

May 4, 1971

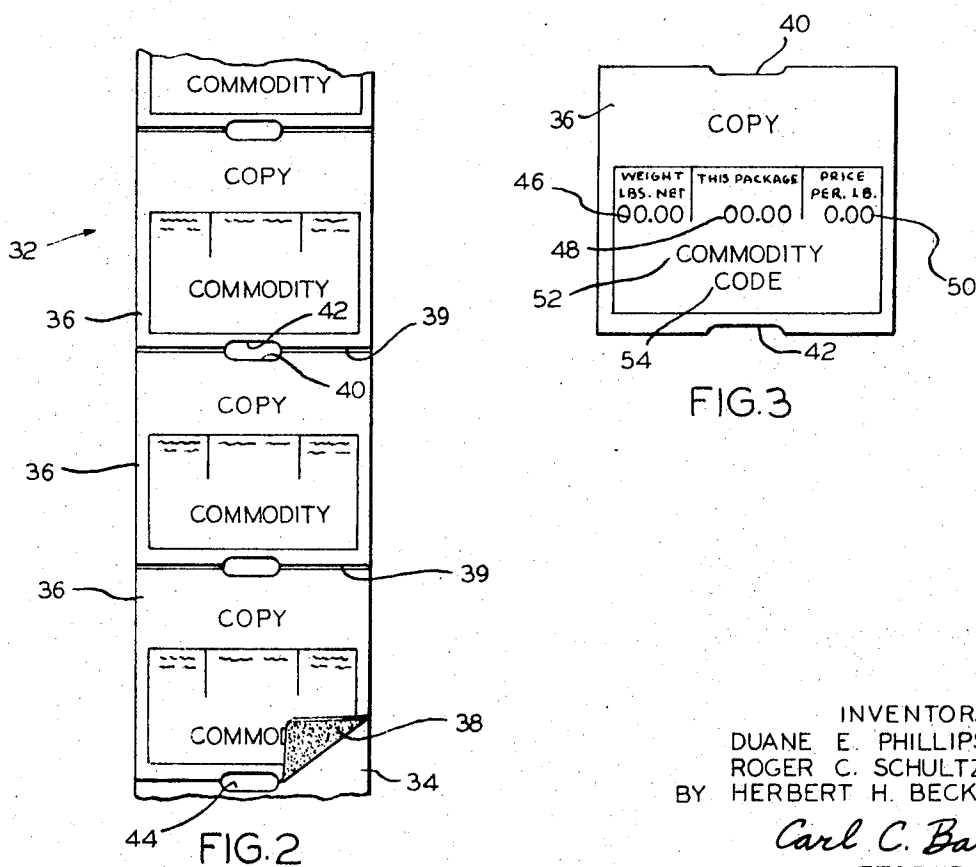
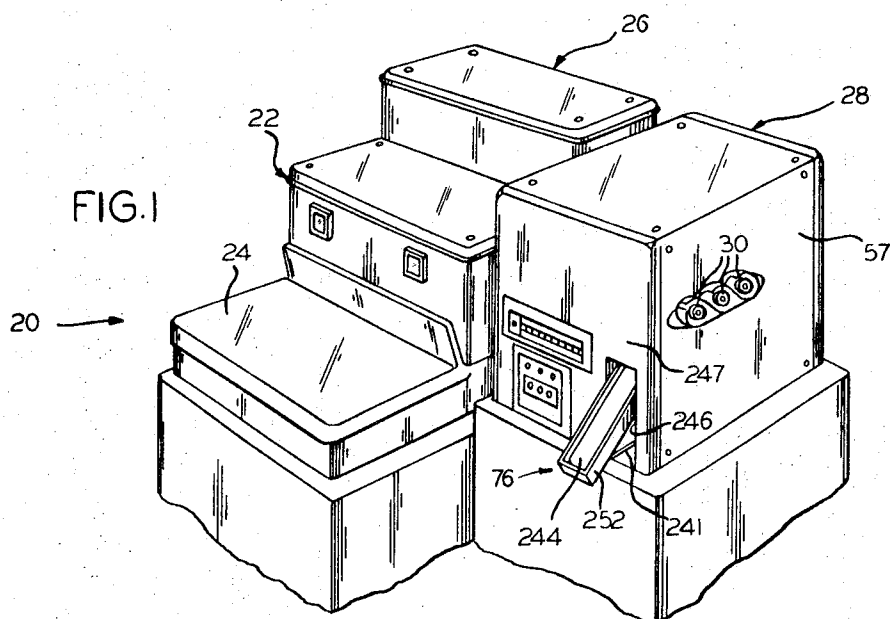
D. PHILLIPS ET AL

3,577,296

METHOD FOR PRINTING AND APPLYING LABELS

Original Filed July 23, 1965

6 Sheets-Sheet 1



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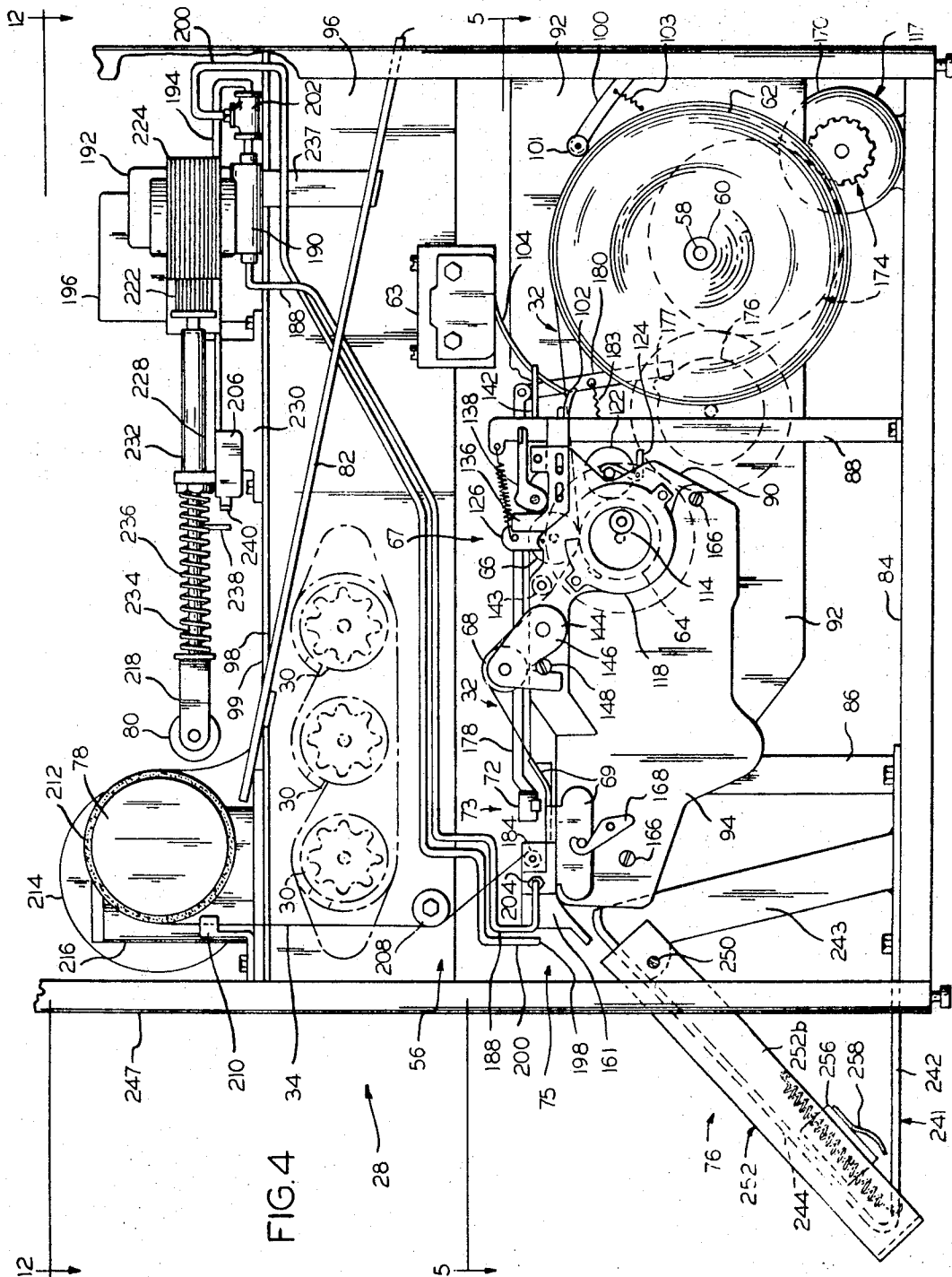
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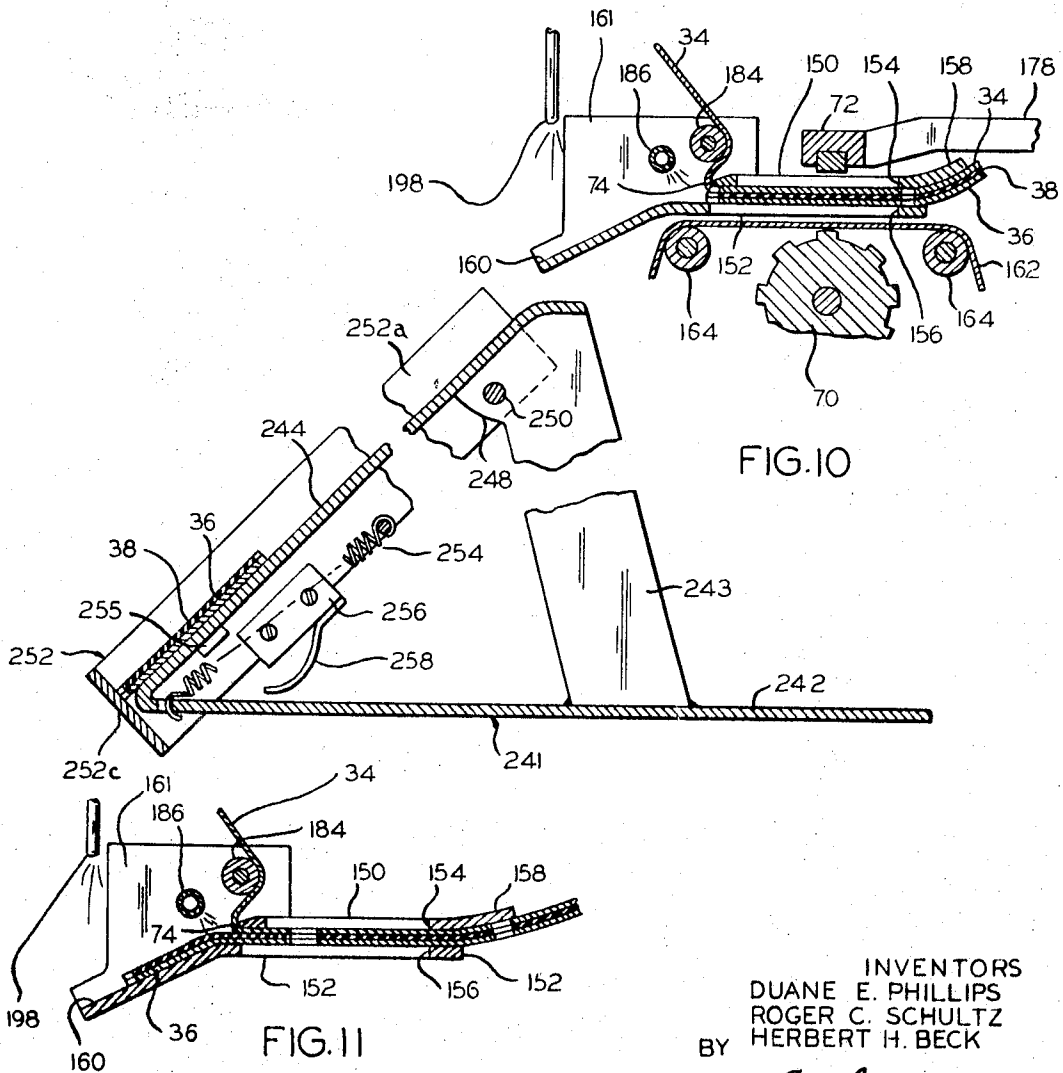
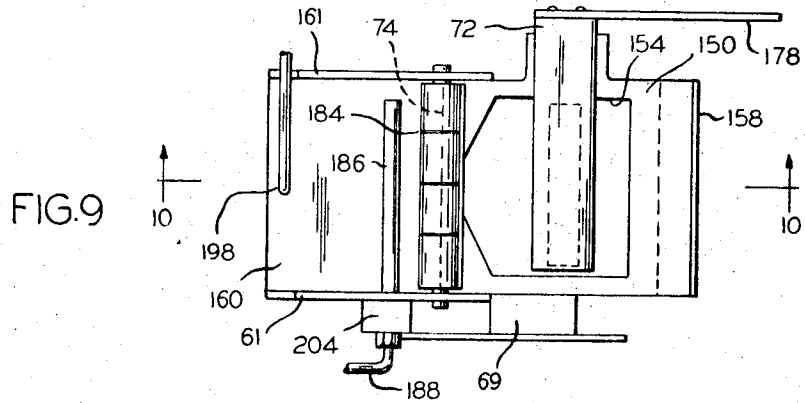
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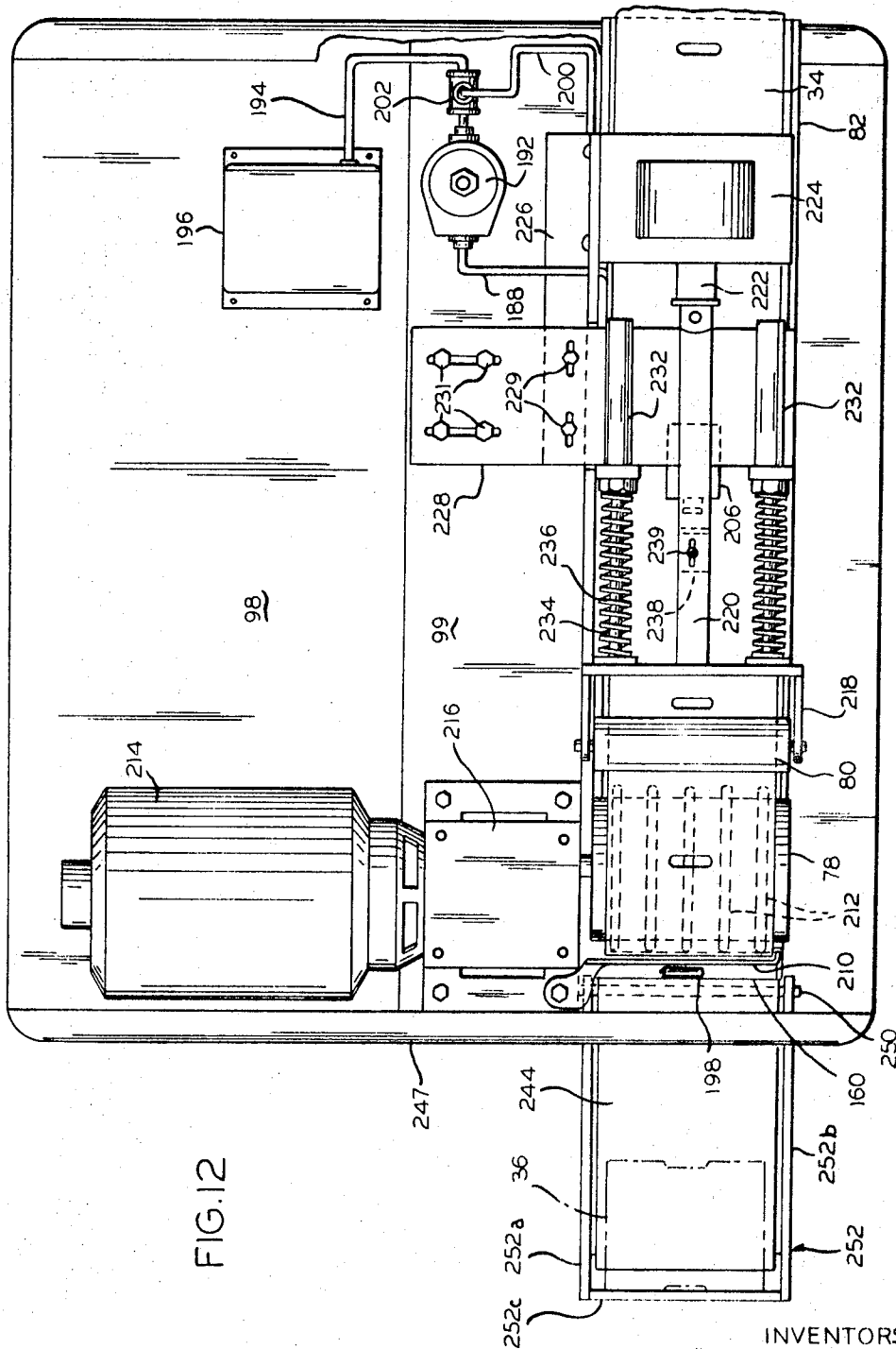
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6 Sheets-Sheet 6

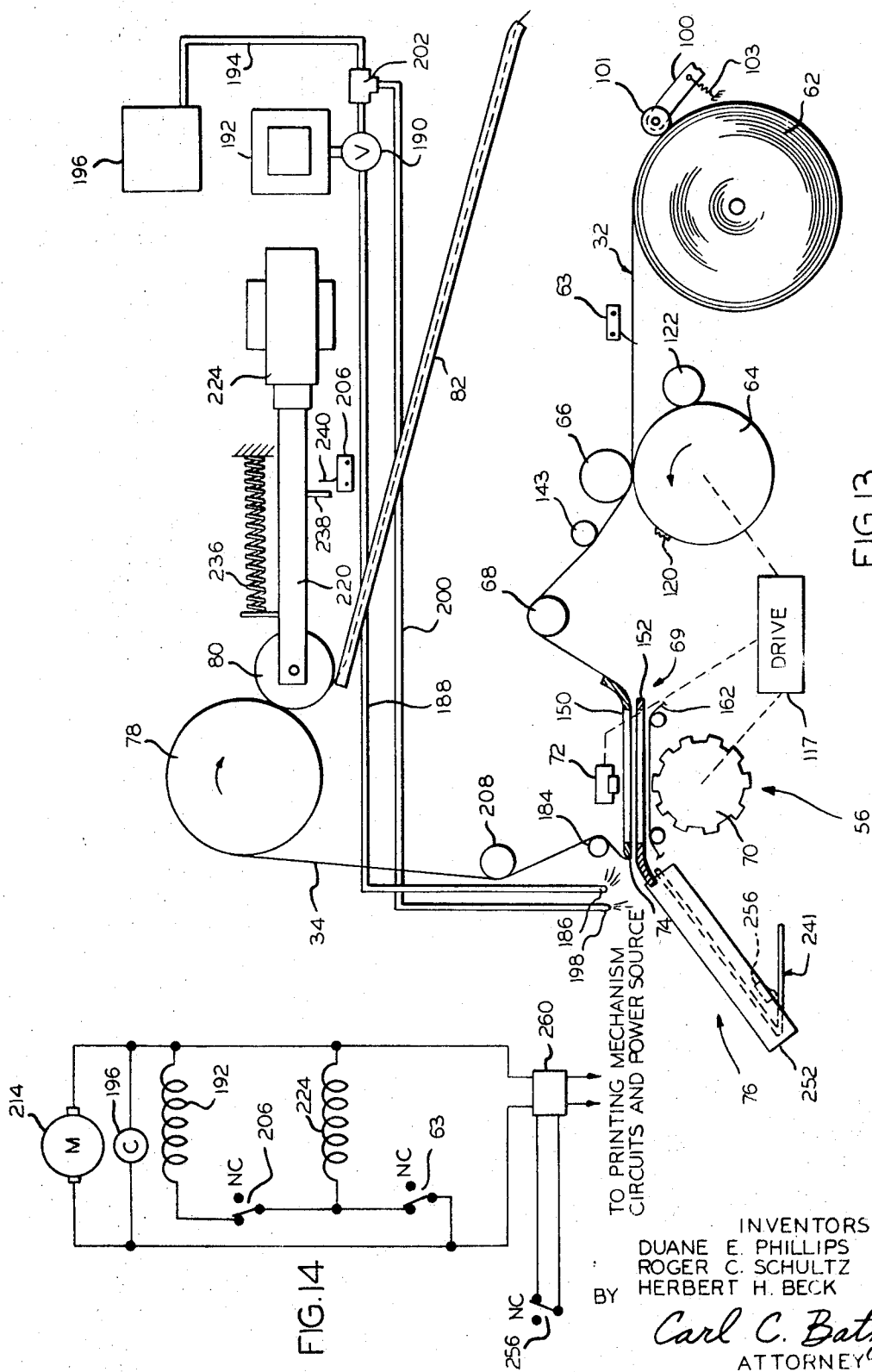


FIG. 13

FIG. 14

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3,577,296

METHOD FOR PRINTING AND APPLYING LABELS
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Original application July 23, 1965, Ser. No. 474,441, now
Patent No. 3,461,984, dated Aug. 19, 1969. Divided
and this application June 18, 1969, Ser. No. 834,437

Int. Cl. B32b 31/00

U.S. Cl. 156—249

7 Claims

ABSTRACT OF THE DISCLOSURE

Packages, especially those containing perishable foods, are labeled with pressure-sensitive labels in a process which provides for weighing each package, printing the weight and cost on a label adhered to a backing strip, removing the label from the strip, and applying to the package.

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a divisional of our copending application entitled "Label Printing and Dispensing Apparatus and Method of Labeling Packages," Ser. No. 474,441, filed July 23, 1965, now Pat. 3,461,984, dated Aug. 19, 1969.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for printing labels carried by a backing strip and dispensing the printed labels from the backing strip, and to a method of labeling packages which may be performed employing the apparatus. The invention is especially adapted for application to a printer interconnected with weighing and computing mechanisms, for printing labels with value data corresponding to the weights of articles placed on the weighing mechanism.

It has become common practice to package foodstuffs such as meat and cheese in random weights and to label the packages with labels bearing printed weight and price information. Apparatus incorporating a weighing mechanism, a computer for computing the value of articles weighed by the weighing mechanism, and a printer for preparing printed labels or tickets identifying the weight, unit price, and value of the articles is now in widespread use. Such apparatus is employed by food packers and processors and by food stores in prepackaging operations for customer self-service.

The prior printing and dispensing apparatus and the labeling methods preformed therewith employ plain paper or paper coated with heat-activated adhesive as the label material. The apparatus serves to print successive labels on a strip of such paper, sever the printed labels from the strip, and dispense the labels. The plain paper labels are loosely inserted beneath transparent plastic wrappers on the foodstuff packages, and the adhesively coated paper labels are affixed to the outer surfaces of the package wrappers. Apparatus is provided for activating the adhesive of the coated labels as they issue from the printer, so that the labels may be affixed to the packages simply by pressing the packages against them. Illustrative apparatus for printing and dispensing both types of labels is shown in U.S. Pat. No. 2,948,466.

Serious problems of food spoilage and loss of labels have been encountered in labeling thermoplastic package wrappers with the heat-activated adhesive labels, employing the prior apparatus and methods. In many instances, the thermoplastic wrappers have been perforated in attaching the labels. Perforations are especially troublesome in packaging cheese, inasmuch as a package with but the

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smallest pinhole will spoil rapidly due to mold growth. In numerous other instances, the labels have failed to adhere properly and have become separated, so that the packages are unmarked. The difficulties arise because very precise control of the various factors, including manual manipulations, is necessary. A package is pressed against the adhesive surface of a label as it reclines on a hot plate. The amount of pressure, the length of time that pressure is applied, and the temperatures of the package and the hot plate all affect the operation. When the conditions are excessive, holes are burned through the thermoplastic wrappers along the edges of the labels. When the conditions are less than optimal, the labels fail to adhere properly.

The present invention solves the foregoing problems by providing a labeling method employing labels carried by a backing strip, and apparatus for printing and dispensing such labels, whereby pressure sensitive adhesive labels may be employed to overcome the disadvantages of the prior methods and apparatus, while retaining the advantages thereof. The problem of perforations in package wrappers is eliminated, the adhesive characteristics of the labels are constant, and proper application of the labels to the wrappers is readily insured.

The invention provides the additional advantages that the structural requirements of the apparatus are reduced, and the apparatus and its operation are simplified. Structure is provided for accurately registering the labels with the printing members, which is especially important when using labels preprinted with design, copy, and identification material. The apparatus operates at a rate which is both conducive to trouble-free operation and commensurate with the rate at which the operators can work.

The new apparatus and method are well suited for incorporation in and application to existing systems employing interconnected weighing, computing, and printing apparatus, the use of which requires the operator merely to place a package on a scale for weighing and then affix a printed label to the package, with the intervening operations being conducted automatically. Alternatively, the invention may be applied to a label printer that is set manually based on visual observation of results indicated by weighing and computing apparatus.

The foregoing and other advantages, objects and functions of the invention will be apparent on reference to the specification and to the attached drawings illustrating a preferred embodiment of the invention, wherein like parts are identified by like reference symbols in each of the views, and wherein:

FIG. 1 is a perspective view of a complete system or installation for weighing articles and producing a printed record of the weight, the unit value, and the total value of the articles, including a weighing mechanism, a computer, and a printer incorporating the label printing and dispensing apparatus of the invention;

FIG. 2 is a fragmentary plan view of a strip of label tape including a backing strip and labels thereon, such as may be supplied to the printer unit of the system;

FIG. 3 is a plan view on a larger scale of a printed label as prepared and dispensed by the printer;

FIG. 4 is a side elevational view of the printing and dispensing apparatus, as seen with the side panel of the printer removed;

FIG. 5 is a horizontal sectional view of the printing and dispensing apparatus, taken substantially on line 5—5 of FIG. 4;

FIGS. 6 and 7 are enlarged fragmentary elevational views similar to FIG. 4, of apparatus for positioning a pressure roller and a switch lever in the printing apparatus, illustrating printing and tape threading positions thereof in the respective views;

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FIG. 8 is a perspective view of a printing cylinder in the printing apparatus;

FIG. 9 is an enlarged plan view similar to FIG. 5 of additional printing mechanism and of the label dispensing apparatus;

FIG. 10 is a vertical longitudinal sectional view thereof and of adjacent receiver apparatus, with parts broken, taken on line 10—10 of FIG. 9;

FIG. 11 is a view similar to FIG. 10 of the dispensing apparatus, illustrating a label being stripped from the backing strip of the label tape;

FIG. 12 is a plan view of the printing and dispensing apparatus, taken on line 12—12 of FIG. 4;

FIG. 13 is a diagrammatic view similar to FIG. 4 of the printing and dispensing apparatus; and

FIG. 14 is a circuit diagram for the printing and dispensing apparatus.

In the invention, printed labels are prepared from a strip of label tape which includes a succession of labels carried by a backing strip and separably adhered thereto. Preferably, the labels are adhered to the strip by a pressure sensitive adhesive layer on the labels, which layer adheres preferentially to the labels when they are separated from the strip. The labels are printed while on the strip, and the printed labels are dispensed from the strip. The labels are affixed to packages by the adhesive layer after being dispensed.

The printing and dispensing apparatus of the invention includes a supply source or means for storing the backing strip having labels thereon, means for pulling the strip from the supply source, means for printing the labels on the strip, and means for stripping the printed labels from the strip. The apparatus is especially suitable for application with appropriate modification to prior assemblies of cooperating weighing, computing, and printing mechanisms. In particular, the supply source for storing a strip of labels, the printing apparatus, and other structure of the printers employed in such assemblies may be utilized, either in their prior forms or altered for cooperation with the additional structure provided by the invention. At the same time, various structural elements are eliminated from the prior printers, and the printer operation is simplified.

A preferred embodiment of the apparatus of the invention is illustrated in the drawings as it is employed in a unitary system of electrically interconnected weighing mechanism, computer, and printer for weighing an article placed on the weighing mechanism, computing the value of the article in accordance with a preset unit value, and producing a printed record of the value and preferably of the unit value and weight of the article. A complete system 20 incorporating the apparatus of the invention is illustrated in FIG. 1. The system is the same as that disclosed in U.S. Pat. No. 2,948,466, and disclosed more particularly in U.S. Pat. No. 2,948,465, with the changes in the printer that are described hereinafter. The system weighs and produces a printed record of the weight, unit value, and total value of the articles.

The system of the said patents includes the combination of a weighing mechanism or scale including electrical means for producing representation of the weight factor in digital form, a printer having inputs for the weight and unit value factors and for total value, a unit value selector mechanism forming part of the printer and including a plurality of elements each representing different columns of unit value and movable to a series of positions corresponding to different integer values in such columns, a computer having a digital weight input and an output representing total value in digital form, electrical connections from the weighing mechanism for supplying the weight factor digits to the computer weight input and to the printer weight input, electrical interconnections between the unit value selector mechanism and the computer for developing data in digital form incorporating the unit value factor and for introducing the digital data to the computer, electrical connections from the computer

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output to the printer total value input to transmit the computed total value data thereto, and means for causing the printer to carry out a printing cycle utilizing the data from the weighing mechanism and the computer. Inasmuch as the apparatus of the said patents is well known and disclosed in the patents, reference is made to the disclosure thereof, and the description of the apparatus will not be repeated herein.

The major components of the foregoing structure of the patents are illustrated in FIG. 1. The system 20 includes a power operated weighing mechanism or scale 22 having a platter 24 on which an article or package to be weighed is placed. The operation of the weighing mechanism produces an analogue response corresponding to the weight of the article and transmits this response to a computer 26. The computer reads out the position of the analogue response of the weighing mechanism and computes the value of the article in accordance with a preset price per pound. The weighing mechanism and the computer are interconnected with a printer 28 which is constructed for cooperation therewith to print successive labels with weight, unit value, and total value data or indicia corresponding to successive articles on the scale, and to dispense the printed labels successively. The printer is provided with manual control knobs 30 corresponding to dollars, dimes, and cents per pound, for presetting the unit value of the article being weighed. The weighing mechanism 22, the computer 26, and the printer 28 are constructed as described in the said patents, with the printer being modified and having apparatus incorporated therein pursuant to the present invention, as described hereinafter.

The preferred illustrative embodiment of the printing and dispensing apparatus of the invention is adapted for use with the label tape 32 illustrated in FIG. 2. The tape includes a perforated continuous backing strip or ribbon 34 and a succession of individual substantially rectangular labels 36 thereon and separably adhered thereto. The backing strip and labels are constructed of paper, plastic or other suitable sheet material. The labels have a layer 38 of pressure sensitive adhesive on their reverse sides, which layer is preferentially adherent to the labels. The labels are adhered to the backing strip by the adhesive layer, and when the labels are separated from the strip, the adhesive layer adheres to the labels and serves to affix them to package wrappers.

The labels 36 may be severed in uniform lengths from a continuous label strip while on the backing strip, preferably with successive labels slightly spaced apart and the waste removed from between the ends of the labels, as illustrated. The spaces 39 between the adjacent ends of successive labels are constant, preferably at about $\frac{1}{16}$ inch. Alternatively, the labels may be butt cut, so that the label ends substantially abut on each other. The former arrangement is preferred, to facilitate dispensing the labels from the backing strip.

The label tape 32 is perforated at the junctures of successive labels, to provide openings through the tape that are regularly spaced apart therealong a distance equivalent to the label length, i.e., equivalent to the distance between corresponding points on successive labels. The perforations form recesses 40 and 42 in the opposite ends of the labels 36 centrally thereof, and openings 44 in the backing strip 34 registering with the recesses. The end portions of the labels at the recesses thus are spaced apart from adjacent end portions of successive labels on the strip. The label recesses and the strip openings cooperate with means for sensing the advance of the strip, as described herein after. The illustrative recesses and openings are generally straight sided with rounded ends, the sides being parallel to the ends of the labels, however, the recesses and openings may have other configurations for cooperation with the sensing means, as will be apparent.

Referring also to FIG. 3, the illustrative labels 36 are preprinted with copy and identification material,

and also may bear appropriate design work. The copy may include a store designation and other material, and weight, total value, and unit value headings as illustrated. The labels are printed in the printer 28 with weight data or indicia 46, total value data 48, and unit value data 50, beneath their respective headings. A commodity identification 52 also is reprinted. Alternatively, it may be printed in the printer 28 by incorporating commodity printing apparatus as disclosed in the above-identified patents. Code data and/or other printed material 54, such as factory expiration date and grade, is printed in the printer 28.

FIGS. 4 and 13 illustrate the printing and dispensing apparatus 56 of the printer 28 as viewed with the side panel 57 (FIG. 1) of the printer removed. The apparatus includes a stud 58 on which is mounted the core 60 of a supply roll 62 of the tape 32. The tape is conducted in a movement path from the supply roll to a sensing microswitch 63, between a code printing cylinder 64 and a pressure roller 66 at a first printing station 67, over an adjustment roller 68, into a guide chute 69 and between weight and value type wheels 70 and an impression hammer 72 at a second printing station 73, and to a stripping edge 74 at a delivery station 75. Labels are separated from the backing strip 34 at the stripping edge and are collected in a receiver 76. The backing strip is conducted over a drive roller 78, between the drive roller and a clutch roller 80, and then to a waste chute 82.

The several parts of the apparatus are mounted on printer frame members and on members mounted on the frame. Referring to FIGS. 4-8, the frame members include a base frame member 84, forwardly and rearwardly disposed uprights 86 and 88 thereon, and outer and inner side frame members 90 and 92. A ribbon support plate 94 is mounted on the outer frame member 90. Vertical and horizontal divider panels 96 and 98 are mounted on the frame, and a base plate 99 is mounted on the horizontal panel 98.

The supply roll 62 is revolvably mounted on the stud 58, in turn mounted on the inner frame member 92. A drag on the movement of the roll is provided by a feeler arm 100 and a tape sensing roller 101 thereon engaging the supply roll under the tension of a spring 103. These parts serve to indicate when the roll is approaching exhaustion, as more particularly described in U.S. Pat. No. 2,948,465.

The tape 32 is wound on the supply roll 62 with the backing strip 34 on the outside and the labels 36 on the inside. The tape extends from the supply roll beneath the normally closed sensing microswitch 63, mounted on the panel 96, and over a horizontal support and guide plate 102. At this location, an operating lever 104 on the microswitch depends into engagement with the backing strip 34 uppermost on the tape. The lever is disposed in the movement path of the openings 44 in the backing strip, and of the registering recesses 40 and 42 in the labels. The lever moves into and out of the openings as the tape is moved past the lever. Thus, the free end of the lever rides on the backing strip between successive openings 44, and it projects through the tape when in register with an opening.

The tape 32 extends from the microswitch location under a guide bar 106 on the inner frame member 92, and between the printing cylinder 64 and the pressure roller 66 at the first printing station 67. The printing cylinder is largely conventional, as disclosed in the above-identified patents. As seen most clearly in FIG. 8, the cylinder includes a drum 108 having adjustable type wheels or electros 110 mounted therein for printing code and/or grade data from the surface of the drum upon rotation thereof. An axial mounting shaft 112 extends from one end of the drum, and a typesetting mechanism 114 extends eccentrically from the opposite end of the

drum. The typesetting mechanism includes indexing rings or dials 116 for the type wheels or electros 110. The mounting shaft 112 is connected to a main drive mechanism 117 for the printer. The opposite end of the drum is rotatably supported in a mounting bracket 118 on the outer frame member 90.

The printing cylinder 64 is constructed and arranged to function in a different manner from the corresponding cylinder in the prior patents. Thus, the prior cylinders include feed rail portions which effect the forward feeding movement of the tape, moving the tape for a distance at least the length of a label upon each revolution of the cylinder. In providing for accurate registration of the labels with the weight and value type wheels which follow, the prior cylinders advance the tape for a distance greater than a single label length, and additional apparatus is provided for retracting the tape to establish registration, as disclosed in U.S. Pat. No. 3,021,988. In the present invention, the rail portions are replaced by but several teeth 120 for moving the tape a distance less than a label length during each revolution. The tape is moved only a distance corresponding to the printing movement of the type wheels 110 on the drum 108, i.e., about $\frac{1}{4}$ inch for a label 2 inches long. Alternatively, the teeth 120 may be omitted, and movement may be imparted to the tape solely by the type wheels or electros. The printing cylinder also advances the tape in a timed relationship to the operation of other structure that differs from the operation of the prior cylinders, as described hereinafter.

An ink roll 122 is rotatably mounted on the side frame members 90 and 92, and it is removably secured in place by a latch 124. The roll serves to ink the type wheels 110 on the printing cylinder drum 108 during each revolution thereof.

The printing cylinder 64 cooperates with the resilient pressure roller 66 to print code data 54 and the like on the labels 36, as illustrated in FIG. 3. The labels are on the underside of the tape 32 and face the printing cylinder. A single label is printed during each revolution of the printing cylinder. The cylinder is connected to the printer main drive mechanism 117 for rotation in the counterclockwise direction as view in FIG. 4. The cylinder is arranged so that on each operation of the mechanism, the cylinder rotates about three-fourths of one revolution without advancing the tape, then engages a label on the tape to print the code data thereon and advance the tape slightly, and then completes one revolution out of engagement with the tape. As the teeth 120 and the raised type wheels 110 meet the pressure roller 66, the tape is engaged between the cylinder and the roller for printing and advancing the tape.

The pressure roller 66 is movably mounted for initially threading the tape 32 between it and the printing cylinder. Movement members are provided for moving the roller and also for clearing the microswitch operating lever 104 from the movement path of the tape. Referring particularly to FIGS. 6 and 7, a roller level 126 is pivotally mounted intermediate its ends on the outer frame member 90 by means of a stud 128. A shaft 130 on one end of the roller is supported in the lower end of the lever, and a shaft 133 (FIG. 5) on the opposite end of the roller is movably supported in the inner frame member 92. A pin 132 is mounted in the upper end of the roller lever 126 and extends from both sides of the lever. The lever may be rotated about the stud 128 by applying a force to the pin, thereby moving the pressure roller 66, which is eccentrically mounted with respect to the axis of pivot.

A tension spring 134 is connected to the upright 88 and to the pin 132, to bias the pressure roller towards the printing cylinder 64. A lever movement plate 136 is movably mounted on the outer frame member 90 and bears against the lever pin 132. A cam lever 138 is pivotally mounted on the frame member 90 adjacent the movement

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plate for engagement therewith. A pin 140 is mounted on the movement plate and extends inwardly therefrom. A bent wire 142 is secured to the latter pin and extends under the switch lever 104 for engagement therewith.

In the printing positions of the parts, as illustrated in FIG. 6, the pressure roller 66 is adjacent to the printing cylinder 64 for engaging the tape 32 therebetween, and the switch lever 104 engages the tape. When it is necessary to thread the tape through the apparatus, as when a fresh roll 62 is inserted, the cam lever 138 is rotated in the counterclockwise direction, as illustrated in FIG. 7. The cam lever then forces the movement plate 136 to the left against the lever pin 132, causing the roller lever 126 to rotate in the counterclockwise direction. When the roller lever rotates, the pressure roller 66 moves therewith away from the pressure cylinder. The switch lever-engaging wire 142 moves to the left with the movement plate, and raises the switch lever 104 out of the movement path of the tape. The tape is threaded through the apparatus with the parts in the positions illustrated in FIG. 7, after which the cam lever 138 is rotated in the clockwise direction, and the parts are restored to their positions illustrated in FIG. 6 by the tension spring 134.

The tape 32 extends from the first printing station 67 under a guide roller 143 mounted on the frame members 90 and 92, over the adjustment roller 68, and into the guide chute 69 at the second printing station 73. The adjustment roller is rotatably mounted on an adjustment bracket 144 pivotally mounted by a stud 146 on the outer frame member 90. A set screw 148 on the frame member engages the bracket for adjusting the position of the roller up or down, to adjust the length of the movement path portion between the first and second printing stations, i.e., to vary the length of the portion of the tape 32 that extends between the stations.

Referring to FIGS. 4, 5, and 9-11, the guide chute 69 is mounted on the side frame members 90 and 92. The chute includes upper and lower spaced apart generally parallel guide plates 150 and 152 receiving the tape 32 therebetween and disposed between the type wheels 70 and the impression hammer 72. The plates have respective openings 154 and 156 exposing the tape to the printing action of the type wheels and the hammer. An upwardly inclined integral directing flange 158 on the receiving end of the upper guide plate 150 guides the tape from the adjustment roller 68. The stripping edge 74 is a sharply rounded edge formed on the opposite or discharge end of the upper guide plate. A downwardly inclined integral apron 160 on the discharge end of the lower guide plate 152 extends over the receiving 76. Two parallel upstanding side plates 161 are integral with the discharge end of the lower guide plate 152 on opposite sides thereof. The foregoing parts of the guide chute 69 are secured together as a unit removably mounted on the frame members.

A ribbon assembly is mounted on the ribbon support plate 94 at the second printing station 73. The assembly includes an inked printing ribbon 162 supported by rollers 164 to pass between the type wheels 70 and the hammer 72, beneath the lower guide plate 152, as more particularly disclosed in the aforesaid patents. The ribbon support plate is removably secured to the outer frame member 90 by screws 166. The guide chute 69 is removably secured to the ribbon support plate by a latch 168.

The type wheels 70 include a series of weight, total value, and unit value wheels mounted in a row between the side frame members 90 and 92. The type wheels print the corresponding data 46, 48 and 50 on the labels 36, as illustrated in FIG. 3. The unit value wheels are preset mechanically by the knobs 30. As disclosed in the said Pat. No. 2,948,465, the present condition of these wheels is transmitted to the computer 26 by means of selector switches to control the action of the computer in computing total value. The weight and total value wheels are individually set by the computer for each weighing opera-

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tion. The computer actuates the printer drive mechanism 117 including a drive motor 170 upon completion of the computing operation, to start the printing cycle. The drive mechanism indexes the weight and total value wheels to their proper positions for printing the data obtained.

As also disclosed in the aforesaid patents, the printing cylinder 64 and the impression hammer 72 are operated once during each operation of the drive mechanism, after which the motor 170 is shut off and operation of the drive mechanism is discontinued. The drive motor 170 is operatively connected to the printing cylinder 64 by a clutch 172 and a gear train 174 in the drive mechanism. The impression hammer 72 is operated in timed relationship to the printing cylinder, by means of a cam wheel 176 having a cam surface 177 and connected to one of the gears in the train 174, or other suitable associated intermittent operating means. An arm 178 is connected to the hammer and to an operating lever 180 which follows the cam wheel. The arm and lever are pivotally mounted on a stud 182 on the inner frame member 92, and a spring 183 or similar means serves to bias the lever to maintain the hammer in a withdrawn position. When the lever is engaged by the cam surface 177, the hammer strikes the tape 32 in the exposed area of the guide chute openings 154 and 156, to carry the tape and the printing ribbon 162 against the type wheels 70 and print weight, unit value, and total value data on a label 36 registering with the openings.

The tape 32 extends from the second printing station 73 to the stripping edge 74 at the delivery station 75, where the printed labels 36 are separated from the backing strip 34. The backing strip extends from the stripping edge in a reverse direction around an angle producing a roller 184. The roller is mounted on the guide chute side plates 161 and is removable with the guide chute 69. The stripping edge and the roller cooperate to form an abrupt bend in the movement path of the strip, thus causing the printed labels 36 to separate from the backing strip and issue face down on the apron 160 with the adhesive layer 38 uppermost, as illustrated in FIGS. 10 and 11.

An intermittently operating stripping air nozzle 186 is mounted at the delivery station 75 above the apron 160 and adjacent the stripping edge 74. The nozzle is mounted in a block 204 on the guide chute 69 and is removable with the guide chute. The nozzle extends along the stripping edge 74, and it is mounted for directing air against the trailing end of a label 36 being separated, between the label and the backing strip 34. The nozzle is connected by a conduit 188 to an air valve 190 mounted on the base plate 99 and operated by a solenoid 192 (see FIGS. 4, 12 and 13). The valve is connected by a conduit 194 to an air compressor 196 mounted on the horizontal panel 98.

A continuously operating air nozzle 198 is mounted adjacent to the edge of the apron 160, where the apron extends over the receiver 76. The continuous nozzle is mounted for directing air against the leading end of a label 36 being separated, between the label and the backing strip 34. The nozzle is connected by a conduit 200 to a T fitting 202 in the conduit 194, between the air valve 190 and the compressor 196. A stream of air issues continuously from the continuous nozzle. The air stream is directed by the nozzle onto the leading end of each label as it separates from the backing strip 34 at the stripping edge 74, to force the label downwardly and provide stripping leverage, as illustrated in FIG. 11.

The air valve solenoid 192 is operated by the label sensing microswitch 63 and a normally closed air valve microswitch 206 (FIGS. 4, 12 and 13), to issue a short puff or burst of air from the intermittent nozzle 186 when the trailing end of each label is at the stripping edge 74 and advancing movement of the tape is discontinued. The flexible adhesive at the trailing edge of the label has a tendency to adhere to the backing strip 34. The puff of air forces the label downwardly and thereby assists in sep-

arating the adhesive to complete the separation of the label from the backing strip without blowing the label away. The air also helps move the label down the apron 160 to the receiver 76, and in the process, air is directed between the label and the apron to dispense the label onto the receiver in a stream of air. This movement is assisted by the stream of air from the continuous nozzle 198. Each label tends to float into the receiver in a stream of air, so that the label falls to the bottom of the receiver without sticking to the receiver on the way.

Referring to FIGS. 4 and 12, the backing strip 34 extends from the angle producing roller 184 over a guide roller 208 mounted on the vertical divider panel 96, between a guide bar 210 and the drive roller 78, over the drive roller and between the drive roller and the clutch roller 80. Rubber friction rings 212 are mounted around the drive roller and are spaced apart thereon. The drive roller is driven by a motor 214 on the horizontal panel 98 through a speed reducer 216 mounted on the base plate 99. The guide bar 210 is mounted on the speed reducer. The drive roller motor operates continuously when the system is in operation.

The clutch roller 80 is movably mounted on a clutch mounting plate 228 which in turn is laterally adjustably mounted by screws 231 on a support 230 secured on the base plate 99. Two cylinders 232 are fixedly mounted on the mounting plate, and they receive a pair of support and guide rods 234 slidably therein. The rods are connected to a roller mounting yoke 218. A compression clutch spring 236 is mounted on each rod between the yoke and the corresponding cylinder. The yoke is connected by a roller arm 220 to the plunger 222 of a single-acting clutch solenoid 224. The solenoid is mounted on an angle bar 226 longitudinally adjustably secured to the clutch mounting plate 228 by screws 229. The air valve microswitch 206 is mounted on the underside of the mounting plate. A switch actuator 238 is longitudinally adjustably mounted by a screw 239 on the roller arm 220 and depends therefrom for engagement with an operating lever 240 of the air valve microswitch.

The clutch solenoid 224 and the air valve solenoid 192 are energized by operation of the sensing microswitch 63. With the sensing microswitch closed, the clutch solenoid is energized and acts through the plunger 222 and the roller arm 220 against the force of the clutch springs 236 to withdraw the clutch roller 80 from the drive roller 78, as illustrated in FIG. 4. The backing strip 34 then is loose on the rotating drive roller and is not advanced thereby. When the sensing microswitch is opened, the clutch solenoid is de-energized, and the clutch roller is moved by the force of the clutch springs 236 against the drive roller with the backing strip becoming engaged therebetween, as illustrated in FIG. 13. The drive roller then engages the backing strip to pull the strip and thus pull the tape 32 from the supply roll 62, advancing the tape and the strip separated from labels along the movement path.

When the sensing microswitch 63 is closed subsequently, the clutch solenoid 224 and the air valve solenoid 192 are energized at the same time, causing the clutch roller 80 to be withdrawn and the air valve 190 to open immediately. The clutch and drive rollers are separated to discontinue the advance of the backing strip and tape, and air is admitted to the intermittent stripping nozzle 186. After a brief mechanical delay owing to the time required for movement of the roller arm 220, the actuator 238 engages the lever 240 of the air valve microswitch 206 to open the switch. The air valve solenoid is de-energized by opening the air valve microswitch, whereupon the air valve closes and stops the flow of air to the intermittent nozzle 186. In this manner, only a short puff of air issues from the intermittent nozzle each time the sensing microswitch 63 is energized to withdraw the clutch roller 80 and discontinue the advance of the backing strip and the tape.

The backing strip 34 is conducted from the drive and clutch rollers to the waste chute 82 supported by a hanger 237 depending from the base plate 99. The waste chute conducts the strip out of the machine to a waste collector (not shown). Alternatively, a suitable take-up roller might be provided for rolling up the waste strip.

Referring to FIGS. 4 and 10, the receiver 76 is a unitary assembly of a support 241, a pair of standards 243, and a frame 252. The support is constructed of sheet material bent angularly to provide a horizontal base portion 242 and an inclined tray portion 244. An inner end of the base portion is fixedly mounted on the base frame member 84, and the base portion projects through a delivery opening 246 (FIG. 1) in the front wall 247 of the printer 28. The standards are mounted on the base portion at its inner and adjacent opposite sides thereof, and they extend upwardly and outwardly from the inner end. The tray portion extends upwardly and inwardly from the outer end of the base portion to a position beneath the apron 160. The inner end of the tray portion extends over the standards and is secured thereto. Each standard includes a shoulder 248, and a rod 250 extends between the shoulders.

The frame 252 includes two parallel side walls 252a and 252b, and an end wall 252c. The frame encloses the sides and outer end of the tray portion 244 of the support 241, and the side walls of the frame are pivotally mounted on the rod 250 at the open inner end of the frame. A tension spring 254 is connected to one side wall 252a of the frame beneath the tray portion and to the base portion 242 of the support. A stop bar 255 is secured to the side wall 252a beneath the tray portion. The spring serves to maintain the frame normally in the elevated position illustrated in FIG. 10, wherein the stop bar engages the tray portion 244 and the frame extends above the tray portion for collecting and retaining the labels 36. The frame may be pushed down against the tension of the frame spring 254 while the tray portion remains stationary. The adhesive layer 38 uppermost on the label then is rendered accessible for contact with an article pressed thereagainst to affix the label to the article. When the frame is released, it is raised by the frame spring to its normal position.

A normally closed recycle microswitch 256 having an operating lever 258 is mounted on the side wall 252a of the frame 252, between the tray portion 244 and the base portion 242 of the support 241. When the frame is depressed, the lever is moved by contact with the base portion and opens the switch. When the frame is raised, the lever is restored and closes the switch. The recycle switch is connected in the circuits controlling the operation of the printing mechanism, in the manner disclosed for the switch "80" in the aforesaid Pat. No. 2,948,466. The switch must be opened and closed after each printing cycle, by successively depressing and raising the frame 252 for operation of the switch by means of its lever 258, before the printing mechanism can operate to conduct a new printing cycle. Alternatively, as described in the said patent, the circuits can be arranged so that the next operation of the printing mechanism can commence as soon as the switch is opened. Also, the printing mechanism then may be operated repeatedly to print a plurality of identical labels by operating the repeat switch described in the patent.

FIG. 14 illustrates the circuits incorporated in the printer 28 in accordance with the present invention. The electrically powered units are connected to a terminal 260 for their power supply, and the recycle switch 256 is connected to the terminal. The terminal corresponds to the terminal member "186" in the said Pat. No. 2,948,466. The terminal is in turn connected to the printing mechanism circuits and an electrical power source, as disclosed in the patent. Alternatively, the powered units may be connected to an independent power source if desired. Operation of the printer main drive mechanism 117 includ-

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ing the main drive motor 170, which drives the printing cylinder 64 and the impression hammer 72, is initiated through the computer 26 utilizing the main power supply to the system, as disclosed in the said patent. Alternatively, any appropriately modified printer may be operated separately and independently of the weighing mechanism 22 and the computer 26, with suitable provision for setting all type wheels 70 manually. The printer drive mechanism and the units illustrated in FIG. 14 then may be connected to an independent power source with the drive mechanism operated intermittently for successive printing cycles.

In operation, a supply roll 62 of tape is mounted on the stud 58 and threaded through the apparatus as illustrated in FIG. 4. The cam lever 138 is moved to the position illustrated in FIG. 7 for threading the tape, and then moved to the position illustrated in FIG. 6 for operation. The tape is adjusted so that one label 36 projects slightly, e.g., $\frac{1}{8}$ inch, beyond the stripping edge 74, as illustrated in FIG. 10, and the operating lever 104 of the sensing microswitch 63 extends through a backing strip opening 44 and between the adjacent recesses 40 and 42 of a pair of succeeding labels. If necessary in order to obtain registration of the labels, the position of the adjustment roller 68 is altered by changing the position of the bracket 144 on the set screw 148.

The control knobs 30 on the printer are set for the unit value of the articles to be weighed, producing a corresponding setting of those type wheels 70 which serve to print unit value data. With the system 20 connected to an electrical power source, an article such as a wrapped package of foodstuff is placed on the weighing platter 24. The weight factor determined by the weighing mechanism 22 is supplied to the computer 26, which operates to compute the total value of the package. The drive mechanism 117 is actuated by the computer 26 upon completion of the computing operation, and the appropriate type wheels 70 automatically are set to their proper positions for printing the weight data and total value data by respective wheels, as described in the aforesaid patents.

The gears in the gear train 174 of the drive mechanism are turned, and the next operation that takes place is that of printing a label 36 with weight and value data at the second printing station 73. The label is printed when the operating lever 180 engages the cam surface 177 on the wheel 176 to cause the impression hammer 72 to strike the tape 32. At the same time, the printing cylinder 64 is rotated, in the counterclockwise direction as viewed in FIG. 4. The type wheels 110 and the teeth 120 on the printing cylinder engage the tape 32 between the cylinder and the pressure roller 66 following the operation of the impression hammer. A label then is printed at the first printing station 67, and the tape is caused to advance a short distance.

Up to the time of printing at the first station, the operating lever 104 of the sensing microswitch 63 projects through an opening 44 in the tape, so that the switch is closed. The clutch solenoid 224 is energized, and the clutch roller 80 is withdrawn from engagement with the continuously rotating drive roller 78. With the roller arm 220 retracted, the switch actuator 238 engages the lever 240 of the air valve microswitch 206 to open the switch, de-energize the air valve solenoid 192, and close the air valve 190 in the line to the intermittent stripping nozzle 186.

The advancing movement of the tape 32 caused by engagement with the printing cylinder 64 causes the sensing microswitch lever 104 to be moved out of the backing strip opening 44 and onto the surface of the strip, thus opening the sensing switch. With the sensing switch open, the clutch solenoid 224 is de-energized, and the clutch roller 80 is moved by the clutch springs 236 into engagement with the rotating drive roller 78, with the backing strip 34 therebetween. The air nozzle microswitch 206 is restored to its closed position when the clutch roller arm 220 and the actuator 238 are moved towards the

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drive roller. Inasmuch as the sensing microswitch 63 is open, the circuit to the air valve solenoid 192 remains open.

With the drive roller 78 thus drivingly engaging the backing strip 34, the backing strip is pulled to advance it and the tape 32 further along the movement path from the supply roll 62. The label 36 just printed at the second printing station 73 separates from the backing strip at the stripping edge 74, as illustrated in FIG. 11. The drive roller continues to pull the tape until it has advanced for one label length, at which time the sensing microswitch lever 104 drops into the next succeeding tape opening 44 and closes the sensing switch. Thereupon, the clutch solenoid 224 is energized and disengages the clutch roller 80 from the drive roller 78 to discontinue the advance of the tape. The action is rapid and precise, so that the tape advance is discontinued when the label 36 next succeeding the label being stripped is advanced accurately into the printing position at the second station 73 and displaces the label being stripped in the printing position, while a succeeding label is accurately located in the printing position at the first station 67.

With the sensing microswitch 63 closed, the circuit to the air valve solenoid 192 is closed, and the air valve 190 is opened thereby to admit air to the intermittent stripping nozzle 186. Shortly thereafter, the clutch roller arm 220 is retracted sufficiently to cause the switch actuator 238 to open the air valve microswitch 206 and thereby de-energize the air valve solenoid and close the air valve 190. A short puff of air is directed by the intermittent nozzle at the trailing edge of the label being stripped, insuring complete separation from the backing strip and moving the label toward the receiver 76. The label is assisted in its movement by the stream of air issuing from the continuous nozzle 198, and the label is deposited at the bottom of the receiver, as illustrated in FIG. 10.

When operation is started with a new supply roll 62, the first several labels are not printed with code data and are discarded. Thereafter, as each package is weighed and its label delivered to the receiver 76, the package is removed from the weighing platter 24 and pressed against the receiver frame 252. The frame is depressed, and the package wrapper contacts the adhesive layer 38 on the label. The package is pressed firmly against the label to cause the label to adhere to the wrapper, thus completing the labeling operation. The recycle microswitch 256 is opened when the frame is depressed and closed when the frame is restored by the frame spring 254. The printer then is in condition for another printing and dispensing cycle.

The illustrative apparatus may operate at a rate of about 40 labels per minute, whereas operators usually work at a rate of about 20-30 labels per minute. Consequently, there is no delay, and the apparatus operates without jerking and tearing the tape. The labeling process is efficient and reliable, and the integrity of the packages is preserved, without damage in the labeling process which would lead to spoilage of the contents.

The apparatus provides accurate registration of successive labels at the printing stations 67 and 73, and apparatus for retracting the tape to establish registration, such as disclosed in the said Pat. No. 3,021,988, is eliminated. The prior label heater and its controls, and their problems, are eliminated. Also eliminated in the preferred form of the invention are the prior knife mechanisms for serving labels from a strip and their actuating mechanisms, the prior ejector wheels, and the prior delivery apparatus. The timing of the operation of the printing cylinder 64 to advance the tape is changed, to cause the tape to advance after printing takes place at the second station 73 rather than prior thereto, whereby the stripping operation takes place following such printing and constitutes the last operation in each cycle. The apparatus may utilize label tape 32 of the same size and having the same perforations as the label strip employed with the

prior apparatus, and the label size may be varied by adjustment of the apparatus.

While a preferred embodiment of the apparatus has been described, it will be apparent that various changes and modifications may be made therein, and the apparatus may be employed in other ways, within the spirit and scope of the invention. Thus, for example, an external supply source for the tape may be provided, and an external source of air under pressure may be employed. Other means for sensing the advance of the tape may be employed in place of the sensing microswitch, and the sensing means may be located in other appropriate positions along the movement path for discontinuing the advance of the tape as each label is advanced into printing position. Other or additional printing means may be employed. Other apparatus may be provided for engaging the backing strip and pulling it along the movement path from the supply source, and it may be engaged with the strip by other actuating means. It is intended that all such changes and modifications be included within the scope of the appended claims.

We claim:

1. In a method of labeling random weight packages with respective value data wherein a strip of successive labels is supplied to a printer, value data corresponding respectively to the weight of the packages is introduced successively into the printer, the printer is caused to conduct successive printing cycles for printing the respective value data on the labels successively, the printed labels are dispensed from the strip successively, and the printed labels are applied successively to their respective packages, the improvement which comprises supplying to said printer a backing strip having a succession of labels thereon and separably adhered thereto by a pressure sensitive adhesive layer preferentially adherent to the labels, printing said labels on said backing strip successively with said value data while pulling the strip, and mechanically stripping the printed labels while in motion from said backing strip successively for affixation of the stripped labels successively to their respective packages by said adhesive layer.

2. In a method of labeling random weight packages having thermoplastic wrappers with respective value data wherein a strip of successive labels is supplied to a printer, value data corresponding respectively to the weight of the packages is introduced successively into the printer, the printer is caused to conduct successive printing cycles for printing the respective value data on the labels successively, the printed labels are dispensed from the strip successively, and the printed labels are applied successively to their respective packages, the improvement which comprises supplying to said printer a backing strip having a succession of individual labels thereon and separably adhered thereto by a pressure sensitive adhesive layer preferentially adherent to the labels, printing said labels on said backing strip successively with said value data while

pulling the strip, mechanically stripping the printed labels from said backing strip while in motion and delivering the stripped labels onto a receiver successively with said adhesive layer uppermost, and affixing the stripped labels successively to the wrappers of their respective packages by pressing each package against the adhesive of its label on said receiver.

3. In a method for weighing individual quantities of perishable foods wrapped in thermoplastic wrap, for pricing each quantity and for printing the price thereof on a label to be applied to the wrap wherein each quantity is weighed and its weight is transmitted to a computer for computing the price of each quantity, a first printer is provided for printing first indicia on a label for each quantity, the label also being advanced by the first printer, and a second printer is provided for printing other indicia on the label including the computed price for each quantity, the improvement which comprises pulling a series of individual pressure sensitive labels mounted on a backing strip from a supply source along a movement path wherein said strip is intermittently advanced along said path in a manner in which the advance of said strip discontinued during printing by said second printer and in which the strip is advanced during printing by said first printer, and stripping the printed labels from said strip while in motion in said movement path.

4. The method according to claim 3 wherein the advance of said strip is discontinued as each label is advanced into the first printing position.

5. The method according to claim 4 wherein said backing strip has perforations therein regularly spaced apart along the strip of a distance equivalent to the label length, and wherein the advance and discontinuance of the advance of said strip is controlled by the movement of a lever into one of said perforations.

6. The method according to claim 5 wherein said printed labels are stripped from said backing strip with the aid of a stream of air directed between a label being separated and said backing strip.

7. The method according to claim 6 wherein a directed stream of air further aids in moving said label into position to be applied to a wrap, and wherein the application of said label to said wrap initiates the printing of the next label.

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