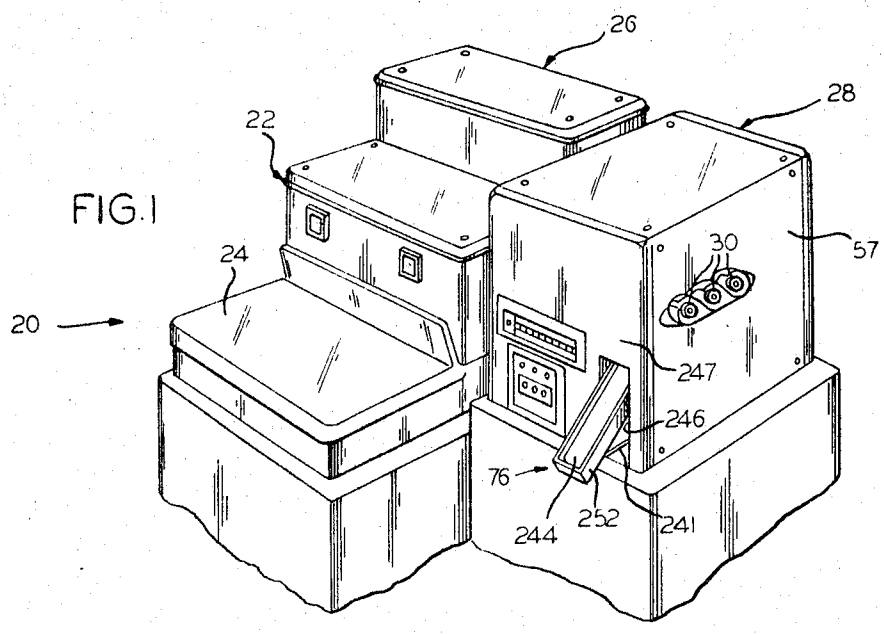
Aug. 19, 1969 D. E. PHILLIPS ET AL 3,461,984

LABEL PRINTING AND DISPENSING APPARATUS AND METHOD OF LABELING PACKAGES

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FIG. 1



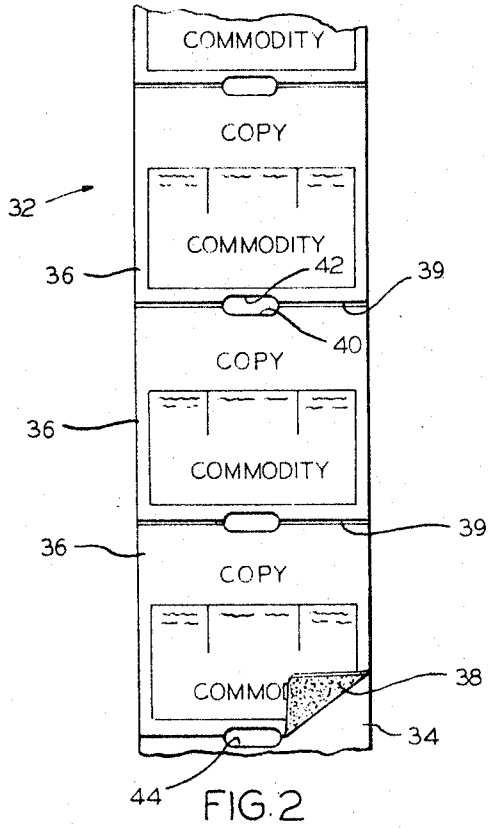


FIG. 2

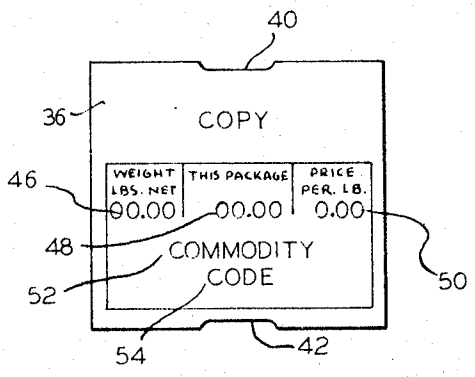


FIG. 3

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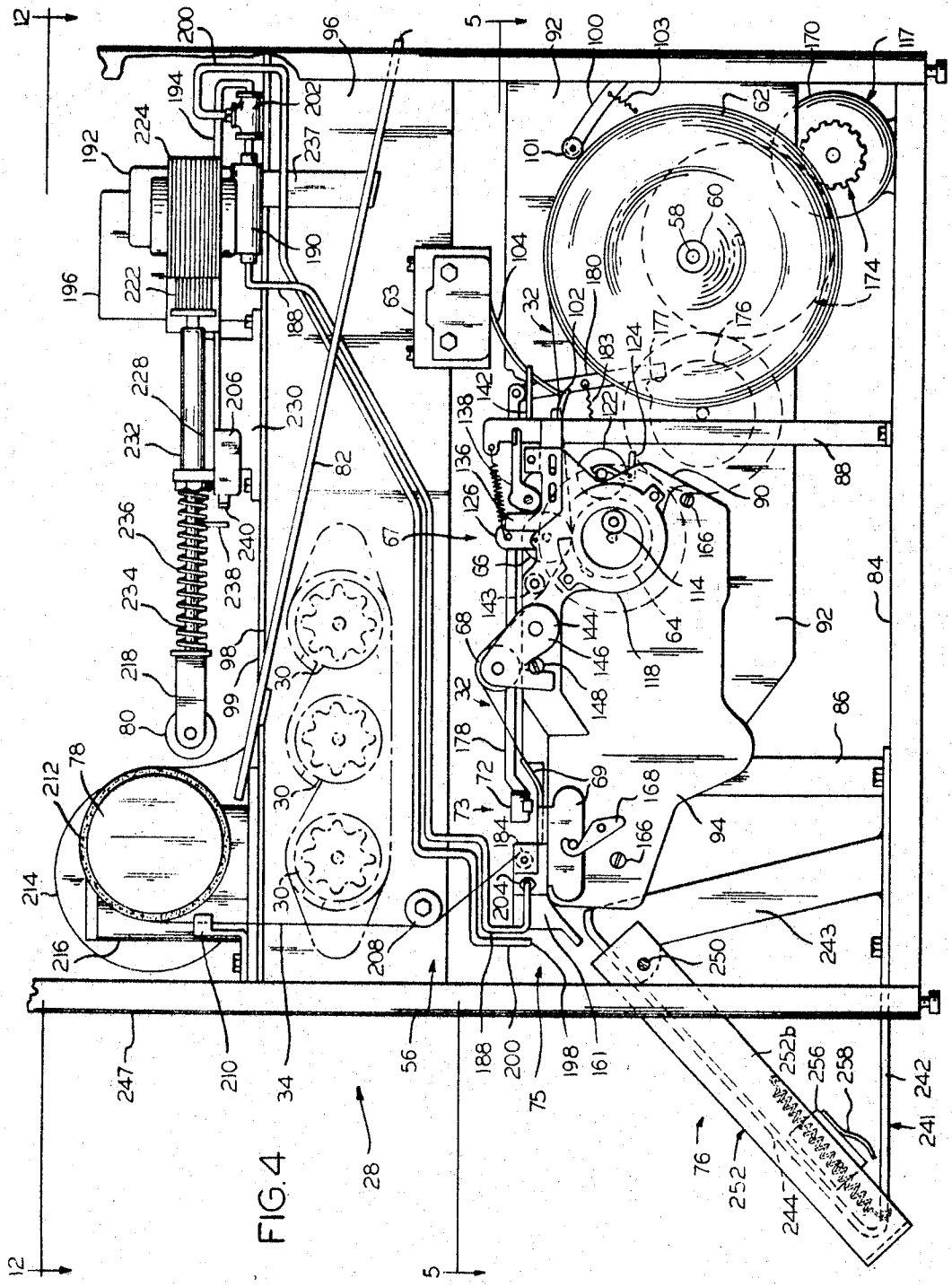


FIG. 4

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LABEL PRINTING AND DISPENSING APPARATUS AND METHOD OF LABELING PACKAGES

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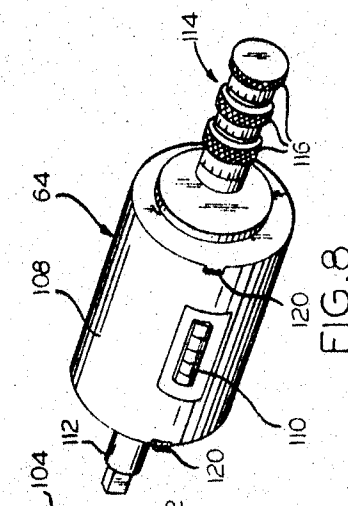


FIG. 8

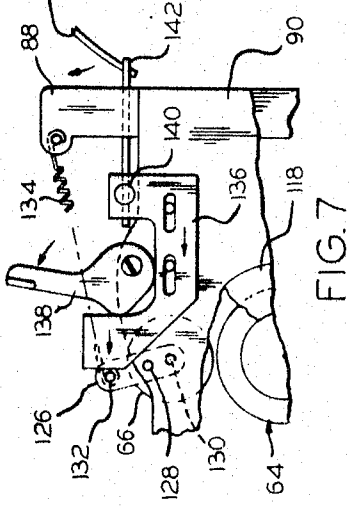


FIG. 7

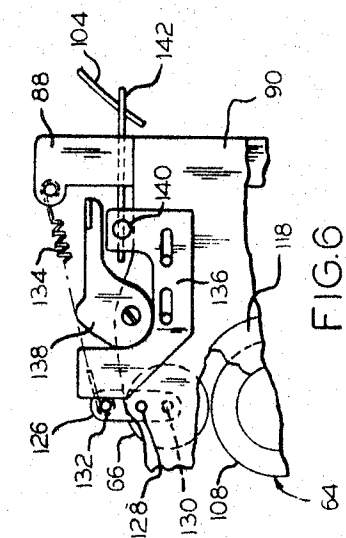


FIG. 6

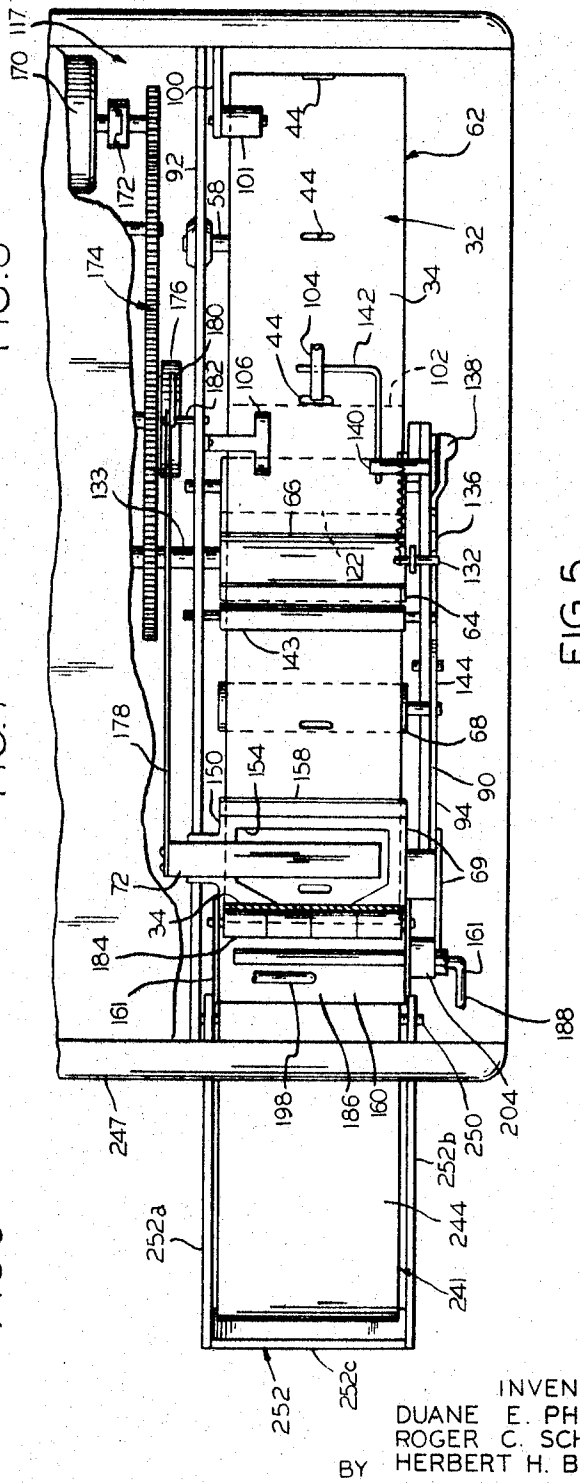


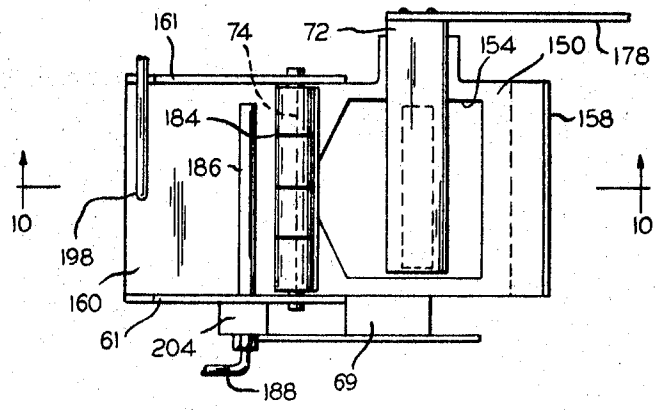
FIG. 5

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LABEL PRINTING AND DISPENSING APPARATUS AND METHOD OF LABELING PACKAGES
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FIG.9



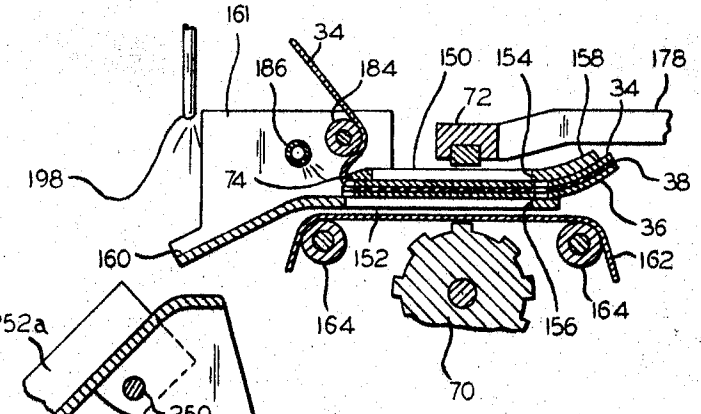
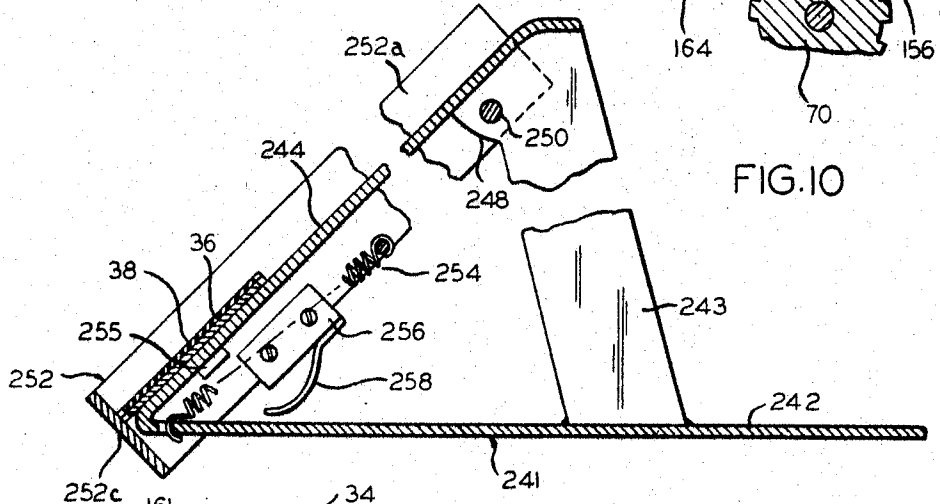


FIG.10



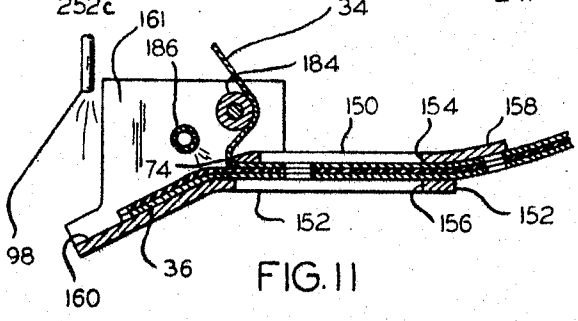


FIG.11

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LABEL PRINTING AND DISPENSING APPARATUS AND METHOD OF LABELING PACKAGES
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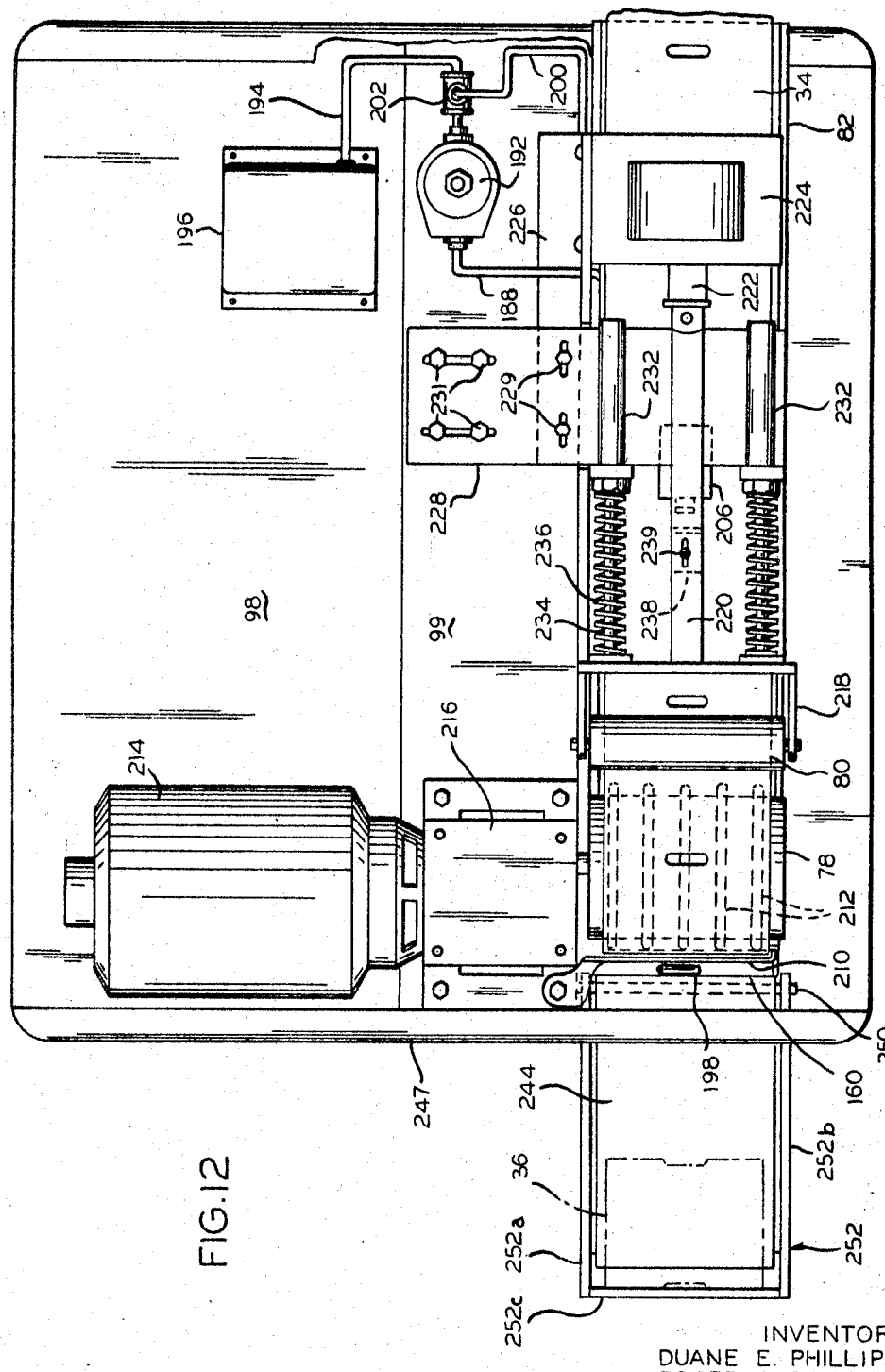


FIG. 12

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LABEL PRINTING AND DISPENSING APPARATUS AND METHOD OF LABELING PACKAGES
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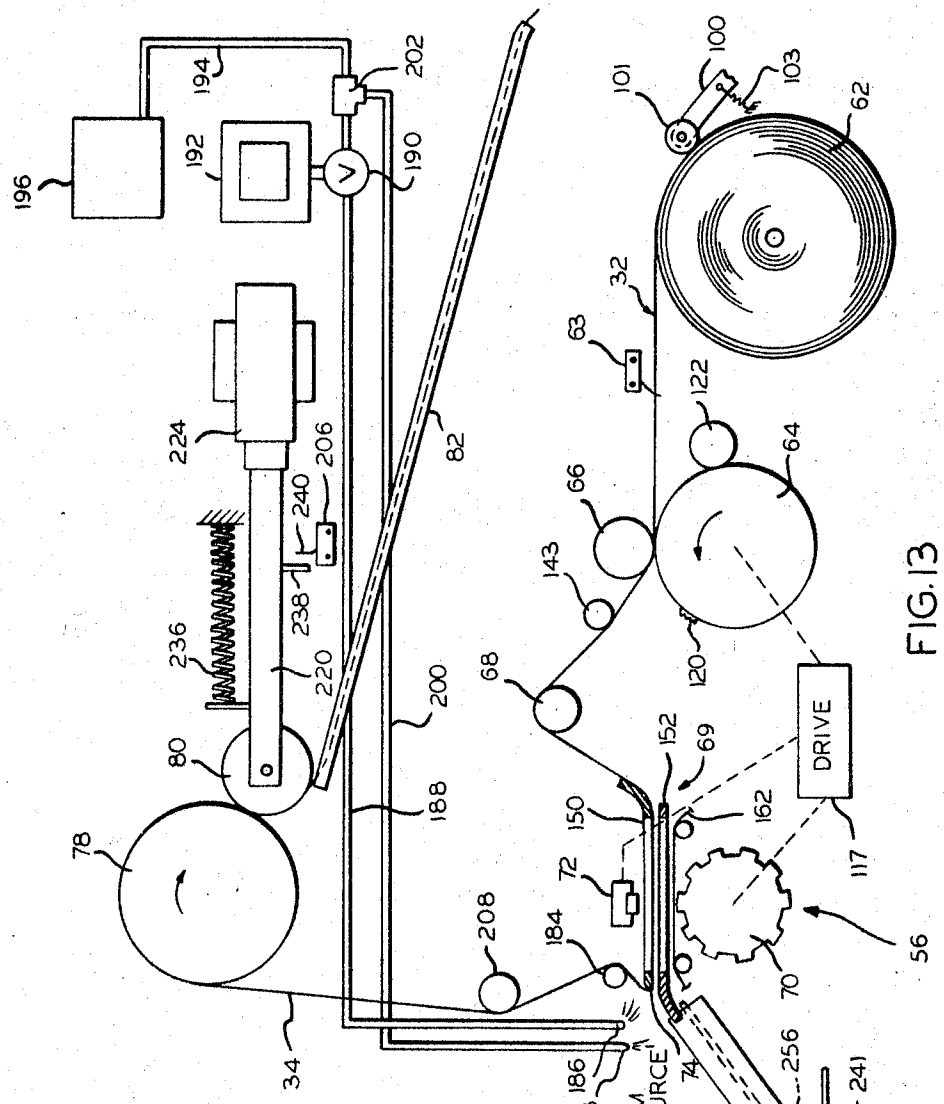


FIG. 13

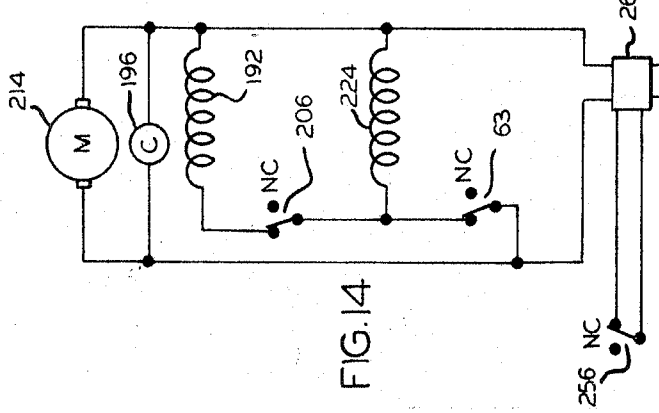


FIG. 14

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Patented Aug. 19, 1969

3,461,984

LABEL PRINTING AND DISPENSING APPARATUS AND METHOD OF LABELING PACKAGES

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Filed July 23, 1965, Ser. No. 474,441
Int. Cl. G01g 23/28
U.S. Cl. 177—3 5 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for weighing individual quantities of perishable foods wrapped in thermoplastic wrap, for pricing each quantity and for printing the price thereof on a strip mounted pressure sensitive label. The apparatus includes strip pulling means for pulling the strip through first and second printing stations. The first printing means includes engagement means for independently advancing the strip. Control means are provided for discontinuing strip advance by the strip pulling means during printing by the second printing means and for actuating the engagement means during printing by the first printing means.

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 performed 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. Patent 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 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 ot 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:

FIGURE 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;

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. Patent No. 2,948,466, and disclosed more particularly in U.S. Patent 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 diffcult 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 output to the printer total value input to transmit the computed total value data thereto, and utilizing the data from the weighing mechanism and the computer. Inasmuch as the apparatus of the said patents means for causing the printer to carry out a printing cycle

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 their 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 and 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 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 hereinafter. 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 cooperating 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 preprinted. 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 printed material 54, such as factory expiration date and grade, is printed in the printer 28.

FIGS. 4 and 13 illustrates 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. Patent 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. Patent 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 ⅛-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 viewed 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 lever 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 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 receiver **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 Patent No. 2,948,465, the preset 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 operation. 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 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 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 separating 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 recieve 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 end 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 **252***a* and **252***b*, and an end wall **252***c*. 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 **252***a* 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 **252***a* 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 **252***a* 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 Patent 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 Patent 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** including 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, an 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 the one label **36** projects slightly, e.g., ⅛-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 anr 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 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 2–30 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 Patent 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 severing 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 apparatus 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, the apparatus including:

weighing means for weighing each quantity;

computer means connected to said weighing means for computing the price of each quantity;

first printing means for printing first indicia on a label for each quantity, said first printing means including engagement means for advancing the label;

and second printing means for printing other indicia on the label, said other indicia including the computed price for each quantity;

the improvement comprising label delivery means for delivering a series of individual pressure sensitive labels mounted on a backing strip, said label delivery means including:

a supply source for storing said strip having said labels thereon;

strip pulling means for pulling said strip from said supply source;

guide means defining a movement path for said strip between said supply source and said strip pulling means;

stripping means for stripping printed labels from said strip while in motion in said movement path;

and control means operatively connected to said printing means for operating said strip pulling means to alternately advance and discontinue the advance of said strip along said movement path, said control means operating to discontinue the advance of said strip by said strip pulling means during printing by said second printing means and to actuate said engagement means for advancing said strip during printing by said first printing means.

2. In apparatus according to claim 1 wherein said control means further comprises sensing means for sensing the advance of said strip along said movement path and clutch means for disengaging said strip pulling means and said strip to discontinue the advance of said strip as each label is advanced into the first printing position.

3. In apparatus according to claim 2 for use with a backing strip having perforations therein regularly spaced apart along the strip for a distance equivalent to the label length, wherein said sensing means comprises a switch having an operating lever mounted for moving into and out of said perforations as said strip is advanced, whereby said switch operates to disengage said strip pulling means and said strip when said lever moves into one of said perforations.

4. In apparatus according to claim 3 wherein said stripping means further comprises air nozzle means for directing air between a label being separated and the backing strip to aid in separation of a label from said strip and to aid in moving said lavel to a receiver means for applying said label to a wrap, said receiver means connected to said control means for initiating printing of the next label upon application of said label to a wrap.

5. In apparatus according to claim 4 wherein said nozzle means include a first nozzle for directing air between a label being separated and the backing strip to aid in separating a label from said strip and a second nozzle for moving said label to said receiver means.

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177—4, 8; 156—360, 367, 384, 584

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3461984 Dated August 19, 1969

Inventor(s) Duane E. Phillips, Roger G. Shultz & Herbert H. Beck

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 3 line 61 the term "diffcult" should read -- Different --

In column 3 line 72 after the last word in that line insert -- means for causing the printer to carry out a printing cycle --; and in line 75, delete the entire line reading "means for causing the printer to carry out a printing cycle"

In Claim 4, column 14, line 20 the term "lavel" should read -- label --

SIGNED AND
SEALED
DEC 29 1970

(SEAL)
Attest:

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