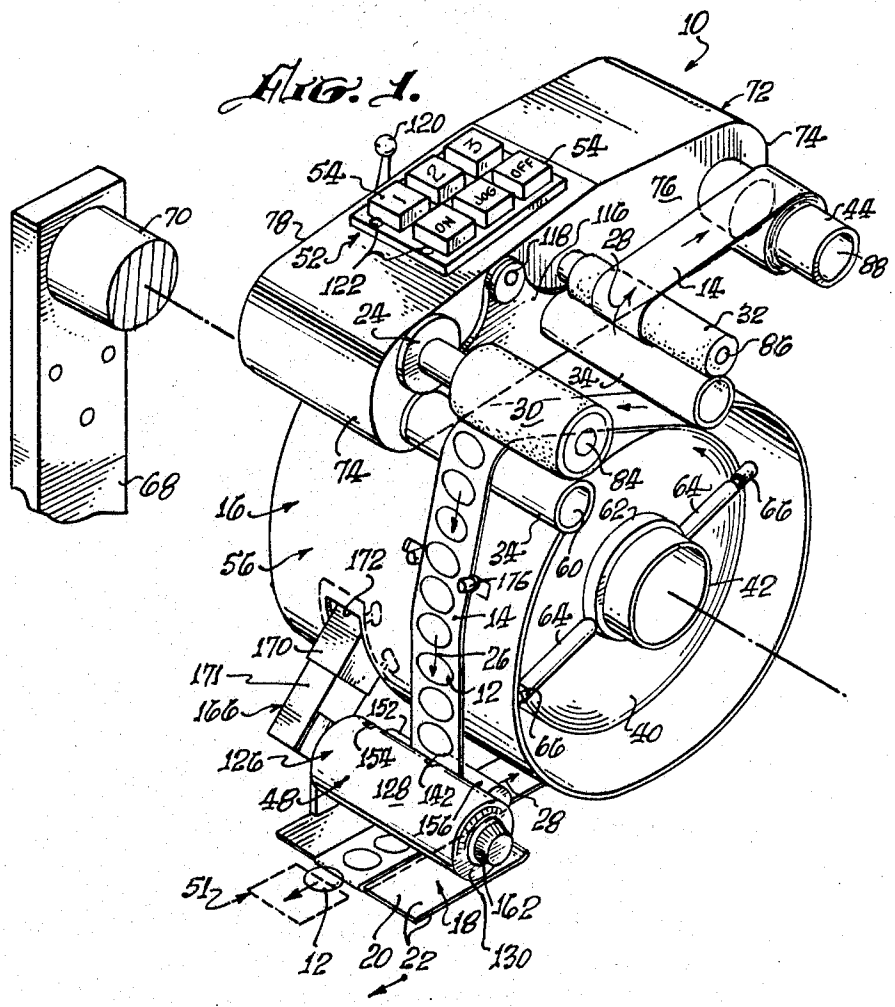
Dec. 23, 1969 H. DINTER 3,485,414

LABEL DISPENSER WITH CONSTANT TENSION MEANS

Filed May 13, 1968 3 Sheets-Sheet 1

FIG. 1.



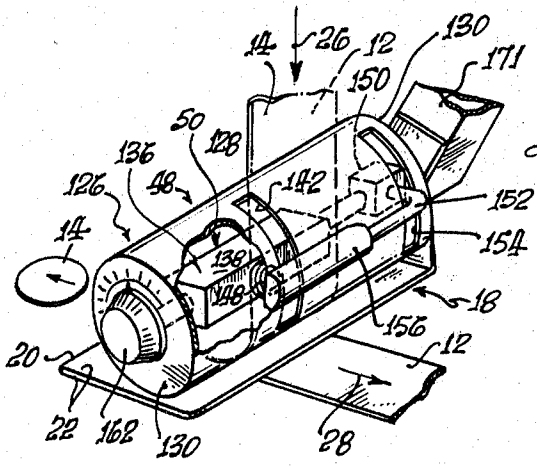


FIG. 2.

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LABEL DISPENSER WITH CONSTANT TENSION MEANS

Filed May 13, 1968 3 Sheets-Sheet 2

FIG. 3.

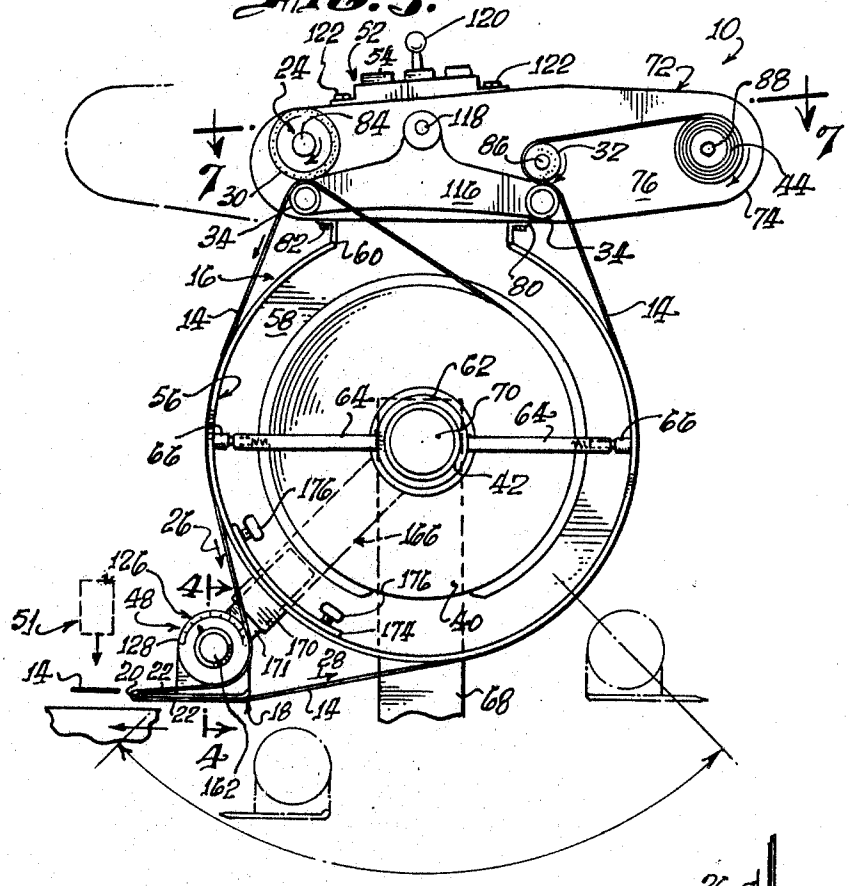


FIG. 4.

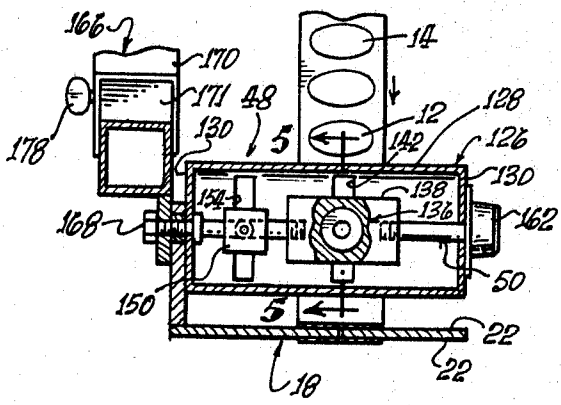
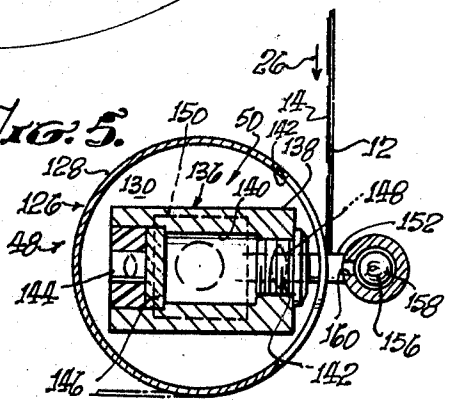


FIG. 5.



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LABEL DISPENSER WITH CONSTANT TENSION MEANS

Filed May 13, 1968 3 Sheets-Sheet 3

FIG. 6.

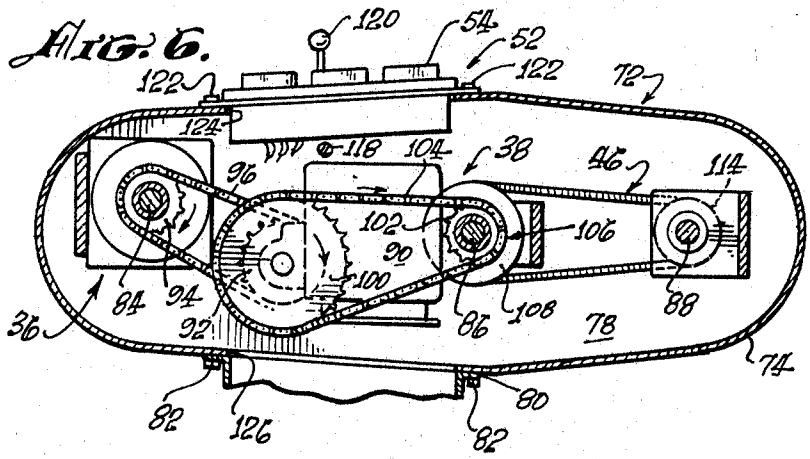


FIG. 7.

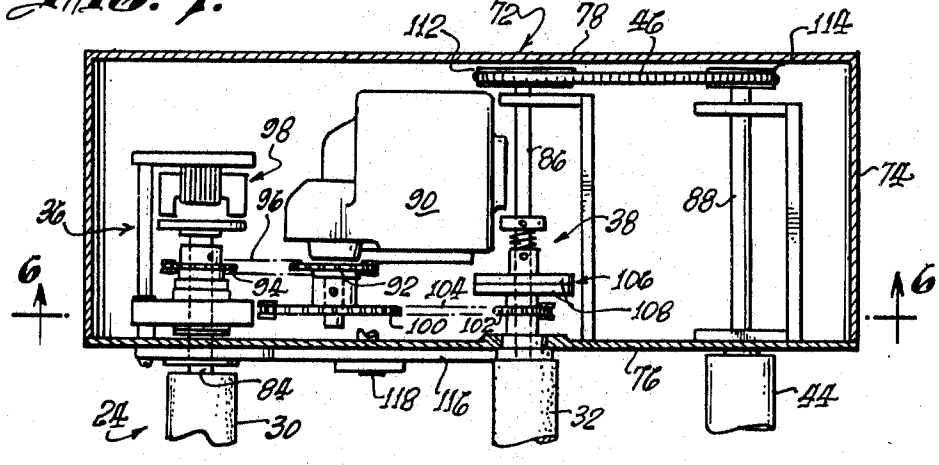
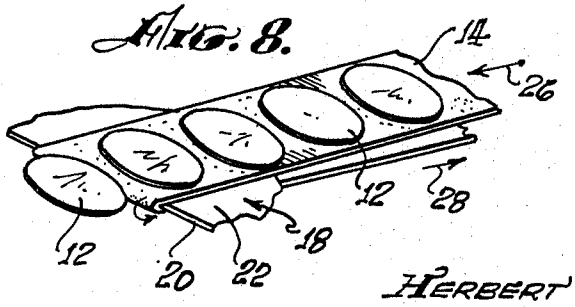


FIG. 8.



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3,485,414

LABEL DISPENSER WITH CONSTANT TENSION MEANS

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Filed May 13, 1968, Ser. No. 728,611
Int. Cl. B65h 5/28
U.S. Cl. 221—73 21 Claims

ABSTRACT OF THE DISCLOSURE

A label dispenser for dispensing pressure sensitive labels in succession from a backing strip to a label applicator by endwise movement of the strip about the edge of a thin peeling edge plate which forms the strip into a sharp reverse bend in such away that the strip is effectively peeled from each label. The dispenser is characterized by a novel intermittent feed mechanism for the backing strip which maintains a constant tension in the strip to prevent parting of the strip during intermittent feeding hereof, and by a novel label sensing unit which is adjustable to assure proper dispensing of each label to the label applicator.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to machines for applying pressure sensitive labels to containers and other articles. More particularly, the invention relates to an improved label dispenser for dispensing pressure sensitive labels in succession from a backing strip to a label applicator.

Prior art

A variety of machines have been devised for applying pressure sensitive labels to containers or other articles which are transported in succession past the machine by the conveyor or the like. The present invention is concerned with machines of this type wherein the labels are carried by a backing strip which is fed endwise about the edge of a thin peeling edge plate that forms the strip into a sharp reverse bend in such a way that the strip is effectively peeled from each label at the plate edge. This label dispensing operation is performed by a label dispenser which presents each peeled label to a label applicator. The operation of the label dispenser and label applicator are synchronized with the movement, through a labeling station, of the articles which are to receive the labels in such a way that the dispenser feeds the labels in succession to the applicator and the applicator, in turn, applies the labels to the articles as the latter pass through the station.

The existing label applying machines of this kind, and particularly their label dispensers, are subject to certain deficiencies which this invention seeks to cure. One of these deficiencies resides in the fact that the intermittent strip feed mechanism employed in the label dispensers subject the label backing strip to substantial periodic inertia induced tensile stresses which frequently cause parting of the strip. Many of the existing label dispensers are further deficient in that they lack adequate adjustments for accommodating articles of various sizes and shapes and regulating the strip feed mechanism to assure proper dispensing of the labels to the label applicator. Another disadvantage of some existing labeling machines resides in the fact that they are not reversible so as to permit the

application of labels to articles moving in either direction past the machines.

SUMMARY OF THE INVENTION

The present invention provides an improved label dispenser which avoids the above-noted and other drawbacks of the existing label dispensers. According to one of the invention, for example, the strip feed mechanism of the dispenser embodies a novel arrangement of intermittently driven constant speed infeed rolls and continuously driven constant torque outfeed rolls for intermittently feeding the backing strip around the peeling edge plate. This feed roll arrangement is effective to eliminate inertia induced stresses in the backing strip and to maintain a generally constant tension in the strip, whereby parting of the strip during intermittent feeding thereof is avoided. Another feature of the invention resides in a unique label sensing unit for controlling the backing strip travel during each label dispensing cycle of the label dispenser in such a way as to assure proper dispensing of the labels from the backing strip to the label applicator. To this end, the sensing unit is arranged to generate an electrical control signal in response to arrival of each label at a predetermined position along the infeed path of the backing strip to the peeling edge plate. The control signals from the sensing unit are utilized to control the strip feed mechanism in such manner that each actuation of this mechanism to initiate a label dispensing cycle advances the backing strip the correct distance to bring a label into proper relation to the label applicator for application of the label to an article in label receiving position with respect to the applicator. The label sensing unit is adjustable in a unique way which permits precise registry of each dispensed label with the label applicator.

According to another important feature of the invention, the various parts of the label dispenser are uniquely arranged to accommodate application of labels to articles travelling in either direction through the labeling station of the labeling machine embodying the dispenser.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of a label dispenser according to the invention;

FIGURE 2 is an enlarged fragmentary perspective view, partly broken away, of the peeling edge plate and label sensing unit of the dispenser;

FIGURE 3 is a side elevation of the label dispenser;

FIGURE 4 is an enlarged section taken on line **4—4** in FIG. 3;

FIGURE 5 is an enlarged section taken on line **5—5** in FIG. 4;

FIGURE 6 is a section taken on line **6—6** in FIG. 7;

FIGURE 7 is an enlarged section taken on line **7—7** in FIG. 3; and

FIGURE 8 is an enlarged fragmentary perspective detail illustrating the manner in which the backing strip is fed endwise about the peeling edge plate to peel the strip from the labels on the strip.

According to the present invention, there is provided a label dispenser, represented in the drawings by the label dispenser **10**, for dispensing pressure sensitive labels **12** from a backing strip **14** to which the labels are secured in longitudinally spaced relation. In general terms, the label dispenser comprises a frame **16** mounting a thin peeling edge plate **18**. This plate has a relatively sharp peeling edge **20** and opposite side faces **22** joining the edge. Also mounted on the frame are feed means **24** for feeding the backing strip **14** endwise along an infeed path **26** leading to the peeling edge plate **18** and an outfeed path **28** leading from the plate. The infeed path **26** extends

across the upper face 22 of the peeling edge plate, as the latter is viewed in FIG. 1, toward and generally normal to its peeling edge 20. The outfeed path 28 extends across the lower face of the plate, away from and generally normal to the edge. From this description, it is evident that during operation of the strip feed mechanism 24, the backing strip 14 undergoes endwise movement across the upper face of the peeling edge plate 18 toward its peeling edge 20, then around this edge, and finally back across the underface of the plate away from the peeling edge. Referring particularly to FIG. 8, it will be observed that the peeling edge plate 18 forms the backing strip 14 into a sharp reverse bend as it passes around the peeling edge 20 of the plate in such a way that the strip is effectively peeled from each label 12 at the edge. This method of peeling a backing strip from pressure sensitive labels on the strip is old in the art and thus need not be explained in detail. Suffice it to say that the peeling occurs by virtue of the fact that the peeled strength of the pressure sensitive adhesive on each label is insufficient to retain the label in adhesive contact with the backing strip as the latter travels around the sharp peeling edge 20. Accordingly, the backing strip is separated from each label with a peeling action, in the manner depicted in FIG. 8, as the strip passes around the peeling edge.

According to one important feature of the invention, the strip feed mechanism 24 includes an infeed friction roller 30 along the infeed path 26 and an outfeed friction roller 32 along the outfeed path 28. Mounted in the frame 16 opposite each roller is a means 34 for urging the backing strip into frictional driving contact with the adjacent roller. Associated with the infeed roller 30 are selectively operable drive means 36 for selectively and intermittently driving this roller at a given constant rim speed and in a direction to feed the backing strip 14 along the infeed path 26 toward the peeling edge 20 of the peeling edge plate 18. Associated with the outfeed roller 32 are constant torque drive means 38 for driving this roller with a generally constant torque at a maximum rim speed slightly greater than the constant rim speed of the infeed roller 30 and in a direction to feed the backing strip along the outfeed path 28 away from the peeling edge 20.

In the particular embodiment of the invention which has been selected for illustration, the backing strip 14 is initially wound into a supply roll 40. This supply roll is rotatably supported on a spindle 42 mounted on the dispenser frame 16. The backing strip 14 passes from the supply roll to the infeed roller 30 and then along the infeed path 26 to the peeling edge plate 18. The illustrated embodiment of the invention is also equipped with a rotary take-up shaft 44 located along the outfeed path 28 of the backing strip 14 on which the strip is wound after it passes the outfeed roller 32. According to a further feature of the invention, the take-up shaft 44 is driven, by constant torque drive means 46, at a maximum rim speed slightly greater than the maximum rim speed of the outfeed roller 32.

Another feature of the invention is concerned with a label sensing unit 48 which is mounted on the dispenser frame 16, along the backing strip infeed path 26, for sensing passage of the labels 12 past the predetermined position along this path. Embodied within the sensing unit are sensing means 50 for generating an electrical control signal in response to movement of each label 12 through a predetermined position along the infeed path 26. As noted earlier and hereinafter explained in more detail, these control signals are utilized to control the strip feed mechanism 24 in such a way that the backing strip 14 is advanced a predetermined distance during each intermittent operation of the mechanism. A unique feature of the label sensing unit 48 resides in the fact that the label sensing means 50 are adjustable to effectively adjust the label sensing position of the unit along the infeed path 26 to regulate the position occupied by each dispensed label 12, relative to the peeling edge 20 of the peeling edge plate 18, at the conclusion of a corresponding operating or dispensing cycle of the dispenser.

Briefly, during operation of the label dispenser 10, the infeed roller drive means 36 are inactive, while the outfeed roller drive means 38 and take-up shaft drive means 46 are continuously powered to exert continuous, predetermined driving torque on the outfeed roller 32 and the take-up shaft 44. Prior to actuation of the infeed roller drive means 36, therefore, the backing strip 14 remains stationary, and the outfeed roller 32 and take-up shaft 44 cooperate to maintain a predetermined tension in the portion of the backing strip between the infeed roller and the take-up shaft. An operating or label dispensing cycle of the dispenser is initiated by activating the infeed roller drive means to drive the infeed roller 30 at its constant rim speed. Under these conditions, the backing strip 14 is fed endwise along its infeed path 26 and outfeed path 28, from the supply roll 40 to take-up shaft 44, by the con-joint feeding action of the infeed roller 30, outfeed roller 32, and take-up shaft. During this cycle, the outfeed roller and take-up shaft operate to maintain a constant tension in the portion of the backing strip between the endfeed roller and the take-up shaft because of the differential rim velocities of the rollers and shaft. In the course of its periodic endwise movement, the backing strip passes around the peeling edge 20 of the peeling edge plate 18 to effect dispensing of successive labels 12 from the strip to a label applicator 51. This label applicator is mounted adjacent the peeling edge plate, as shown. The intermittent operating or label dispensing cycles of the machine are initiated by actuation of an article sensing device (not shown) in response to movement past the applicator 51 of the articles (not shown) which are to receive the labels. During each cycle, the label dispenser 10 presents one or more labels 12 to the label applicator 51 which then applies the labels to the passing articles.

The number of labels dispensed during each cycle is determined by the travel of the backing strip 14 around the peeling edge plate 18. This endwise travel of the backing strip, in turn, is controlled jointly by the label sensing unit 48 and an electrical control unit 52 having numbered buttons 54. These buttons may be selectively depressed to conditions or preset the label dispenser for dispensing one, two or three labels during each dispensing cycle. The label sensing unit 48, control unit 52, and the article sensing device are interconnected in such a way that the dispenser is actuated to initiate a label dispensing cycle in response to movement of each article past the label applicator. Each dispensing cycle is terminated in response to the electrical control signals generated by movement past the label sensing unit 48 of the number of labels for which the dispenser has been preset by depression of the control buttons 54. The label sensing unit 48 is adjusted in such a way that during each label dispensing cycle, the backing strip 14 is advanced to a posiiton in which the next label to be dispensed remains adhesively attached at its extreme trailing edge to the backing strip and projects laterally beyond the peeling edge 20 of the peeling edge plate 18 into label applying relation to the label applicator 51, in the manner illustrated in FIG. 1.

Referring now in the greater detail to the illustrated embodiment of the invention, the dispenser frame 16 has a generally cylindrical housing 56 which is open at its front end, as the housing is viewed in FIG. 1. The rear end of this housing is closed by an end wall 58. Housing 56 is cut away at its top to form a circumferentially extending opening or slot 60. This slot opens through the front edge of the housing, as shown. The backing strip supply roll 40 is concentrically positioned within the cylindrical dispenser housing 56 and is rotatably supported on the spindle 42 in the manner best illustrated in FIGS. 1 and 3. Spindle 42 comprises a hollow tube, the rear end of which is rigidly joined to the rear housing wall 58.

Supply roll **40** is placed on the spindle **42** through the open front end of the housing **56** and is retained in position on the spindle by a collar **62** on the spindle. Collar **62** has lateral arms **64** with spring load friction tips **66** which seat against the inner wall of the housing **56** to releasably retain the collar on the spindle.

Label dispenser **10** is supported on the main frame of the overall labeling machine in any convenient way. In this instance, the dispenser is supported by a bracket **68** on the frame having a shaft **70** which fits slidably within the tubular supply roll spindle **42**. Means (not shown), such as a lock screw, are provided for securing the dispenser to the bracket shaft **70**.

The backing strip drive mechanism **24** has a housing **72** including an annular wall **74** of generally elipsoidal shape closed at its ends by end walls **76** and **78**. This drive housing is positioned on top of the cylindrical dispenser housing **56**, just to the rear of the dispenser housing slot **60**, with the annular wall **74** of the drive housing seating against an upper mounting flange **80** on the dispenser housing. The ends of the drive housing extend laterally of the dispenser housing, as shown. The driving housing is releasably secured to the dispenser housing by bolts **82**.

Referring particularly to FIGS. 6 and 7, it will be seen that the backing strip infeed roller **30**, outfeed roller **32**, and take-up shaft **44** extend forwardly from the drive housing **72** in laterally spaced parallel relation to one another and the axis of the dispenser housing **56**. The rollers and shaft are located adjacent to the left end, center, and right end, respectively, of the drive housing as the latter is viewed in the drawings. The infeed roller **30** is a resilient friction roller having a rear shaft **84** which is rotatably supported in the driving housing **72**. Similarly, the outfeed roller **32** is a friction roller having a rear shaft **86** rotatably supported in the drive housing. Similarly, the take-up shaft **44** has a rear shaft portion **88** rotatably supported in the drive housing. The infeed roller **30**, outfeed roller **32**, and take-up shaft **44** are driven by a common drive motor **90** within the drive housing **72**. This drive motor thus forms part of the infeed roller drive means **36**, the outfeed roller drive means **38**, and the take-up shaft drive means **46**.

In addition to the motor **90**, the infeed roller drive means **36** has a driving sprocket **92** rigid on the motor shaft. Trained about this sprocket and a sprocket **94** rotatable on the infeed roller shaft **84** is a sprocket chain **96**. Also embodied in the infeed roller drive means **36** is an electromagnetic clutch **98** for drivably connecting the driven sprocket **94** to the infeed roller shaft **84**. This clutch is normally disengaged to permit continuous operation of the motor **90** without driving the infeed roller **30**. The clutch is engaged by energizing its coil **98** to drivably couple the driven sprocket **94** to the infeed roller shaft **84**. The infeed roller **30** is then directly coupled to the motor **90** for rotation at a predetermined constant speed by the motor.

The outfeed roller drive means **38** includes a second driving sprocket **100** rigid on the motor shaft. Trained about the sprocket **100** and a driven sprocket **102** rotatable on the outfeed roller shaft **86** is a sprocket chain **104**. Driven sprocket **102** is drivably coupled to the outfeed roller shaft **86** through a spring loaded slip clutch **106**. The outfeed roller **32** is thus subjected to a continuous driving torque so long as the motor **90** is energized. The spring loading of the slip clutch **106** is adjusted to permit slippage of the clutch plates **108** in response to a predetermined restraining torque on the outfeed roller **32**. Accordingly, the outfeed roller drive means **38** constitutes a constant torque drive means which exert a predetermined driving torque on the outfeed roller **32** so long as the motor **90** is energized.

The take-up shaft drive means **46** has a spring drive belt **110** which is trained about pulleys **112** and **114** fixed to the rear ends of the outfeed roller shaft **86** and the rear shaft portion **88** of the take-up shaft **44**. Thus, the take-up shaft is driven from the motor **90** through the outfeed roller slip clutch **106** and the outfeed roller shaft **86**. The tension in the spring drive belt **110** is adjusted to permit slippage of the belt in response to a predetermined restraining torque on the take-up shaft **44**. It will be understood, therefore, that the take-up shaft drive means **46** also constitutes a constant torque drive means which exert a continuous constant driving torque on the take-up shaft **44** during rotation of the outfeed roller shaft **86**.

It is evident from the preceding description of the backing strip feed mechanism **24** that the infeed roller **30** is positively driven at a constant speed when its clutch **96** is engaged with the motor **90** energized. The outfeed roller **32** and take-up shaft **44**, on the other hand, are arranged to be continuously driven with a constant torque and at given maximum speeds so long as the motor is energized. According to an important feature of the invention, the ratio of the speed reducer embodied in the drive motor **90**, and the ratios of the dispenser drive means **36**, **38**, and **46** are such that the maximum rim speed of the outfeed roller **32** is slightly greater than the constant rim speed of the infeed roller **30**, and the maximum rim speed of the take-up shaft **44** is slightly greater than the maximum rim speed of the outfeed roller.

As noted earlier, each feed roller **30**, **32** has an adjacent pressure means **34** for urging the backing strip **14** in frictional driving contact with the adjacent roller. In this instance, the pressure means comprise idler or pressure rollers located opposite and parallel to their respective feed rollers. The infeed roller **30** and its pressure roller **34** straddle the infeed path **26** of the backing strip **14**, while the outfeed roller **32** and its pressure roller **34** straddle the outfeed path **28** of the strip. Pressure rollers **34** are mounted on and extend forwardly from an equalizer plate **116**. This equalizer plate seats slidably against the front wall **76** of the drive housing **72** and is pivotally suspended at its center on an eccentric shaft **118** journaled in the drive housing **72**. Fixed to the rear end of the eccentric shaft **118** is a lever **120** by which the shaft may be turned to elevate and lower the equalizer plate **116**. The eccentric shaft **118** is constructed and oriented in such fashion that rotation of its lever **120** in one direction elevates the equalizer plate **116** and thereby the pressure rollers **34** to a position wherein these rollers are disposed to urge the backing strip **14** into frictional driving contact with their respective feed rollers **30**, **32**. Rotation of the lever **120** in the opposite direction lowers the equalizer plate **116** and pressure rollers **34** to positions wherein these rollers are spaced from the feed rollers **30**, **32** to permit insertion and retraction of the backing strip into and from the space between the rollers.

As noted earlier, the label dispenser **10** has an electrical control unit **52**. This unit is removably mounted by screws **122** within an upper opening **124** in the drive housing **72**. Formed in the underside of this housing is a second opening **126** in which the control unit may be alternatively installed, as described later.

Turning now to FIGS. 1 through 5, it will be seen that the label sensing unit **48** has a generally cylindrical housing **126** which contains the label sensing means **50**. The sensor housing **126** has a cylindrical wall **128** closed by end walls **130**. The label sensing means **50** comprises a pair of coaxial shafts which are rotatably supported in an restrained against axial movement relative to the sensor housing end walls **130**. Positioned between and secured to the inner ends of these shafts is a detector **136**, in this instance a photo-electric detector. Detector **136** has a housing **138** extending through which, on an axis normal to and intersecting the common axis of the support shafts **132**, **134**, is a light passage **140**. The right hand or

front end of this passage in FIG. 5 is open and registers with a circumferential slot **142** in the sensor housing **126**. Mounted within the left hand or rear end of the light housing **138** is a photosensitive cell **144**, referred to herein simply as a photo cell. A translucent or frosted glass plate **146** is interposed in the light passage **140** between the photo cell and the front end of the passage. A lens **148** is positioned within the front end of the passage.

Fixed on the rear detector support shaft **34** is a collar **150** to which is attached one arm of an L-shaped lamp support bracket **152**. The bracket arm extends radially from the collar and through a second circumferential slot **154** in the sensor housing **126**. The second arm of the lamp bracket **152** is located externally of the housing **126** and extends parallel to the housing axis toward the first housing slot **142**. Mounted on the end of the outer bracket arm is a lamp housing **156** which extends parallel to and is radially spaced from the sensor housing **126**. Positioned within the lamp housing is a lamp **158**. Lamp housing **156** has an illumination port **160** located on the axis of and opening toward the front end of the light passage **140** in the detector housing **138**. It will be understood, therefore, that light from the lamp **158** passes through the port **160**, the slot **142** in the sensor housing **126**, and the light passage **140** in the detector housing **138** to the detector photo cell **144**. The detector **136** and lamp housing **156**, both being fixed to the detector support shafts **132**, **134**, rotate in unison when these shafts are turned, whereby the lamp housing port **160** remains in coaxial alignment with the detector light passage **140**. Fixed to the outer end of the front detector support shaft **132** is a knob **162** by which the photosensitive detector **136** and the lamp housing **156** may thus be rotated in unison. If desired, the knob and the adjacent sensor housing end wall **130** may be provided with angular scale markings, as shown, for reasons which become evident shortly.

The rear end wall **130** on the housing **126** of the label sensing unit **48** has an integral coaxial, internally threaded boss **164** which seats against the outer end of a telescopically adjustable sensing unit support arm **166**. A screw **168** extends through the arm and is threaded in the boss **164** for adjustably securing the label sensing unit **48** to the arm. As explained below, the screw **168** may be loosened to permit rotation of the sensor housing **126** relative to the support arm **166**. Support arm **166** has inner and outer telescoping sections **170** and **171**. The label sensing unit **48** is secured to the outer arm section **168**. The inner arm section **170** extends radially through a circumferential slot **172** in the cylindrical dispenser housing **56** and is journaled at its inner end on the rear end of the housing spindle **42**. The support arm **166**, and hence the label sensing unit **48**, may thus be angularly adjusted relative to the dispenser housing **56** about the housing axis. As indicated in full and broken lines in FIG. 3, the housing slot **172** is such as to permit angular adjustment of the arm **166** and label sensing unit **48** through an angle of about 45-degrees to either side of a vertical plane containing the central axis of the dispenser housing **56**. Within the dispenser housing **56**, the label sensor support arm **166** mounts a curved plate **174** carrying thumbscrews **176** which may be tightened against the housing to secure the arm, and hence the label sensing unit **48**, in fixed angular position. The outer arm section **168** may also be telescopically adjusted relative to the inner arm section **170** to adjust the label sensing unit **48** radially of the dispenser housing **56**. The arm sections are locked in adjusted position by means of a set screw **178**.

At this point, it is significant to observe that the label sensing unit **48** extends parallel to and is radially spaced from the cylindrical dispenser housing **56**. Moreover, the label sensing unit is aligned, circumferentially of the dispenser housing, with the infeed roller **30**, outfeed roller **32**, and take-up shaft **44**.

Interposed between the rear wall **130** of the sensor housing **126** and the outer section **168** of the support arm **166** is a bracket plate **170** which fits rotatably on the threaded boss **164** of the sensor housing. The peeling edge plate **18** is disposed with one longitudinal edge portion of the plate seating against the outer edge of the bracket plate **170** and is releasably secured to the flange by screws **172**. Along the opposite longitudinal edge portion of the peeling edge plate are a set of holes **174** for alternatively receiving the screws **172**, whereby the position of the plate may be reversed, as explained below. Thus, the bracket plate **170** constitutes, in effect, a mounting flange on the peeling edge plate **18**. This mounting flange is clamped between the rear end wall **130** of the sensor housing **126** and the outer end of the support arm **166** when the housing clamp screw **168** is tightened. Thus, the screw **168** is effective to secure the peeling edge plate **18** and the label sensing unit **48** in fixed position relative to the support arm **166**.

The peeling edge plate **18** is a relatively thin metal plate, one edge of which forms the peeling edge **20**. This peeling edge extends parallel to the longitudinal axis of the label sensing unit **48**. The opposite edge portion of the plate turns toward the dispenser housing **56**, as shown best in FIG. 2, for reasons which will appear presently.

The label dispenser **10** is conditioned for operation by first removing the spindle collar **62** and placing a supply roll **40** of labels **12** and their backing strip **14** on the spindle. The collar is then replaced to retain the supply roll on the spindle. The lever **120** is now rotated to retract the pressure rollers **34** from their respective feed rollers **30**, **32** and the leading end of the backing strip **14** is threaded through the dispenser, in the manner illustrated best in FIGS. 1 and 3, whereby the backing strip conforms to its infeed and outfeed paths **26**, **28**. In this regard, it will be observed that the backing strip passes along its infeed path **26** from the supply roll **40** upwardly through the dispenser housing slot **60**, then between the infeed roller **30** and its pressure roller **34**, then downwardly around the dispenser housing **56** and the housing **126** of the label dispensing unit **48**, then between the latter housing and the peeling edge plate **18**, and finally across the upper face **22** of the plate to its peeling edge **20**. From this point, the strip passes around the peeling edge in a sharp reverse bend and along its outfeed path **28**, from the peeling edge, across the underside of the peeling edge plate **18**, then upwardly around the dispenser housing **56**, and then between the outfeed roller **32** and its pressure roller **34** to the take-up shaft **44**. The leading edge of the backing strip is secured to the take-up shaft in any convenient way. Strip guides **176** may be adjustably mounted on the dispenser housing **56** between the infeed roller **30** and the label sensing unit **48**, as shown. After the backing strip has been thus properly threaded through the dispenser, the lever **120** is returned to its initial position to urge the strip into feeding contact with the infeed and outfeed rollers **30**, **32**.

During actual operation of the label dispenser **10**, the motor **90** is continuously energized to exert constant driving torque on the outfeed roller **32** and the take-up shaft **44**. The infeed roller remains stationary until its clutch coil **98** is energized. Under these conditions, the outfeed roller drive means **38** and the take-up shaft drive means **46** slip to maintain constant driving torque on the outfeed roller and take-up shaft and, thereby, constant tension in the backing strip **14**. When the infeed roller clutch **96** is engaged by energizing of its clutch coil **98**, the infeed roller **30** is driven at constant speed. The backing strip **14** is thereby fed endwise at constant speed from the supply roll **40**, around the peeling edge **20**, to the take-up shaft **44** in such a way that the backing strip remains under constant tension. As the backing strip travels around the peeling edge, the strip is peeled from the labels **12**, in the manner explained earlier and illustrated in FIGURES 1 and 8.

As the backing strip **14** moves along its infeed path

26 from the infeed roller 30 to the peeling edge 20, the strip passes around the label sensing unit 48 and between the front end of its photo detector light passage 140 and the external lamp 158. The labels 12 and backing strip 14 are translucent but have different light transmission characteristics. Accordingly, periodic movement of the labels between the light passage and lamp causes the photo cell 144 to generate a fluctuating electrical control signal. This control signal is fed to the control unit 52 and serves to actua'e this unit in such a way as to de-energize the infeed roller clutch coil 98 when the label 12 currently passing the label sensing unit 48 is situated in centered relation relative to the sensitive axis of the unit, that is the axis of the detector lens 148.

At this point, attention is directed to a unique and highly beneficial feature of the label sensing unit 48, whereby the latter is capable of accurately sensing arrival of each label 12 at a center position on the sensitive axis of the sensing unit. According to this feature, the lens 148 is focused to produce on the frosted glass plate 146 a slightly out of focus or fuzzy image of each label as the latter passes between the lens and the light source 158. This image occupies a major portion or substantially entire area of the plate, within the field of view of the photocell 144, when the label is centered on the sensitive axis. If the label is slightly displaced from the sensitive axis in either longitudinal direction of the backing strip 14, the label image occupies only a portion of a glass plate within the field of view of the photocell. Under these conditions, the remainder of the glass plate is illuminated by the light which passes through the portion of the backing strip between the respective label and the adjacent label. Accordingly, as each label 12 moves past the label sensing unit 48, the intensity of light incident on the photocell 144 initially diminishes as the label approaches its center position on the sensitive axis of the unit and then increases as the label recedes from this position. The photocell thus receives minimum light when each label is cen'ered on the axis. The control unit 52 is set to respond to this minimum light condition by de-energizing the clutch coil 98, as just explained. As a consequence, the label sensing unit is effective to accurately sense the position of the labels 12 on the sensitive axis of the unit regardless of legends or other copy imprinted on the labels. In this regard, the present label sensing unit differs from the existing label sensing units which respond to or sense dark or light areas on the individual labels themselves. The primary advantage of the present label sensing unit resides in its substantially improved sensing accuracy. The present sensing unit, for example, is sufficiently sensitive to control or sense the position of the labels within an error on the order of .010 inch.

As noted earlier, periodic operation of the label dispenser 10 is triggered by movement, past the label applicator 51, of the articles which are to receive the labels from the applicator. Each time the label dispenser is thus triggered, its infeed roller clutch 96 is momentarily engaged to drive the infeed roller 30 and thereby effect endwise feeding movement of the backing strip 14. The backing strip continues to be advanced until the number of labels, corresponding to the depressed control button 54 of the control unit 52, have been dispensed to the label applicator 51. At this point, the control signal from the label sensing unit 48 actuates the control unit 52 to de-energize the infeed clutch coil 98 and thereby terminate endwise feeding of the backing strip in the position wherein the next label 12 projects beyond the peeling edge 20 into label applying relation to the label applicator 51, with the trailing edge of the label still adhesively attached to the backing strip 14, in the manner illustrated in FIGURES 1 and 8. The terminal position occupied by the backing strip 14 at the conclusion of each such label dispensing is adjusted by angular adjustment of the label sensing means 50 within the sensor housing 126. In this regard, it will be recalled that the label sensing means 50 are rotatable by means of the knob 162. This rotation of the label sensing means obivously shifts the point of intersection of the infeed path 26 by the sensitive axis A of the label sensing means 50 lengthwise of this path. This endwise adjustment of the sensitive axis along the infeed path, in turn, obviously adjusts the position occupied by the backing strip 14 along its infeed path at the conclusion of each label dispensing cycle. The actual electrical connections of the label dispenser and the internal circuitry of the electrical control unit 52 form no part of the invention and, accordingly, have not been illustrated nor will they be described in detail. After all of the labels 12 have been peeled from the backing strip 14, the entire length of the strip will be wound on the take-up shaft 44. The final step in the operation of the label dispenser 10, therefore, involves removal of this rolled strip from the take-up shaft and reconditioning of the dispenser for operation by placement of a new supply roll 40 on the dispenser spindle 42.

The present label dispenser has several unique and highly important features of construction and operation. One imortant feature of the dispenser, for example, resides in the fact that the strip feed mechanism 24 is effective to maintain a constant tension in the backing strip 14 and to eliminate inertia induced stresses or loads in the strip as occur in the intermittent strip feed mechanisms of the existing label dispensers. This maintenance of a constant tension and elimination of inertia induced stresses in the backing strip prevents the latter from parting or breaking during operation of the dispenser, as frequently occurs in the existing machines of this type.

Another important feature of the invention resides in the adjustability of the label dispenser. In this regard, for example, it has already been noted that the peeling edge plate 18 and label sensing unit 48 may be adjusted relative to the dispenser housing 56, both angularly about the aixs of the housing and radially toward and away from the housing. These adjustments permit the effective elevation of the peeling edge plate and the label sensing unit to be adjusted, as indicated in FIGURE 3, thus to accommodate application of labels to articles of various sizes and shapes. In this regard, it will be observed in FIGURE 3 that the label applicator 51 is vertically adjusted with the peeling edge plate and label sensing unit.

The present label dispenser may be also adjusted to accommodate application of the labels 12 to articles moving in either direction past the dispenser. The flow lines in FIGURE 3, for example, illustrate the dispenser when set for articles which move from right to left past the dispenser. The broken lines, on the other hand, illustrate the dispenser when set to accommodate articles which move from left to right past the dispenser. It will be observed that adjustment of the dispenser from its full line condition to its broken line condition and vice versa involves removal of the control unit 52 from the drive housing 72, inversion of the drive housing relative to the dispenser housing 56, and remounting of the control unit in the currently upper side wall opening 124, 126 of the drive housing. The adjustment further involves swinging of the label sensing unit 48 between its full and broken line positions in FIGURE 3, rotation of the label sensing unit on its central axis so that the unit housing slots 142, 154 face the backing strip 14, and mounting of the peeling plate edge 18 in the appropriate position on the label sensing unit so that the peeling edge 20 of the plate extends in the direction of movement of the articles past the dispenser, all as illustrated in FIGURE 3.

A further important feature of the invention resides in the fact that the take-up shaft 44 may be hollow, as shown, to permit air flow through this shaft.

While the invention has been described in what is presently conceived to ge one of its most practical embodiments, it will be evident to those versed in the art that various modifications of the invention are possible.

What is claimed is:

1. In a label dispenser for dispensing pressure sensitive labels in succession from a backing strip to which said labels are secured in longitudinally spaced relation, the combination comprising:

a frame,

a thin peeling edge plate mounted on said frame having a relatively sharp peeling edge, and opposite side faces joining said edge,

a strip feed mechanism on said frame for feeding said backing strip endwise along an infeed path extending across one face of said plate toward and generally normal to said peeling edge, then around said peeling edge, and finally along an outfeed path extending across the other face of said plate away from said peeling edge, whereby said strip is formed into a sharp reverse bend as it passes around said peeling edge in such a way that said strip is peeled from each label at said edge, and

said feed mechanism including an infeed friction roller along said infeed path, an outfeed friction roller along said outfeed path, pressure means opposite each feed roller for urging said backing strip into frictional driving contact with the adjacent feed roller, selectively operable constant speed drive means for selectively and intermittently driving said infeed roller at a given constant rim speed and in a direction to feed said backing strip along said infeed path toward said peeling edge, and constant torque drive means for driving said outfeed roller with a generally constant torque and at a maximum rim speed slightly greater than said constant rim speed in a direction to feed said backing strip along said outfeed path and away from said peeling edge.

2. The combination according to claim 1 including:

a take-up shaft mounted on said frame along said outfeed path and following said outfeed roller,

means for securing the leading end of said backing strip to said take-up shaft, and

constant torque drive means for driving said take-up shaft with a generally constant torque and at a maximum speed slightly greater than the maximum rim speed of said outfeed roller to wind said strip on said take-up shaft.

3. The combination according to claim 1 including:

a label sensing unit mounted on said frame along said infeed path for sensing passage of each label past a given position along said infeed path.

4. The combination according to claim 3 wherein:

said sensing unit has a sensitive axis extending transversely of and intersecting said infeed path, and said unit includes label sensing means responsive to passage of said label across said sensitive axis, and means for adjusting said sensing means to adjust the intersection of said axis with said infeed path in the lengthwise direction of said infeed path.

5. The combination according to claim 1 including:

means on said frame along said infeed path in advance of said infeed roller for rotatably supporting a supply roll of said backing strip and labels.

6. The combination according to claim 1 including:

a label sensing unit mounted on said peeling edge plate for sensing passage of each label past a given position along said infeed path adjacent said peeling edge, and

means mounting said peeling edge plate and sensing unit for unified adjustment of said plate and unit relative to said frame along a direction line transverse to said faces of said peeling edge plate, thereby to vary the elevation of said plate and unit.

7. The combination according to claim 6 wherein:

said label sensing unit has a sensitive axis extending transversely of and intersecting said infeed path, and said sensing unit includes label sensing means responsive to passage of each label across said sensitive axis, and means for adjusting said sensing means to adjust the intersection of said axis with said infeed path in the lengthwise direction of said infeed path.

8. In a label dispenser for dispensing pressure sensitive labels in succession from a backing strip to which said labels are secured in longitudinally spaced relation, the combination comprising:

a frame,

a thin peeling edge plate mounted on said frame having a relatively sharp peeling edge and opposite side faces intersecting said edge,

a strip feed mechanism mounted on said frame for feeding said backing strip endwise along an infeed path extending across one face of said plate toward and generally normal to said peeling edge, then around said peeling edge, and finally along an outfeed path extending across the other face of said plate away from said peeling edge, whereby said strip is formed into a sharp reverse bend as it passes around said peeling edge in such a way that said strip is peeled from each label at said edge, and

a label sensing unit mounted on said frame along said infeed path adjacent said peeling edge in such a way that said backing strip passes around said sensing unit as said strip travels along said infeed path to said peeling edge, said sensing unit having a sensitive axis extending laterally of and intersecting said infeed path and including label sensing means for sensing passage of each label across said sensitive axis, and means for rotatably adjusting said label sensing means about an axis of adjustment normal to said sensitive axis, parallel to the plane of said backing strip, and normal to the direction line of movement of said backing strip along said infeed path, thereby to adjust the position of intersection of said sensitive axis with said infeed path in the endwise direction of said infeed path.

9. The combination according to claim 8 wherein:

said label sensing unit comprises a generally cylindrical housing containing said label sensing means and having a central axis coincident with said axis of adjustment of said label sensing means,

said label sensing means comprises a photosensitive detector mounted within said housing for rotation relative to said housing on said axis of adjustment and for sensing light incident on said detector along said sensitive axis, a light source mounted externally of said housing on said sensitive axis for directing light toward sad detector along sad sensitive axis, said housing having a circumferential slot on said sensitive axis through which light from said source passes to said detector, said infeed path passing between said light source and housing, whereby light from said source passes to said detector through said backing strip, and means operatively connecting said detector and light source for unified adjustment thereof about said axis of adjustment to vary said position of intersection lengthwise of said infeed path.

10. The combination according to claim 9 wherein:

said means operatively connecting said detector and light source comprises a generally L-shaped bracket having one arm extending radially of said adjustment axis through a second circumferential slot in said housing and operatively connected within said housing to said detector and a second arm located externally of said housing and extending axially thereof toward said first mentioned slot, and a lamp secured to the end of said external arm and located on said sensitive axis.

11. In a label dispenser for dispensing pressure sensitive labels in succession from a backing strip to which said labels are secured in longitudinally spaced relation, the combination comprising:

a frame,

a spindle on said frame for rotatably supporting a supply roll of said labels and backing strip,

a thin peeling edge plate having a peeling edge parallel to the axis of said spindle and opposite faces joining said peeling edge,

means supporting said plate on said frame,

a strip feed mechanism on said frame for intermittently feeding said backing strip endwise along an infeed path extending from said supply roll across one face of said plate toward and generally normal to said peeling edge, then around said edge, and finally along an outfeed path extending across the other face of said plate away from said peeling edge, whereby said backing strip is formed into a sharp reverse bend as it passes around said peeling edge in such a way that said strip is peeled from each label at said edge, and said feed mechanism including an infeed friction roller mounted on said frame along said infeed path with its axis parallel to said spindle axis, an outfeed friction roller mounted on said frame along said outfeed path with its axis parallel to said spindle axis, means opposite each feed roller for urging said backing strip into frictional driving contact with the adjacent feed roller, selectively operable constant speed drive means for selectively and intermittently driving said infeed roller at a given constant rim speed and in a direction to feed said backing strip along said infeed path from said supply roll toward said peeling edge, and constant torque drive means for continuously driving said outfeed roller with a generally constant torque and at a maximum rim speed slightly greater than the constant rim speed of said infeed roller in a direction to feed said backing strip along said outfeed path away from said peeling edge.

12. The combination according to claim **11** wherein:

said strip feed mechanism further comprises a take-up shaft mounted on said frame along said outfeed path following said outfeed roller with the axis of said shaft parallel to said spindle axis, means for securing the leading end of said backing strip to said take-up shaft, and constant torque drive means for driving said take-up shaft with a generally constant torque at a maximum rim speed slightly greater than the maximum rim speed of said outfeed roller to wind said backing strip on said take-up shaft.

13. The combination according to claim **12** wherein:

said drive mechanism further comprises a common drive motor for said feed rollers and take-up shaft,

said infeed roller drive means comprises a selectively engageable positive drive clutch for selectively connecting said motor to said infeed roller,

said outfeed roller drive means comprises a slip clutch drivably connecting said motor to said outfeed roller, and

said take-up shaft drive means comprises a slip clutch drivably connecting said outfeed roller to said take-up shaft.

14. The combination according to claim **11** wherein:

said means supporting said peeling edge plate on said frame comprises an arm journaled on said spindle, whereby said plate may be rotatably adjusted about the axis of said spindle, and means securing said plate to said arm for angular adjustment of said plate relative to said arm about an axis parallel to said spindle axis.

15. The combination according to claim **14** including:

a label sensing unit mounted on said arm for angular adjustment about said plate adjustment axis in such a way that said backing strip passes from said infeed roller around said sensing unit to said peeling edge, and

said label sensing unit having a sensitive axis extending laterally of said plate adjustment axis and intersecting said infeed path and including label sensing means for sensing passage of each label across said sensitive axis, and means for angularly adjusting said label sensing means about said plate adjustment axis to adjust the position of intersection of said sensitive axis with said infeed path in the lengthwise direction of said infeed path.

16. The combination according to claim **15** wherein:

said frame comprises a cylindrical housing concentrically surrounding said spindle,

said feed rollers and peeling edge plate are located externally of said housing and said housing has a slot through which said backing strip is adapted to extend from said supply roll to said infeed roller, and

said drive mechanism comprises a drive housing supporting said feed rollers, a motor within said drive housing for driving said feed rollers, and means releasably securing said drive housing to said cylindrical dispenser housing, whereby said drive housing may be mounted in an inverted position on said dispenser housing, and

said means supporting said peeling edge plate on said frame comprises an arm rotatably supported at one end on said frame for angular adjustment about the axis of said spindle, and means securing said plate to the other end of said arm for angular adjustment about an axis parallel to said spindle axis.

17. The combination according to claim **16** including:

a label sensing unit mounted on said arm for angular adjustment about said plate adjustment axis in such a way that said backing strip passes from said infeed roller, around said label sensing unit, to said peeling edge, and

said label sensing unit having a sensitive axis extending laterally of said plate adjustment axis and intersecting said infeed path, and including label sensing means for sensing passage of each label across said sensitive axis, and means for rotatably adjusting said label sensing means about said plate adjustment axis to adjust the position of intersection of said sensitive axis lengthwise of said infeed path.

18. The combination according to claim **17** wherein:

said strip drive mechanism further comprises a take-up shaft rotatably supported on said drive housing parallel to said feed rollers and located along said outfeed path following said outfeed rollers, and constant torque drive means for driving said take-up shaft with a constant torque at a maximum rim speed slightly greater than the maximum rim speed of said outfeed roller, and means of securing the leading edge of said backing strip to said take-up shaft, whereby said backing strip is wound on said take-up shaft.

19. The combination according to claim **18** wherein:

the drive mechanism further comprises a common drive motor for said feed rollers and take-up shaft, and means mounting said motor in said drive housing, and

said infeed roller drive means comprises a selectively engageable positive drive clutch for selectively drivably connecting said motor to said infeed roller,

said outfeed roller drive means comprises a slip clutch drivably connecting said motor to said outfeed roller, and

said take-up shaft drive means comprises a slip clutch drivably connecting said outfeed roller to said take-up shaft.

20. A label sensing unit for sensing labels secured in spaced relation along a translucent backing strip which is fed endwise along a given path of movement, said unit comprising:

a photocell and a light source located at opposite sides of said path on an axis intersecting said path,

a lens on said axis between said path and photocell,

a translucent plate on said axis between said lens and photocell, and

said lens being focused to produce on said plate a slightly out of focus image of each label illuminated by said light source as the label passes between said light source and lens.

21. A label sensing unit according to claim **20** wherein said labels are translucent, and

the light incident on said photocell progressively diminishes as each label approaches a centered position on said axis and progressively increases as the respective label recedes from said center position.

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