This invention relates to apparatus for dispensing pressure sensitive adhesive labels and more particularly to apparatus for feeding articles and applying pressure sensitive adhesive labels thereto.

An object of the invention is to provide a new and improved apparatus for dispensing pressure sensitive adhesive labels.

Another object of the invention is to provide a new and improved apparatus for applying pressure sensitive labels onto articles.

Another object of the invention is to provide an apparatus for feeding articles and applying pressure sensitive adhesive labels thereto in predetermined positions thereon.

A further object of the invention is to provide an apparatus for feeding articles and applying pressure sensitive adhesive labels removably mounted thereon and for conveying the labels through a predetermined path transversely of the first path and around a sharp corner to cause the labels to peel off of the tape and be advanced thereby into engaging engagement with an article in its path.

A motor drive advances the tape and is started in response to actuation of a trip lever by the movement of an article to a predetermined position adjacent the label dispenser, and means are provided for projecting a beam of light onto the labels and through the tape between the labels as the tape advances and photo-electric control means are actuated by the beam of light passing through the tape between the labels for stopping the motor drive and the tape. The trip lever is adjustable along the path of movement of the article to vary the position of the article at which the labels are applied thereto.

Means are provided for stopping the feeding of articles when the supply of labels runs out or when the tape breaks.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 is a fragmentary side elevational view of the apparatus for conveying articles and applying labels thereto;

Fig. 2 is a plan sectional view of the apparatus taken along line 2—2 of Fig. 1;

Fig. 3 is a perspective view of an article showing a label applied thereto;

Fig. 4 is a fragmentary view of a tape with the labels removably applied thereto;

Fig. 5 is an enlarged fragmentary side elevational view of the label dispensing portion of the apparatus.

Fig. 6 is a fragmentary vertical cross-sectional view of the apparatus taken along line 6—6 of Fig. 5;

Fig. 7 is an enlarged fragmentary cross-sectional view of the apparatus taken along line 7—7 of Fig. 5;

Fig. 8 is a fragmentary vertical cross-sectional view of a portion of the apparatus taken on the line 8—8 of Fig. 7;

Fig. 9 is a detailed cross-sectional view taken on line 9—9 of Fig. 8;

Fig. 10 is a fragmentary side elevational view of a portion of the apparatus looking in the direction indicated by arrows 10—10 on Fig. 2 and showing the means for adjustably mounting the starting switch and the trip lever therefor;

Fig. 11 is a plan sectional view taken along line 11—11 of Fig. 10; and

Fig. 12 is a wiring diagram showing the electrical control for the apparatus.

The present apparatus is designed to automatically dispense labels 12 and apply them onto predetermined portions of cartons 17 as the cartons are conveyed along a predetermined path. The labels 12 have a layer of pressure sensitive adhesive 18 (Fig. 4) on one face thereof and are removably secured thereto by a flexible transparent or translucent tape 20 with spaces 21 therebetween. The labels may be readily removed from the tape by passing the tape around a relatively sharp corner, causing the label to progressively peel or separate therefrom.

As shown in Fig. 1, the cartons 17 are moved through a vertical path by a conveyor or elevator 25 which includes guides, hangers 26 pivotally mounted on a conveyor chain 27 engaging drive sprockets 28 which are driven by a suitable drive mechanism indicated diagrammatically at 30. Vertical L-shaped guide members 32 of the conveyor form a vertical guideway for guiding the cartons as they are raised to a predetermined elevation where they are transferred onto a horizontal conveyor (not shown) which receives cartons containing different products from a plurality of elevators and conveys the articles to storage chutes into which the articles are selectively shunted in accordance with the different positions of the labels 15 on the cartons.

A tape dispensing device 35 for applying the labels 15 onto the cartons as they move thereby has a main frame plate 37 which has flanges 38 by means of which the frame plate is secured to one of the vertical guide members 32. A spool or reel 40 for holding a supply of the tape 20 with the labels 15 thereon is rotatably mounted on a supporting spindle 41 on the frame plate 37 and the tape 20 is guided through a predetermined path around idler rollers 42 and a spring pressed roller 44 which presses the tape against an inclined guide plate 45. The guide plate 45 has an integral attaching flange or bracket 46 which is secured to the frame plate 37 by screws 47. The upper end of the guide plate 45 has a narrow edge forming a relatively sharp corner 48 which is positioned adjacent the path of travel of the cartons 17, and the tape 20 is moved through a sharp angle around the corner 48 to cause the labels 15 to progressively separate from or peel off of the tape and be carried thereby into engagement with the carton 17 positioned in its path of movement. The adhesive side of the label contacts the carton and the end portion of the label adheres to the carton and aids in removing the label from the tape. With the labels 15 removed therefrom, the tape 20 is directed downwardly and laterally around a guide roller 49 and between a pair of meshing spur gears 50 and 51 which grip the tape and are driven by a motor 52 for positively advancing the tape. As the tape 20 leaves the drive gears 50 and 51, it is wound up on a tape spool or reel 53 releasably mounted on a drive spindle 54.
which is driven through gears 55 by a motor 56 mounted on the frame plate 37. The gear 50 is mounted on one end of an arm 57 and is secured to the frame plate 37 and is geared for clockwise movement by a spring 53 against a stop 59 to yieldingly maintain the drive gears 50 and 51 in mesh and gripping engagement with the tape 20. The stop 59 also limits pressure on the tape to prevent cutting thereof.

The label 15 is peeled off the tape 20 and is applied to a carton it advances upwardly with the carton into engagement with a flexible belt 60 and is pressed thereby into a tight engagement with the carton. The belt 60 rides on a pair of rollers 61 and 62, which are rotatably mounted on pins 64 and 65. The arm 65 is pivotally supported on the bracket 46 for limited oscillatory movement about the pin 64 and is stressed for clockwise movement by a spring 67 to a normal position with the belt 60 disposed in the path of travel of the cartons 17. As a carton is carried upwardly by the conveyor 25, it engages the belt 60 which rides along the side of the carton and presses the label firmly against it. An electric heating unit 75 (Figs. 5 and 8) is mounted in a recess in the upper end of the inclined guide plate 45 for heating the tape and the labels 15 before the labels are applied to the carton. As the tape and the label 15 are heated, the adhesive on the label becomes more sticky and enables the labels to be more readily peeled from the tape and also increases the adherence of the labels to the cartons.

Control means are provided for starting and stopping the motors 51 and 56 to automatically feed the tape 20 through a predetermined distance and apply a single label to a carton in response to movement of the carton to a predetermined position relative to the label dispensing corner 48 of the apparatus. A normally open starting switch 80 (Figs. 1, 2, and 12) has a pivoted trip lever 81 connected thereto which is positioned in the path of travel of the cartons 17 and is actuated thereby to close the switch 80 when the carton reaches a predetermined position. When closed, the switch 80 energizes a timer 83 (Fig. 12) which is connected to power lines 84 and 85 and closes normally open contacts 83—1 thereof to complete a circuit through and energize the takeup motor 56 and line 88 which has normally open contacts 88—1, 88—2, and normally closed contacts 88—3. Upon energization of the relay 88, the contact 88—2 closes and connects the drive motor 52 to a source of alternating current from a secondary winding 89 of a transformer 90, the primary of which is connected to the power lines 84 and 85. The normally closed contacts 88—3 close a circuit through a secondary winding 92, and a rectifier 93 to apply direct current dynamic braking to the drive motor 52 to effect a quick stop thereof and to locate the foremost label adjacent the corner 48 for the next cycle. Thus, when the contacts 88—3 are opened in response to energization of relay 88, the braking of the motor 52 is terminated simultaneously with the energization and starting thereof.

When the relay 88 is energized the relay contacts 88—1 close and energize a light source 94 which is mounted on the bracket 46 on one side of the guide plate 45 and the tape 20 for projecting a beam of light through a slot 95 in a masking plate 96 onto the labels 15 and through the portions 21 of the tape 20 between the labels as the tape with the labels thereon advances along the guide plate 45. The beam of light, when it passes through the spaces 21 of the tape 20 strikes a photo-electric cell 97 which is connected to the grid of a glow discharge tube 98 and which changes the grid bias thereof to trip the tube and cause it to conduct and energize a relay 99 and thereby open the normally closed contacts 99—1 thereof to deenergize the relay 88 and the takeup motor 56. Upon deenergization of the relay 88 the contact 88—1 is opened to deenergize the light source 94, and the contact 88—2 is opened to deenergize the drive motor 52, and the contact 88—3 is closed to apply D.C. dynamic braking to the drive motor for a quick stop thereof. The timer 83 times the operation of the relay 88 and later to open contacts 83—1 to stop tape feed motor 56 in the event of failure of tube 98 or of photocell 97 and to open contacts 88—2 to interrupt the D.C. circuit through the tube 98 and prepare it for the next cycle.

The starting switch 80 and the trip lever 81 (Figs. 1, 2, 10, and 11) are carried by an aperture block 100 which is slidable mounted on a pair of vertical guide rods 101—102 and has a threaded bore engaging a threaded rod 103. The rods 101, 102, 103 are supported in a suitable frame 104 secured to one of the vertical guide members 105 carried by an aperture block 100. The stops 102 has graduations thereon to indicate the relative position of the trip lever 81. The threaded rod 103 has a handle 106 thereon by means of which the rod may be rotated to raise and lower the switch 80 and the trip lever 81 to vary the distance between it and the end of the corner 48 of the tape dispensing device 35. Thus, the trip lever 81 may be adjusted to selectively vary the position on the carton 17 at which the label 15 is applied. A spring 108 yieldingly maintains the switch 80 open and the trip lever 81 in a horizontal position in the path of movement of the cartons 17.

A levering switch 82 mounted on a pin 111 pivotally supported in the frame plate 37 and rides on the roller 20 on the supply reel 10 on one side of the frame plate and has an arm 112 on the other side of the frame plate for actuating a normally closed switch 113 when all but a predetermined supply of tape is exhausted to stop the conveyor drive 30 and thereby prevent the movement of the cartons 17 past the dispenser when there is a possibility that no labels can be applied thereto. As shown in Fig. 5 the idler roller 49 about which the tape 20 moves, is rotatably supported on crank arm 114 secured to a pin 115 which is oscillatably mounted on the frame plate 37 and has a cam 116 for actuating a switch 117. The tape 20 holds the roller 49 and crank arm 114 in operative position to maintain the switch 117 closed and in the event the tape 20 should break, the weight of the roller 49 and the crank arm 114 will cause them to turn the cam 116 and open the switch 117 and thereby effect the stopping of the conveyor drive 30. To permit adjusting the position of the corner 48 relative to the side of the carton 17 the guide plate 45 is made with a separate movable section 145 on which the corner 48 is formed and which is adjustably secured to the plate 45 by screws 146 (Figs. 5 and 9) and has a shallow flat tongued groove 147 which is provided in the guide plate 45 for guiding the tape 20 therein. The masking plate 96 likewise is adjustably secured to the guide plate 45 to permit adjustment of the slot 95 and the beam light relative to the corner 48 whereby the tape drive controls may be adjusted to stop the tape 20 on the guide plate 145 with the end of the foremost label 15 adjacent the corner 48.

In the operation of the apparatus the conveyor 25 moves the cartons 17 upwardly to a predetermined position where the upper edge of the carton actuates the trip lever 81 and closes the starting switch 80 to energize the timer 83 and close the contacts 83—1 and 83—2 for a predetermined interval. The closing of contacts 83—1 starts the takeup motor 56 and energizes the relay 88 which starts the drive motor 52 to feed the tape 20 and cause the foremost label 15 to peel off of the tape and be advanced thereby into adhering engagement with the side of the carton 17 and in a predetermined location thereon. The energized gas filled electronic cell 97 is energized and effects the energization of the light source 94 and the projection of the beam of light which is intercepted by the label 15 as the label passes therebeneath and after the label has been advanced a predetermined distance the beam of light passes through the space between adjacent labels and strikes the photo-electric cell 97 to energize it and change the grid bias of the electronic
tube 98 and cause it to conduct and energize the relay 99. This instantly opens contacts 99—1 to stop the take-up motor 56 and deenergize relay 88 which effects the immediate deenergization of the drive motor 52 and simultaneously therewith effects the application of D.C. dynamic braking current to the motor to brake the motor drive. The relay indicates the tape feed 100 and cause it to conduct and energize the relay 99. This instantly opens contacts 99-1 to stop the conveyor drive 91 and when the tape from the tape supply reel 40 becomes exhausted, the switch 111 is actuated to stop the conveyor drive 30. The timer 83, after it is actuated, times out a fraction of a second after the tape feed stops and thus opens the circuit to insure that the tape stops in case of a failure of the electronic tube 98 or photo-electric cell 97.

While a trip lever 81 has been shown for actuating the starting switch 89 of the label feed mechanism in response to movement of a carton to a predetermined position, it will be understood that other suitable means, as, for example, a photo-electric means, may be used to actuate the switch 89 in response to the movement of the carton to said predetermined position.

From the above description, it will be seen that a relatively simple and effective mechanism is provided for automatically applying pressure sensitive adhesive labels individually onto selected portions of advancing cartons in response to movement of the carton individually to a predetermined position in their path of travel, and that means are provided for automatically stopping the tape feed after a label has been applied to a carton, and that means are provided for stopping the carton conveyor drive when the supply of tape is exhausted or when the label supply of tape is exhausted.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In an apparatus for applying pressure sensitive adhesive labels onto articles, means for feeding articles along a predetermined first path, a supply of transparent tape having pressure sensitive labels spaced thereon, means for supporting the supply of transparent tape and for guiding said tape through a predetermined second path transversely of said first path and around a corner to cause the labels to peel off of the tape and be advanced thereby into adhering engagement with moving articles in their path, drive means for advancing said tape along said second path, a switch means mounted in the path of movement of said article and actuated by the movement of an article to a predetermined position for starting the drive means, means operated by the switch means for directing a beam of light onto the labels and through the transparent tape between the labels as the tape is advanced, and means responsive to the beam of light passing through the tape between said labels for stopping said drive means, and means for selectively moving said switch means to vary the position of the labels applied to the articles.

2. A device for applying labels to articles, a transparent tape having spaced opaque labels removably attached thereto, means for advancing articles, means for feeding the tape to said articles to apply the labels, a light source to direct a beam through the path of the tape, a normally open circuit having a photocell, a thyratron connected to and adapted to be energized by said photocell, said photocell means for conducting in response to the light beam passing through the tape, relay means within said circuit and operated by the thyratron to interrupt the tape feed means and light source, a timer energized by the advance of an article to actuate the light source and tape feeding means, and means operated by the timer timing out to de-energize the thyratron.

3. An apparatus for dispensing labels from a movable transparent web to which labels are separately attached in spaced relationship comprising means for advancing articles through said web to cause said labels from said advancing articles to be separated and applied to articles, a timed operated by the advance of each article for initiating operation of said feed means, said timer unit adapted to time out after a period of time required to apply a label, a normally unoperated tube circuit, a photocell positioned on one side of said web to sense for spaces between said labels, an unoperated light source positioned on the opposite side of said web, a first relay circuit operated by said timer for operating said light source to energize said photocell to operate said tube circuit, a second relay circuit operated by said tube circuit for interrupting said first relay circuit, and means operated by said timer timing out for deenergizing said tube circuit a further interrupting of said first relay circuit.

4. An apparatus for dispensing labels from a movable transparent web to which the labels are separably attached in spaced relationship comprising means for individually advancing articles to be labeled, a squeeze mounted switch means actuated by an advanced article, a timer operated by the switch means, a first relay circuit energized by the timer, a normally closed switch in series with the first relay circuit, a light source energized by the first relay circuit and directed toward the tape, a photocell in the path of the light source on the opposite side of the tape and adapted to be energized by the passage of light through the space between a pair of labels, an electron tube operated by the energization of the photocell, a second relay circuit operated by the electronic tube to open the normally closed switch, a guide plate juxtaposed to the path of the articles, a drive unit actuated by the first relay circuit to move the transparent web over the guide plate to apply a label to a predetermined section of the article, means operated by said timer timing out after a predetermined period of time for interrupting the operation of the electronic tube and said first relay circuit, and means for moving the switch to vary the predetermined section of the article that receives the label.

5. A device for applying labels to articles, a transparent tape having pressure-sensitive adhesive labels spaced thereon, means for advancing articles along a predetermined path, a guide plate juxtaposed to said predetermined path, means for feeding tape over said guide plate to apply a label to each article advanced along said predetermined path, and a control circuit for said tape feeding means comprising a first circuit having normally opened and normally closed contacts together with a first relay, means operated by closure of said normally opened contacts and the energization of said relay for operating the tape feed means, a normally unoperated light source adapted to project light onto said labels, means actuated by said first relay for operating said light source, a second circuit including a thyratron and a second relay adapted to open said normally closed contacts, a photoelectric device responsive to the passage of light through said transparent tape to operate said thyratron and energize said second relay to open said normally closed contacts, a movably mounted switch means juxtaposed to said predetermined path of said articles and operated by the movement of an article, a timer operated by said switch means for immediately closing said normally opened contacts, a second set of normally opened contacts connected to said second relay and immediately closed by operation of said timer, said timer adapted to open both sets of said normally opened contacts following a period of time sufficient for the feed means to advance a label.
onto a moving article, and means to adjust the position of said switch means to vary the position of the label applied to the moving article.

References Cited in the file of this patent

<table>
<thead>
<tr>
<th>Patent</th>
<th>Inventor(s)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,002,194</td>
<td>Brasseur</td>
<td>Aug. 29, 1911</td>
</tr>
<tr>
<td>1,946,371</td>
<td>Walker</td>
<td>Feb. 6, 1934</td>
</tr>
<tr>
<td>1,968,166</td>
<td>Pythian et al.</td>
<td>July 31, 1934</td>
</tr>
<tr>
<td>2,226,766</td>
<td>Gordon et al.</td>
<td>Dec. 31, 1940</td>
</tr>
<tr>
<td>2,482,711</td>
<td>Jensen</td>
<td>Sept. 20, 1949</td>
</tr>
</tbody>
</table>

OTHER REFERENCES