United States Patent [19]

Michels

[11] **3,722,177**

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[54] **PACKAGE WRAPPING APPARATUS WITH PACKAGE ACTUATED WEB SEVERING TOOL**

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[22] Filed: **Feb. 14, 1971**

[21] Appl. No.: **112,582**

[52] **U.S. Cl.** **53/390**

[51] **Int. Cl.** **B65b 11/56,** B65b 67/10

[58] **Field of Search** 53/390, 213, 218, 219, 33

[56] **References Cited**

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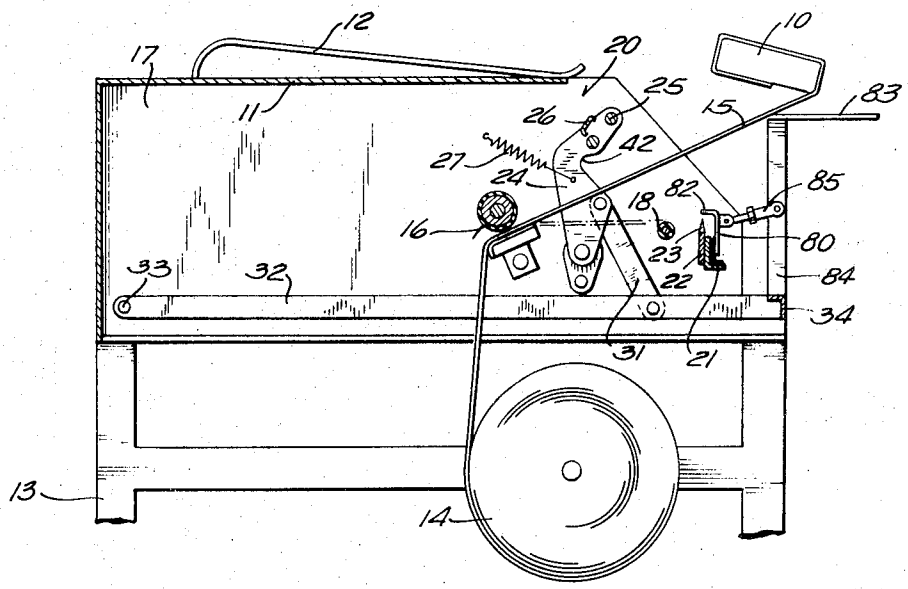
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[57] **ABSTRACT**

Package wrapping apparatus which has a wrapping table and a roll film stand is provided with a cooperating knife blade and web snubber to sever the web into lengths appropriate for wrapping the package. The web snubber and knife blade are mechanically actuated in time with the wrapping sequence under pressure of the package which is undergoing wrapping on the apparatus. The web severing tool parts are provided with motion transmitting linkages to a movable frame having a package rest. The movable frame is shifted under pressure of the package, thus to actuate the linkages and sever the web.

2 Claims, 9 Drawing Figures



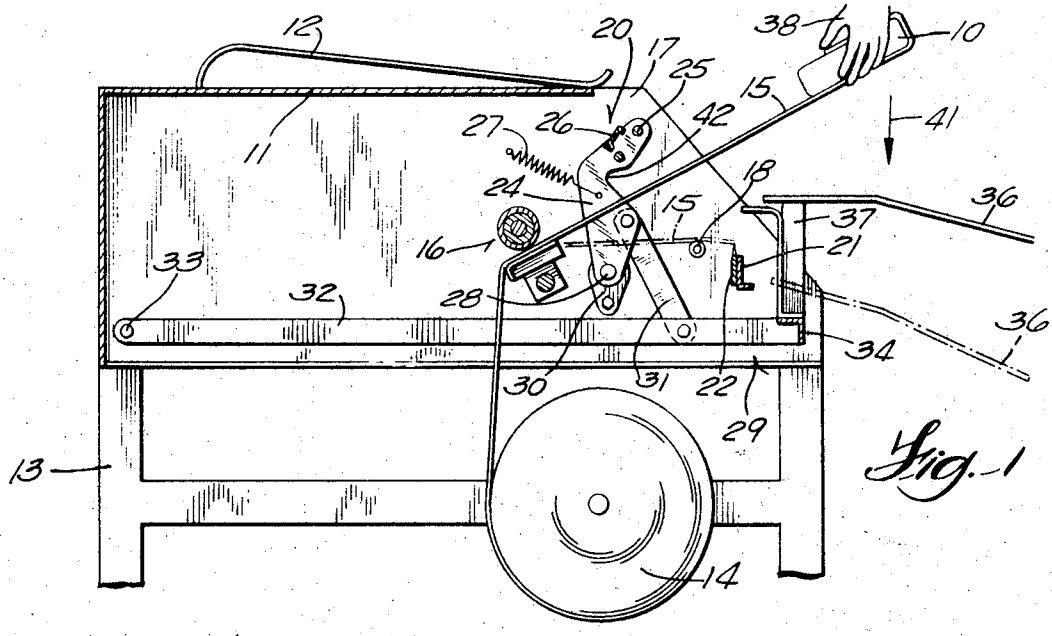


Fig. 1

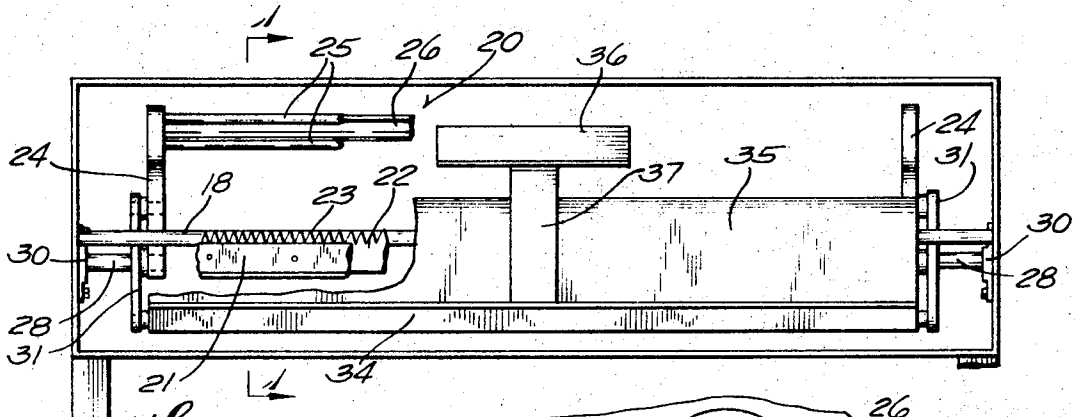


Fig. 2

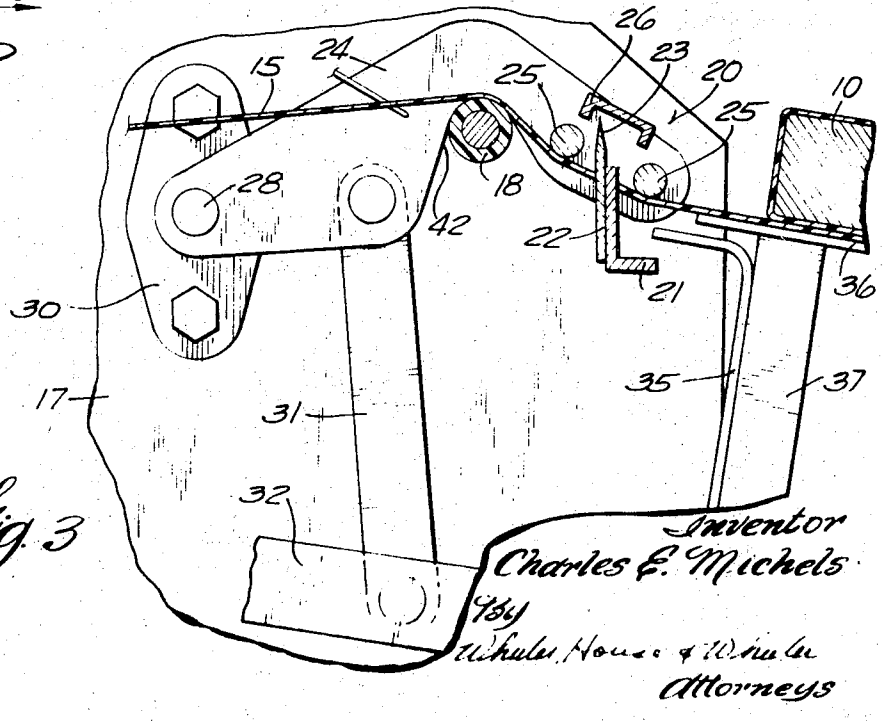


Fig. 3

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Fig. 4

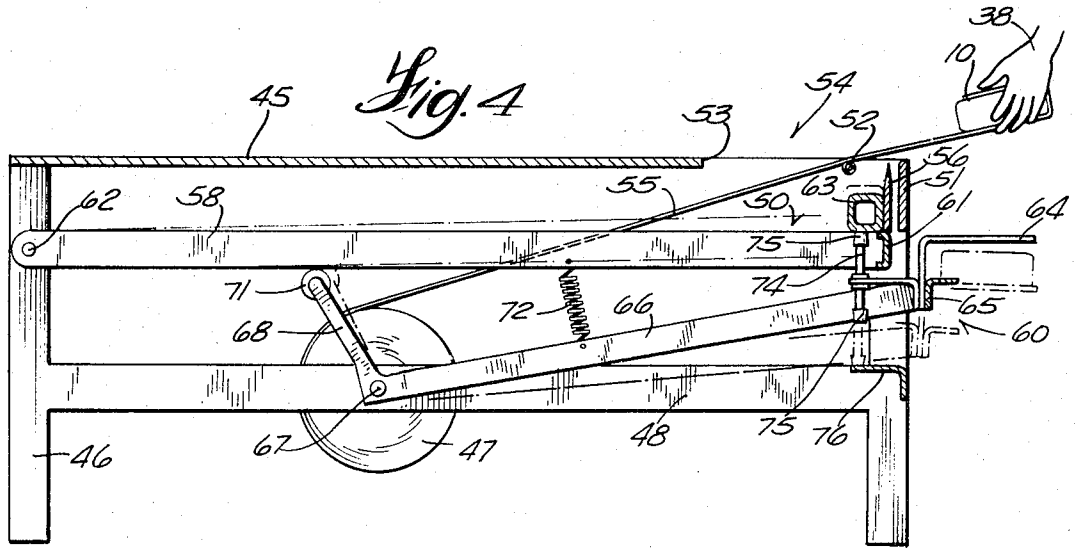


Fig. 5

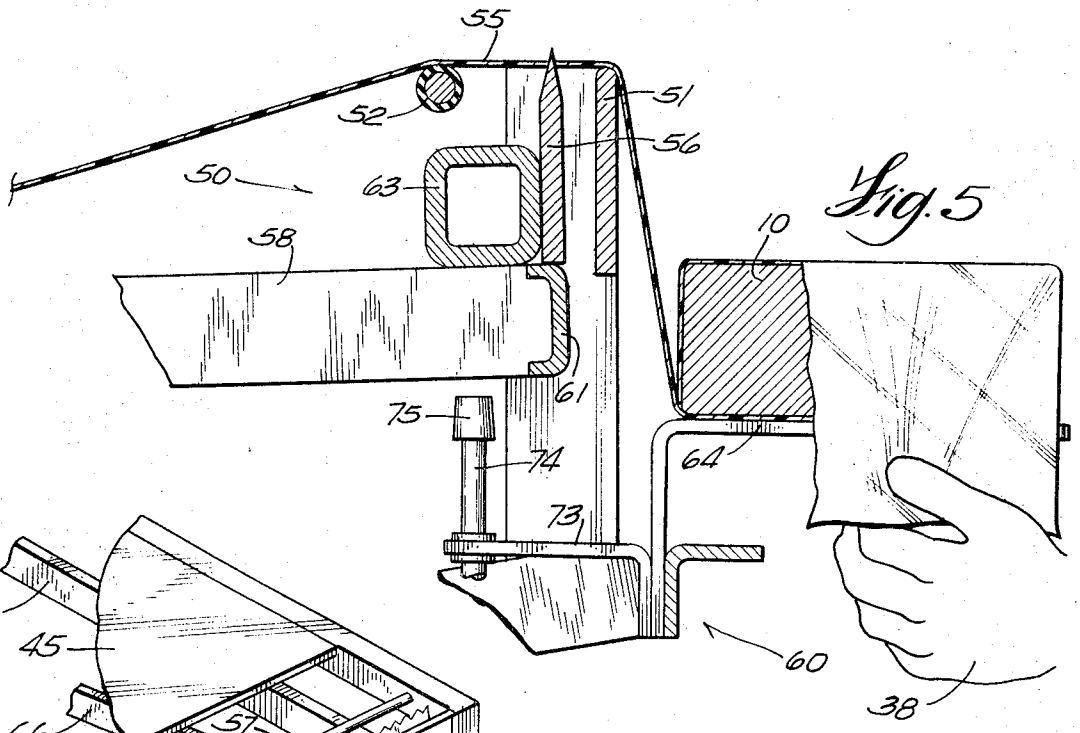
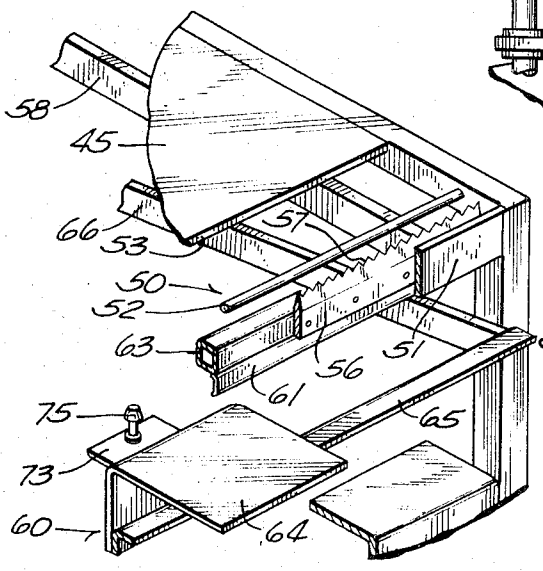


Fig. 6



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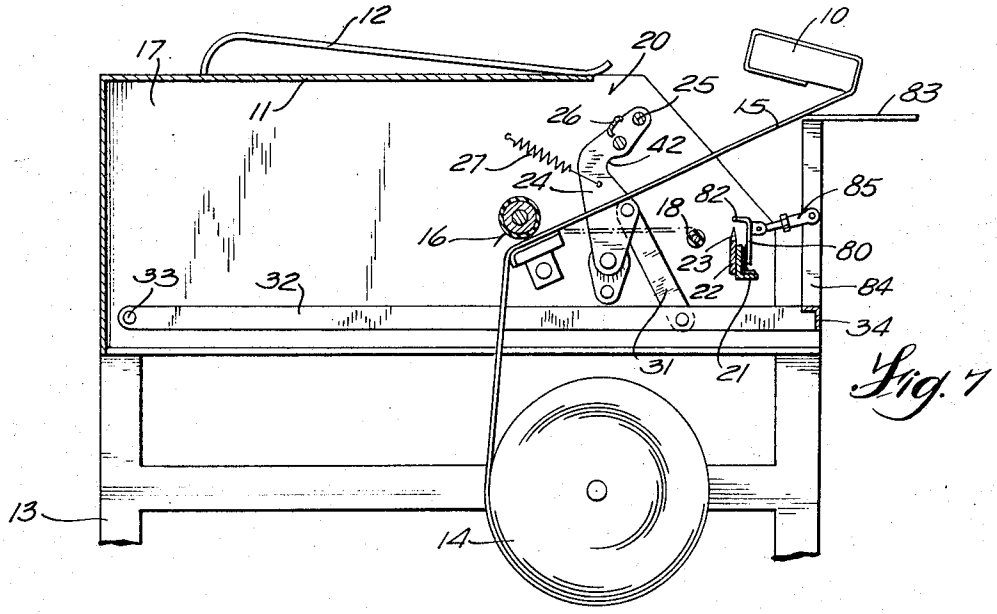
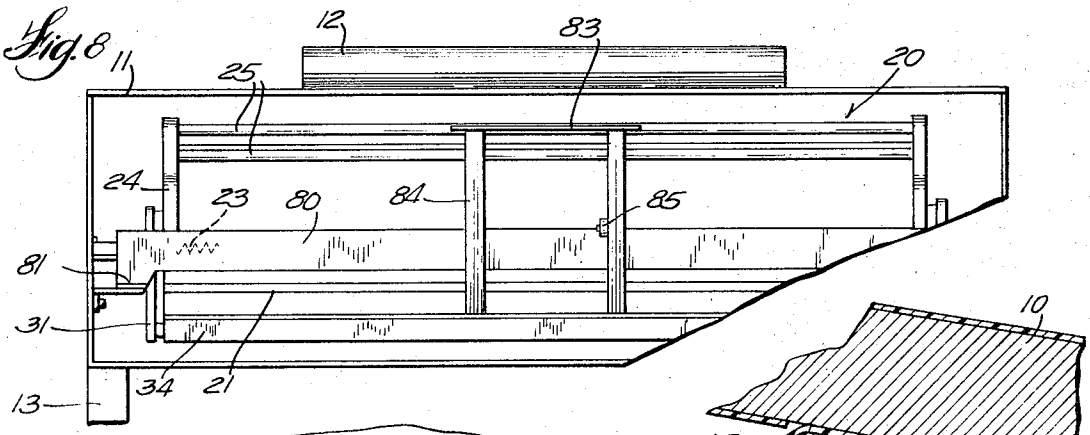


Fig. 7

Fig. 8



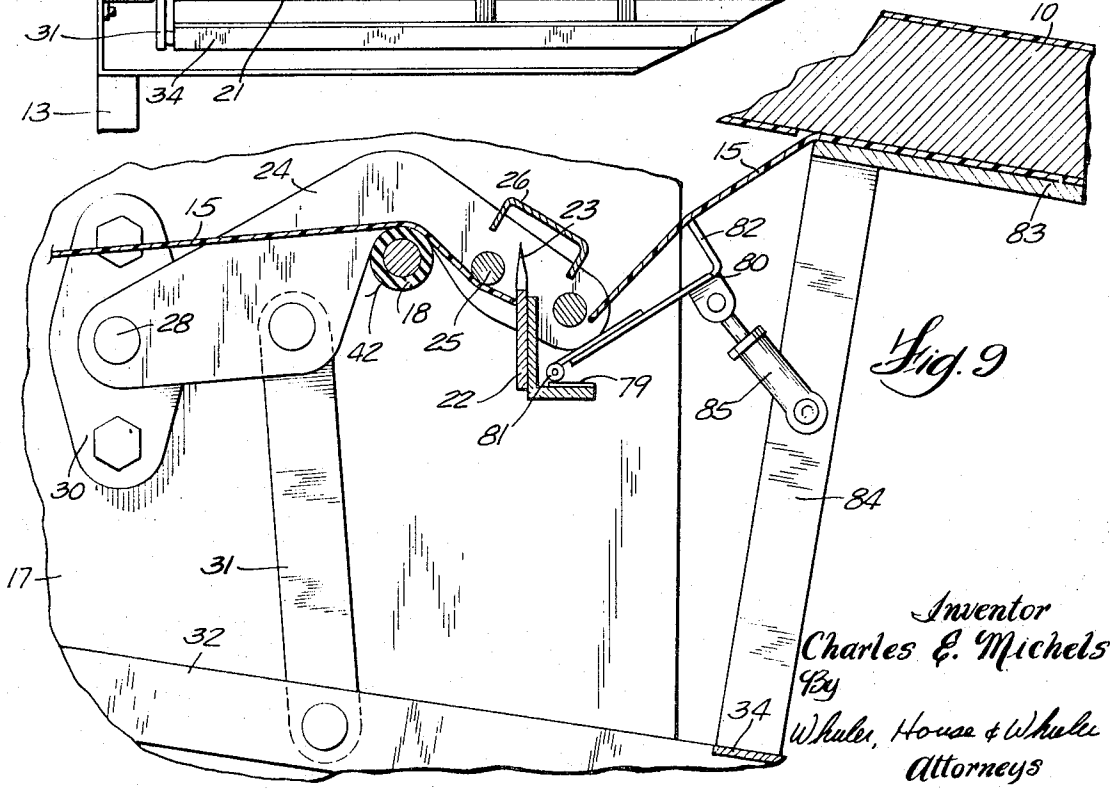


Fig. 9

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PACKAGE WRAPPING APPARATUS WITH PACKAGE ACTUATED WEB SEVERING TOOL

CROSS REFERENCE TO RELATED APPLICATIONS

This application relates to improvements on assignee's copending U.S. patent application Ser. No. 662,674 filed Aug. 23, 1967 now U.S. Pat. No. 3,579,949, and U.S. application Ser. No. 792,535 filed Jan. 21, 1969 now U.S. Pat. No. 3,589,633.

BACKGROUND OF THE INVENTION

The wrapping apparatus shown in the cross referenced applications use a hot wire severing tool. In the course of severing the film, which is typically vinyl or other plastic material, the hot wire vaporizes noxious fumes from the film. These fumes create an unpleasant and potentially hazardous work environment for the machine operator. The hot wire also involves a burn hazard and requires a source of electricity for its operation.

SUMMARY OF THE INVENTION

In accordance with the present invention, the web is severed by a purely mechanical knife action, generating no fumes and avoiding the burn hazard. Apparatus embodying the invention requires no source of electricity for its operation.

In accordance with the present invention the web is severed by mechanically acting web severing parts, including a knife and web snubber which holds the web taut in the path of knife action. In one embodiment of the invention the knife is fixed and the web snubber is mounted on a swing frame which moves the snubber on an arcuate path to intercept the knife. In another embodiment of the invention the web snubber is fixed and the knife is mounted on a swing frame which moves on an arc on which the knife intercepts the snubbed web. In both embodiments of the invention the frame upon which the movable part is mounted is actuated physically in the later stages of the package wrapping operation in which the package is pressed against a package rest which is mounted on a movable frame. As the package is pressed against the package rest it will move the movable frame through a short distance sufficient to mechanically actuate the web severing parts to forceably impale the snubbed web on the knife and thus sever the web in a relatively clean cut straight line of severance. Web severance occurs in time with the normal package wrapping sequence and after a length of film appropriate for wrapping the package has been withdrawn from the film supply roll.

Other objects, features, and advantages of the invention will appear from the following disclosure.

DESCRIPTION OF DRAWINGS

FIG. 1 is a vertical cross section taken through apparatus embodying the invention and in which the knife is stationary and the web snubber is swingable with respect thereto. In this view the web snubber is retracted from the knife and the package is shown in its position just before it lands on the package rest.

FIG. 2 is a front view of the apparatus shown in FIG. 1, portions being broken away to expose details.

FIG. 3 is an enlarged fragmentary cross section of portions of the apparatus shown in FIG. 1, but showing the knife in the course of impaling the snubbed web.

FIG. 4 is a cross section taken through a modified embodiment of the invention in which the web snubber is fixed and the knife is mounted on a swing frame.

FIG. 5 is an enlarged fragmentary cross section of certain cooperating parts of FIG. 4 and showing the knife in the course of impaling the snubbed web.

FIG. 6 is a fragmentary perspective view of a portion of the apparatus shown in FIGS. 4 and 5.

FIG. 7 is a vertical cross section taken through a further modified embodiment of the invention, similar to the embodiment of FIGS. 1–3, but in which the knife guard is of a different construction.

FIG. 8 is a front view of the apparatus shown in FIG. 1, portions being broken away.

FIG. 9 is an enlarged fragmentary cross section of portions of the apparatus shown in FIG. 7, but showing the knife in the course of impaling the snubbed web and the guard swung to an open position.

DESCRIPTION OF PREFERRED EMBODIMENTS

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 claims appended hereto.

Like parts are given the same reference characters in the several views.

In the embodiment of FIG. 1 the wrapping table is typically of the same basic construction as shown in U.S. Pat. No. 3,589,633 aforesaid. Said patent shows the series of film selector trays, such as tray 16 herein, which are selectively manipulated between operative and inoperative positions. Said patent also shows a hot wire web severing tool. Apparatus embodying the present invention is intended to be substituted for the hot wire shown in the prior patent. Inasmuch as the film selector trays are fully disclosed in said prior patent and it is generally immaterial to the present invention whether a single or a series of trays are provided these details are omitted from the present disclosure.

Wrapping table 11 is desirably provided with an inclined support 12 to facilitate wrapping package 10 in a sequence of wrapping steps substantially the same as those illustrated in U.S. Pat. No. 3,579,949 aforesaid. The table 11 is carried on a floor supported roll stand 13 which can carry one but which usually carries several film rolls 14. The film is typically a soft plastic, such as polyvinyl chloride. Film web 15 from the supply roll 14 is trained around a shelf structure 16. Only one shelf structure is shown in FIG. 1, but where several rolls 14 are provided there will be an equal number of shelves, substantially as shown in copending U.S. Pat. No. 3,589,633. Spanning across the side walls 17 of the table near its front end is a plastic covered rod 18. The plastic of the rod is desirably that to which the film web 15 will adhere. For example, when the film web is vinyl, the plastic rod 18 will also be made of vinyl, thus to promote adherence of the film to the rod, in accordance with assignee's U.S. Pat. No. 3,521,425.

In this embodiment of the invention there is another cross member such as angle iron 21 which supports one

part of the web severing tool, namely, a fixed knife blade 22 which has a serrated edge consisting of relatively deep spaced, sharply pointed teeth 23. The knife blade 22 is spaced sufficiently ahead of the plastic rod 18 to leave room for the web snubber in its FIG. 3 position.

Another part of the web severing tool consists of a web snubber 20 which is mounted on paired swing arms 24. The snubber 20 includes fore and aft spaced rod nips 25. An inverted channel guard 26 desirably surmounts the rod nips. The ends of the arms 24 opposite the snubbing rods 25 are pivotally connected to the side walls 17 on paired pintles 28. These, in turn, are mounted on the side walls 17 on the brackets 30. The swing arms 24, nips 25 and guard 26 together constitute a relatively rigid swing frame which is biased to its elevated position illustrated in FIG. 1 by one or a pair of coil springs 27, one end of which is attached to an arm 24 and the other end of which is attached to the wrapping table.

The web snubber 20 is mechanically actuated by motion transmitting connections including paired links 31 respectively pivotally connected at corresponding ends to the swing arms 24 and at corresponding opposite ends to the swing arms 32 of movable frame 29. The swing arms 32 are pivotally connected at their rear ends to the side wall 17 on the pintles 33 and have their forward free ends cross connected by the angle shaped cross member 34 which, in turn, carries a knife guard or shield 35 and a package rest 36 which is elevated on the angle member 34 by upright pedestal 37.

Paired links 31 pivotally interconnect the swing arms 24 of the snubber frame to the swing arms 32 of the movable frame 29.

The springs 27, through swing arms 24, links 31 and frame 29, normally bias the package rest 36 to its uppermost position as shown in FIG. 1.

In the course of wrapping the package 10 in general accordance with the steps illustrated in U.S. Pat. No. 3,579,949, the package 10 from which web 15 extends to the roll 14, as illustrated in FIG. 1, is swept downwardly in the direction of arrow 41 under control of the operator whose hands are shown at 38. Continued downward movement presses the package against the package rest 36 to swing the various parts from their full line positions shown in FIG. 1 to their positions shown in FIG. 3. In the course of this movement the movable frame 29 swings downwardly to concurrently move the guard 35 downwardly to expose the stationary knife blade 22 to the web 15. The swing arms 24 pivot about their pintles 28 to swing the web snubber 20 in an arc toward the knife blade 22. The film web 15 contacts the vinyl coated cross rod 18 just before the knife teeth 23 contact the web 15 which is snubbed or held taut between the two nip rods 25 which embrace the knife blade 22. The sharp teeth 23 penetrate the film web at laterally spaced aligned points thereon, thus to start web tears which develop rapidly as the slanting sides of the teeth rip through the film web. In the position of the parts shown in FIG. 3, where the notches 42 in crank arms 24 stop against the cross rod 18, the film web 15 has been completely severed. The guard channel 26 on the snubber 20 protects the operator from contact with the sharp teeth 23 of the knife.

The severed end of the portion of web 15 which is attached to the package is then snugged around the package as shown in U.S. Pat. No. 3,579,949 aforesaid. The severed end of the web which is still attached to roll 14 will adhere to the rod 18. When the wrapped package 10 is lifted from the package rest 36 the bias springs 27 will retract the web snubber 20 to its position shown in FIG. 1, the web 15 remaining in its broken line position shown in FIG. 1, in readiness for the next package wrapping operation.

The embodiment of the invention shown in FIGS. 1–3 is primarily intended for in-store wrapping of trays of fresh food products, such as meat, poultry, etc.

In the embodiment shown in FIGS. 4, 5 and 6 the wrapping table 45 is mounted on a low profile stand 46 which is adapted to be supported on a table. Stand 46 typically supports a single film roll 47 on paired cross stretchers 48.

The front edge of the table has a fixed web snubber plate or strip 51. Spaced rearwardly therefrom is a vinyl cross member 52 which is similar to cross member 18 of the embodiment shown in FIGS. 1–3.

The table top 45 has its front edge 53 spaced rearwardly from the cross rod 52, thus to provide a gap 54 through which the web 55 of the film roll 47 is trained.

In this embodiment the top edge of plate 51 and the cross piece 52 function as stationary web snubber nips to hold the web taut in the path of movement of a movable blade 56 which desirably has sharp, upwardly projecting teeth 57, as in the previously described embodiment.

The knife 56 is mounted on a swing frame 50 which has swing arms 58 and cross members 61, 63 at the front end of the arms 58. The rear ends of arms 58 are pivotally mounted to the stand 46 on pintles 62.

The swing frame 50 is actuated by pressure of the package 10 against a package rest 64 which is mounted on the front cross member 65 of a movable swing frame 60 which is in motion transmitting connection to the knife frame 50. Swing frame 60 has side arms 66 pivotally mounted on pintles 67 to the stretchers 48. Arms 66 have bell crank end extensions 68 which carry cam rollers 71 which bear against the bottom edges of the side arms 58 of the swing frame 50. Arms 66 are biased upwardly by paired coil springs 72 which interconnect the arms 66 and the arms 58.

The package rest 64 has a rearwardly projecting bracket 73 from which extend oppositely projecting paired bumper rods 74 having rubber bumpers 75 on their ends. Top bumper 75 is aligned with the cross beam 63 on swing frame 50. Beam 63 contacts top bumper 75 in the downwardly retracted position of the knife 56, as shown in full lines in FIG. 4. Lowermost bumper 75 cooperates with a fixed bracket stop 76 mounted on the stand 46 to define the advanced position of knife 56, as shown in broken lines in FIG. 4.

In use the package is partially wrapped on the table top 45 in a manner similar to that shown in U.S. Pat. No. 3,579,949 aforesaid. As the package is drawn forwardly by the operator's hands 38 and is lowered toward the package rest 64, as shown in FIG. 4, the film web 55 will be stretched and snubbed between the snubbing nips 51, 52. At this point in the wrapping sequence the knife 56 is retracted below the level of the snubbed film.

The package **10** is then pressed by the operator downwardly against the package rest **64** as illustrated in FIG. **5**, thus to swing the frame **60** downwardly and cause the rollers **71** on the bell cranks **68** of arms **66** to cam against the swing arms **58** on the knife frame **50**, thus driving the knife through the snubbed film web **55** and severing the web. The end of the severed film web attached to the package will then be snugged by the operator about the package. The end of the film web still connected to the roll **47** will adhere to the cross rod **52** where it will be available for the next wrapping operation. When the operator lifts package **10** from rest **64**, gravity and spring bias will return the parts to FIG. **1** full line position.

The embodiment of FIGS. **4–6** is primarily intended for rewrapping packages with a damaged original film wrapper, at the retail level.

In both embodiments the film web is severed mechanically without need for a hot wire and the severing occurs automatically in the course of the normal movements in wrapping the package and in the course of sweeping the package in an arc from the prewrapped position on the table to the package rest on which terminal wrapping operations are effectuated.

When the package rest reaches its bottommost position (FIGS. **3** and **5**), it is firmly supported to enable it to function as a reaction point about which film wings extending laterally from the package may be folded beneath the package rest, as is illustrated in U.S. Pat. No. 3,579,949.

FIGS. **7**, **8** and **9** relate to a modification of the apparatus shown in FIGS. **1–3**, inclusive. In this embodiment the guard **80** is provided with hinges **79** having pintles **81** by which the guard is mounted on the horizontal flange of the angle member **21** which spans between the side walls **17** of the machine.

The guard **80** has an in-turned top flange **82** which is disposed above the teeth **23** of the knife blade **22** in the FIG. **7** position of the parts in which spring **27** biases the frame **34** to its uppermost position and in which the web severing tool **20** is elevated. Thus the guard **80** intervenes between the knife and the operator and protects the operator from injuring his hand on the knife.

In this embodiment the package rest **83** is mounted from the frame **34** on legs **84**. The guard **80** is pivotally connected to one of the legs **84** by a swing link **85** so that when the frame **34** is depressed under pressure of the package **10** to its FIG. **9** position and the severing tool **20** swings down to sever the web **15**, the link **85** will withdraw the guard **80** to its retracted forward position, clear of the knife blade **22, 23**. However, even in this retracted forward position the guard **80** and its flange **82** span across the front of the mechanism and intervene between the operator and the knife blade **23** so as to intercept the operator's hands in the event he moves them toward the knife blade. This arrangement provides even better protection than the guard **35** of the embodiment of FIGS. **1–3** in which the guard **35** is lowered below the level of the knife blade in its FIG. **3** position. In the embodiment of FIGS. **7** through **9** the guard **80, 82**, while withdrawn out of the way of coaction between the web severing tool **20** and the film web **15**, will still perform a hand guarding function, even in its retracted position.

When package pressure is removed from the package rest **83** spring **27** will elevate the frame **34** and the pivot link **85** will restore the guard **80, 82** to its position shown in FIG. **7** in which it overhangs the knife blade **22, 23**.

I claim:

1. In package wrapping apparatus having a wrapping table, a roll film stand from which a web of roll film is trained and a web severing tool, the improvement in which said tool comprises cooperating web severing parts including a knife and a web snubber, a movable frame on which one of said parts is mounted for movement with respect to the other part, bias means for biasing said parts apart, and package operated means for overcoming the bias of said bias means and moving said frame to cause said knife to cooperate with said web snubber and sever said web by mechanical knife action in response to the pressure of a package, said package operated means comprising a package rest and motion transmitting connections from said rest to said movable frame, said web snubber comprising spaced nips which embrace the knife causing the knife to pierce the web snubbed between said nips, and means including guard means and shield means, said guard means surmounting said nips to block operator contact with the knife at the time the web makes contact with the knife and after it has pierced the web, said shield means movable as one with said package rest and surmounting said knife when said parts are biased apart by said bias means to block operator contact with the knife when said parts are biased apart.

2. Package wrapping apparatus according to claim **1** wherein said shield means includes a shield pivotally connected to said package rest and which blocks said operator contact with the knife when said parts are biased apart and also intervenes between the operator and the knife after the knife has pierced the web.

* * * * *