July 21, 1970 V. E. PALMER 3,521,425

WRAPPING METHOD AND APPARATUS

Filed May 24, 1967 5 Sheets-Sheet 1

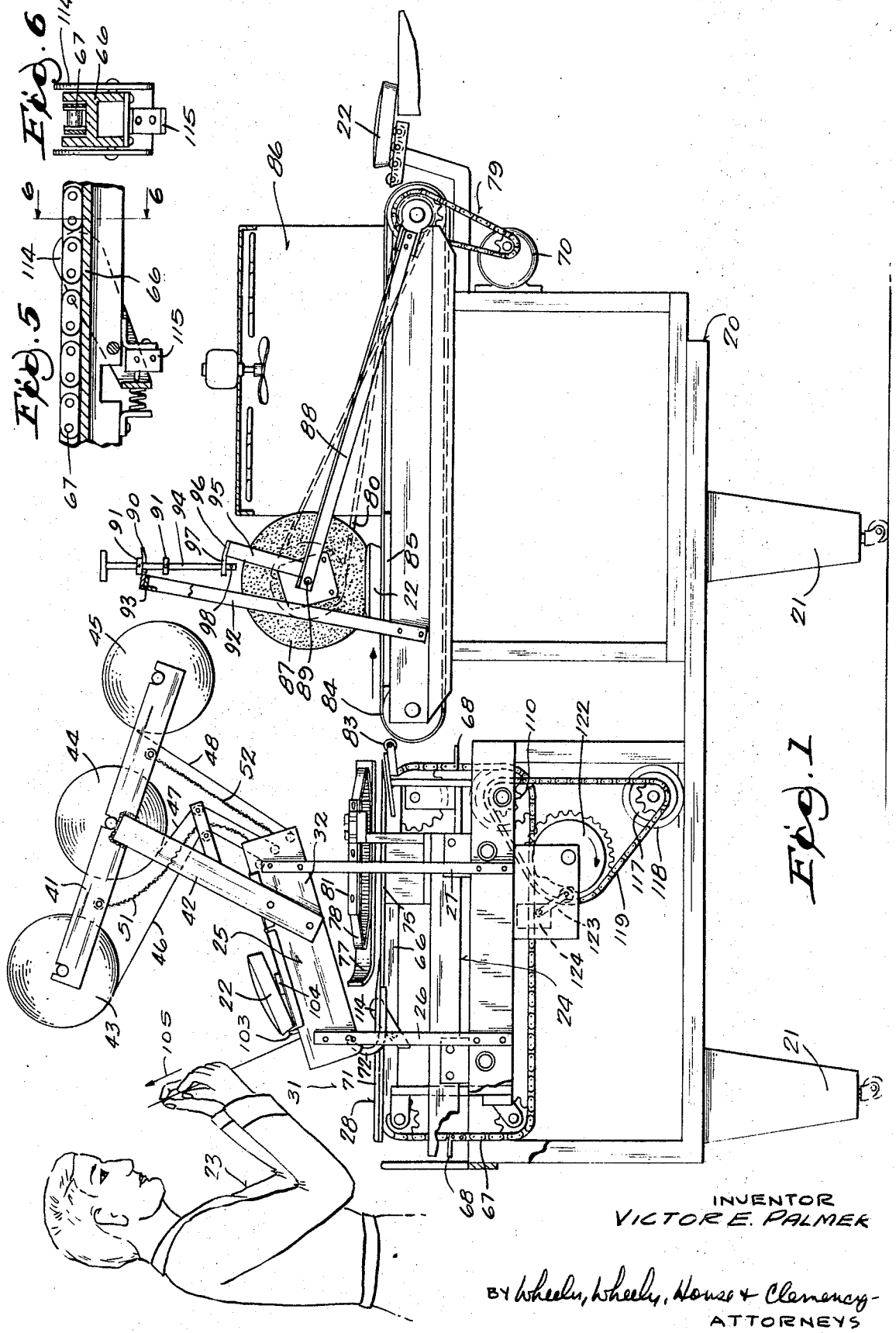


Fig. 1

Fig. 5

Fig. 6

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WRAPPING METHOD AND APPARATUS

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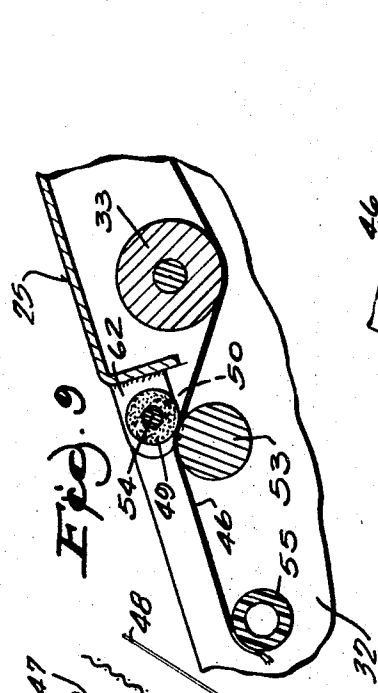


Fig. 9

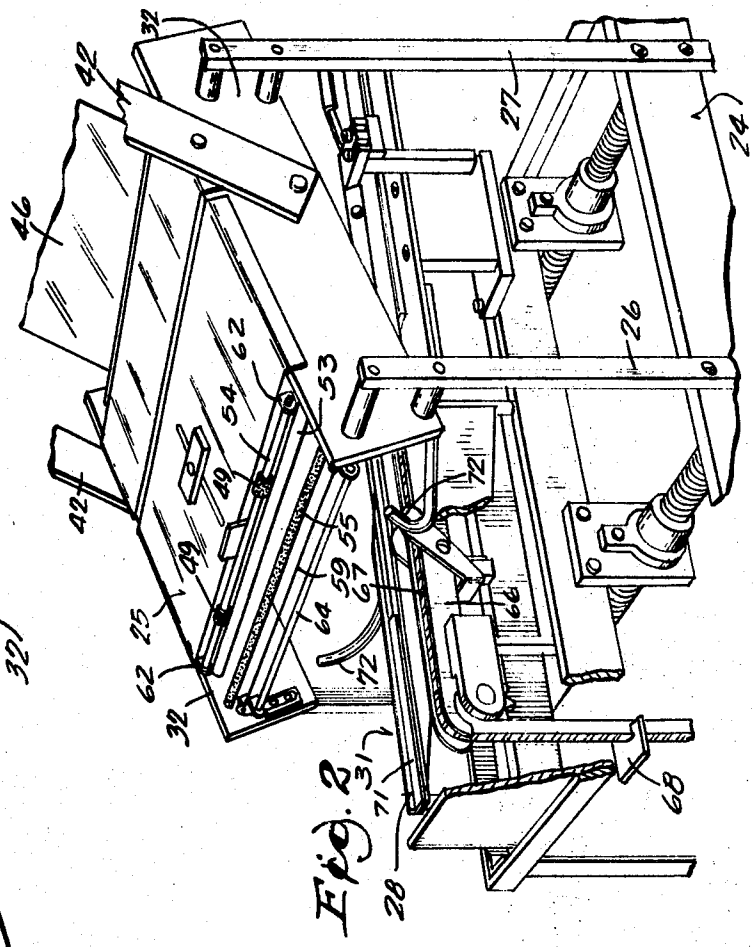


Fig. 2

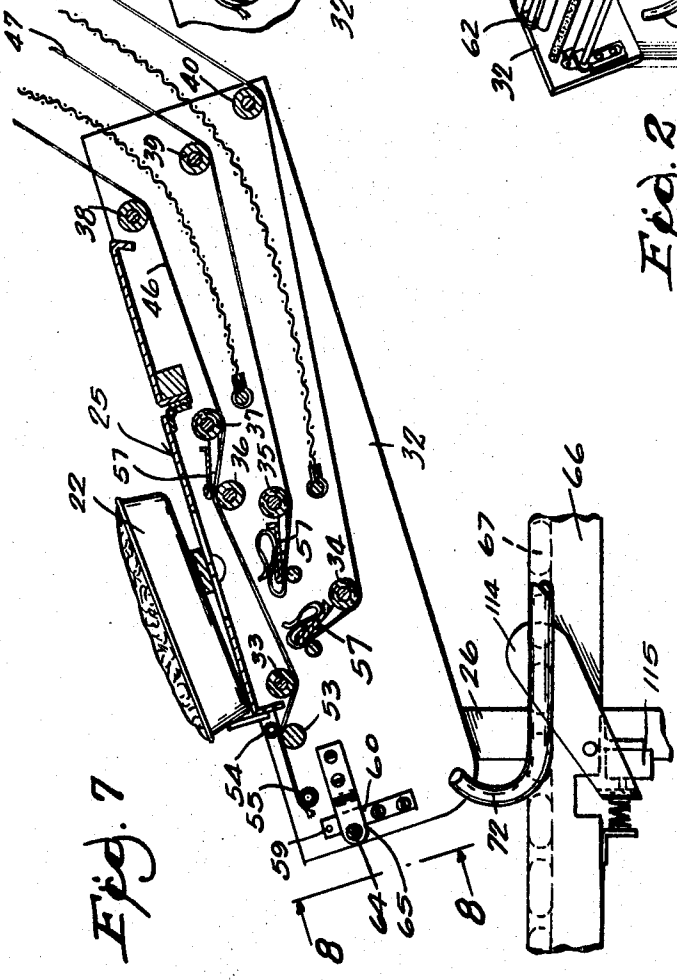


Fig. 7

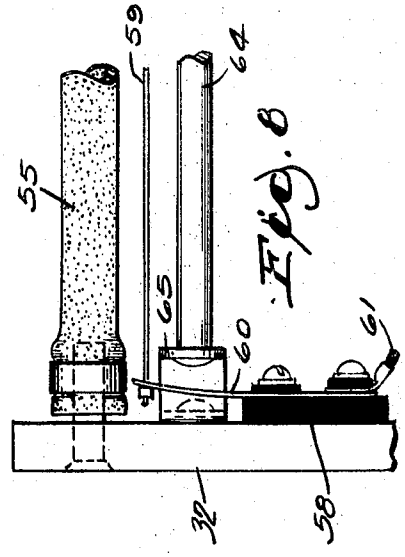


Fig. 8

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Fig. 4

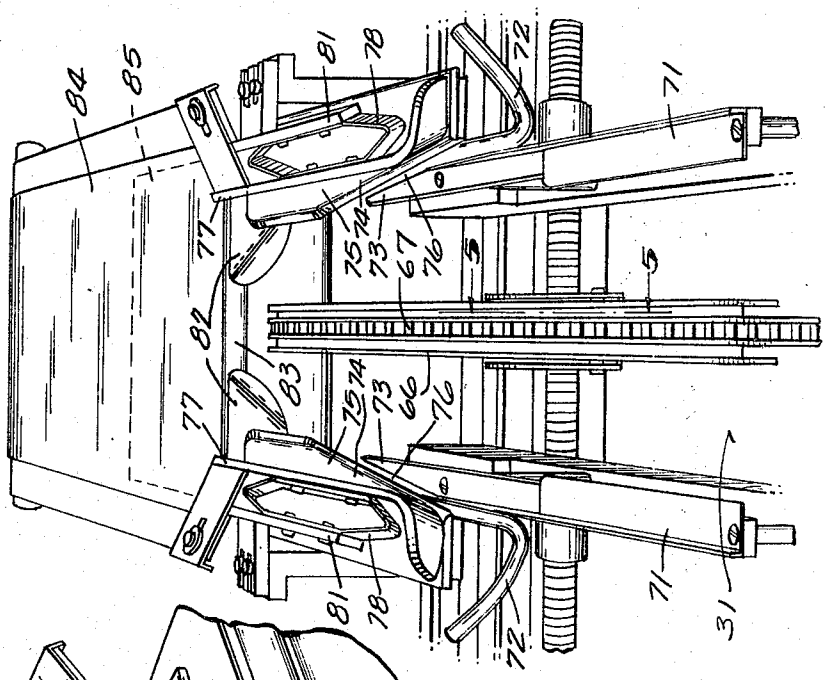
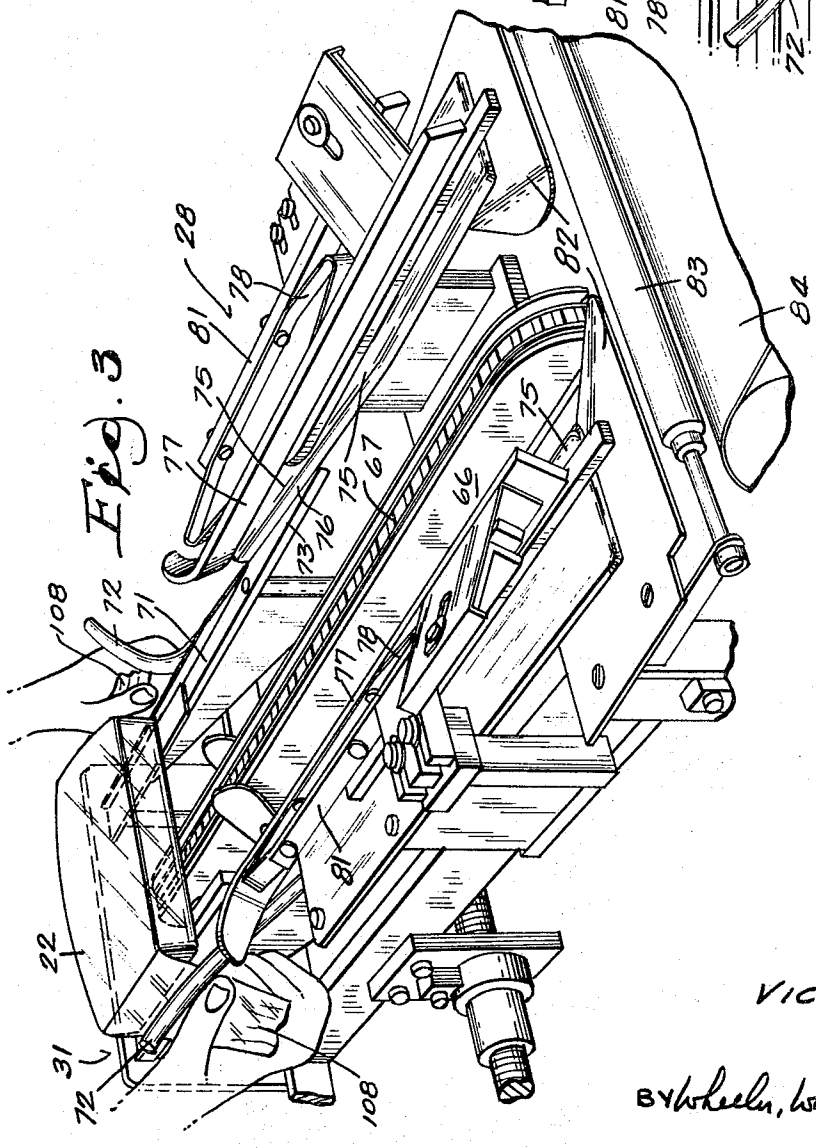


Fig. 3



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Fig. 10

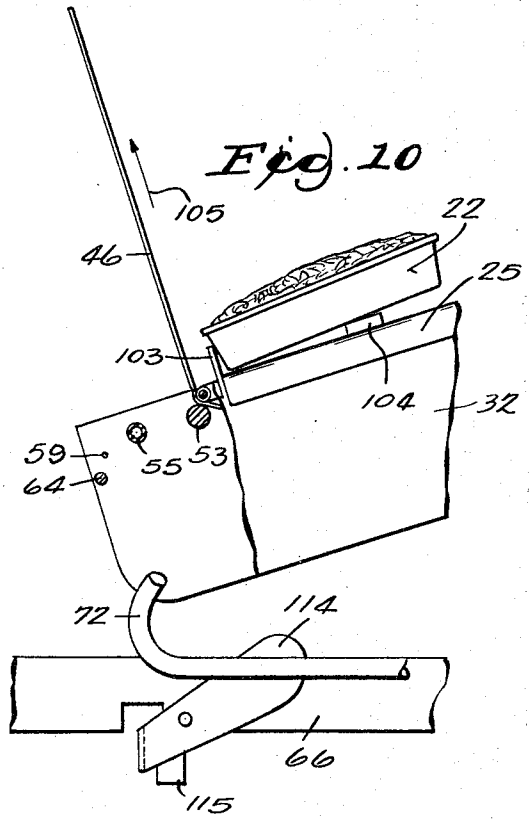


Fig. 12

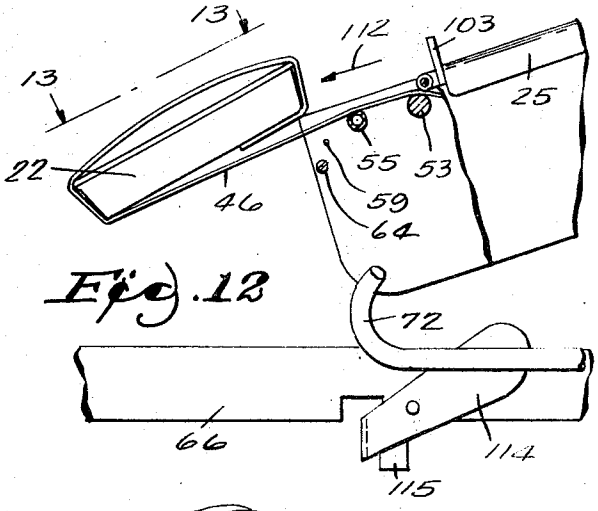


Fig. 13

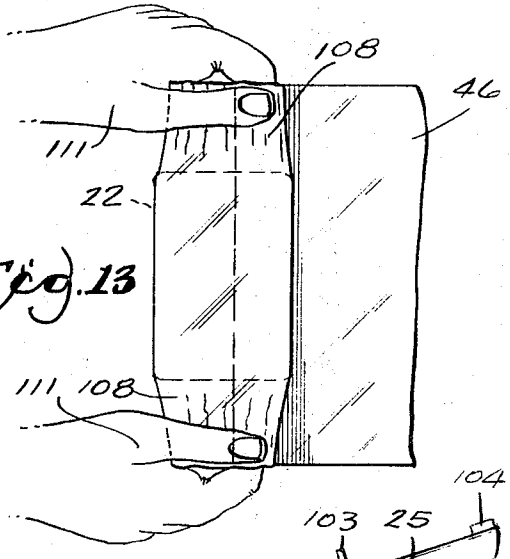


Fig. 11

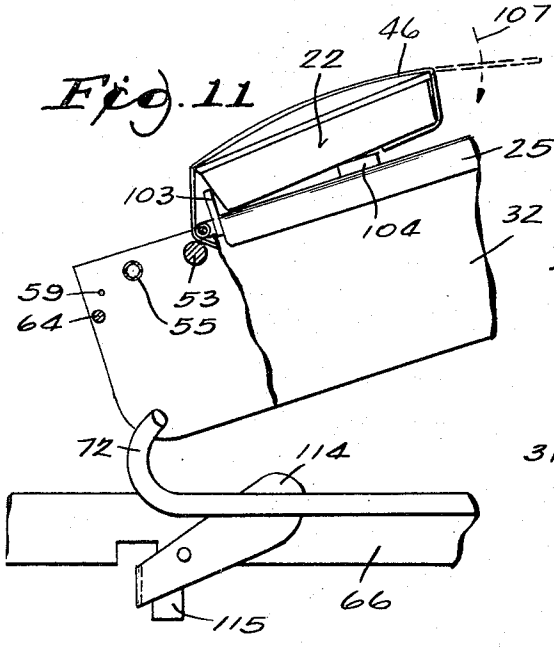
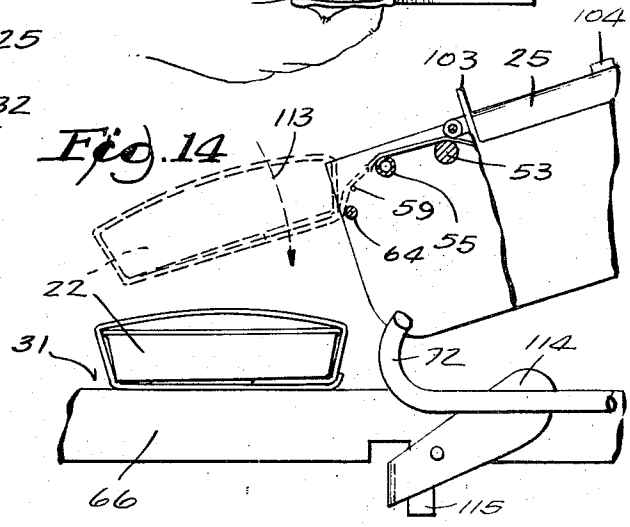


Fig. 14



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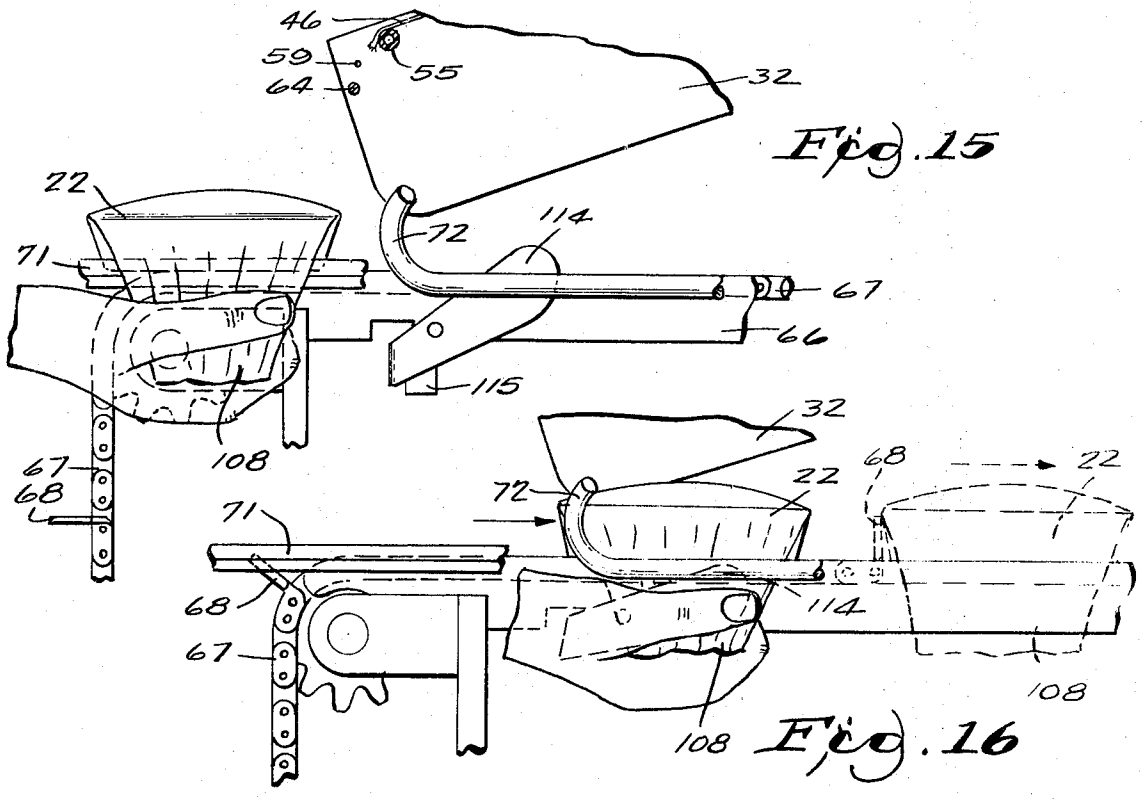


Fig. 15

Fig. 16

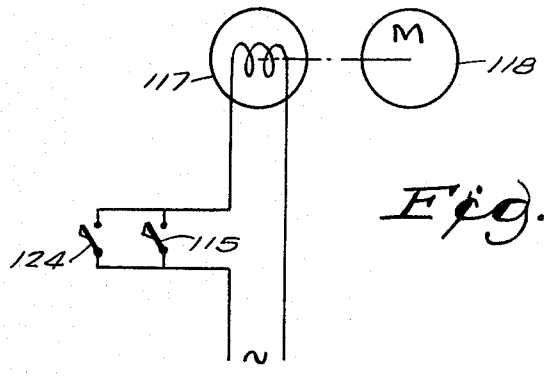


Fig. 17

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United States Patent Office

3,521,425
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3,521,425

WRAPPING METHOD AND APPARATUS

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Int. Cl. B65b 67/10, 11/48
U.S. Cl. 53—33 18 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a package wrapping method and apparatus adapted to wrap articles in "soft" or "shrink" film drawn from a roll. There is an article prewrap table spaced above a conveyor table and offset rearwardly from its input end to expose a landing space thereon. An operator partially hand prewraps the article on the prewrap table and transfers it from the prewrap table to the input end of the conveyor table. In the course of this transfer, the partially wrapped article is swept past a hot wire to sever the film web, without lost motion on the part of the operator. The operator handles the partially wrapped package by grasping laterally extending film wings on which the operator can exert pressure to tension the film about the article.

BACKGROUND OF THE INVENTION

It is old to associate a prewrap table in line with the conveyor of a semiautomatic wrapping machine, as shown, for example, in U.S. Pat. 2,917,886, which is primarily intended for use in wrapping articles in precut square sheets of cellophane film. After the introduction of "soft" thermoplastic heat shrinkable films, it became common to draw a web of such film from a supply roll and to hand wrap an article therewith. In the course of this hand wrapping procedure, the length of film used in wrapping the article is severed from the roll. The wrapped package may then be carried away from the operator on a conveyor. If the film is heat shrinkable, the package may be conveyed through a heat shrink tunnel to shrink the film about the article to produce a neat, tightly wrapped package.

SUMMARY OF THE INVENTION

In accordance with the present invention, a prewrap table, supply rolls for continuous webs of film, a conveyor table and underfolder are so organized and associated with respect to one another as to facilitate the wrapping operation and achieve greater output with less manual effort than has heretofore been possible in hand wrapping articles with film drawn in a continuous web from a supply roll. Increased efficiency and greater speed with reduced manual effort is achieved in the present invention by locating the prewrap table in spaced relation above the conveyor table and offset rearwardly from the input end thereof to expose a landing space to which the partially wrapped article is transferred in an easy motion of the operator. A web of film from the supply roll is trained beneath the prewrap table and into a space between the

operator and the article on the prewrap table. The operator draws a length of film web upwardly into that space and thence folds the web partially about the article. The operator then grasps laterally extending film wings and uses them as handles to pick up the partially wrapped article and start to transfer the article toward the input end of the conveyor. As he draws the article toward himself in the same natural movement which will deposit it on the input end of the conveyor table, an additional length of film web is drawn from the supply roll, and the film web is swept across a severing tool, such as a hot wire, to sever the length from the web. This leaves the cut end of the web readily accessible for the next wrapping operation.

In a continuation of movement aforesaid, the operator deposits the partially wrapped package on the input end of the conveyor table and manually folds downwardly the laterally extending film wing portions thereof. This gives the operator a good purchase to impose lateral tension on the film. The operator then moves the package forwardly to actuate a control which starts the conveyor to move the package past underfolders which fold the wings up against the bottom of the package to complete the wrapping thereof. The conveyor desirably transfers the package to subsequent processing apparatus, such as a hot sealing belt and/or shrink tunnel which will snug the film about the package.

The invention resides in both the apparatus exemplified in the instant disclosure and in the method by which the operator processes a package through the novel wrapping steps herein disclosed.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation, partly in section, of apparatus embodying the present invention.

FIG. 2 is a fragmentary perspective view of the prewrap table and a portion of the conveyor table, other portions being broken away to expose details of construction.

FIG. 3 is a fragmentary perspective viewed from the tail end of the conveyor table to show details of the underfolder, the prewrap table being removed to expose details of construction.

FIG. 4 is a front fragmentary perspective viewed from the input end of the conveyor table, the prewrap table being removed to expose details of construction.

FIG. 5 is an enlarged fragmentary, but detailed vertical cross section taken along the line 5—5 of FIG. 4.

FIG. 6 is a cross section taken along the line 6—6 of FIG. 5.

FIG. 7 is a fragmentary vertical cross section taken through the longitudinal medial plane of the apparatus and showing the guides about which the film webs are trained beneath the prewrap table.

FIG. 8 is a fragmentary front elevation viewed in the direction of arrows 8—8 in FIG. 7 and showing details of the hot wire web severing tool and the guard and retainer rods adjacent thereto.

FIG. 9 is an enlarged detail of a portion of the apparatus shown in FIG. 7.

FIGS. 10 through 16 are diagrammatic views illustrating the wrapping in sequence and in which:

FIG. 10 shows the method step in which the film web

is first drawn upwardly between the operator and the article on the prewrap table.

FIG. 11 shows the film web swung away from the operator and partially around the article on the prewrap table.

FIG. 12 shows the article after it has been picked up by the operator and pulled away from the prewrap table and toward the input end of the conveyor table and in the course of which an additional length of web is drawn from the supply roll.

FIG. 13 is a fragmentary plan view taken along the line **13—13** of FIG. 12 and showing how the operator grasps the laterally projecting film wings on the partially wrapped package and uses the film wings as handles to transfer the package and tension the film.

FIG. 14 shows the package in the course of being swept downwardly past the hot wire, thus to sever the partially wrapped length of film from the web and deposit the package on the input end of the conveyor table.

FIG. 15 shows how the operator manually folds the laterally projecting film wings to a taut downwardly inclined position and exerts a tensioning pressure on the wings.

FIG. 16 shows how the operator manually advances the package on the conveyor table slide rails to move the wings into a slot between the slide rails and retaining rails until the package engages the conveyor control lever to actuate the conveyor.

FIG. 17 is a simplified electric schematic circuit diagram of the control circuit for the conveyor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. The scope of the invention is defined in the claim appended hereto.

The invention will be described primarily in terms of the apparatus, with interspersed reference to the method, both of which will be clear to those skilled in the art.

The wrapping apparatus is desirably mounted on a portable dolly or cart **20** having castered legs **21** by which it can be advantageously located in a supermarket or the like, where articles **22** are to be wrapped in transparent soft or shrink film. As described in U.S. Pats. 2,917,886 and 3,045,406, the articles **22** typically comprise pallets or trays of cut meat or other food items which are to be displayed in display cases in a self-serving food market.

At its end near operator **23**, cart **20** supports a conveyor table frame **24** on which a prewrap table **25** is elevated on legs **26, 27**. The prewrap table **25** has its rear end somewhat elevated with respect to its front end so that the table **25** is inclined or slanted downwardly toward operator **23** to facilitate the wrapping operation. In the disclosed embodiment, the inclination is in the range of fifteen to twenty degrees to the horizontal. Prewrap table **25** is spaced sufficiently above a conveyor table **28** to pass wrapped articles **22** therebetween. The prewrap table **25** is offset rearwardly from the input end **31** of the conveyor table **28** to expose a landing space at its input end **31** between the operator **23** and table **25**, as shown in FIGS. 1 and 14.

Prewrap table **25** is supported on relativley deep side plates **32** which are widely spaced laterally at the sides of the conveyor table **28**, as shown in FIG. 2. Film guide roller assemblies **34, 35, 36, 37, 38, 39, 40** span laterally from one plate to the other. Each film guide roller assembly **34–40**, inclusive, desirably consists of a central rod and a roller sleeve fitted loosely on the rod to turn under pressure of the film thereacross.

Plates **32** provide anchorage for upwardly extending

bracket arms **42** which support laterally spaced bearing bars **41** for a series of transparent rolls **43, 44, 45** of wrapping film. It is desirable to accommodate for several different specific types and gauges of film so that the operator has a choice of film best suited to wrap specific articles **22**. Generally speaking, film rolls **43, 44, 45** consist of PVC thermoplastic film or variations thereof known in the trade as "soft" or "shrink" film.

Respective film webs **46, 47, 48** from the rolls **43, 44, 45** will be trained about the guide rollers **34–40**, inclusive, as illustrated in FIG. 7. Fabric spacing aprons **51, 52** desirably define film web lanes and isolate one film web from contact with another.

The web of the film selected for use by the operator, for example, web **46** of film roll **43**, is drawn around additional guides **33, 53, 54** and **55** to dispose the leading transverse edge of the web **46** in a position where it can be easily grasped by the operator **23** to initiate the process of prewrapping an article **22**. The leading edges of the webs **47, 48** which are not in use are held in stored position by retainers **57**.

At their leading front margins, and adjacent the path of transfer of the article **22** from table **25** to the input end **31** of conveyor **28**, side plates **32** carry a transverse hot wire **59**. Hot wire **59** is stretched taut and is held at its ends on spring leaves **60** which are mounted on terminal blocks **58** fastened to the plates **32**. Wiring **61** connects to the terminal blocks **58** to heat the wire **59** electrically for the purpose of severing the thermoplastic film webs when a web is touched in contact with the wire. While the hot wire is preferred, it is but one example of severing tool that can be used to cut the web.

Immediately ahead of the hot wire **59** is a transverse guard bar **64** supported from the side plates **32** on end brackets **65**. Guard bar **64** is a safety device to keep the operator **23** from inadvertently touching the hot wire.

Guide **54** coacts with guide **53** to function as an anti-backlash brake to hold the severed end of web **46** from retraction after it has been cut. Guide rod **54** has rollers **49** which bear on cross rod **53**. The ends of rod **54** are free to move vertically in slots **50** formed in end brackets **62** (FIG. 9) by which the rod **54** is supported from the table **25**. Gravity biases the rod **54** and rollers **49** to exert light clamping pressure on the web **46** and against rod **53**.

Conveyor table **28** and associated underfolders are generally similar to those shown in U.S. Pat. 3,045,406 and 3,016,671. As best shown in FIGS. 3, 4 and 6, there is a longitudinally extending channel-shaped track **66** over which passes the upper run of conveyor chain **67**. Chain **67** is provided with spaced pusher lugs **68** which will push the packages along rails **71, 75** adjacent the track **66** when the chain is driven.

At its input end **31**, the conveyor table comprises laterally exposed spaced side rails or tracks **71** and the end of track **66** on which a partially wrapped package **22** lands in the course of transferring it from prewrap table **25**, as is indicated in FIGS. 3 and 14. Rails **71** are laterally unobstructed at the input end **31** of the conveyor table **28** so that the laterally extending film wings **108** of the partially wrapped article **22** can be manually swung in an arc to a downwardly inclined position, as is indicated in FIGS. 3 and 15.

Rearwardly offset from the input end **31** of conveyor table **28**, each side rail **71** coacts with a guide rod or rail **72** which extends along the outside of side rail **71** and defines therebetween a slot into which the downturned wings **108** of the package are received when the operator manually advances the package from its position shown in FIG. 15 to its position shown in FIG. 16.

As in the prior patents aforesaid, conveyor table rails **71** have tapered end portions **73** which coact with correspondingly tapered end portions **74** of complementary conveyor table rails **75**. These parts comprise an underfolding mechanism defining between the respective tapered

end portions **73, 74** an oblique slot **76** through which the film wings **108** pass in the course of being underfolded against the bottom of the package **22**. As in the prior Pat. 3,016,671 aforesaid, spring pressed elongated guide shoes **77** are mounted adjacent the rails **71, 75** to hold the package against the rails **71, 75** and guide it in its longitudinal movement along the conveyor table **28** under pressure of the conveyor chain lug **68**. Shoes **77** have leaf springs **78** on which the shoes **77** may yield obliquely upwardly under pressure of the package. Springs **78** are mounted on adjustable brackets **81**, as in the prior Pat. 3,016,671 aforesaid. The side rails of the conveyor table are laterally adjustable to accommodate different width packages, as in the prior patents aforesaid.

Still further underfolding of the wings **108** is accomplished by the converging plow blade plate **82** which define a V-notch to fold the wings **108** upwardly into contact with the package bottom. At the end of the conveyor table **28** there is a roller **83** over which the package rolls onto a traveling belt **84**. Belt **84** is supported on an apron plate **85** which is heated to transmit heat to the underfolded wings **108** and fuse the wings to the film at the bottom of the package. Beyond the plate **85** there may be a shrink tunnel **86** (FIG. 1) through which the package travels, if the film is heat shrinkable. This will snug the wrapper film about the package.

In order to exert some down pressure on the package **22** as it travels over the heated apron plate **85**, one or more axially aligned pressure sponge rollers **87** are swingably mounted over plate **85** on the swing arms **88**. Arms **88** carry a transverse axle **89** on which sponge rollers **87** turn as driven by belt **80** as the package travels therebeneath. Belt **80** is driven by the same power train **79** that drives belt **84** from motor **70**. The weight of the rollers **87** adds to gravity to press the underfolded wings **108** into intimate contact with the belt **84** and heated plate **85**.

Rollers **87** are kept spaced from the belt **84** even when there is no package **22** therebeneath by a suspension frame including side legs **92** which carry a cross bridge **93** from which depends a central stem **94**. Stem **94** has two collars **91**, either one of which is selectively engaged with hanger yoke **90** to adjust the height at which the rollers are hung.

Swing arms **88** have upstanding arms **95** with a cross connecting bridge **96** having a lateral support eye **97** slideably related to the stem **94**. The bottom of the stem **94** has a cross pin **98** which defines the lower limit of movement of the eye **97**. However, eye **97** can ride up on the stem **94** under the upward pressure of a package therebeneath. Accordingly, the powered rollers **87** can be set at various heights spaced above belt **84** to admit various height packages therebeneath. The rollers **87** yield upwardly to pass the package.

The novel wrapping method is illustrated diagrammatically in FIGS. 10 through 16. The operator selects one of the film rolls **43, 44, 45** as appropriate for wrapping article **22** which come to the operator's station in a series on another conveyor, in a bin or the like. In this illustration roll **43** having web **46** is selected. An article **22** from the series is manually placed on table **25** with its lower end braced against positioning abutment flange **103**. The table is also provided with an adjustable elevating support block **104** on which the rear edge of the package **22** is elevated above the table **25**. The operator grasps the side margins of web **46** which are between support rods **53, 55** and draws the web **46** upwardly in the direction of arrow **105** through the space which exists between the operator **23** and the prewrap table **25**. This is also shown in FIG. 1.

A sufficient length of the web **46** is drawn beyond cross rod **53** so that it may be swung forwardly toward the prewrap table **25**, as shown in FIG. 11, to go around the far end of the article **22** and be tucked therebeneath, as indicated by the arrow **107** in FIG. 11. This motion creates lateraly extending wing portions **108** of the film, as is indicated in FIG. 13. The operator grasps wings **108** with his hands **111** and uses the wings **108** as handles in manipulation of the package during the next following sequences of the method. The operator also exerts lateral pull on the film to tension it laterally.

As shown in FIGS. 12 and 13, the operator then picks up the partially wrapped article **22** utilizing the wings **108** as handles and draws the article toward himself. In the course of this movement of the article **22** in the direction of arrow **112**, an additional length of the film web **46** is drawn from its parent roll **43** and beyond cross rod **53** until the package reaches substantially its position shown in FIG. 12. The operator then swings or lowers the package downwardly toward the input end **31** of the conveyor table and in the direction indicated by the arrow **113** in FIG. 14.

This motion will sweep the film web **46** against the hot wire **59** to sever the web transversely across its length. The package continues its downward movement to its landing place on the rails **71** and conveyor track **66** at the input end **31** of the conveyor table **28**, as shown in full lines in FIG. 14.

The severed leading edge of the web **46** will retract slightly from the hot wire **59** and will remain adhered to the laterally exposed cross member **55**, where it is readily available for the next wrapping operation, this condition being also shown in FIG. 7. Cross member **55** comprises means positioned between the hot wire and the table to hold the severed leading edge of the web in a position ahead of the table. Cross member **55** desirably consists of a plastic tube to which the film tends to adhere.

As thus far described, it is clear that the article **22** has been partially hand prewrapped in a simple continuous sweep motion of the operator's arms on a generally circular path near the termination of which the package is swept past the hot wire **59** to sever the web in the course of its transfer from the prewrap table **25** to the input end **31** of the conveyor table **28**. The transfer motion is in a generally downward and rearward direction requiring minimum effort on the part of the operator and substantially no lost motion.

An important advantage of the foregoing sequence is that at the completion of the hand prewrap sequence, the package **22** is on the input end **31** of the conveyor table **28** in readiness for further movement without the operator having to transfer the package to another conveyor, etc. Moreover, the package is advantageously located so that the operator has good purchase to exert down pressure on the package wings **108** to tension the film and fold the wings about the laterally open rails **71** to a downwardly inclined position suitable for further action thereon by the underfolders.

At this point in the sequence, the chain conveyor **67** is inactive, both switches **115** and **124** in the electric circuit of FIG. 17 being open. The operator now advances the package manually forwardly on the conveyor table **28** from its position shown in FIG. 15 to its position shown in FIG. 16 in the course of which the package **22** engages a control lever **114** for a microswitch **115** (FIG. 5) which is in the circuit ot an electric clutch **117** by which drive motor **118** is coupled to a drive chain **119** (see FIGS. 1 and 17). When the clutch **117** is energized in consequence of the package tripping the control lever **114**, chain **119** will drive chain **67** through sprocket drive **110**, thus to advance a pusher lug **68** against the rear of the package, and mechanically convey the package along the conveyor table **28** and underfold the wings **108** beneath the package **22** as hereinbefore described. By the time the conveyor chain **67** has advanced far enough to move the package **22** off of control lever **114**, thus to open switch **115**, cam **122** (FIG. 1) has closed parallel switch **124** to hold closed the circuit to the clutch **117**, as shown in FIG. 17.

The conveyor chain **67** will remain in motion until the package has been discharged onto the belt **84** at which

time cam **122** will act on lever **123** for control switch **124** (FIG. 1) to open switch **124**, deenergize the clutch **117** and stop the chain. Clutch **117** is now in readiness for reenergization when the next package is moved forwardly to engage control lever **114**.

As the operator moves the package **22** manually from its position shown in FIG. 15 to its position shown in FIG. 16, the wings **108** will pass into the slot between the side rails **71** and the retaining or guide rails **72** so that the operator can release his manual grip on the wings **108** without their becoming disoriented.

In some embodiments the conveyor chain **67** can be continuously driven. The operator will time his prewrap and transfer motions to synchronize with the chain motion to insure delivery of the prewrapped articles to the conveyor table **28** in time therewith.

I claim:

1. Apparatus for hand prewrapping an article in film drawn from a film web supply roll and conveying it therefrom, said apparatus comprising a conveyor, a conveyor table and means to move the conveyor along the table, a prewrap table spaced above said conveyor table and offset beyond the input end of the conveyor table to leave landing room for the article on the input end of the conveyor table and a space beneath the prewrap table through which the article is moved by the conveyor, and a transverse web severing tool between the prewarp table and the input end of the conveyor table and in the path of transfer from the prewarp table to to the input end of the conveyor table and against which the web is swept to sever the web in the course of said transfer.

2. The apparatus of claim **1** in which said severing tool comprises a hot wire.

3. The apparatus of claim **1** in which there are guides beneath the prewrap table and along which said web is trained to dispose its leading edge in the space between the prewarp table and the input end of the conveyor table where it is readily accessible to an operator to draw the web from the supply roll in the course of prewrapping the next article.

4. The apparatus of claim **1** in which said prewrap table has a package rest on which the rear edge of the article is elevated to leave room to receive the leading edge of the web so it is wrapped thereabout.

5. The apparatus of claim **1** in which the input end of the conveyor table has laterally open rails around which film wings laterally extending from the package are drawn to a generally downward inclination after the article lands on said input end, and wing underfolders along said conveyor table beyond its said input end and by which said film wings are folded beneath the package in the course of its movement along said conveyor table.

6. The apparatus of claim **5** in which there is a heat seal surface to which said package is conveyed by the conveyor to seal the underfolded film wings.

7. The apparatus of claim **5** in which the conveyor has a control beyond said input end and which is engaged by manual movement of the package along the conveyor table.

8. The apparatus of claim **7** in which there are wing retaining rails beyond said input end and adjacent which the film wings are slid in the course of moving the packages toward said control.

9. The apparatus of claim **5** in which there is a heat seal surface to which the package is conveyed by the conveyor to seal the underfolded film wings, and a presser roller to press the package against said surface.

10. In a wrapping method in which an article is manually prewrapped at a prewrap table to a partially wrapped condition in which film wings extend laterally from the article and the article is transferred to a conveyor table having laterally open side rails and along which underfolding apparatus is disposed, the improvement in which an operator located at the end of the conveyor table and in alignment with the rails manually transfers the partially wrapped article to an input end of the conveyor table by grasping respective extending wings with his respective hands and using the wings as handles for the article, draws the article toward himself, deposits the article on said input end and moves his hands downwardly at each side of the rails to manually fold the wings to a generally downward inclination about said side rails for subsequent motion away from the operator for action thereon by said underfolding apparatus.

11. The wrapping method of claim **10** in which the operator exerts lateral tension on the film by pushing the wings downwardly about said rails.

12. The wrapping method of claim **10** in which the operator also manually advances the package along said side rails by pushing forwardly on said wings to actuate a conveyor control and then releases his grasp on said wings to permit the conveyor to move said package past the underfolding apparatus.

13. A wrapping method in which an operator successively hand prewraps a succession of articles on a prewrap table with film drawn from a film web supply roll, severs the web on a transverse severing tool and transfers the hand prewrapped article to a conveyor table on which the article travels beneath the prewrap table, and including the steps of positioning the article on the table in spaced relation to the operator, drawing a length of web from the roll on a path beneath the table and upwardly through said space, folding the withdrawn web length away from the operator and partially about the article, moving the article from the table toward the operator to remove it from the table and at the same time withdraw an added length of web from the roll, moving the article downwardly toward the conveyor table in the course of which movement the article is swept past the tool to sever said web and moving the article along the conveyor table beneath the prewarp table and through the space between said tables.

14. A wrapping method in which an operator successively hand prewraps a succession of articles on a prewrap table with film drawn from a film web supply roll, severs the web on a transverse severing tool and transfers the hand prewrapped article to a conveyor table on which the article travels beneath the prewrap table, and including the steps of positioning the article on the table in spaced relation to the operator, drawing a length of web from the roll on a path beneath the table and upwardly through said space, folding the withdrawn web length away from the operator and partially about the article, moving the article from the table toward the operator to remove it from the table and at the same time withdraw an added length of web from the roll and moving the article downwardly toward the conveyor table in the course of which movement the article is swept past the tool to sever said web, the movement of the article from the prewrap table being accomplished by the operator's grasping laterally extending film wings formed by folding the web partially about the article on the prewrap table and using these wings as package handles.

15. The method of claim **14** in which said wings are folded down manually at the sides of the conveyor table after the article is placed thereon.

16. The apparatus of claim **1** in which there is a cross member between said web severing tool and the prewarp table, said cross member comprising plastic to which the film tends to adhere and toward which the severed leading edge of the web will retract and adhere to be available in a position ahead of the table for the next wrapping operation.

17. Wrapping apparatus comprising a prewrap table, a source of plastic wrapping film which is drawn in

the form of a web in the course of prewrapping an article on the table, a web severing tool beyond the table and means positioned between the tool and the table to hold the severed leading edge of the web in a position ahead of the table to be available for the next wrapping operation, said means comprising a laterally exposed plastic cross member to which the film will adhere.

18. The apparatus of claim **17** in which the web severing tool comprises a hot wire.

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