ABSTRACT OF THE DISCLOSURE

A tape applicator for applying translucently extending strips of adhesive tape at predetermined intervals along the edge of a moving web of material such as disposable diaper stock, and for simultaneously applying release coated covered tabs over the strips of tape. The tape applicator may utilize either wide tape cut into short segments or, with an appropriate change of gear ratios, may use narrow tape cut in long segments to take advantage of the longitudinal strength properties of certain types of tape material. In their preferred form, the long narrow tape segments are re-oriented and applied to extend transversely from the edge of the web material.

BACKGROUND OF THE INVENTION

The invention relates generally to an adhesive tape applicator and, more particularly, concerns a waistband tape applicator for disposable diapers.

In recent years, new materials and advanced manufacturing techniques have made possible mass production of disposable diapers which can effectively compete with conventional laundered diapers. This is particularly true of those disposable diapers which include a fluid impervious backing sheet that eliminates the need for separate plastic or rubber panties that are normally required for conventional laundered diapers. The incorporation of such a fluid-impermeable exterior for disposable diapers makes desirable the diaper be properly folded into a body-forming shape in order to enhance the holding capacity of the diaper as well as avoid unnecessary contact of the impermeable material with an infant's skin which might cause irritation.

As disclosed in the Hrubeyck Patent No. 3,196,874, such diapers are machine embossed or otherwise creased along designated pre-fold lines to facilitate subsequent folding of the diaper into substantially body conforming and excrement entrapping configuration.

In their preferred form, the diaper blanks are of multilayered constructions such as disclosed in the copending Endres application, Ser. No. 715,301, now U.S. Pat. No. 3,520,305, to which reference may be made for further details. Such diaper blanks may be made on a disposable diaper forming apparatus such as disclosed in the copending application of Frick et al. application, Ser. No. 776,351, filed Nov. 18, 1968, now U.S. Pat. No. 3,552,736. The particular tape applicator of the present invention is an improvement over that disclosed in the latter application. All of the above named applications as well as the patent, are assigned to the assignees of the present invention.

As an added advantage to purchasers of disposable diapers, the diapers are often supplied with a pair of waist band tape segments adhesively secured to opposite end portions of the disposable diaper which serve as a substitue for conventional safety pin-like diaper clips. The tape segments extended outwardly generally transversely from opposite end portions of the diaper and include a cover strip to protect the adhesive surface until immediately before use, whereupon the cover strip is removed.

It will be appreciated that many different kinds of adhesive tape material may be used in conjunction with disposable diapers; including: thin paper, fabric and plastic tape materials. For disposable diapers to economically compete with the conventional laundered diapers, it is necessary to use mass production techniques as well as utilize the lowest cost quality materials available. For these reasons, it is advantageous to use the lowest cost tape available that will have the necessary tensile strength in the direction of greatest stress when applied to the disposable diaper.

It is generally recognized in the paper and cloth producing industries that these products generally have the greatest tensile strength in the machine direction, whether it be in the machine direction of a fourdriner machine for making paper or a weaving machine for producing a cloth fabric. In many instances, the tensile strength of the material in the machine direction is more than twice as great in the transverse direction. For a given tensile strength, a strip of paper tape, for example, may need to be only one-half as thick if the tape is oriented such that the stress applied to the strip is in the machine direction. It will also be appreciated that continuous paper webs produced by the high speed fourdriner machines are more easily wound and subsequently rewound into rolls in the machine direction.

Because of these tensile strength and production considerations, it is advantageous to cut a number of relatively narrow rolls from a relatively wide roll of paper tape material. However, since disposable diaper stock is also made as a continuous web, and the tape segments are applied at predetermined intervals to opposite sides of the web of diaper stock in a direction transverse to the movement of the diaper stock it is seen that difficulty arises in applying the tape segments to the moving diaper stock, since the machine direction of the tape is transverse to the machine direction of the diaper stock.

Accordingly, it is a primary object of the present invention to provide an improved apparatus for applying an outwardly extending strip of adhesive material to the edge of a moving web of material, such as disposable diaper stock, with the strip being transverse in its long direction relative to the moving web.

A further object of the invention is to provide an improved apparatus for applying an outwardly extending transverse strip of an adhesive material in timed relation with a moving web of the material, so that the strips of adhesive are applied thereto at predetermined intervals.

Yet another object of the present invention is to provide an apparatus that will cut off a predetermined length of a relatively narrow strip adhesive material from a roll, with the machine direction of the adhesive material being in its long direction with the apparatus re-orienting the strip before applying it transversely in the direction of the moving web.

A more detailed object of the present invention is to provide an apparatus that is easily adaptable to cut short tape segments from a wide roll or long segments from a narrow roll, applying either type of segments transversely to the direction of the moving stock.

Other objects and advantages will become apparent upon reading the following detailed description and upon reference to the attached drawings, in which:

FIG. 1 is a side elevation of the waist band tape applicator in conjunction with a disposable diaper producing apparatus;

FIG. 2 is a view, partially in section, taken along line 2-2 of FIG. 1 illustrating the lower portion of the waist band tape applicator;

FIG. 3 is a view, partially in section, taken along line 3-3 of FIG. 1 illustrating the upper portion of the waist band applicator;
FIG. 4 is an enlarged side view of portions of the waist band tape applicator, taken along line 4-4 of FIG. 3; FIG. 5 is an enlarged side view with parts removed, illustrating the lower transfer roller shown in FIG. 1; FIG. 6 is a perspective schematic view illustrating the simultaneous application of adhesive tape as well as a cover strip to a sheet; FIG. 7 is a side view, partially in section, illustrating the vacuumized carrier block of the transfer roller of FIG. 5; FIG. 8 is a top view of the carrier block taken along the line 8-8 of FIG. 7; FIG. 9 is an elevation of a modified transfer roller which may be substituted for the transfer roller of FIG. 5; and FIG. 10 is an end view, partially in section, illustrating the modified transfer roller shown in FIG. 9.

DESCRIPTION OF THE INVENTION

While a preferred embodiment has been illustrated in the accompanying drawings and will hereinafter be described in detail, it is recognized that many alterations, modifications, and substitutions may be performed. It is intended that the invention not be limited to the preferred embodiments shown and described, but that such alterations, modifications and substitutions be included as fall within the spirit and scope of the appended claims.

Turning now to the drawings, and particularly FIG. 1, a waistband tape applicator, indicated generally at 20, is illustrated in conjunction with portions of a disposable diaper producing apparatus indicated generally at 22, which for simplicity is shown to include a supply roll 24 of disposable diaper stock 26 that is fed to the tape applicator by a feeding mechanism 28. It will be understood, however, that the disposable diaper stock 26 may also be supplied directly from the discharge end of the diaper stock forming machine (not shown) rather than from the supply roll 24.

To feed the diaper stock 26 in timed relation to the tape applicator 20, a suitable drive train 30 is coupled to the feeding mechanism 28 and to the internal drive means of the tape applicator 20, as well as other portions of the diaper producing apparatus which are not shown.

Subsequent to the application of tape on the diaper stock 26, the stock may be cut into individual diapers, suitably folded and thereafter packaged as desired. Thus, it is seen that the applicator 20 is preferably in-line part of the total diaper producing apparatus, applying segments of tape at regularly spaced intervals as the stock passes therethrough. The speed of the diaper stock 26 may, of course, be extremely high for the mass production of the disposable diapers. Because outwardly extending adhesive tape segments are applied at spaced intervals at opposite sides of the diaper stock 26, the tape applicator 20 is generally symmetrical and includes substantially similar portions on each side thereof which are driven by a gear train that is common to both sides.

The tape applicator also includes upper and lower sections, divided by the diaper stock traveling therethrough, the lower portion applying segments of adhesive tape to the underside of the diaper stock and the upper portion simultaneously applying segments of cover strip to the outwardly extending portion of the tape segments in face-to-face contact. The adhesive tape as well as the cover strip originate from respective continuous supply rolls and are fed to transfer rollers. While on the respective transfer rollers, a predetermined length is cut and then carried to simultaneously contact the moving diaper stock 26.

To accommodate the use of various tape and cover strip materials, the apparatus is adaptable to cut along strips from a supply of relatively narrow tape or cut relatively short strips from a wide roll of supply tape. This conversion is accomplished by substituting transfer rollers and changing the gear ratios of pull rollers which deliver the tape to the cut-off and transfer rollers.

In the event relatively long tape segments are cut from a narrow roll of supply tape, the transfer roller includes a unique mechanism to reorient the tape segment to take advantage of the relatively better characteristics of non-isotropic tapes as hereinbefore described. Referring again to FIG. 1, adhesive tape material 32 may originate from either a supply roll 34 or a ready roll 36 and is passed around tensioning or pull rollers 38 and 40 prior to contacting a transfer roller 42 which cooperates with a cutting orer 44, to cut a segment from the tape 32. The transfer roller 42 rotates in a clockwise direction to carry the tape segment and apply it to the underside to the traveling diaper stock 26.

To apply a cover strip for protecting the outwardly extending portion of the tape segment, cut strip material 46 is played off either a supply roll 48 or a ready roll 50 and is fed around tensioning or pull rollers 52 and 54 where a cutting roller 56 cooperating with a vacuum roller 58, cuts a segment of the cover strip material and transfers it to a transfer roller 60 which applies it in face-to-face contact with the tape segment substantially simultaneously applied to the lower surface of the diaper stock 26.

As is shown in FIGS. 2 and 3, the tape applicator 20 is generally symmetrical, having respective pull, vacuum and transfer rollers on each side thereof, with the respective rollers of the lower tape applicator being driven by a gear train 62 which drives the respective rollers on opposite sides at the same rotational velocity. Similarly, the upper cover strip rollers are driven by a gear train 64 (see FIG. 3). The respective gear trains 62 and 64 are of conventional construction and will not be described in detail. However, the relationships of the rotational velocities of the various rollers being driven by the gear trains will be described.

In accordance with one aspect of the present invention, and referring to FIG. 4, the pull rollers 38 and 40, the cut-off roller 44, as well as the transfer roller 42, are all driven by the gear train 62 in timed relation to apply segments of tape 32 at predetermined intervals as the diaper stock 26 travels through the applicator in the direction of the arrow as shown. As will hereinafter be described in more detail, the transfer roller 42 has a vacuum system (shown by the dotted lines) which operates to hold the tape 32 on the outer surface of the transfer roller 42 as it approaches the cut-off roller 44.

To cut segments from the tape 32, the cut-off roller has a cut-off blade 66 cooperating with three cut-off anvils 68 equally positioned around the circumference of the transfer roller 42. For the cut-off knife 66 to cooperate with each of the anvils 68, it will be understood that the cut-off roller 44 must be rotated by the gear train 62 at three revolutions for each revolution of the transfer roller 42, with the length of the segment cut from the tape 32 being determined by the rotational velocity of pull rollers 38 and 40 (also driven by gear train 62) which feed the tape 32 to the transfer roller.

Application of the tape is achieved by providing the transfer roller 42 with three carrier blocks 70 equally spaced on the circumference of the transfer roller immediately ahead of the anvils 68 in the direction of rotation, so that the segments of tape are carried by the blocks 70 for application to the underside of the diaper stock 26. The tape segments are held on the outer surface of the carrier blocks, by means of another vacuum system.

In the event the tape 32 is relatively narrow, longer segments must be cut therefrom and applied to the moving stock 26. However, since the tape segments are to be applied transversely to the direction of the diaper stock 26, it is seen that the segments must accordingly be rotated or reoriented approximately 90° before being applied to the moving stock 26.

In keeping with an important aspect of the present invention, the carrier blocks 70 are a part of a unique mechanism that provides for such reorientation and, re-
ferring to FIG. 5, it is seen that the carrier blocks 70 are rotatable through an angle approximating 90°.

To angularly position the carrier blocks 70 in timed relation to the rotation of the transfer roller 42, meshing bevel gears 72 and 74 are provided, with the bevel gear 72 being shafted to a rotatable shaft 76 which is longitudinally extendable. The bevel gear 74 has an operating arm 80 including a cam follower 82 that engages an eccentric cam track 84. Thus, as the transfer roller 42 rotates, the operating arm 80 rotates the bevel gears to rotate the carrier block as well. Although other relationships may be used, the illustrated embodiment has bevel gears 72 and 74 with a 2:1 tooth ratio, such that the carrier block 70 rotates 2° for every 1° of rotational movement of the operator arm 80.

The eccentric cam track 84 is such that the long dimension of the face of the carrier block is parallel to the direction of rotation of the transfer roller 42 when the carrier block is at the lowest evaluation as shown in FIG. 5, with the operating arm rotating 45° to rotate the face of the carrier block 90° by the time it reaches its uppermost elevation. Additionally, the cam track 84 operates to rotate the follower 82 to its original position as the transfer roller completes a single revolution, so that the face of the carrier block 70 is in position to receive another segment of tape.

It is desirable to apply uniform pressure along all points of the tape segment as it is applied to the diaper stock 26 and accordingly, the face of the carrier block 70 is substantially flat as is shown in FIGS. 7 and 8. With the blocks having a substantially flat face surface, it is recognized that the leading and trailing edges in the long direction of the carrier block would be above the periphery of the curved transfer roller 42, resulting in possible interference with the cut-off knife 66.

Thus, in keeping with another aspect of the present invention, this possible interference is eliminated by elevating and retracting the carrier block 70 in respect to the outer surface of the transfer roller 42. To provide for such movement, the carrier block 70 has an Acme screw thread 86 or the like, on its inner end portion, with the thread 86 engaging a stationary threaded nut 88 secured to the transfer roller 42. Thus, as the carrier block 70 is rotated by the above described bevel gear linkage, the carrier block is extended as it approaches its highest elevation, and is similarly retracted such that the leading and trailing edges of the face thereof are substantially level or below the peripheral surface of the transfer roller 42 when a second segment of tape.

While the tape is being applied to the underside of the moving stock 26, the upper portion of the apparatus 20 simultaneously applies a segment of cover strip to the outwardly extending portion of the tape segment as well as a part of the diaper stock itself, as is shown in FIG. 6. The cover strip segment need not have adhesive applied thereto, since the adhesive of the tape holds the cover strip in place. The advantage of a non-adhesive cover strip segment is that the portion of the cover strip segment that is not in face-to-face contact with the adhesive on the tape provides a convenient leader portion which permits easy removal of the cover strip.

Whereas the tape 32 may originate from a relatively narrow supply roll, the cover strip material 46 originates from a relatively wide supply roll from which short lengths are cut and thereafter applied to overlie the tape segments. One reason for this arrangement is that the cover strip does not require strength characteristics of the magnitude of carrying the stress carried by the tape segments and therefore, does not need to be reoriented to take advantage of the machine direction as is important for some tape materials.

Referring to FIG. 4, the pull rollers 52 and 54 are driven by the gear train 64 in timed relation to feed the wide strip material 46 to a vacuum roll 88 which, as the name implies, contains a vacuum system for holding the strip material 46 in contact therewith. The vacuum roll 58 has two oppositely positioned cutting anvils 90 which cooperate with a cutting blade 92 that is a part of a cutting roller 56. Because each of the cutting anvils 90 cooperates with the cutting blade 92 to sever segments from the strip material 46, the cutting roller 56 must be driven by the stress carried by the tape segments of the vacuum system within the transfer roller 60 effectively holds the strip segment to one of the surfaces 94 and rotation of the transfer roller 60 carries the strip segments toward the diaper stock 26 to be simultaneously applied with the tape segments. Additionally, the vacuum holding a single cover strip segment is terminated upon application of the strip segments to the tape segments. It is seen that since the vacuum roller 58 and the transfer roller 60 each have two time contact with segments of strip material for each revolution, they have equal rotational velocities, and since the transfer roller 42 has three times contact with tape segments compared with the simultaneously applied strip segments from the two time transfer roller 60, it is seen that the transfer roller 60 has a rotational velocity one and one-half times greater than transfer roller 42. These rotational velocities are, of course, attained by suitably providing the appropriate gear ratios for the gears within the drive train 64.

In accordance with another aspect of the present invention, many of the rollers, as well as the carrier block 70 associated with transfer roller 42 utilize a vacuum system to retain either the cover strip material or the adhesive tape material in contact therewith during rotational travel of the rollers. Referring to FIG. 4, it is seen that the cover strip material 46 is held to the surface of the vacuum roller 58 immediately before it reaches the nip between the vacuum roller and the cutting roller 56 and the cut strip segments are thereafter held in place until they contact one of the surfaces 94 on the transfer roller 60, whereupon the vacuum is terminated for that angular position and the vacuum system of transfer roller 60 thereafter holds the segment in place until it is applied to overlie the tape segment.

Similarly, transfer roller 42 utilizes two vacuum systems, one of which holds the tape material 32 to the surface of transfer roller 42 immediately prior to reaching the nip between the roller 42 and the cutting roller 44, with the other vacuum system being associated with the carrier block 70 to retain the tape segments on the face of the carrier blocks while they are carried to the diaper stock 26 whereupon the vacuum is terminated as the segments are applied.

To vacumize the surfaces of the rollers 42 and 58, as well as the surfaces 94 of the transfer roller 60, each have a plurality of generally radially directed apertures 96 communicating the outer surfaces of the respective rollers with generally axially parallel passage ways 100, 102, 104 as shown in FIGS. 2-4. Support brackets 100, 102 and 104 are respectively associated with transfer roller 42, vacuum roller 58 and transfer roller 60 as is shown in FIGS. 2 and 3, and each of the brackets have an annular passageway 106 therein as well as an inlet 108 communicating the annular passageway 106 with a vacuum source (not shown). Interposed between the respective brackets and rollers are stationary vacuum valve plates 110 that have apertures 112 selectively positioned to communicate the annular passageway 106 with respective passageways 98 during rotation of the rollers. Thus, it is seen that vacuum may be supplied to various segments of the surfaces during rotation of the rollers, and may also be terminated at other angular positions by the solid portion
of the valve plate 110 by selectively positioning the apertures 112. Thus, it is seen that vacuum may be applied during virtually any portion of the rotation movement of the various rollers.

To provide vacuum for retaining the tape segments upon the carrier block 70, the faces of the blocks have a number of elongated grooves 114 in communication with generally radial passages 116 which extend through the shaft 76 (see FIG. 5) to openings 118. As is shown in FIGS. 2 and 4, the bracket 100 additionally has an annular passageway 120 as well as an inlet 122 communicating the annular passageway 120 with a suitable vacuum supply (not shown). Similarly, the vacuum plate 110 associated with the support bracket 100 has a second set of annular openings 124 which are similar to openings 112 to selectively communicate the annular passageway 120 with the openings 118.

As was previously mentioned, the tape applicator 20 may either apply relatively short lengths of tape from a wide supply of tape material 32, or relatively long lengths from a narrow supply roll. The transfer roller 42 which has the rotatable carrying block 70 associated therewith is adapted to cut long lengths from a relatively narrow supply roll. For example, 3" lengths may be cut from a supply roll having a width of approximately ¾". Similarly, the cover strip portion of the tape applicator may cut ¾" lengths from a supply roll of 3" width, with the result that the cover strip and tape segments are approximately the same size as is shown in FIG. 6.

In keeping with yet another aspect of the present invention and referring to FIGS. 9 and 10, the transfer roller 42 may be replaced by a modified transfer roller 126 similar to transfer roller 42 except that the rotatable carrying blocks 70 are not included. Thus, it is seen that short lengths of tape 32 would be cut from a wide supply roll, for there is no provision to reorient a long segment of narrow tape. Accordingly, pull rollers 38 and 40 must be adapted to feed the tape 32 to the transfer roller 126 at a slower speed. For example, in the event ¾" x 3" segments were to be applied by the transfer roller 42 as well as the transfer roller 126, the speed of the approaching tape 32 would be four times greater feeding a narrow tape 32 to the transfer roller 42 than for feeding a wide tape to transfer roller 126.

Thus, it is seen that the wasteband tape applicator 20 is easily adaptable to apply tape segment economically, to take advantage of the strength characteristics of various tape material and to efficiently apply the tape and cover strip segments while operating at high production speeds. We now present our invention:

1. An apparatus for applying an outwardly extending strip of material to the edge of a sheet traveling along a predetermined flow path comprising, in combination; means for supplying strip material from a source in timed relation to the flow of said sheet, means for cutting off a predetermined length of said strip material, means for transferring said cut strip to adjacent a preselected location along the edge of said sheet as said sheet moves along said flow path while simultaneously reorienting said cut strip so the length thereof extends generally outwardly from the edge of said sheet, and means for attaching the inner end of said cut strip to said sheet.

2. An apparatus as defined in claim 1 wherein said transfer means includes a carrier block mounted in the periphery of a rotating transfer wheel and said block is rotatable about an axis extending radially of said transfer wheel for reorienting said strip generally transverse to said edge.

3. An apparatus as defined in claim 2 wherein said transfer wheel includes a plurality of said carrier blocks symmetrically located about the periphery thereof.

4. An apparatus as defined in claim 3 wherein said transfer wheel is provided with a cutting anvil located adjacent to and in trailing relation to each of said carrier blocks.

5. An apparatus as defined in claim 4 wherein said cutting means includes a knife roll located adjacent said transfer wheel, said knife roll being rotatable in timed relation to the rotation of said transfer wheel, and having at least one knife edge thereon for cooperating with said anvil blocks to cut said strip material.

6. An apparatus as defined in claim 3 wherein said transfer wheel is provided with a perforated periphery and means are provided for drawing a vacuum through said periphery as it passes between preselected accurate points to hold the leading end of said strip material against said transfer wheel prior to cutting off each predetermined length of said strip material.

7. An apparatus as defined in claim 6 wherein means are provided for terminating said vacuum as the periphery of said transfer wheel passes a point substantially coincident with the location of said cutting means.

8. An apparatus as defined in claim 3 wherein said carrier block is formed with a perforated face and a vacuum is drawn through said face to hold said cut strip thereon.

9. An apparatus as defined in claim 8 wherein means are provided for terminating said vacuum substantially simultaneously with the attachment of said strip to said sheet.

10. An apparatus as defined in claim 3 including means for radially extending said carrier block from the periphery of said transfer wheel incident to rotation of said block to reorient said strip.

11. An apparatus as defined in claim 10 wherein said carrier block is provided with a substantially flat face in order to apply substantially uniform pressure to said strip as it is attached to said sheet.

12. An apparatus as defined in claim 10 wherein said carrier block is retracted and rotated back to its original position subsequent to attachment of said strip on said sheet.

13. An apparatus as defined in claim 2 wherein said carrier block is mounted on the end of a screw rotatable about said radially extending axis and including means for rotating said screw incident to rotation of said transfer wheel.

14. An apparatus as defined in claim 13 wherein said screw rotatable means includes an eccentric cam track located adjacent said transfer wheel and a cam follower mounted on an operating arm carried by said transfer wheel and drivingly coupled to said screw.

15. An apparatus as defined in claim 14 wherein said arm is coupled to said screw through a pair of meshing bevel gears which have a 2:1 tooth ratio such that said screw rotates 2° for every 1° of rotational movement of said operating arm.

16. An apparatus as defined in claim 2 including a second transfer wheel for applying another cut strip at a preselected location along the opposite edge of said sheet.

17. An apparatus as defined in claim 2 wherein said attaching means includes a second transfer wheel which forms a nip with said first transfer wheel through which the edge of said sheet passes and said second transfer wheel includes means for carrying a strip of backing material to said preselected location and applying the same to cover the outwardly extending portion of said cut strip.

18. An apparatus as defined in claim 17 wherein said first strip material is relatively narrow and is cut into lengths at least twice its width and said second strip material is relatively wide and is cut into lengths less than half its width.

19. An apparatus as defined in claim 17 wherein the cut length of said second strip material exceeds the width of said first strip material.
20. Apparatus as defined in claim 17 wherein said apparatus includes a second pair of transfer wheels forming a nip through which the opposite edge of said sheet material passes.

21. A method of applying a transversely extending strip of material to the edge of a sheet travelling along a predetermined flow path comprising the steps of:
   drawing relatively narrow strip material from a supply source in timed relation to the flow of said sheet,
   cutting off a predetermined length of said strip material,
   transferring the cut strip to adjacent a preselected location along the edge of said sheet as it moves along said flow path while reorienting the strip so the length thereof is generally transverse to said edge,
   and attaching the inner end of said strip to said sheet at said preselected location.

22. The method defined in claim 21 wherein said supply source is a roll and said strip material is withdrawn from said roll along a path parallel to the flow path of said sheet and substantially in alignment with the edge thereof.

23. The method defined in claim 21 wherein said strip material has a contact adhesive on one face thereof and said attaching is accomplished by pressing said adhesive bearing face against said sheet.

24. The method defined in claim 21 wherein said cut strip is transferred on a vacuum block carried on the periphery of a rotating transfer roll and said strip is re-oriented by simultaneously rotating said block about an axis extending radially of said transfer roll.

25. The method defined in claim 24 wherein said vacuum block is extended radially outwardly from the periphery of said transfer roll incident to the rotation thereof to reorient said strip.

References Cited
UNITED STATES PATENTS
3,322,600 5/1967 Harrison et al. ------ 156—519 X
3,221,738 12/1965 Ekberg et al. ------ 156—290 X

DANIEL J. FRITSCH, Primary Examiner
U.S. Cl. X.R.
156—292, 299, 302, 519, 552, 556, 568