

[54] METHOD OF PRINTING AND DISPENSING LABELS

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Related U.S. Application Data

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[52] U.S. Cl. 156/249; 156/249; 156/277;
156/384

[51] Int. Cl. B44c 1/00

[58] **Field of Search** 156/238, 249, 277, 384,
156/540, 541, 542, 579, 574; 101/227, 228

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Primary Examiner—Daniel J. Fritsch

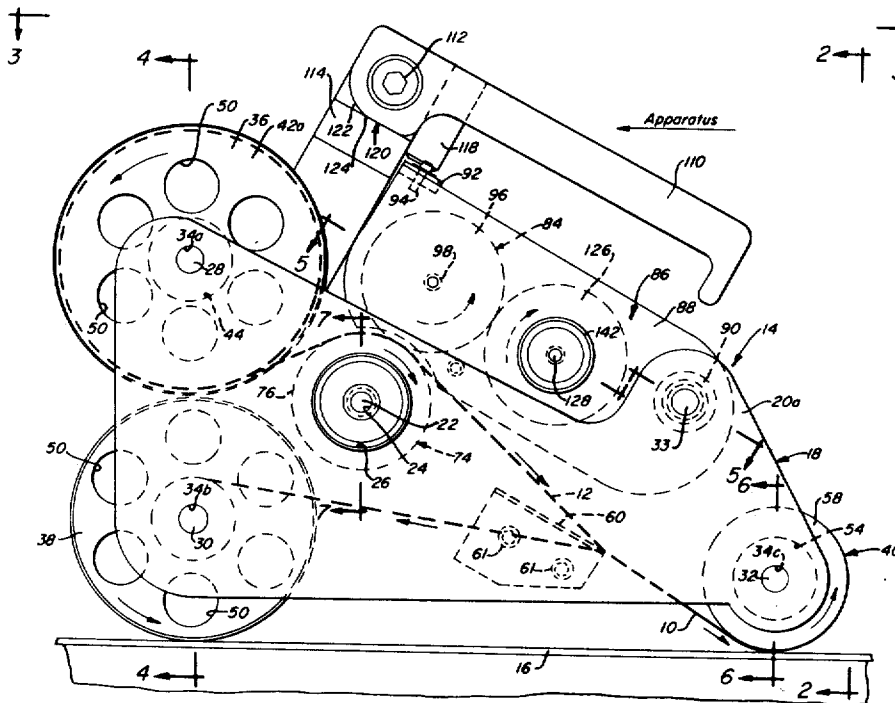
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[57] **ABSTRACT**

A method of printing indicia on labels mounted in spaced relation on a carrier strip and then dispensing the printed labels onto a member is disclosed.

8 Claims, 19 Drawing Figures



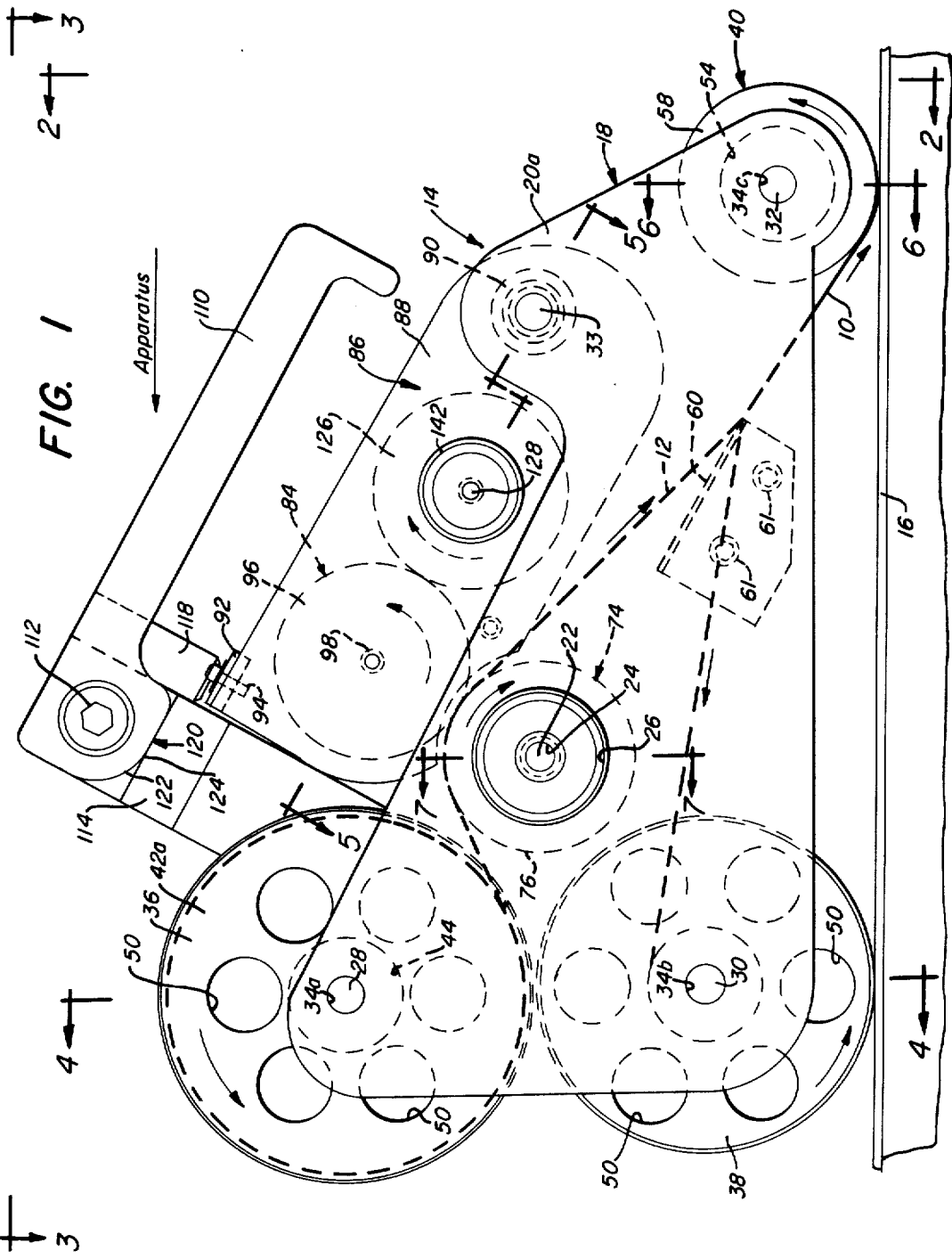


FIG. 5

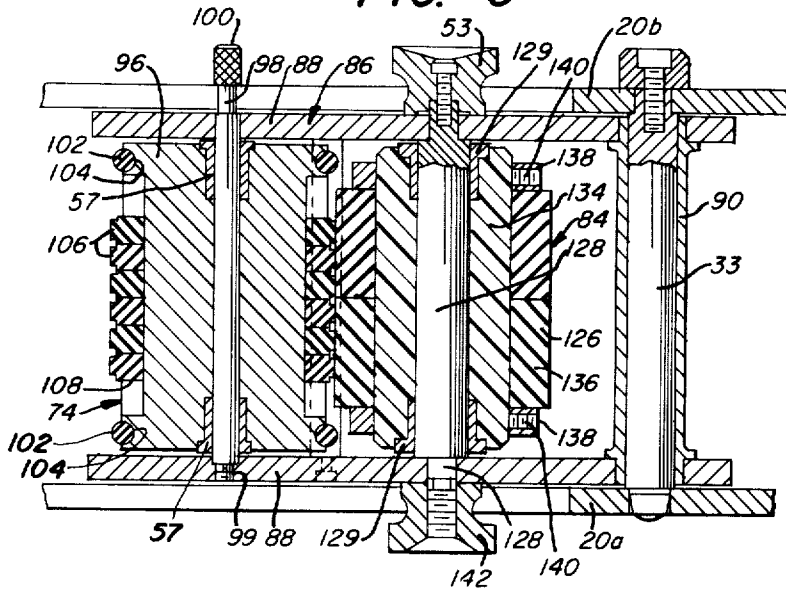


FIG. 6

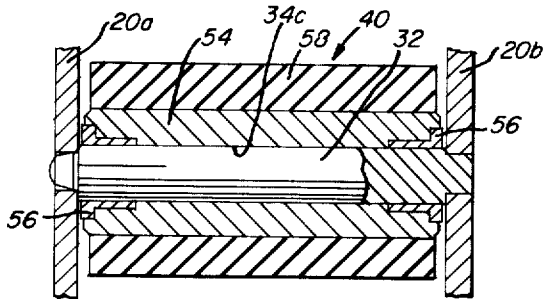


FIG. 7

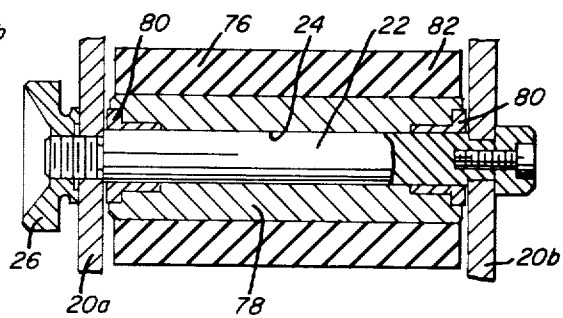


FIG. 8

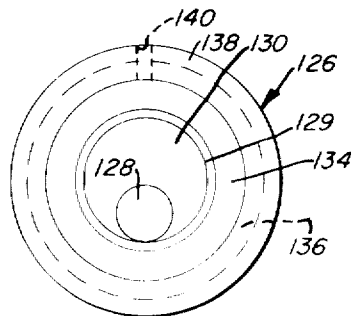


FIG. 10

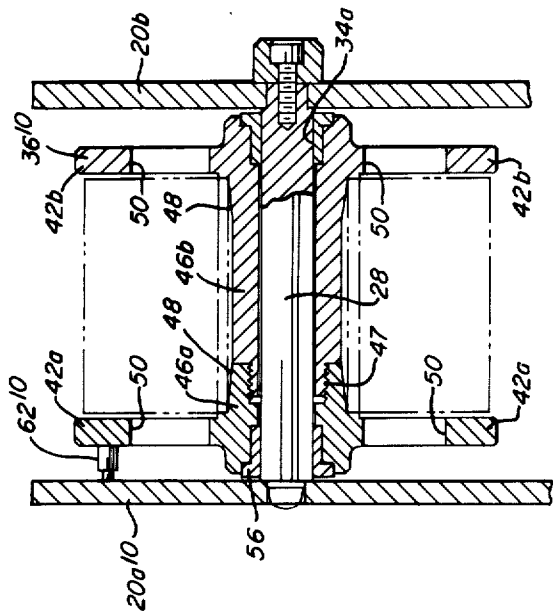


FIG. 11

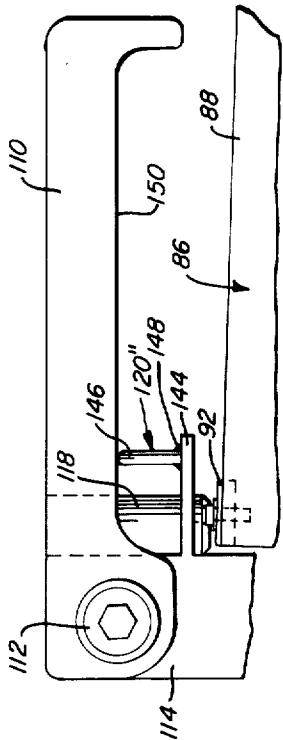


FIG. 9

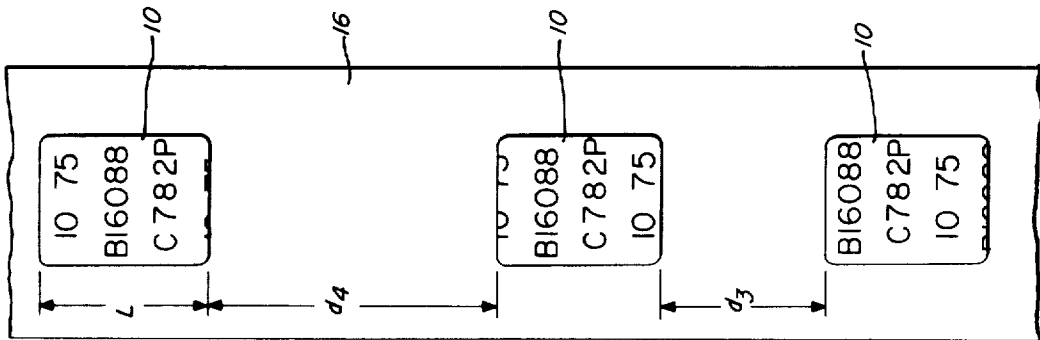


FIG. 12

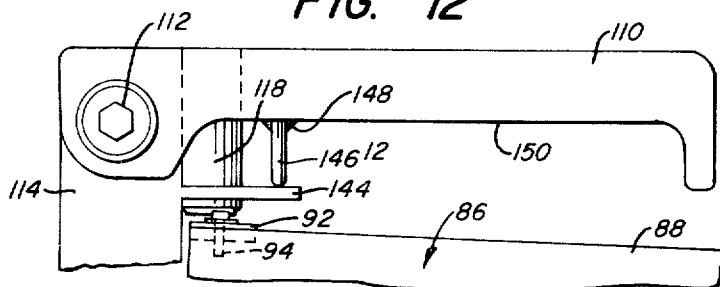


FIG. 13

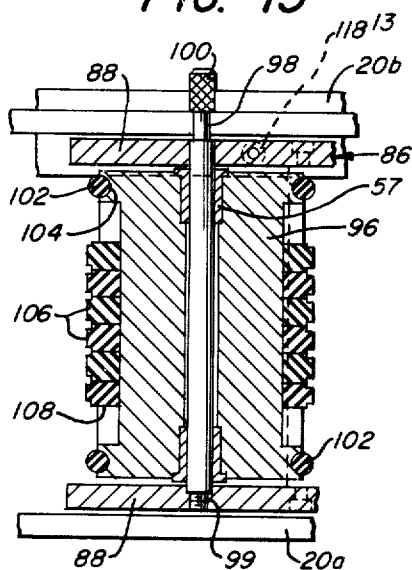


FIG. 14

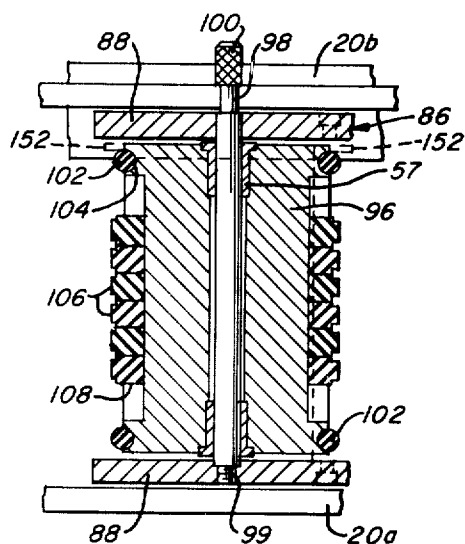


FIG. 15A ← Apparatus

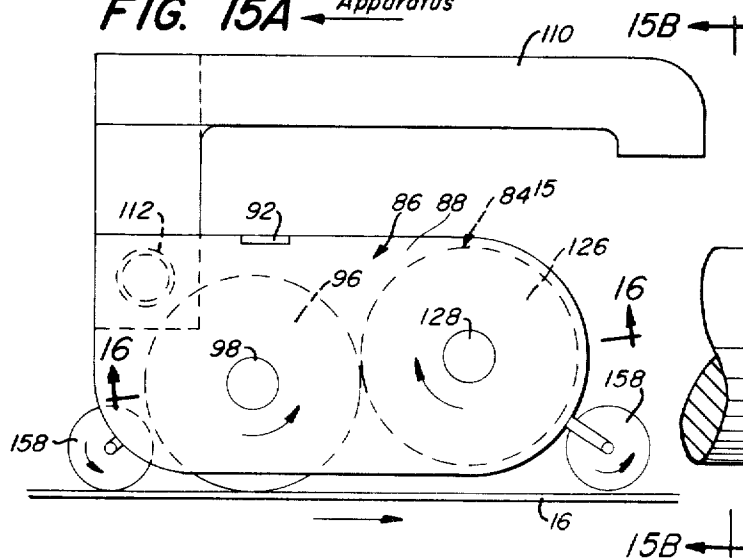


FIG. 15B

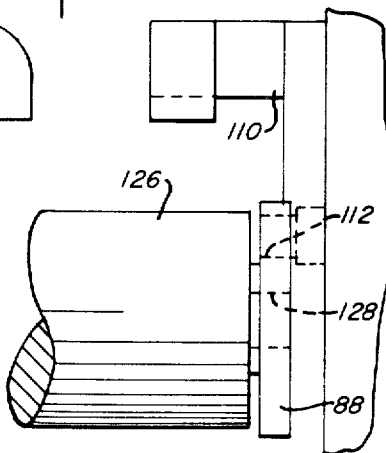


FIG. 16

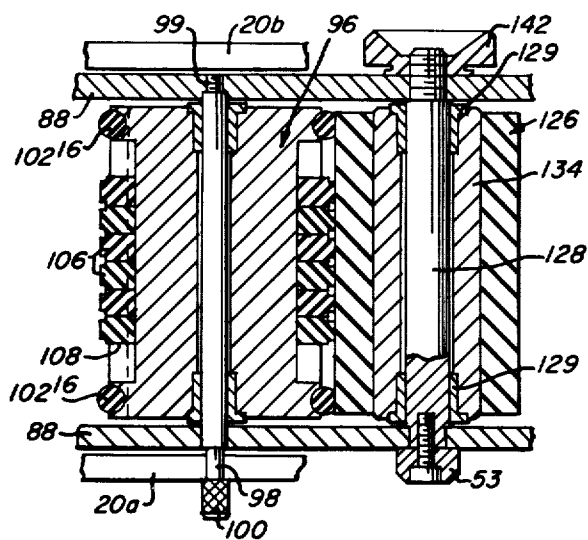


FIG. 1A

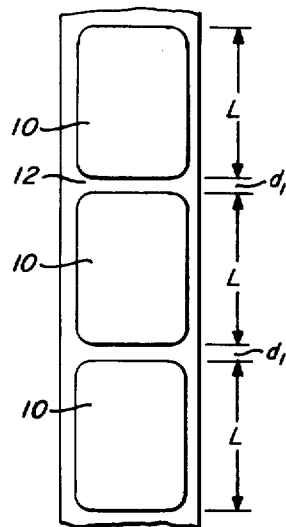
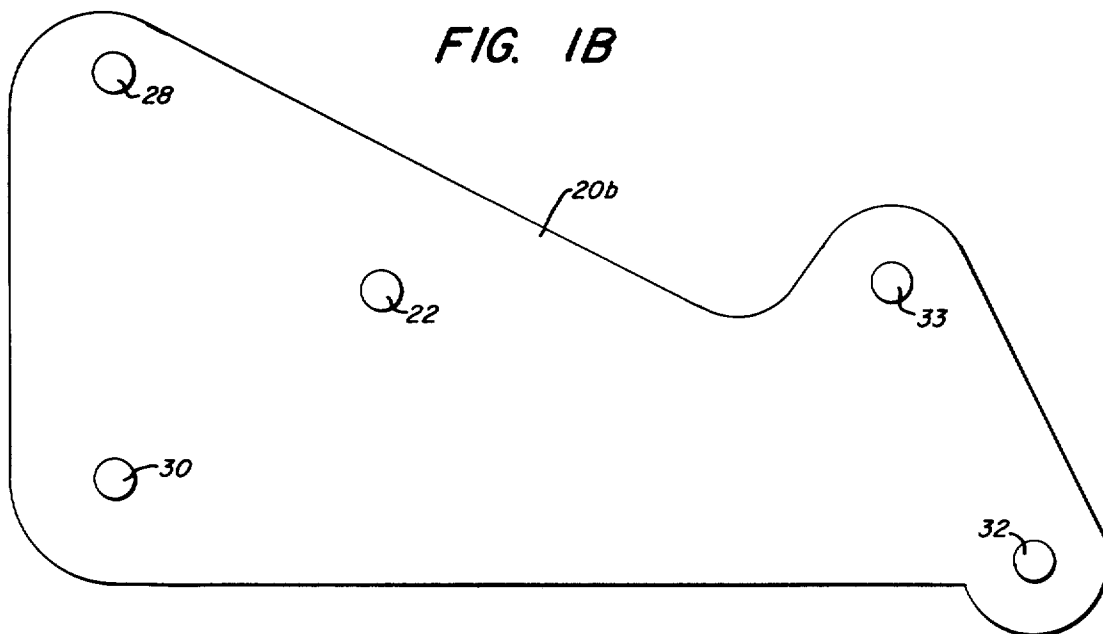


FIG. 1B



METHOD OF PRINTING AND DISPENSING LABELS

This application is a divisional application of U.S. Patent application Ser. No. 117,601, now U.S. Pat. No. 3,715,262, filed Feb. 22, 1971, by applicant and assigned to the same assignee as the subject application.

BACKGROUND OF THE INVENTION

Heretofore, prior to my invention it has been known to strip pressure sensitive labels automatically from a carrier strip by a reverse bend around a metal plate. Prior art devices, however, have been unable to consistently strip the label onto a hot surface without the label curling. Attempts to place a contact roll near the point at which the label is desposited have either been only partially successful or have had a tendency to tear the carrier paper and thus cause delays.

Also, it is known to make a labeling machine with a printing attachment. These machines have generally been of the platen type, wherein the whole series of information is on one plate and, as the label passes over an oppositely disposed plate, the whole label is immediately printed. Because these devices are not adaptable to vary with the speed of a moving elongated object and not easily converted to a size amenable to both hand operation and pedestal-mounted machine operation, they have not been successful.

Hand roller printing units have been produced but these devices always succumbed to the tendency to "throw" the letter blocks when a small diameter wheel was used on operations running at speeds of about 200 fpm and above. Hand roller printing units have not been successfully combined with labelers because of the inability to maintain a constant pressure between the label and the printing mechanism and between the printing mechanism and the ink supply and also because commercially available labels are not produced suitable for use with roller printers having diameters of about four inches and over.

Roller printers are currently available but are not produced with a printing roll having a diameter below about 4 inches because of the throwing of the 1/4 inch letters, which 1/4 inch size is a desirable size for steel mill applications. Therefore, conventional devices, currently used, are large and cumbersome, generally being of a size that requires a standing man to operate the roller printing mechanism. These roller-printers are also provided with characters around the circumference of a wheel.

Conventional labeling devices are of the type shown in:

U.S. Patent No.	Inventor	Issue Date
538,208	Coe	4/23/95
844,302	Cherry	2/12/07
1,231,094	Swallow	6/26/17
2,173,437	Kataja	9/19/39
2,371,711	Schofield et al	3/20/45
3,075,569	Blumberg et al	1/29/63
3,222,242	Ingalls et al	12/7/65
3,231,446	Satas	1/25/66
3,265,553	Kind et al	8/9/66
3,321,105	Marano	5/23/67
3,461,984	Phillips et al	8/19/69
Great Britain		
872,896	Smith et al	7/21/61

OBJECTS OF THE INVENTION

It is the general object of this invention to avoid and overcome the foregoing and other difficulties of and objections to prior art practices by the provision of an improved method of printing, dispensing and applying labels or for dispensing and applying the labels in an unprinted condition to an elongated member at spaced intervals thereon, which improved method:

1. provides a permanent or semi-permanent mark on the elongated members;
2. provides a readily readable mark through the primer coating on the elongated members;
3. eliminates the use of scanners, detectors and the like;
4. provides a mark which is inert with respect to primer coating systems;
5. provides a mark which is pleasing in appearance;
6. does not affect the mechanical properties of the elongated member;
7. will operate with a long life in a factory or plant environment;
8. is simple to operate and to maintain;
9. minimizes erroneous marking of the elongated member product;
10. provides rapid and facile change of the mark from one product to another product;
11. is low in capital cost and operating cost;
12. provides properly spaced marking on elongated members to eliminate loss of material identity in the elongated members after severance thereof into smaller sizes;
13. provides a consistently readable mark on elongated members;
14. provides a marked label or label for marking such that the label is not susceptible to "curling" when applied to a heated elongated member;
15. is reproducible in sizes adaptable to hand application of a mark;
16. provides consistent marking quality by automatically maintaining a fixed, critical pressure between the label to be marked and the marking device and between the marking device and an ink supply;
17. provides a readily removable supply reel, take-up reel, printing device, back-up roller, and front roller;
18. accommodates variations in the diameter of the core for the carrier tape and in the width of the tape;
19. provides a predetermined pressure to the printer roll on the back-up roll and to the ink roll on the printer roll, thereby preventing smudging of the printing on the label and insuring uniform printing thereon;
20. controls deformation of the ink roll during printing;
21. requires no synchronization between the printing roll and label travel;
22. is readily assembled and disassembled; and
23. is adaptable for either in-line operation or hand (portable) operation (i.e., off-line operation).

BRIEF SUMMARY OF THE INVENTION

The aforesaid objects of this invention, and other objects which will become apparent as the description proceeds, are achieved by providing a method of printing and of dispensing labels.

A. The printing and dispensing method includes the steps of:

a. storing the unused portion of said label-bearing carrier strip on a supply reel for subsequent advancement toward said elongated member, while storing the used portion of said carrier strip on a take-up reel commonly supported with said supply reel and which is rollably engageable with said elongated member;

b. passing the intermediate portion of said label-bearing carrier strip, lying between said supply reel and said take-up reel, through the nip of a back-up roll and a co-operating printing roll driven thereby, for frictionally engaging and rotating said back-up roll and thereby rotating said printing roll to successively print predetermined indicia on a label upon the advancement of said carrier strip; then

c. passing the intermediate portion of said carrier strip having indicia printed on said labels over one side of a peel-off member so that advancement of said carrier strip from said supply reel and onto said take-up reel successively separates the spaced labels from the carrier strip and advances each successive label away from the carrier strip and onto the elongated member;

d. moving said take-up reel and said elongated member relative to one another to rotate said take-up reel by an amount sufficient to print at least one intermediate label with indicia and to separate the leading label from said carrier strip by passage of the strip over said peel-off member and advance said leading label onto said elongated member; and

e. rolling said separated label against said elongated member by a roll movable with said take-up reel to secure said label to said member.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

For a better understanding of this invention, reference should be had to the accompanying drawings, wherein like numerals of reference indicate similar parts throughout the several views and wherein:

FIG. 1 is a side elevational view of the labeling apparatus of the present invention;

FIG. 1A is a fragmentary plan view of a portion of the label-bearing carrier strips showing the length L of the labels and the spaced relation d_1 between such labels;

FIG. 1B is a side elevational view of one of the side plates of the frame for such apparatus and showing the integrating rod, the supply reel rod, take-up reel rod, roller means rod and printing roll frame pivot rod;

FIG. 2 is a side elevational view of the apparatus taken along the line 2—2 of FIG. 1 in the direction of the arrows;

FIG. 3 is a plan view of the apparatus taken along the line 3—3 of FIG. 1 in the direction of the arrows;

FIG. 4 is a vertical sectional view of the frame supply reel, take-up reel and supply reel tensioning means taken along the line 4—4 of FIG. 1 in the direction of the arrows;

FIG. 5 is a horizontal sectional view of the printing means taken along the line 5—5 of FIG. 1 in the direction of the arrows and showing the printing roll frame, printing roll and inking roll;

FIG. 6 is a vertical sectional view of the rolling means taken along the line 6—6 of FIG. 1 in the direction of the arrows;

FIG. 7 is a vertical sectional view of a portion of the frame, the assembly rod and the locking means for securing the readily detachable frame together, taken along line 7—7 of FIG. 1 in the direction of the arrows;

FIG. 8 is a side elevational view (with the frame omitted for clarity) of the inking roll showing the pressure determining rod, the eccentric rod, the bearing between the eccentric rod and the rotatable mounting sleeve, the ink roll on the mounting sleeve and one of the side retaining plates or sleeves;

FIG. 9 is a plan view of a portion of the elongated member and three of the printed labels thereon showing that by maintaining the peripheral length of the printing means substantially equal to the length of a label, the label movement need not be synchronized with the printing movement;

FIG. 10 is a view similar to the upper portion of FIG. 4 showing an alternative embodiment of the supply reel tensioning means carried by the supply reel and engaging the extended side walls of the frame;

FIG. 11 is a fragmentary side elevational view of the handle, the pressure pin and a portion of the printing roll frame showing an alternative stop means having a mounting lug on the printing roll frame and a stop engageable with the handle;

FIG. 12 is a view similar to FIG. 11 showing a further embodiment of the stop means having a stop plate on the printing roll frame and the stop carried by the handle;

FIG. 13 is a view similar to the left-hand portion of FIG. 5 showing an alternative embodiment of the printing roll pressure means wherein said pressure pin is carried by the frame;

FIG. 14 is a view similar to FIG. 13 showing a further embodiment of the printing roll pressure means wherein the printing roll pressure means is a resilient ring carried by the printing roll;

FIG. 15A is a view similar to FIG. 1 of an alternative embodiment of the printing means for printing directly on the longitudinal member;

FIG. 15B is a side elevational view taken along the line 15B—15B of FIG. 15A in the direction of the arrows; and

FIG. 16 is a vertical sectional view taken along the line 16—16 of FIG. 15, of the O-ring on the printing roll for driving the inking roll wherein the nut and threads on the printing roll shaft are reversed from that shown in FIG. 5 and the adjustment nut and the locking nut on the inking roll shaft are also reversed from the showing of FIG. 5.

Although the principles of this invention are broadly applicable to the printing of labels and dispensing of such printed labels onto a workpiece of any size or shape, this invention is particularly adapted for use in conjunction with an elongated workpiece, and hence it has been so illustrated and will be so described.

DETAILED DESCRIPTION

With specific reference to the form of this invention illustrated in the drawings, and referring particularly to FIGS. 1-3 a labeling apparatus for dispensing pressure sensitive adhesive labels 10 (FIGS. 1, 1A, 9) having a length L (FIG. 1A) of about $2\frac{1}{2}$ inches and mounted in spaced relation d_1 (FIG. 1A) of about $\frac{1}{8}$ inch on a label-bearing carrier strip 12 (FIGS. 1, 1A), is indicated by the reference numeral 14 (FIG. 1).

APPARATUS 14

The labeling apparatus 14 applies the labels 10 onto an elongated member 16 (FIGS. 1, 9, 15A) such as a steel bar, plate or the like. As shown in FIGS. 1-3, the labeling apparatus 14 has a frame 18.

FRAME 18

The frame 18 has a pair of opposed side plates 20a and 20b (FIGS. 1-7, 10, 13-14, 16). The means utilized to integrate the two readily detachable side plates 20a and 20b has an assembly rod 22 (FIGS. 1, 18) projecting from the plate 20b (FIGS. 1, 1B, 2, 3) and into and through a hole 24 (FIGS. 1, 3) on the other side plate 20a. A knurled nut 26 (FIGS. 1-3) applied to the threaded end of the assembly rod 22 projecting through the hole 24 secures the frame 18 in the integrated position shown in FIGS. 1-3. Also as shown in FIGS. 1, 1B, 2, 3, 4, a supply reel shaft 28, a take-up reel shaft 30 (FIGS. 1, 1B, 4), and a rolling means shaft 32 (FIGS. 1, 1A, 2, 3, 6) project from the side plate 20b in substantially parallel relationship to the assembly rod 22 and project through suitable holes 34a (FIGS. 1-4), 34b (FIG. 1), 34c (FIGS. 1-3, 6) in the other side plate 20a to provide suitable mounting means for a supply reel 36 (FIGS. 1-4), a take-up reel 38 (FIGS. 1, 4) and rolling means 40 (FIGS. 1-3).

TAKE-UP REEL 38

The take-up reel 38 (FIGS. 1-3 and 4) shown partially in FIG. 4, has a pair of opposed side plates 42a (FIGS. 1, 3, 4), 42b (FIGS. 2, 4) connected by a roll core sleeve 33 (FIGS. 1, 3, 4). As noted particularly in FIG. 4, the roll core sleeve 44 has a first core sleeve member 46a projecting from the side plate 42a which core sleeve member 46a is threadable and readily disconnected from a second core sleeve member 46a projecting from the other side plate 42b. For the purpose of accommodating varying diameters of the core (not shown) for the label-bearing carrier strip roll and varying widths of the label-bearing carrier strip 12, the core sleeve members 46a and 46b (FIG. 4) are provided with tapered portions 48 (FIG. 4) adjacent the side plates 42a, 42b. The roll core sleeve 44 rotates on the take-up reel shaft 30 by means of bearings 56. The means utilized to lighten or reduce the weight of the take-up reel 38 and to provide visibility of the amount of the carrier strip 12 on the take-up reel 38 comprises a plurality of holes 50 (FIGS. 1, 4) drilled in the side plates 42a, 42b of such take-up reel 38.

The take-up reel 38 (FIGS. 1, 4) mounted on the left-hand end of the frame 18 (as viewed in FIG. 1) is engageable with the elongated member 16 as a first rolling means for the frame 18 and is utilized for driving and receiving the carrier strip 12 after the labels 10 have been removed from the carrier strip 12 as herein-after explained.

ROLLING MEANS 40

To provide a second means for movable supporting the frame 18, the rolling means or roller 40 (FIGS. 1, 2, 3, 6) is mounted on the rolling means shaft 32 (FIGS. 1-3) in spaced relationship with the take-up reel 38. This rolling means or roller 40 is shown in FIGS. 1-3 and 6, and particularly in detail in FIG. 6. Such roller 40 has a steel sleeve 54 (FIGS. 1-3, 7) rotatable by means of bearings 56 (FIG. 6) on the rolling means

shaft 32 and is provided with an outer substantially hard-rubber-like roller 58 (FIGS. 1-3, 6).

SUPPLY REEL 36

The supply reel 36 is mounted on the supply reel shaft 28 above the take-up reel 38, as viewed in FIG. 1, for storing the label-bearing carrier strip 12. The rolling means shaft 32 is secured in the side plate 20b of the frame 18 by means of a nut 53 (FIG. 3).

This supply reel 36 (FIGS. 1-3 and 4) is essentially similar in construction to the take-up reel 38, and as shown in FIG. 4, has a pair of opposed side plates 42a', 42b' integrated by a roll core sleeve 44' having core sleeve members 46a', 46b' threadably connected at 47' for easy assembly and disassembly. The roll core sleeve 44' rotates on the supply reel shaft 28 by means of bearings 56' and the core sleeve members 46a' and 46b' are tapered at 48 (FIG. 4) adjacent the side plates 42a' and 42b' for the same purpose as the tapered portions 48 on the take-up reel 38. Between the rolling means 40 and the take-up reel 38, a peel-off member 60 (FIG. 1) is mounted by bolts 61 (FIG. 1) on the frame 18 adjacent the elongated member 16.

PEEL-OFF MEMBER 60

As shown particularly in FIG. 1, the peel-off member 60 receives the label-bearing carrier strip 12 (FIGS. 1, 1A) from the supply reel 36 adjacent one side (i.e., the top side as viewed in FIG. 1) of the peel-off member 60 while the label-bearing carrier strip 12 is moving in one direction (i.e. to the right as indicated by the arrow in FIG. 1) toward the elongated member 16 so that the label 10 continues in the one direction to the right (indicated by the arrow in FIG. 1) while the carrier strip 12 moves around the peel-off member 60 and continues in another or opposite direction to the left as indicated by the lower arrow in FIG. 1 toward the take-up reel 38.

OPERATION

The label 10 is moved in the one direction to the right as indicated by the upper arrow in FIG. 1 by the carrier strip 12 and such label moves into engagement with the elongated member 16 as the carrier strip 12 moves in the other direction to the left indicated by the lower arrow in FIG. 1 toward the take-up reel. The labeling apparatus 14 moves to the left, as indicated by the top arrow marked with the legend "apparatus" in FIG. 1, and the detached label 10 is rolled against the elongated member 16 as the rolling means 40 engages the label 10 during such movement of the labeling apparatus 14 to the left.

As shown in FIGS. 1-3, the frame 18 is movable on the rolling means 40 and the take-up reel 38 in the direction of the large arrow marked apparatus in FIG. 1 to rotate the take-up reel 38 in a counter-clockwise direction indicated by the arrow associated with the take-up reel 38 in FIG. 1, thereby causing the take-up reel 38 to pull the label-bearing carrier strip 12 from the supply reel 36 around the peel-off member 60 and onto the take-up reel 38.

Alternatively, to achieve the same above described results, the labeling apparatus 14 can be maintained in a stationary position and the elongated member 16 moved in the one direction to the right to cause the desired rotation of the take-up reel 38 and the roller 40 (FIG. 1).

SUPPLY REEL TENSIONING MEANS 62

For the purpose of tensioning the supply reel 36, a supply reel tensioning means 62 (FIG. 4) is provided.

Such supply reel tensioning means 62 (FIG. 4) is mounted on one member of the supply reel 36 and the frame 18 (in this case, as shown in FIG. 4 on the frame 18) and is engageable with the other member of the supply reel 36 and the frame 18 (in this case, the supply reel 36) to apply a predetermined tension to the supply reel 36 and the label-bearing carrier strip 12 stored on the supply reel 36. This supply reel tensioning means 62 has a housing 64 (FIG. 4) threadably secured at 65 in the side plate 20a and is provided with a positionable pressure pin 66 secured by a hollow threaded pin 67 (containing a plunger 67a and spring 67b) into the housing 64 and having its piston 68 projecting out of the housing 64 and into engagement with the side plate 42a of the supply reel 36. In order to apply the predetermined desired pressure or tensioning force against the supply reel 36, the threadable bolt 67 is rotatable on the threads 72 which mesh with threads on the housing 64.

PRINTING MEANS 74

The means utilized to print a predetermined indicia (FIG. 9) in decreasing spaced relation d3 and d4, etc. (FIG. 9) on the elongated member 16, is a printing means 74 (FIGS. 1-3, 5) which is mounted on the frame 18 between the supply reel 36 and the peel-off member 60. The printing means 74 is engageable with the labels 10 (FIG. 1) on the label-bearing carrier strip 12.

This printing means 74 has a back-up roll (FIGS. 1-3 and 7) which is mounted on the assembly rod 22 secured in the side plate 20a of the frame 18 by the knurled nut 26 and in the side plate 20b by an assembly knurled nut 53. This back-up roll 76 has a steel sleeve 78 (FIG. 7) rotatable by means of bearings 80 (FIG. 7) on the assembly rod 22, and has a resilient rubber-like roll 82 (FIG. 7) mounted on the sleeve 78. Such back-up roll 76 is, of course, mounted on the carrier strip side, i.e., the lower side, as viewed in FIG. 1, of the label-bearing carrier strip 12. The backup roll 76 is driven in clockwise direction as indicated by the arrow associated with the backup roll 76 (FIG. 1) by the label-bearing carrier strip 12.

A printing roll assembly 84 (FIGS. 1-3, 5, 15) of the printing means 74 has a frame 86 (FIGS. 1-3, 5, 11-14, 15) pivoted on the printing roll assembly pivot rod 33 (FIGS. 1-3, 5). As shown in FIGS. 1-3, the frame 86 has a pair of side plates 88 (FIGS. 1-3, 5, 11-14, 15) fixedly secured to a steel sleeve 90 (FIGS. 1-3, 5), which sleeve 90 rotates on the printing roll assembly pivot rod 33. In the opposite end, i.e., the left-hand end as viewed in FIG. 3, the side plates 88 are integrated by a top plate 92 (FIGS. 1-3, 5, 11, 12, 15) secured to the side plates 88 by suitable fasteners, such as screws 94 (FIGS. 1-3, 5, 11, 12) or the like.

A printing roll 96 (FIGS. 1-3, 5, 13-15) is mounted on a bolt 98 (FIGS. 1-3, 5, 13-15) extending through the side plate 20b of the frame 18 and threadable by means of threads 99 (FIGS. 5, 13, 14) into the side plate 20a of the frame 18. The printing roll 96 rotates by means of bearings 57 (FIGS. 5, 13, 14) on the bolt 98 and such bolt 98 is removable from the frame 18 by means of a knurled head 100 (FIGS. 3, 5, 13, 14) on

the upper side of the bolt 98 as viewed in FIGS. 3 and 5.

Such printing roll 96 is provided with a pair of opposed tires 102 (FIGS. 5, 13, 14) suitably O-rings or the like seated in slots 104 (FIGS. 5, 13, 14) in the outer periphery of the printing roll 96. These tires 102 engage and ride on the back-up roll 76 so that such printing roll 96 is driven in a counter-clockwise direction as indicated by the associated arrow in FIG. 1 by the back-up roll 76. The marking indicia indicated in FIG. 9 comprises for example, coded indicia indicating the type of elongated member, the metallic heat number utilized in the elongated member and the dimensional characteristics of such elongated member and are suitably hard rubber-type members 106 (FIGS. 2, 5, 13, 14) force fitted into suitably spaced cavities 108 or a longitudinal groove 108 (FIGS. 5, 13, 14) in the periphery of the printing roll 96. Each of the three lines or rows of indicia (totaling nine lines or rows are suitably substantially equal to the length L (FIGS. 1A, 9) of a label 10 so that as shown in FIG. 9, the three rows of predetermined indicia are always printed on a label 10 regardless of the synchronization of the label movement through the printing roll assembly 84 with the printing roll assembly 84.

As shown in FIGS. 1-3, the printing roll assembly 84 has a pressure member, suitably a handle 110 (FIGS. 1-3, 11, 12, 15) or the like, pivoted at 112 (FIGS. 1-3, 11, 12, 15) on an arm 114 (FIGS. 1, 2, 11, 12) secured by a bolt 116 (FIG. 2) to the side plate 20b of the frame 18. The pressure member handle 110 carries a spring loaded pin 118 (FIGS. 1, 11, 12) similar to pin 67, FIG. 4, which pin 118 is engageable with one member of the printing roll 96 and the printing roll frame 86 to apply a predetermined printing pressure to the printing roll 96, the labels 10, and the resilient back-up roll 76. The pressure member or handle 110 is provided with stop means 120 (FIG. 1) for limiting the pressure applying movement of the handle 110. Such stop means 120 comprises a generally flat surface 122 (FIG. 1) on the handle 110 adjacent the pivot 112 which is engageable when the handle 110 is moved in a clockwise direction as viewed in FIG. 1 with a stop lug surface 124 (FIG. 1) on the arm 114 beneath the pivot 112 and adjacent the top plate 92 of the frame 86 of the printing roll assembly 84.

In the embodiment shown in FIGS. 1-3, the pressure pin 118 engages the top plate 92 of the frame 86 of the printing roll assembly 84. When the flat surface 122 (FIG. 1) on the handle 110 engages the stop lug surface 124 further clockwise movement of the handle 110 is prevented and a predetermined pressure is applied by the spring loaded pin 118 to the frame 86 of the printing roll assembly 84, thereby transmitting such predetermined printing pressure to the printing roll 96, the labels 10, and the resilient back-up roll 76.

As shown in FIGS. 1-3, 5, and 8, an inking roll 126 is mounted on the printing roll frame 86 in engagement with the printing roll 96 for applying printing ink to the printing roll 96. Such inking roll 126 has a pressure positioning shaft 128 (FIGS. 1-3, 5, 8, 15) extending on bearings 129 (FIGS. 5, 8) through the side plates 20a, 20b of the frame 18 of the labeling apparatus 14. An eccentric shaft 130 (FIG. 8) is integrally formed with the pressure positioning shaft 128 (FIGS. 5, 8). A rotatable mounting sleeve 134 (FIGS. 5, 8) rotates on the bearings 129 and carries the resilient ink-saturated ink

roll 136 (FIGS. 5, 8). For the purpose of maintaining the dimensional stability of the ink roll 136 during the inking operating while such ink roll 136 is in engagement with the printing roll 96, retaining side plates 138 (FIGS. 5, 8) are secured to the rotatable mounting sleeve 134 as by screws 140 (FIGS. 5, 8). In order to apply a predetermined inking pressure to the printing roll 96, the pressure positioning shaft 128 is positioned by means of a knurled nut 142 (FIGS. 1-3, 5) against the printing roll 96 (adjacent side plate 20a of frame 18) and is secured in the predetermined pressure applying position by means of a knurled nut 53 (FIGS. 2, 3, 5) on the opposite side of the shaft 128 adjacent the side plate 20b of the frame 18.

ALTERNATIVE EMBODIMENTS

It will be understood by those skilled in the art that alternatively as shown in FIG. 10, the supply reel 36¹⁰ carries the supply reel tensioning means 62¹⁰ which engages and rides on the extended side plate 20a of the frame 18 of the labeling apparatus 14.

FIG. 11 shows an alternative embodiment of a stop means 120¹¹ associated with the handle 110. In this embodiment, the flat surface 122 engageable with the stop lug 124 is eliminated and an arm 144 projects from the mounting arm 114 for the handle 110. The mounting lug or arm 144 carries a stop 146 secured thereto as by welds 148, which stop 146 is engageable with the underside 150 of the handle 110 to limit the clockwise rotation of such handle 110.

In FIG. 12, the stop 146¹² is secured as by welds 148 to the underside 150 of the handle 110 and engages the stop plate 144 on the pivot arm 114 to limit the downward clockwise movement of the handle 110.

In FIG. 13, a pressure pin 118¹³ is mounted on one of the side plates 88 of the frame 86 for the printing roll assembly 84 and engages the handle 110 (not shown in FIG. 13).

FIG. 14 shows a resilient pressure ring 152 carried by the outer periphery of the printing roll 96 as a replacement for the pressure pin 118 shown in FIGS. 1-3 and pressure pin 118¹³ shown in FIG. 13.

FIGS. 15A, 15B show a portable printing roll assembly 84¹⁵ for printing directly on the elongated member 16 or label-carrying member. Such printing means 84¹⁵ has a handle 110 mounted on side plates 88 of the frame 86, which frame 86 is movable by means of wheels 158 relative to the elongated member 16. Although not shown in FIG. 15A and 15B it will be understood by those skilled in the art that the above described stop means 120 and pressure pin 118 associated with the handle 110 can be incorporated in the printing machine 84¹⁵ and that the pressure applying means associated with the inking roll 126 is also used therein.

FIG. 16 shows drive rings 102¹⁶ for driving the inking roll 124 and for preventing over pressure on printing members 106 to prevent smudging of the printing members 106.

SUMMARY OF THE ACHIEVEMENTS OF THE OBJECTS OF THE INVENTION

It will be recognized by those skilled in the art that the objects of this invention have been achieved by providing an improved labeling apparatus 14 and method of labeling an elongated member 16, an improved printing means 74 and method of printing on a label 10

on the workpiece 16. The labeling apparatus 14 and printing roll assembly 84 (FIGS. 1-14) and 84¹⁵ (FIG. 15) provide a permanent or semi-permanent mark (FIG. 9) on the elongated members 16; provide a readily readable mark (FIG. 9) through a primer coating (not shown) on the elongated members 16; eliminate the use of scanners, detectors (not shown) and the like; provide a mark (FIG. 9) inert with respect to primer coating system for the workpiece 16; provide a mark (FIG. 9) which is pleasing in appearance; do not affect the mechanical properties of the elongated workpiece 16; will operate with a long life in a factory or a plant environment; are simple to operate and to maintain; minimize and eliminate erroneous marking of the elongated workpiece 16; permit rapid and facile change of the mark 106 (FIG. 9) from one product 16 to another product 16; are low in capital cost and operating cost; provide properly spaced marking d3, d4, etc. (FIG. 9) on workpieces 16 to eliminate loss of material identity on the workpiece 16 after severance thereof into smaller sizes and pieces; provide a consistently readable mark (FIG. 9) on the workpieces 16; provide a marked label 10 or label 10 for marking such that the label 10 is not susceptible to curling when applied to a heated workpiece at about 300°-500°F; are reproducible in sizes adaptable to hand application of a mark (FIG. 9); provide consistent marking quality by automatically mounting a fixed critical pressure between the label 10 to be marked and the printing rod 96 and the back-up roll 76 and between the printing roll 96 and the inking roll 126; provide a readily removable supply reel 36, take-up reel 38, printing roll assembly 84, 84¹⁵, back-up roller 76, and front roller 40; accommodate variations in the diameter of the core (not shown) for the carrier tape roll and variations in the width of the carrier tape 12; provide a predetermined pressure to the printing roll 96 on the back-up roll 76 and to the inking roll 126 on the printing roll 96 thereby preventing smudging of the mark (FIG. 9) on the label 10 and insuring uniform printing thereon; prevent deformation of the inking roll 126 (by the sleeves 138, FIGS. 5, 8) during the printing operation; requires no synchronization between the printing roll 96 and the label travel or movement through the printing means 74; and are readily assembled and disassembled.

While in accordance with the patent statutes, preferred and alternative embodiments of this invention have been illustrated and described in detail, it is to be particularly understood that the invention is not limited thereto or thereby.

I claim:

1. A method of printing and dispensing pressure-sensitive adhesive labels maintained in spaced relation on a continuous label-bearing carrier strip and for applying said labels onto an elongated member, said method comprising the steps of:

- a. storing the unused portion of said label-bearing carrier strip on a supply reel for subsequent advancement toward said elongated member, while storing the used portion of said carrier strip on a take-up reel commonly supported with said supply reel and which is rollably engageable with said elongated member;
- b. passing the intermediate portion of said label-bearing carrier strip, lying between said supply reel and said take-up reel, through the nip of a back-up roll and a co-operating printing roll driven thereby,

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for frictionally engaging and rotating said back-up roll and thereby rotating said printing roll to successively print predetermined indicia on a label upon the advancement of said carrier strip; then

- c. passing the intermediate portion of said carrier strip having indicia printed on said labels over one side of a peel-off member so that advancement of said carrier strip from said supply reel and onto said take-up reel successively separates the spaced labels from the carrier strip and advances each successive label away from the carrier strip and onto the elongated member;
- d. moving said take-up reel and said elongated member relative to one another to rotate said take-up reel by an amount sufficient to print at least one intermediate label with indicia and to separate the leading label from said carrier strip by passage of the strip over said peel-off member and advance said leading label onto said elongated member; and
- e. rolling said separated label against said elongated member by a roll movable with said take-up reel to secure said label to said member.

2. The method as recited in claim 1 wherein said take-up reel and elongated member can be continuously moved relative to one another for continuously printing, peeling-off, advancing, and securing said labels onto said elongated member in spaced relationship thereon.

3. The method recited in claim 1 including the step

of limiting the printing pressure so that the pressure between said printing roll, labels, and said back-up roll does not exceed a predetermined amount.

4. The method recited in claim 3 including the step of applying a pressure to one member of a pressure member, said printing roll and a printing roll frame to engage another member of said pressure member, said printing roll and said printing roll frame, when said pressure applying movement of said pressure member ceases, to apply predetermined printing pressure to said printing roll, said labels and said back-up roll.

5. The method recited in claim 1 including the step of applying printing ink to a printing roll.

6. The method recited in claim 5 including the step of applying a predetermined inking pressure between said printing roll and an inking roll.

7. The method recited in claim 5 including the step of containing said inking roll during the inking operation so that said inking roll maintains its dimensional stability.

8. The method recited in claim 1 including the step of maintaining the peripheral length of a printing section on a printing roll substantially equal to the length of a label and continuously maintaining said carrier strip in contact with said back-up roll which drives said printing roll thereby assuring that all of the indicia on one printing section appears on each label.

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