RESILIENT STRIPPING DEVICE FOR INTERMITTENTLY ACTUATED CUTTER

Filed Aug. 3, 1956

INVENTOR.

Bengt O. Arvidson

BY

Schneider, Happe, Brady & Wagner

Attys
This invention relates to a wrapping machine for cutting sheets of wrapping material from a web of limp film material such as used in the packaging art and for facilitating wrapping of such a sheet around a product.

An object of this invention is to provide a new and improved wrapping machine.

A further object of this invention is to provide a stripping having new and improved properties in association with cutting mechanism having relatively movable knives to effect the leading edge of the cut material from one of the knives after a cutting operation.

A further object of the invention is to provide a stripper as defined in the preceding paragraph wherein the stripper is a relatively smooth, slippery surfaced blade of reinforced plastic which overlies and is secured to a lower knife of the cutter with a free edge overlying and spaced from the cutting edge of the lower knife and being free for slight movement toward and away from the lower knife, said stripper blade being relatively stiff, but flexible, whereby the free edge moves with the material toward the lower knife as the upper movable knife of the cutter cuts the material and moves away from the lower knife to lift the cut edge of the material from the lower knife as the knives move relatively apart.

The objects of the invention generally set forth, together with other ancillary advantages, are attained by the construction and arrangement shown by way of illustration in the accompanying drawings, in which:

FIG. 1 is a side view in elevation of the wrapping machine with the left hand side thereof broken away;

FIG. 2 is an end view in elevation of the machine showing the end of the machine appearing at the right in that view;

FIG. 3 is a plan view of the machine;

FIG. 4 is a fragmentary side view in elevation of the side of the machine opposite to that shown in FIG. 1;

FIG. 5 is a fragmentary enlarged view in elevation showing the web stripper mechanism;

FIG. 6 is a fragmentary horizontal section taken along the line 6-6 in FIG. 5.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings, and will herein be described in detail, an illustrative embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated.

The scope of the invention will be pointed out in the appended claims.

The wrapping machine is illustrated in FIGS. 1 to 4 and includes a frame having legs 1, 2, 3 and 4 with longitudinally extending braces 5 and 6 connecting the legs 1 and 3 and the legs 2 and 4, respectively. Added rigidity is provided for the frame by diagonal braces 7 and 8. As shown in FIG. 3, a rotatably mounted shaft 9 may support a supply roller carrying a web of relatively limp film material 10. This film material is extremely thin and in some instances may be only .0004 inch in thickness. The material may have a substantial static charge of electricity which increases the problems in handling the material. Although not limiting the disclosed invention to such materials, examples of limp films used in the wrapping art are polyethylene film, saran film and "Pliofilm." The web of material 10 passes from the supply roller through a web feed coupling supported in the frame and comprising a lower roller 11 having relatively narrow, transversely spaced grooves 12, as shown in FIGS. 3 and 5, and an upper pressure roller 13 having transversely spaced, relatively narrow, web engaging rims 14. The web feed coupling is on the entry side of a cutting station, indicated generally at 15. A lower knife bar 16 at the cutting station extending transversely between the frame members 5 and 6 supports a lower knife 17 (FIG. 5) which cooperates with a movable knife 18 pivoted by a pin 19 at one of its ends to bracket 20 to form with the lower knife 17 a scissors-type cutter.

A sheet of the limp film material is cut from the web at the cutting station 15 and is advanced therefrom by a plurality of transversely spaced, relatively narrow, endless belts 21 to a wrapping station which may be located near the discharge end of the belts. The belts 21 travel around spaced apart rollers 22 and 23 which are rotatably mounted in the frame of the machine.

The foregoing structure is structurally similar to that disclosed in Patent No. 2,654,196 to M. H. Corley et al., dated October 6, 1953.

The drive for the mechanisms described includes a motor 25 (FIG. 1) having a shaft on which a pulley 26 is mounted for moving an endless belt 27 to rotate a pulley 28 which is keyed to a shaft 29 having a pinion 30 in mesh with a gear 31 which is connected to a driving clutch element 32. The driving clutch element 32 is selectively engageable with a driven clutch element 33. A clutch control, indicated generally at 34, operates to engage the clutch elements 32 and 33 to obtain one revolution of the clutch element 33 each time that a cycle of operation is initiated. The clutch control 34 is basically the same as that shown in the Corley et al. patent, and particularly FIGS. 50 to 56 thereof. The clutch element 32 and the gear 31 are rotatably mounted on a shaft 35 (FIG. 1) which carries at its opposite end a roller 36. The shaft 35 is secured to the driven clutch element 33, so that axial shifting movement of the shaft 35 will, in one direction, result in engagement between the clutch elements, and disengagement when moved in the opposite direction. The axial position of the shaft 35 is determined by another steel roller 37 which is secured to a rotatable shaft 38. Reference may be had to the previously mentioned Corley et al. patent for a more detailed illustration and description of the clutch control mechanism. In the instant case, the rotation of shaft 38 to free roller 37 from roller 36 is carried out by mechanism different from that shown in the referred-to patent, and which will be more fully described hereinafter.

A cam 40 is connected to the driven clutch element 33 for rotation therewith, which cam carries a connecting rod 41 to which one end 42 of a crank arm 43 is connected. The crank arm 43 is connected to a rock shaft 44, so that one revolution of the cam 40 will result in oscillating the crank arm 43 and rock shaft 44 back and forth in one cycle of operation. The rock shaft 44 carries a rocker arm 45 (FIG. 4) which has a rack 46 connected thereto above the rock shaft 44 by an adjustable connection 47. The rack 46 engages a gear 48 connected to the driving element of a one-way clutch 49 with the driven element of the clutch being engaged with the roller 11 of the web feed coupling. The opposite end of the rocker 11 supports a gear 50 for driving a gear 51 on a stub shaft 52 which drives a gear 53 on the shaft of roller 23 around which the belts extend.

It will thus be apparent that rotation of the rocker arm 45 in a clockwise direction will result in the rotation of the roller 11 to cause the web to be advanced therefrom through the web feed coupling and simultaneously cause movement of the sheet advancing belts 21, so as to advance a sheet of limp film material away from the cutting station 15.
where it has been cut from the web. Movement of the rocker arm in the opposite direction will not result in movement of the web feed coupling or the sheet advancing belt since the one-way clutch 49 will free wheel. However, the lower part 54 of the rocker arm 45 carries a roller 55 which rolls upon an inclined wall 56 formed on an arm 57 so as to lower the arm 57 about its pivot 58. This lowering movement of the arm 57 results in lowering of the movable knife 18 to cut the web of material by the connecting link 59 extending between the movable arm 57 and the knife. A spring 60 connected between the arm 57 and the frame as shown at 61 raises the arm 57 to raise the cutter knife 18 after the roller 55 has passed off the inclined wall 56. Upon movement of the rocker arm 45 in the next cycle of operation, the roller 55 will pass from the position shown in FIG. 4 to a position to the left of the wall 56 by passing through a pivoted gate 62 forming a part of the wall 56 which permits the roller 55 to pass therebeyond when returning, but does not move when the roller 55 is rolling on the inclined wall 56.

At the cutting station 15, a stripper blade 63 extends across the top of the lower knife 17 (FIG. 5) and is adhesively secured to the top of the lower knife by means such as double-faced, pressure-sensitive tape 64. The stripper blade 63 is substantially coextensive with the lower knife 17, while the tape 64 is set back from the cutting edge of the lower knife so as to provide a free edge 65 of the stripper blade which overlies and is spaced from the cutting edge of the lower knife. In assembly of the structure, a stripper blade which is overlaid on the lower knife 17 is trimmed to size by causing the knives 17 and 18 to move through a cutting operation.

The stripper blade is formed from a glass-fiber reinforced plastic having a smooth, slippery surface and being relatively stiff but flexible as well as having the capacity to not build up a static charge of electricity. An example of such a material is glass-fiber reinforced "Teflon" which is a tetrafluoroethylene polymer. On the up movement of the movable knife 18, the stripper blade exerts a lifting action on the cutting leading edge of the web to lift the film and break loose any "welding" of the material to the lower knife 17. In this manner, the leading edge of the web may feed out on the next cycle of operation without causing a jam in the material.

The feeding of the web is facilitated by a series of transversely spaced feed strippers 66 connected at one of their ends to a mounting bar 67 extending between the frame braces 5 and 6. The feed strippers 66 extend forwardly from the bar 67 and lie between flanges 14 on the upper feed roller 13 to prevent the film material from sticking to the upper feed roller 13 as it passes through the feed coupling. The feed strippers 66 are formed of the same material as the stripper blade 63 and perform satisfactorily because of their inability to build up a static charge of electricity.

A series of transversely spaced guides and strippers 68 are secured to the lower knife bar 16 by machine screws 69 and function to strip the film material from the lower feed roller 11 by fitting in the grooves 12 therein and also guide the material onto the stripper blade 63.

At the wrapping station previously referred to near the discharge end of the sheet conveying belts 21, a top plate 70 extends between the braces 5 and 6, and a pair of base plates 71 and 72 are located beneath the top plate. Each of the base plates carries a row of upstanding fingers 73 which are of a length sufficient to extend above the belts 21 when the base plates are in an elevated position and to be located beneath the belts 21 when the base plates are in a lowered position. The two rows of diagonally aligned fingers 73 when in their elevated position form a package locating trough in which the fingers under a sheet of wrapping material form a pair of flaps which drape over the fingers with a trough formed in the material between the rows of fingers so that a product, such as a plurality of frankfurters, as shown in FIG. 7, may be placed therein, and the two diagonal flaps then folded across the product to form a band.

The fingers 73 are arranged with respect to the belts 21 so that each finger is arranged in the space between two adjacent belts for non-interfering movement with respect to the belts. The top plate 70 positioned beneath the belts 21 is provided with a plurality of elongated slots 74, there being one slot for each finger, and the slots are of a length to permit adjustment of the distance between rows of fingers for size of package and also simultaneous shifting of all the fingers in order to make a slight adjustment in the position of the wrapping station. The adjustment between the rows of fingers is accomplished by connecting the base plates 71 and 72 together by bolts 75 extending through slots 76 in the two base plates. The simultaneous shift of all the fingers is accomplished by adjustment of a supporting bracket 77 (FIG. 1) extending downwardly from base plate 71 along a tubular arm 78 on which the bracket 77 is adjustably mounted.

The fingers 73 are raised and lowered by means of the cam 40 connected to clutch element 33, previously referred to, which cam operates a cam follower roller 79 carried on an arm 78a pivoted to the frame by a pin 80. A connecting link 81, which is constructed for adjustment in length, extends between the arm 79a and an arm 82 which is pivoted to a bracket 82a on the frame by a shaft 83. The tubular arm 78 is also connected to the shaft 83 so that raising and lowering movement of the cam roller arm 79a results in raising and lowering movement of the tubular arm 78 and the fingers 73.

A heat sealer is movably mounted adjacent the wrapping station and includes a head 85 engageable with the folded-over, diagonal flaps bonded around a product at the wrapping station to heat seal the flaps together. The head 85 is carried on an arm 86 which is pivoted to a mounting bracket 87 by a pin 88. The up and down movement of the heat sealer is manually controlled by a foot treadle 89 (FIGS. 1 and 2) which is pivoted at 90 on a swivelly mounted bracket 91. The treadle 89 is connected by a horizontal bar 92 to a vertically extending link 93 which at its upper end is connected to a pivoted arm 94 intermediate its ends by a pin 95. The arm 94 at one end is pivoted on the machine frame by a pin 96 and at its other end is slidable mounted on a vertically extending link 97 which is pivotally connected to the heat sealer arm 86 by a pin 98. The lower end of the link 97 is provided with a nut 99 so that downward movement of the pivoted arm 94 in response to pressing on the foot treadle 89 causes following movement of the link 97 by engagement with the nut 99 to lower the heat sealer into engagement with a package. A spring 100 connects between a bracket 101 on the link 97 and a lug 102 on the frame and functions to raise the heat sealer when the foot treadle is released and restore the foot treadle to its normal position. The raised position of the heat sealer is determined by an adjustable collar 103 on the link 97 which engages an abutment 104 on the frame.

The restor to the heat sealer to its raised position by the spring 109 is utilized to start a cycle of operation of the machine. A collar 105 is secured to the vertically extending link 93 associated with the foot treadle 89 and is positioned beneath a forked member 106 pivoted at 107 on the frame of the machine. The forked member 106 has at its other end an arm 108 which is connected by a pin 111 to an L-shaped link having arms 109 and 110. The arm 110 of the link is connected to a latch lever 114 pivotally connected to the frame by a pin 115. The latch lever 114 is provided with a latch surface 116 which may engage a mating surface 117 on a clutch release lever 118 secured to the rotatable shaft 36, previously referred to.
A release lever spring 119 extends between the pin 120 on the clutch release lever and a pin 121 secured to the frame of the machine and acts to raise the clutch release lever 118 about the shaft 38 when the release lever is freed from the latch 114. A latch spring 122 extends between a bolt fixed in the shaft 38 and a lug 120 on the latch 114. The latch spring 122 functions to restore the latch lever 114 to its latching position. This is accomplished by the latch spring 122 acting to pull the fork member 106 downwardly a short distance which results in also shifting the collar 105 on the foot-treadle-operated link 93 which is made possible by the force exerted by the latch spring 122 exceeding the force exerted by the heat sealer elevating spring 109.

The resetting of the clutch release lever 118 subsequent to its release from the latch lever 114 is effected by a reset roller 130 carried on an arm 131 which is mounted on the rock shaft 44. The reset roller 130 is in its extreme downward position to reset the clutch release lever 118 when the machine components are half way through a cycle of operation with the rock shaft 44 in its extreme clockwise position, as viewed in FIG. 4, when the rack 46 has completed its operation of the web feed coupling and the sheet advancing belts.

In operation, the lowering of the heat sealer by the foot treadle 89 and upward return thereof by release of the treadle and under the urging of return spring 100 will cause the collar 105 on the treadle link 93 to pivot upwardly the forked arm 106 which results in shifting the latch lever 114 to release the clutch release lever 118 to free the clutch control roller 37 from the roller 36 on the clutch shaft 35. This permits clutch element 33 to engage clutch element 32 and rotate together, so that the cam 40 and the crank arm 43 begin their movements. As shown in FIG. 1, the cam 40 will rotate in a counter-clockwise direction, so that the cam follower roller 79 immediately commences to move down a slope on the cam 40 which results in lowering the base plates 71 and 72 to lower the packaging trough fingers 73 and free banded product at the wrapping station for advance away therefrom by the advance belts 21 and clear the wrapping station for a new sheet 135 of wrapping material.

The rack 46 actuates the web feed coupling to advance a length of limp film material through the cutting station and to cause the belts 21 to move a product from the wrapping station and also a sheet previously advanced from the cutting station into the wrapping station. At the limit of this movement the reset roller 130 has reset the clutch release lever 118 in engagement with the latch lever 114 to reposition the clutch control roller 37 for engagement with the roller 36 subsequently at the end of one revolution of shaft 35 and cause disengagement of the clutch elements 32 and 33. As the rocker arm 45 and rack 46 move in the opposite direction, the roller 55 on the lower end 54 of the rocker arm rides up the inclined wall 56 on arm 57 to lower the movable knife 18 across the lower knife 17 to cut a sheet of material from the web. As the roller 55 rides off the wall 56, the spring 60 is effective to raise the movable knife 18 and at this time the stripper blade 63 is effective to raise the newly cut leading edge of the web off the cutting edge of the lower knife 17. Also, during the second half of the cycle when the cutting occurs, the cam follower roller 79 advances onto the high area of the cam 40 which raises the base plates 71 and 72 to raise the fingers 73 under the advanced sheet 135 of material to form a package locating trough with the pair of diagonal flaps of the sheet of material draped over the fingers 73. At the completion of one revolution of the shaft 35, the clutch control rollers 36 and 37 engage to axially shift the shaft 35 and disengage the clutch elements 32 and 33. The operator may then again operate the heat sealer after folding a pair of diagonal flaps across the product which will start another cycle of operation of the machine.

If desired, the disclosed machine may be operated only as a seether in which the heat sealer 85 and fingers 73 for forming a package locating trough would not be utilized. In this operation, a sheet of limp film material would be taken from sheet advancing belts 21 manually by an operator at either side of the machine, and a succeeding operation of the mechanism would be caused by an operator's hand engaging either of two hand trips 150 and 151 having slanted faces and mounted on a floating hand trip bar 152 extending laterally of the machine. The hand trips extend through openings 153 and 154 in the table top 70 and are movably guided thereby.

The hand trip bar 152 is mounted on the upper end of a rod 155 which at its lower end connects to the arm 10 which is connected to the latch lever 114. Thus, an operator depressing either of the hand trips 150 or 151 as a sheet is taken from the sheet advancing belts will move latch lever 114 to release the latch 118 to start a cycle of machine operation.

I claim:
1. A film seethers for selectively limp film materials comprising, in combination, a cutting station for severing sheets successively from a web of film material, means including upper and lower grooved rollers for advancing the web to the cutting station, a cutter at the cutting station including a relatively movable upper knife and a lower knife over which the web of material passes, a stripper blade secured to the upper side of the lower knife and positioned beneath the web of material providing a support for the web at the point of cutting thereof and having an edge generally overlying and spaced from the cutting edge of the lower knife, said stripper blade being constructed so as to have a relatively smooth slippery surface and somewhat stiff but flexible properties so as to flex toward the lower knife with the material when cut and to unflex and pull the cut edge of the material from the lower knife after the cutting operation, a plurality of guides and strippers extending within grooves in the lower grooved roller beneath the web for stripping and guiding a web onto the stripper blade, and a plurality of upper strippers having the same properties as the stripper blade extending within grooves in the upper grooved roller and overlying therewith for stripping the web from said upper grooved roller.
2. A film seether for relatively limp film materials comprising, in combination, a cutting station for severing sheets successively from a web of film material, a cutter at the cutting station including a relatively movable upper knife and a lower knife over which the web of material passes, a stripper blade of a tetrafluoroethylene polymer overlying the upper side of the lower knife and positioned beneath the web of material with an edge generally overlying and spaced from the cutting edge of the lower knife a strip of double faced pressure sensitive tape securing the stripper to the lower knife, said stripper blade edge being trimmed to size by said knives in assembly of the seether to obtain maximum length thereof and effect in stripping of the film from the lower knife, said stripper blade being constructed so as to have a relatively smooth surface and somewhat stiff but flexible properties so as to flex toward the lower knife with the material due to the cutting action of the knives and to unflex and pull the cut edge of the material from the lower knife after the cutting operation.
3. The film seether of claim 1 whereby the guides and stripper bars extending within the grooves of the upper and lower grooved rollers are of a tetrafluoroethylene polymer and ends of the lower stripper bars lie adjacent the stripper blade.

References Cited in the file of this patent
UNITED STATES PATENTS
978,535 Armstrong ------------- Dec. 13, 1910
(Other references on following page)
<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Invention</th>
<th>Date</th>
<th>Patent Number</th>
<th>Invention</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,007,852</td>
<td>Drucklieb</td>
<td>Nov. 7, 1911</td>
<td>2,338,132</td>
<td>Sandberg</td>
<td>Jan. 4, 1944</td>
</tr>
<tr>
<td>1,473,089</td>
<td>Faust</td>
<td>Nov. 6, 1923</td>
<td>2,405,790</td>
<td>Krueger</td>
<td>Aug. 13, 1946</td>
</tr>
<tr>
<td>1,651,096</td>
<td>Molins</td>
<td>Nov. 29, 1927</td>
<td>2,509,760</td>
<td>Crafton</td>
<td>May 30, 1950</td>
</tr>
<tr>
<td>2,003,027</td>
<td>Wright</td>
<td>May 28, 1935</td>
<td>2,629,440</td>
<td>Shaw et al.</td>
<td>Feb. 24, 1953</td>
</tr>
<tr>
<td>2,037,330</td>
<td>Jackson</td>
<td>Apr. 14, 1936</td>
<td>2,654,196</td>
<td>Corley</td>
<td>Oct. 6, 1953</td>
</tr>
<tr>
<td>2,219,650</td>
<td>Helsel</td>
<td>Oct. 29, 1940</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,220,256</td>
<td>Martindell</td>
<td>Nov. 5, 1940</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,227,877</td>
<td>Malhot</td>
<td>Mar. 31, 1942</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8

**OTHER REFERENCES**