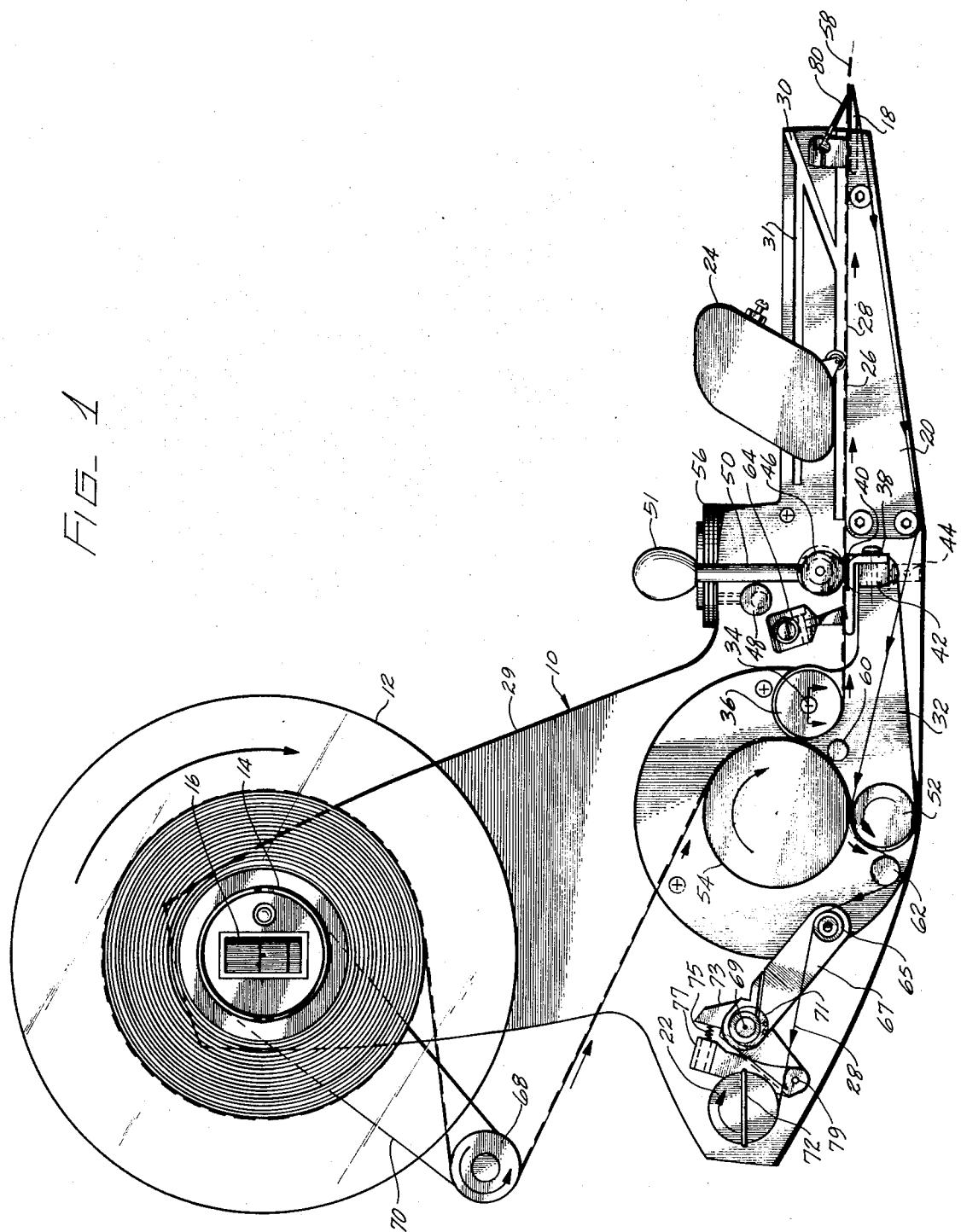


PATENTED OCT 10 1972

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SHEET 1 OF 2

FIGURE 4



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United States Patent

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[15] 3,696,967

[45] Oct. 10, 1972

[54] LABEL DISPENSING SYSTEM

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[22] Filed: April 29, 1971

[21] Appl. No.: 138,689

[52] U.S. Cl..... 221/73

[51] Int. Cl. B65h 5/28

[58] **Field of Search**..... 221/73, 70-72

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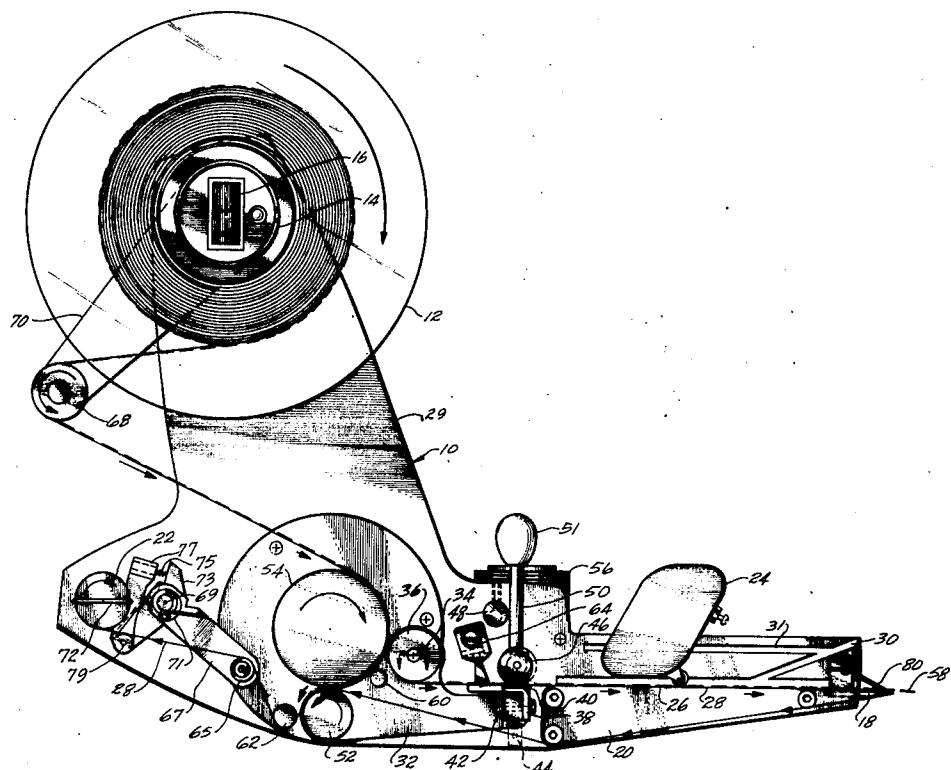
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[57] ABSTRACT

There is provided a system for accurately dispensing labels such as pressure sensitive labels from a carrier web having a release surface, on a continuous or synchronized basis. The system is based on a brake mechanism and a pressure roll pivoted about a common point, the former adapted to prevent transport of labels to a label dispensing element or mechanism and the latter for advancing a web or residue matrix by engagement with a constant running drum, upon release of the brake. Accurate dispensing of labels using the system is achieved through alternating brake-drive of the web or matrix in combination with the maintenance of a constant tension between the brake and rewind mechanism.

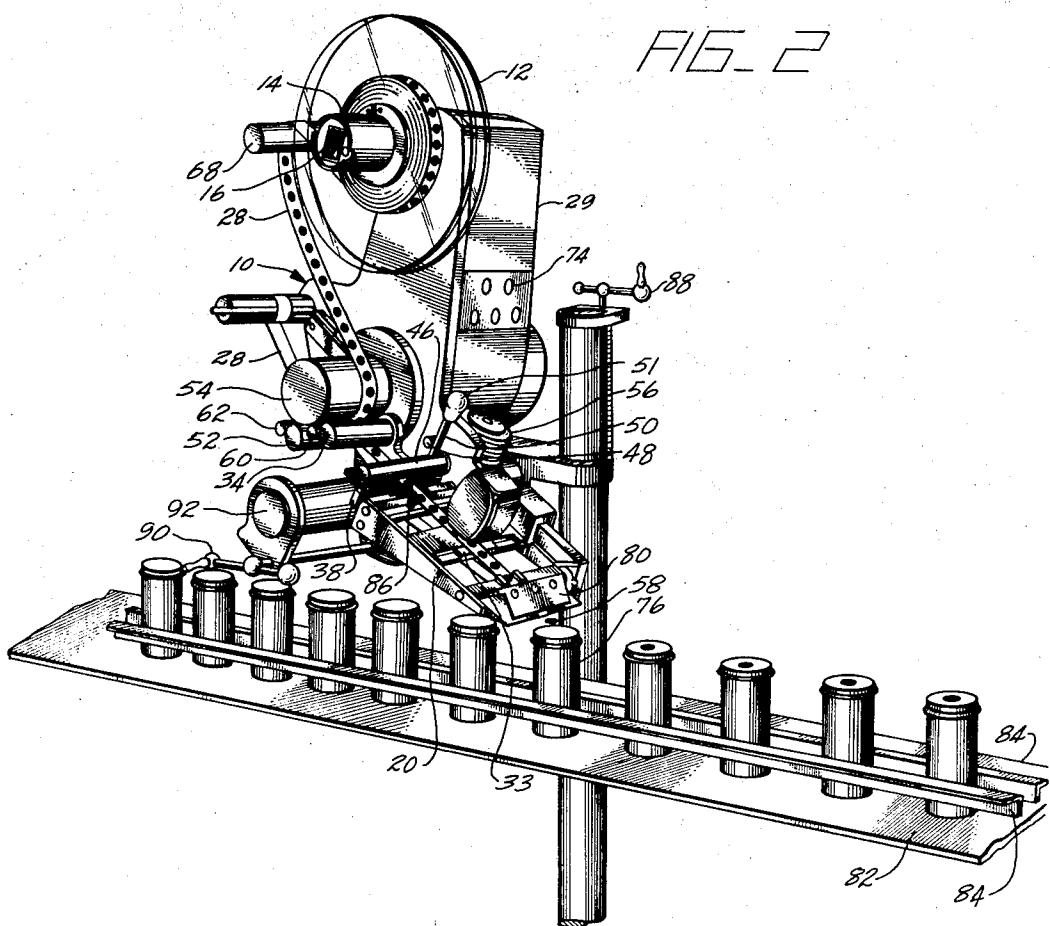
24 Claims, 2 Drawing Figures



PATENTED OCT 10 1972

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SHEET 2 OF 2



LABEL DISPENSING SYSTEM**BACKGROUND OF THE INVENTION**

The advent of the pressure sensitive label represented a new era in labeling operations in that an ability to dispense a self adhesive label from an essentially release coated carrier web eliminated most of the equipment attendant to making initially non-adhesive surfaces, such as glue, adhesive in nature by the application of a solvent, such as water.

In developing systems for dispensing pressure sensitive labels from webs it was found that a pressure sensitive label could be separated from a web and dispensed by drawing the web over the relatively sharp edge of a blade. By this action, this label separates from the surface of the release coated carrier web rather than passing around the edge of the blade with the web.

The label, once dispensed may be applied directly to some substrate or registered on an applicator, typically a perforated grid which draws the label to its surface by a suction pneumatically created then deposits the label on the substrate by reverse air flow through the grid or mechanical movement of the grid to the substrate.

Most prior art systems for label dispensing have consisted of a supply roll containing a release coated web carrying pressure sensitive labels, a sharp edged dispensing blade, powered drive roll, a spring loaded pinch roll, a take-up roll and attendant means to guide the web from the supply roll over the dispensing blade to the take-up roll.

A typical way of dispensing labels is to intermittently rotate the pull roll each time a dispensing operation is called for.

While such systems are functional, the accuracy at which a label can be dispensed is limited and variations exceeding as much as 0.125 inch in label register on a substrate has been experienced. This has limited the utility of such dispensing systems, particularly where accuracy in label application is critical.

Low accuracy in label dispensing has been attributed in part to the stretch imparted to the carrier web when drawn over the edge of the dispensing blade where label separates. Stretch is a result of tensional forces which fluctuate and causes variations in separation pitch attitude of the label.

Tensional force fluctuations may also result from the rate at which a web is passed over the edge of the dispensing blade. Additionally, fluctuations may simply be due to the change in diameter of the carrier web on the supply reel as well as the change in diameter of the collected spent web on the driven take-up roll.

In addition, where the labels have been die cut the carrier web is often weakened due to overcuts and breaks under the more severe tensional forces which may occur during the operation of a typical label dispensing system.

SUMMARY OF THE INVENTION

According to the present invention, there is provided an improved apparatus and method for accurately dispensing labels on a continuous or synchronized basis.

Although not particularly limited to the label source or construction, the apparatus of this invention may be particularly adapted for use with a conventional label supply and dispensing mechanism such as, for instance,

those employing a reel type supply of a web or matrix supported pressure sensitive labels as well as a take-up roll between which there is disposed a relatively sharp edged dispensing blade at which a label is dispensed and is, as indicated, equally adaptive for use with any source of a supply of labels and any system for discarding a spent label carrying webs or matrix.

The improved label dispensing system of this invention comprises, in general, a drive roll which is adapted to be driven at a constant rate of rotation, a braking system which is adapted to engage the carrier web to prevent advancement of the web over the relatively sharp edge of the label dispensing blade, and pressure means adapted to engage the web with the driven roll to advance the web over the dispensing means whereby a label is dispensed when the brake system is disengaged. In this system the brake system and the pressure means are pivoted about a common axis for alternately engaging the brake system with the web and driving the web by forcing the web against the driven roll with the pressure means.

With this system pressure sensitive labels are dispensed on what amounts to a controlled continuous or synchronous basis, by alternate application of the brake to prevent movement of the web and driving of the web by application of the web by the pressure means against the driven roll when the brake is released.

The preferred apparatus of this invention employs web supply reel which is provided with a biased unwind dancer roll which takes up slack in the web between the supply reel and applied brake and maintains a constant web tension between the supply reel and the brake. When the brake is released, the web tension in this system will remain substantially constant and not materially fluctuate with variations in supply web diameter or changes in diameter of the spent web on the web take-up roll.

The process which employs the apparatus of this invention involves, generally, feeding a web containing pressure sensitive labels to a label dispensing edge. Alternately stopping advancement of the web to dispensing edge by application of a brake to the web surface, and drawing the web over the edge of the dispensing lip by pressurizing the web against a cylindrical surface rotating at an essentially constant speed. This method dispenses labels on a continuous or synchronous basis by alternating braking and driving operations.

THE DRAWINGS

FIG. 1 is a detailed illustration of the apparatus used for dispensing labels on a continuous or synchronous basis.

FIG. 2 is a perspective view of labeling system in operation employing the continuous or synchronous label dispensing mechanism shown in FIG. 1.

DESCRIPTION

According to the present invention there is provided a novel apparatus and method employing such apparatus for dispensing labels particularly pressure sensitive labels on a continuous or synchronized basis.

With reference first to FIG. 1, the fairly conventional portion of the label dispensing apparatus 10 consists of

a source of pressure sensitive labels supported by a release coated web such as supplied from reel 12 mounted on shaft 14 which may also contain, as shown, the "on-off" switch 16 for starting and stopping the operation of the label dispensing system; a label dispensing lip 18 and its attending web guiding carriage 20, and wind-up roll 22 which is normally driven to take up spent tape and which may include a reel (not shown) for containing the spent web. It will be understood, however, that other sources of web supported pressure sensitive labels and means to discard the web as it becomes spent may be utilized in accordance with the use of the apparatus of this invention.

Also conventional to the system is label sensing mechanism 24 which senses the presence of a pressure sensitive label 26 on web 28 in order that the dispensing of the label can be coordinated with advancing substrates to which labels are to be applied as more particularly shown in FIG. 2.

Also, as part of the housing 29 for the label dispensing system of this invention, there is provided keyway 30 for mounting a label applicator (not shown) where the label is not dispensed directly to a substrate and channel 31 as an apparatus mount.

Beyond these fairly conventional segments of a label dispensing system, the balance of the label dispensing system of this invention provides a novel combination of elements which permits a high degree of accuracy and speed in the dispensing of pressure sensitive labels. A feature of the label dispensing mechanism of this invention is carriage 32 which pivots about a pivot point such as pivot point 34 which may also serve (as shown) as a shaft for an idler roll 36 which aids in guiding the web from reel 12 to dispensing lip 18.

At one end of the pivotable housing 32 is lower brake system 38 having at the upper surface thereof a rubber or a similar brake pad 40 and a lower brake bar 42 which is spring-biased by plunger spring 44. This action tends to maintain the lower brake system 38 biased towards the web containing pressure sensitive labels and upper brake bar 46 to maintain the web 28 in a normally braked position.

There is also included adjustable eccentric stop 48 which acts on shaft 50 of upper brake bar 46. Shaft 50 is normally biased against stop 48 to adjust the clearance between the upper brake bar 46 and the lower brake system 38. To adjust the clearance, upper bar 46 is drawn away from stop 48 by pulling handle 51. When a desired degree of clearance is achieved and this will depend in part on the nature of the web and the labels, stop 48 is adjusted to just contact shaft 50. Normally, the clearance for rapid stopping action is set at between about 0.007 and 0.010 inch in addition to the thickness of the web.

Also pivoted about pivot point 34 is a pressure means shown as nip roll 52 which is in continuous contact with the web and which serves to force the web against driven roll 54 which is cylindrical in shape and rotates at essentially a constant torque and rate. This occurs when frame 32 is pivoted about pivot point 34 by some cyclic driving means such as solenoid 56.

This action serves to disengage the brake and forces web 28 against driven roll 54. As a consequence, web 28 is advanced over the edge of dispensing blade 18 to

dispense a label 58 which may be applied directly to a substrate or indexed on a label applicator (not shown) which in turn functions to apply the label to a substrate.

There may also be optionally provided, web guard 60 which is normally non-rotating, and web turnback bar 62 which is also non-rotating. There is optionally provided web snubber brush 64 which serves to impart an initial force on web 28 to aid in accurately positioning labels with respect to label sensor 24.

When solenoid 56 is deactivated brake system 38 consisting of pad 40 and lower bar 42 are applied by the spring force of plunger 44 against web 28 and upper brake bar 46 to stop advancement of the web to dispensing blade 18. In this condition solenoid 56 is in a relaxed position and nip roll 52 is away from driven roll 54 in order that a drag will not be imparted to web 28 in the zone between nip roll 52 and driven roll 54.

Take-up reel 22 is normally driven by a slip drive using a belt take-off (not shown) from the motor (not shown) used to drive roll 54.

To override the tendency of take-up reel 22 to continue to rotate and thereby increase the tension in web 28 between take-up reel 22 and the applied brake means there may be provided a secondary brake system which consists, in part, of dancer roll 65, which is rotatable, and spring biased bar 67 pivoted about axis 69. As take-up reel 22 continues to rotate as a consequence of the friction imparted by the slip of the belt drive spring biased bar 69 with dancer roll 65 are drawn downward. This applies by the action of cam 71 a reverse thrust on bar 73 which, in turn, applies a force which compresses spring biased plunger 75. This, in turn, applies brake bar 77 which is pivoted about point 79 against the surface of take-up reel 22. This action serves as a functional brake which overcomes the tendency of take-up reel 22 to continue to rotate due to the action of the slip belt drive. In this system there is eventually reached upon application of brake 77 an equilibrium at which take-up reel 22 is held motionless. The tension in web 28 between the take-up reel 22 and the brake means will become constant by virtue of the bias force applied through roll 65.

While this braking system is an optional part of the label dispensing system of this invention it is partly useful in aiding the maintenance of a constant web tension in the label dispensing system of this invention.

If eliminated, some variations in tension may occur due to the tendency of take-up reel 22 to continue to rotate. This tendency can be reduced, however, by the use of slip clutches and the like.

To maintain a constant tension between the brake means and the web feed reel 12, there is provided roller 68, known as a "dancer roll" which is mounted on spring biased bar 70 which tends to force roller 68 upward and away from the brake means. This takes up any slack in the web between reel 12 and the brake means and provides a constant tension between these points.

By maintaining a constant tension through the system during the braking or stop function, the tension in the web when it is engaged with drive roll 54 will be constant. This, in combination with the braking function applied to roll 22 eliminates fluctuations in the torque applied to driven roll 54 which enables driven roll 54 to rotate at a constant speed which, in turn,

drives web 28 over label dispensing lip 18 at a constant speed. As a result, any label such as label 58 will be dispensed at a controlled attitude or pitch for accurately positioning onto a substrate on indexing on an applicator.

There is also provided as part of take-up reel 22 clip 72 which initially engages the web when it is threaded through the label dispensing apparatus during startup.

The operation of the label dispensing system of this invention may be more fully understood with reference to FIG. 2. As part of the label dispensing housing 29 there may be provided a plurality of input plugs 74 which serve to receive and dispense signals which control or monitor the advancement of a substrate 76 towards the dispensing lip 18 of the label dispensing apparatus; control the function of a label applicator when used and the functional operation of label dispenser system 10.

When the dispensing of a label is called for, bracket 32 is driven downward about pivot point 34 by solenoid 56 moving the lower brake system 38 away from the upper brake bar 46. This releases the web 28 from the break means and engages the web with drive roll 54 by the pressure supplied by nip roll 52, with take-up reel 22 being driven by an internally mounted slip belt in the housing 29 of the label dispensing system 10 to take up driven spent web. As the web passes over the edge of blade 18 a label 58 is dispensed for application to substrate 76. To prevent separation of lifting of web 28 from the surface dispensing lip 18 there is provided resilient but flexible pressure leaf 80 which maintains a positive pressure on web 28 at lip 18. Substrates shown here are a series of bottles transported under label dispensing system 10 by belt 82 with their lateral position confined by channels 84.

Once a label has been dispensed, the brake means is engaged to stop advancement of the web. Advancement of another label toward blade 18 is controlled by label sensor 24 biases against back-up anvil 33 as modified by brush 64 (not shown). The presence of a label produces a signal which is fed to one of the inputs 74 of housing 29 which, in coordination with an advancing substrate causes energization of solenoid 56, which drives roll 52 in pressure contact with driven roll 54 by rotation of bracket 32 about pivot point 34.

When the label has been dispensed solenoid 56 is deenergized and lower brake system 38 engages web 28 with upper brake bar 46 to stop web transport. This interrupts transport of the web toward label dispensing lip 18 causing dancer roll 68 to take up any slack in web 28 and dancer roll 68 and to brake the tendency of reel 12 against continued rotation.

By repeated alternate applications of the braking function and the driving operation it will be appreciated that the labels will be dispensed on an intermittent basis and because, as previously indicated, the web tension is maintained essentially constant the labels will be dispensed within an accuracy of from about $\pm 1/64$ inch at unusually high rates.

There may be provided guides 86 which adjust the position of web 28 relative to the advancing substrates. To adjust the label dispensing system of this invention to substrate height there may be provided elevation system 88 and dispenser pitch system 90 which controls the attitude of the label dispenser to a substrate by rotation about the axis of support cylinder 92.

An additional feature of the label dispensing system of this invention is that it is open to permit easy threading of a label carrier web through the various mechanisms during start up operations.

5 While label dispensing system of this invention has been illustrated in FIG. 2 assuring a generally vertical attitude to a substrate being labeled, a particular advantage of the system is that it may be positioned in any attitude relative to a substrate.

10 While the label dispensing system of this invention has been illustrated as dispensing pressure sensitive labels from a matrix-free web, the system is equally useful in dispensing labels from a matrix with or without a supporting web; supported and unsupported tapes of 15 any length; perforated labels separated by tearing operations or the like.

While the braking system described is of particular utility in the synchronous dispensing of labels, particularly where the rate of feed of substrates may be variable and accuracy requirements high or essential, the label dispensing system may also be operated on a continuous or intermittent basis.

20 For instance, where there is a continuous or constant feed of substrates to be labeled at a high rate, the braking function may be interrupted, pending a disruption in the feed of substrates which requires application of the braking means and disengagement of the drive mechanism until the disruption in feed is corrected.

25 While the alternating brake-drive system has been illustrated as operating using a pivoted supported structure with the movable portion of the brake disposed below an advancing web containing a group of labels, the movable portion of the brake means may be equally disposed above advancing labels and applied by a downward movement.

30 Where a web or matrix is employed to carry the labels or tape to be dispensed, the residue following the dispensing may be braked alone or with the feed to the 40 dispenser. The former function being advantageous where the labels or the like are driven to rather than drawn past a suitable dispenser.

35 While the preferred dispenser has been shown as a relatively sharp edged dispensing blade, as an alternative, the labels or tapes may be detached by any suitable dispenser such as a direct vacuum pick-up; label or tape separation due to serrations; by in-line cutting and like functions.

40 As indicated, the labels, tapes or the like may be supplied externally to the label dispensing system of this invention. As a typical illustration, labels may be fed as "fan-folded" labels with residue matrix and/or web discarded to some waste disposal system.

45 As will be appreciated from the foregoing, the label dispensing system of this invention is adaptive to handling a wide variety of label or tape supplies and mechanisms for dispensing them to a substrate so long as there is preserved the basic attenuating brake-drive system.

50 60 What is claimed is:

1. Apparatus for continuously dispensing pressure sensitive labels on a controlled intermittent basis for use in combination with a supply of pressure sensitive labels supported by a release coated carrier web and a 55 relatively sharp edged label dispensing blade at which pressure sensitive labels are dispensed by passage of said carrier web around the edge of said dispensing

blade and means to receive a web from which labels have been dispensed, a web transport system comprising:

- a. a drive roll adapted to be rotated at a substantially constant torque and rate of rotation;
- b. brake means adapted to be disposed between a supply of carrier web supported pressure sensitive labels and said label dispensing blade and adapted to engage a carrier web supporting pressure sensitive labels to stop advancement of said web to the relatively sharp edge of said label dispensing blade;
- c. pressure means adapted to engage a web section exhausted of pressure sensitive labels with said drive roll to advance said web over the relatively sharp edge of said label dispensing blade;
- d. pivoted support structure containing a portion of said brake means and said pressure means;
- e. means to pivotally rotate said support structure to alternately engage a web supporting pressure sensitive labels with said brake means and a web free of pressure sensitive labels with said drive roll by action of said pressure means whereby said web may be alternately retained from or advanced over the edge of said label dispensing blade.

2. Apparatus as claimed in claim 1 in which said brake means includes an upper brake surface adapted to be positioned above said carrier web and said lower brake surface secured to said pivotal support structure, said upper and lower brake surface adapted to engage a web containing pressure sensitive labels in aligning configuration.

3. Apparatus as claimed in claim 2 in which the portion of said lower brake surface is spring-biased for preferential engagement of said web with said upper brake surface.

4. Apparatus as claimed in claim 1 in which said pressure means comprises a rotatable nip roll.

5. Apparatus as claimed in claim 3 in which said pressure means comprises a rotatable nip roll.

6. Apparatus as claimed in claim 1 in which the supply of pressure sensitive labels supported by said release coated web is contained on spindle mounted reel and supplied to said label dispensing blade by passage over:

- a. a pivoted, spring biased roll adapted to maintain a constant tension between said spring biased roll and said brake means when said brake means is in an engaged position; and
- b. an idler roll positioned between said pivoted spring biased roll and said brake means.

7. Apparatus as claimed in claim 4 in which the supply of pressure sensitive labels supported by a release coated web is contained on spindle mounted reel and supplied to said label dispensing blade by passage over:

- a. a pivoted spring biased roll adapted to maintain a constant tension between said spring biased roll and said brake means when said brake means is in an engaged position; and
- b. an idler roll positioned between said pivoted spring biased roll and said brake means.

8. Apparatus as claimed in claim 5 in which the supply of pressure sensitive labels supported by said release coated web is contained on spindle mounted reel and supplied to said label dispensing blade by passage over:

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a. a pivoted spring biased roll adapted to maintain a constant tension between said spring biased roll and said brake means when said brake means is in an engaged position; and

b. an idler roll positioned between said pivoted spring biased roll and said brake means.

9. Apparatus as claimed in claim 1 in which the means to receive a label from which labels have been dispensed comprises a web take-up reel adapted to rotate when said web is passed over the edge of said dispensing blade and idle by applying a tensionally activated second brake means against the surface of said web take-up reel when said brake means engages said web.

10. Apparatus as claimed in claim 6 in which the means to receive a label from which labels have been dispensed comprises a web take-up reel adapted to rotate when said web is passed over the edge of said dispensing blade and idle by applying a tensionally activated second brake means against the surface of said web take-up reel when said brake means engages said web.

11. Apparatus as claimed in claim 8 in which the means to receive a label from which labels have been dispensed comprises a web take-up reel adapted to rotate when said web is passed over the edge of said dispensing blade and idle by applying a tensionally activated second brake means against the surface of said web take-up reel when said brake means engages said web.

12. A process for continuously dispensing labels or tapes from a supporting carrier means by passage of said supporting carrier means to dispensing means which comprises alternately:

- a. stopping passage of said carrier means to said dispensing means by application of a braking force to said carrier means; and
- b. releasing said braking force and advancing said carrier means to said dispensing means to a constant rate by engaging a pressure means with a cylindrical driven roll rotated at a substantially constant torque and rate of rotation, the advancement of said carrier means over said dispensing means being independent of means to collect the residue of said carrier means.

13. A process as claimed in claim 12 in which the carrier means supports pressure sensitive labels or tapes.

14. Label dispensing system for dispensing labels and tapes such as pressure sensitive labels, on a controlled or synchronous basis for use in combination with a supply of labels and tapes carried by some carrier means and a dispensing means at which the labels or the like are dispensed, the system comprising:

- a. a drive roll adapted to be rotated at a substantially constant torque and rate of rotation;
- b. brake means adapted to engage said carrier means to stop advancement of said carrier means to said dispensing means;
- c. pressure means adapted to engage said carrier means with said drive roll to advance said carrier means to said dispensing means;
- d. a pivoted support structure containing a portion of said brake means and said pressure means;
- e. means to pivotally rotate said support structure to alternately engage said carrier means with said

brake means and said drive roll with said pressure means whereby said carrier means may be alternately retained from or advanced to said dispensing means.

15. Apparatus as claimed in claim 14 in which said brake means includes a first brake surface adapted to be positioned above said carrier means and a second brake surface adapted to be positioned at least below one portion of said carrier means, said first and second brake surfaces adapted to engage said carrier means in 10 aligning configuration.

16. Apparatus as claimed in claim 15 in which one of said brake surfaces is spring-biased for preferential engagement of said carrier means with the other brake surface, said spring-biased brake surface being secured 15 to said pivotable support structure.

17. Apparatus as claimed in claim 14 in which said pressure means comprises a rotatable nip roll.

18. Apparatus as claimed in claim 16 in which said pressure means comprises a rotatable nip roll.

19. Apparatus as claimed in claim 14 in which the supply of labels or tapes are supported by web is contained on spindle mounted reel and supplied to said dispensing means by passage over:

- a. a pivoted, spring biased roll adapted to maintain a constant carrier means tension between said spring biased roll and said brake means when said brake means is in an engaged position; and
- b. an idler roll adapted to be engaged with said means and positioned between said pivoted spring biased roll and said brake means.

20. Apparatus as claimed in claim 17 in which the supply of labels or tapes are supported by web is contained on spindle mounted reel and supplied to said dispensing means by passage over:

- a. a pivoted, spring biased roll adapted to maintain a constant carrier means tension between said spring biased roll and said brake means when said brake means is in an engaged position; and

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b. an idler roll adapted to be engaged with said means and positioned between said pivoted spring biased roll and said brake means.

21. Apparatus as claimed in claim 18 in which the supply of labels or tapes are supported by web is contained on spindle mounted reel and supplied to said dispensing means by passage over:

- a. a pivoted, spring biased roll adapted to maintain a constant carrier means tension between said spring biased roll and said brake means when said brake means is in an engaged position; and
- b. an idler roll adapted to be engaged with said means and positioned between said pivoted spring biased roll and said brake means.

22. Apparatus as claimed in claim 14 in which the means to receive a carrier means from which labels or tapes have been dispensed comprises a take-up reel adapted to rotate when said carrier web is passed over said dispensing means and idle by applying additional

20 brake means tensionally applied by the said carrier means against the surface of said take-up reel when said brake means engages said carrier means.

23. Apparatus as claimed in claim 19 in which the means to receive a carrier means from which labels or tapes have been dispensed comprises a take-up reel adapted to rotate when said carrier web is passed over said dispensing means and idle by applying additional brake means tensionally applied by the said carrier means against the surface of said take-up reel when said brake means engages said carrier means.

24. Apparatus as claimed in claim 21 in which the means to receive a carrier means from which labels or tapes have been dispensed comprises a take-up reel adapted to rotate when said carrier web is passed over 35 said dispensing means and idle by applying additional brake means tensionally applied by the said carrier means against the surface of said take-up reel when said brake means engages said carrier means.

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