary pads 91, 93 are mounted to the free ends of respective fingers 98, 99 that are mounted to connecting member 98, pivoted at 101 to support 96. Extendable arm 102 of power cylinder 87 is connected to member 98, and the other end of power cylinder 87 is fixedly secured to member 96. Thus, as power cylinder 87 is actuated, arms 98, 99 pivot counterclockwise with respect to FIG. 10, thereby moving pads 92, 94 toward the respective pads 91, 93, for clamping a single thickness of web material therebetween.

Idler assembly includes block 105 having anchor support 106 extending downward therefrom. Axially aligned elongated rollers 107, 107 extend in opposite directions from block 105 and are supported by drive cylinder 27. Similarly, axially aligned elongated rollers 108 extend in opposite directions from block 105 and are supported by drive roller 28. The outer ends of each pair of rolls 107, 108 mount a support 109 that have three idler wheels 111–113. Formed wire spreader members 114, 115 are pivotally mounted to members 109 and are biased in opposite directions away from hanger support 106 to open web 34. The biasing means for spreader members 114, 115 permits spreader 114, 115 to collapse by having the lower free ends of members 114, 115 converge just prior to cutting of web 34 by heated wires 54, 56.

Horizontal main shaft 141, at the bottom of frame 21–23, is mounted for rotation in bearings 142, 143. Sprockets 145, 146 are keyed to shaft 141 at portions thereof outboard of side frame members 21, 22. As seen best in FIG. 3, main shaft 141 is driven from output shaft 147 of gear box 148 by closed loop chain 149 that is in mesh with sprocket 151, 152 keyed to the respective shafts 141, 147. Gear box 148 is driven by electric motor 153 through reversing clutch 154. Sprocket 145 drives vertically extending closed loop chain 155 which in turn drives sprocket 156 mounted on stub shaft 157 at the upper end of side frame 21. Sprocket 158 positioned inboard of vertical frame 21 is keyed to stub shaft 157 and drives closed loop chain 159, which in turn drives sprocket 160 keyed to drive roll shaft 26. Spur gear 161, keyed to shaft 26, acts through spur gears 162, 163 to drive spur gear 164 keyed to drive roll shaft 25, so that rolls 27, 28 are driven at the same speed.

The right side of movable assembly 60 (as viewed in FIG. 1) is fixedly secured to one flight of chain 155 by clamp 166 that is mounted to plate 167 having guide wheels 64 mounted thereto. Similarly, the left side of movable assembly 60 is fixedly secured by clamp 168 to vertically extending closed loop chain 169 that is driven by sprocket 146. Chain 169 drives the left ends of delivery roll shafts 25, 26 in essentially the same manner as chain 155 drives the right ends of shafts 25, 26. For a reason that will become obvious, sprockets 156, 171 are connected to the respective stub shafts 157, 172 by one-way locking clutches 173, 174, respectively, so that drive roll shafts 25, 26 are positively

driven when assembly **60** moves downward from its upper position shown in phantom in FIG. **1.** During upward movement of assembly **60,** clutches **173, 174** lock delivery roll shafts **25, 26** against rotation.

The apparatus hereinbefore described is operated in the following manner. Starting with a new supply roll **32,** flattened web **34** is manually drawn over guide cylinders **35, 36** along the path seen best in FIG. **2.** The free end of web **34** is opened to encompass idler assembly **30** with the inner surface of web **34** resting against rollers **107, 108, 111, 112,** and **113** of assembly **30.** The outer surface of web **34** is engaged by idler wheels **29** and cylindrical drive rollers **27, 28.** Withdrawal of web **34** is halted with the free edge thereof being slightly below spreader elements **114, 115.** At this time, movable assembly **60** is in a down position, such as the solid line position of FIG. **1.**

An operator carries garment **180** on hanger **181** to the apparatus and mounts the downwardly curved upper end of hanger **181** on the upwardly curved lower end of idler assembly support **106.** A control panel (not shown) is then actuated to operate motor **153** and clutch **154,** so that chains **155** and **169** move lower assembly **60** upward to the raised position shown in phantom in FIG. **1,** with rod **84** traveling in front of garment **180** and rod **83** traveling behind garment **180.** With assembly **60** in its raised position, stationary pads **91, 93** thereof are positioned outside of web **34,** and movable pads **92, 94** are positioned inside of web **34** between spreader elements **114, 115.** At this point power cylinders **87, 88** are actuated so that movable pads **92, 94** move toward stationary pads **91, 93** and clamp a single thickness of web material therebetween.

Motor **153** and clutches **154** are then operated to reverse the output of gear box **148,** so that chains **155,** 169 drive movable assembly **60** downward. At the same time drive rolls **27, 28** are rotated and the pinching action of drive rolls **27, 28** in cooperation with idler rolls **107, 108** draws web **34** from its supply **32.** The speed of assembly **60** in its downward movement is essentially at the same speed as web **34** is being delivered by rollers **27, 28.** As assembly **60** travels downward, clamps **89** thereof hold the free edge portion of web **34** open so that it may readily be drawn over garment **180** without snagging thereon. During this downward movement of assembly **60,** deflector plates **85, 86** thereof engage the side edges of garment **180** to apply a sideways compacting force to garment **180** thereby making it less difficult to draw web **34** thereover. As assembly **60** moves downward, photoelectric detector **184** mounted on rods **83, 84** senses when detector **184** has reached bottom edge **185** of garment **180,** and after a slight overtravel provided by a delay means controlling motor **153,** assembly **60** is halted in the solid line position illustrated in FIG. **1.**

Thereafter, power cylinders **37, 38** and **65** are actuated. Actuation of power cylinder **65** brings the free ends of arms **71** and **78** together to clamp the lower end of web **34** and form a heat seal below garment **180** approximately at the position indicated by line **187.** Actuation of cylinders **37, 38** causes the free ends of arms **52, 53** to converge. As this is done, web **34** is collapsed below drive rollers **27, 28** with the springs biasing spread elements **114, 115** outward, permitting the lower ends of elements **114, 115** to be deflected inward but at the same time continuing to provide an outward biasing force. The geometry of cutting wires **54, 56** and sealing wire **61** is such that wires **54, 56** sever web **34** just below spreader **114, 115,** but at this time the upper end of bag **234** formed over garment **180** is held closed by the cooperation of sealing wire **61** and backup plate cover **59** until a seal is formed along line **233.** It is noted that the curved upper end of hanger **181** extends above upper seal **233** so that garment **180** on hanger **181** may be removed from support **106** and another hanger supported garment placed on hanger support **106.**

While the instant invention has been described as including hot wires for cutting and sealing, it should be apparent to those skilled in the art that sealing may be done by utilizing high frequency energy and cutting may be done by a knife means. It should also be apparent to those skilled in the art that the apparatus need not be operated in the precise sequence shown and very useful bagging apparatus may be constructed utilizing some and not all features of the invention hereinbefore described.

Although there have been described preferred embodiments of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited not by the specific disclosure herein but only by the appending claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. Apparatus for bagging a hanger held garment; said apparatus including an upper relatively stationary section; a lower section below said upper section; means mounting said lower section for generally vertical movement toward and away from said upper section; said upper section including first means for supporting a hanger having a garment thereon, second means for drawing thermoplastic tubular stock from a supply thereof in the form of a flattened web, and third means for transversely cutting and sealing stock delivered by said second means at a position below said second means and above a garment on a hanger supported by said first means; said lower section including fourth means for engaging the lower end of stock delivered by said second means and maintaining such stock in an open tubular shape as it moves downward in a surrounding position over a garment on a hanger supported by said first means; said upper section also including collapsible spreader means interposed between said second and said third means to open the free end of stock above cuts made by said third means and to facilitate separations at said cuts.

2. Apparatus as set forth in claim **1** in which the lower section also includes fifth means for transversely sealing tubular stock drawn over a garment on a hanger supported by said first means, with sealing by said fifth means being at a location below such garment.

3. Apparatus as set forth in claim **1** in which the third means is constructed to cut prior to sealing.

4. Apparatus as set forth in claim **1** in which the lower section includes sixth means for compacting garments on hangers supported by said first means by engaging opposite sides of these garments during downward travel of said lower section.

5. Apparatus as set forth in claim **2** in which the lower section also includes seventh means for detecting the lower edge of a garment on a hanger supported by said first means to control stopping of said lower section during downward travel thereof.

6. Apparatus as set forth in claim 1 including power means for driving said second means and simultaneously moving said lower section downward in coordinated relationship whereby stock delivered by said second means travels at substantially the same speed as said lower section in its descent.

7. Apparatus as set forth in claim 1 in which the fourth means includes sets of cooperating clamp elements that engage a single thickness of open tubular shape material therebetween.

8. Apparatus as set forth in claim 6 in which the lower section also includes fifth means for transversely sealing tubular stock drawn over a garment on a hanger supported by said first means, with sealing by said fifth means being at a location below such garment.

9. Apparatus as set forth in claim 1 in which the third means includes a heated wire, and biasing means maintaining said wire taut after heating thereof.

10. Apparatus as set forth in claim 8 in which the lower section also includes seventh means for detecting the lower edge of a garment on a hanger supported by said first means to control stopping of said lower section during downward travel thereof.

11. Apparatus for bagging a hanger held garment; said apparatus including an upper relatively stationary section; a lower section below said upper section; means mounting said lower section for generally vertical movement toward and away from said upper section; said upper section including first means for supporting a hanger having a garment thereon, second means for drawing thermoplastic tubular stock from a supply thereof in the form of a flattened web, and third means for transversely cutting and sealing stock delivered by said second means at a position below said second means and above a garment on a hanger supported by said first means; said lower section including fourth means for engaging the lower end of stock delivered by said second means and maintaining such stock in an open tubular shape as it moves downward in a surrounding position over a garment on a hanger supported by said first means; said lower section also including sixth means for compacting garments on hangers supported by said first means by engaging opposite sides of these garments during downward travel of said lower section.

12. Apparatus for bagging a hanger held garment; said apparatus including an upper relatively stationary section; a lower section below said upper section; means mounting said lower section for generally vertical movement toward and away from said upper section; said upper section including first means for supporting a hanger having a garment thereon, second means for drawing thermoplastic tubular stock from a supply thereof in the form of a flattened web, and third means for transversely cutting and sealing stock delivered by said second means at a position below said second means and above a garment on a hanger supported by said first means; said lower section including fourth means for engaging the lower end of stock delivered by said second means and maintaining such stock in an open tubular shape as it moves downward in a surrounding position over a garment on a hanger supported by said first means; said lower section also including seventh means for detecting the lower edge of a garment on a hanger supported by said first means to control stopping of said lower section during downward travel thereof.

13. Apparatus for bagging a hanger held garment; said apparatus including an upper relatively stationary section; a lower section below said upper section; means mounting said lower section for generally vertical movement toward and away from said upper section; said upper section including first means for supporting a hanger having a garment thereon, second means for drawing thermoplastic tubular stock from a supply thereof in the form of a flattened web, and third means for transversely cutting and sealing stock delivered by said second means at a position below said second means and above a garment on a hanger supported by said first means; said lower section including fourth means for engaging the lower end of stock delivered by said second means and maintaining such stock in an open tubular shape as it moves downward in a surrounding position over a garment on a hanger supported by said first means; power means for driving said second means and simultaneously moving said lower section downward in coordinated relationship whereby stock delivered by said second means travels at substantially the same speed as said lower section in its descent.

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