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Daigle et al.

[11] **3,786,944**

[45] **Jan. 22, 1974**

[54] **APPARATUS AND METHOD FOR APPLYING LABELS TO ARTICLES IN A WAREHOUSE SYSTEM**

[75] Inventors: **Jack R. Daigle,** Grand Rapids; **James D. Habegger,** Middleville, both of Mich.

[73] Assignee: **Rapistan, Incorporated,** Grand Rapids, Mich.

[22] Filed: **Sept. 28, 1972**

[21] Appl. No.: **292,958**

[52] **U.S. Cl.** ..... **214/16.4 A,** 214/11 R, 214/152, 101/93 C

[51] **Int. Cl.** **B65g 1/04**

[58] **Field of Search** ..... 214/11 R, 16.4 A, 152

[56] **References Cited**

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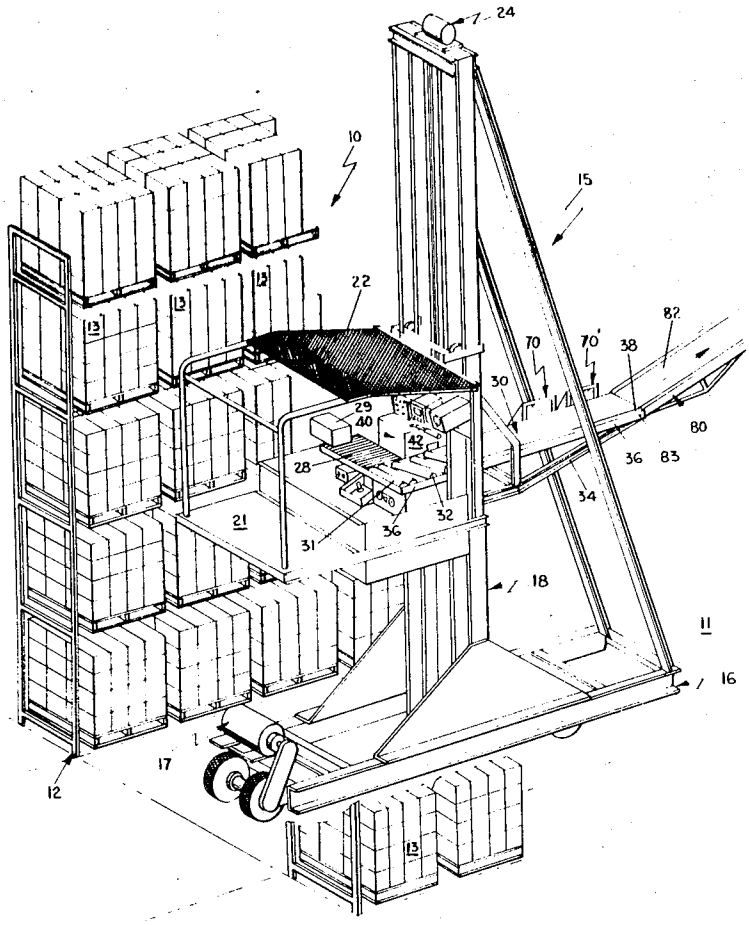
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Primary Examiner—Gerald M. Forlenza
Assistant Examiner—R. B. Johnson
Attorney, Agent, or Firm—Price, Heneveld, Huizenga & Cooper

[57] **ABSTRACT**

An article retrieval system includes an operator carrying picking vehicle for batch picking of customer orders in a warehouse. The vehicle includes a labeler supplied with a sequence of individual labels for positioning on each article picked. Each label includes article storage location, quantity and destination information and display means are provided for displaying this label information to the operator. A tape includes sorting information recorded thereon for each article to be picked and is synchronized with the sequence of labels placed in the labeler. A tape playback mechanism controls destination coding apparatus such that an article picked by the operator will leave the vehicle with both a label and sorting indicia thereon. The sorting information on the tape is also displayed to the operator to provide a check for synchronization between the tape and the sequence of labels. The articles are then routed via an accumulation conveyor to a sorting area where the sorting indicia is detected to control the diverting of articles to predetermined destination areas.

12 Claims, 9 Drawing Figures



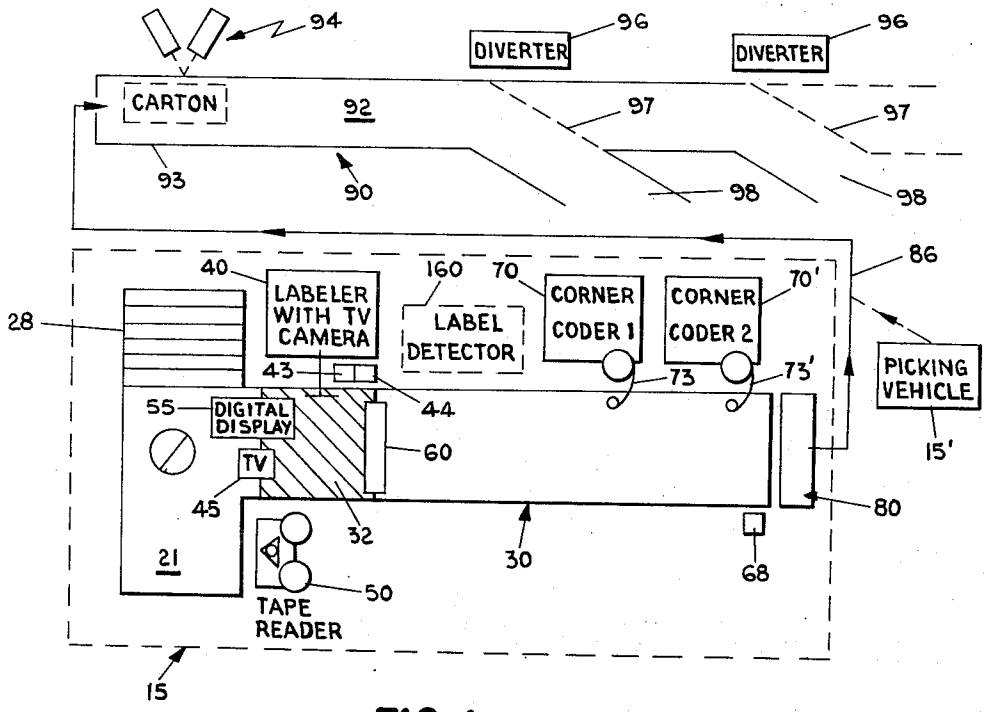


FIG. 1

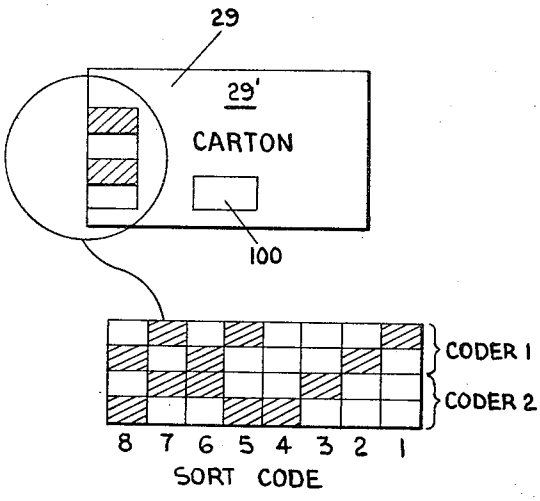


FIG. 7

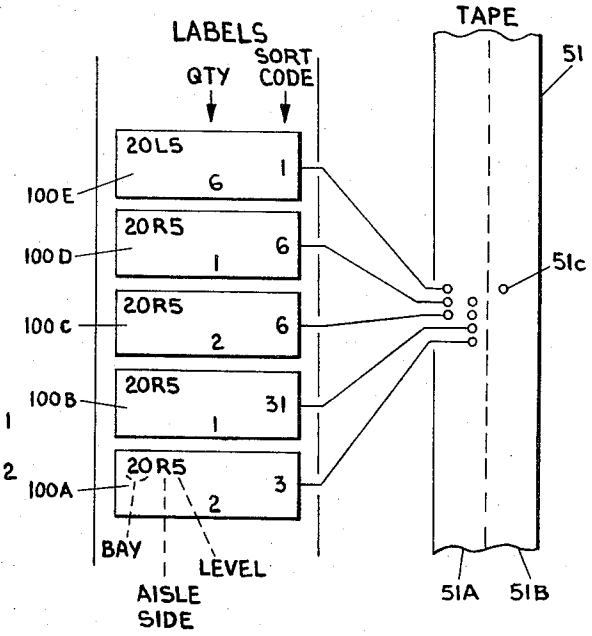


FIG. 6

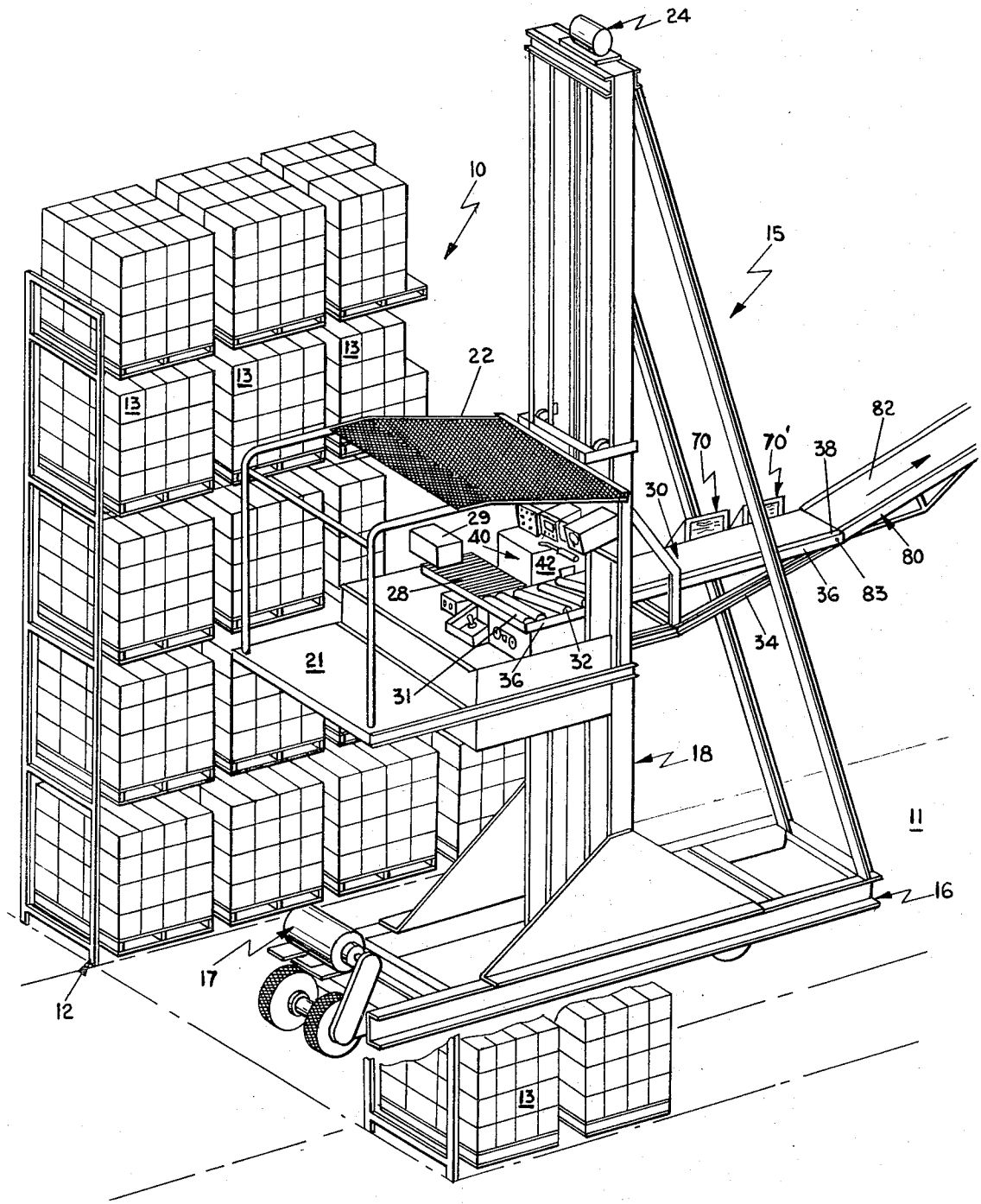

24
10
15
22
13
13
13
82
70
70'
38
30
29
40
42
28
80
36
83
34
21
31
36
32
18
11
16
17
12
13

FIG. 2 A

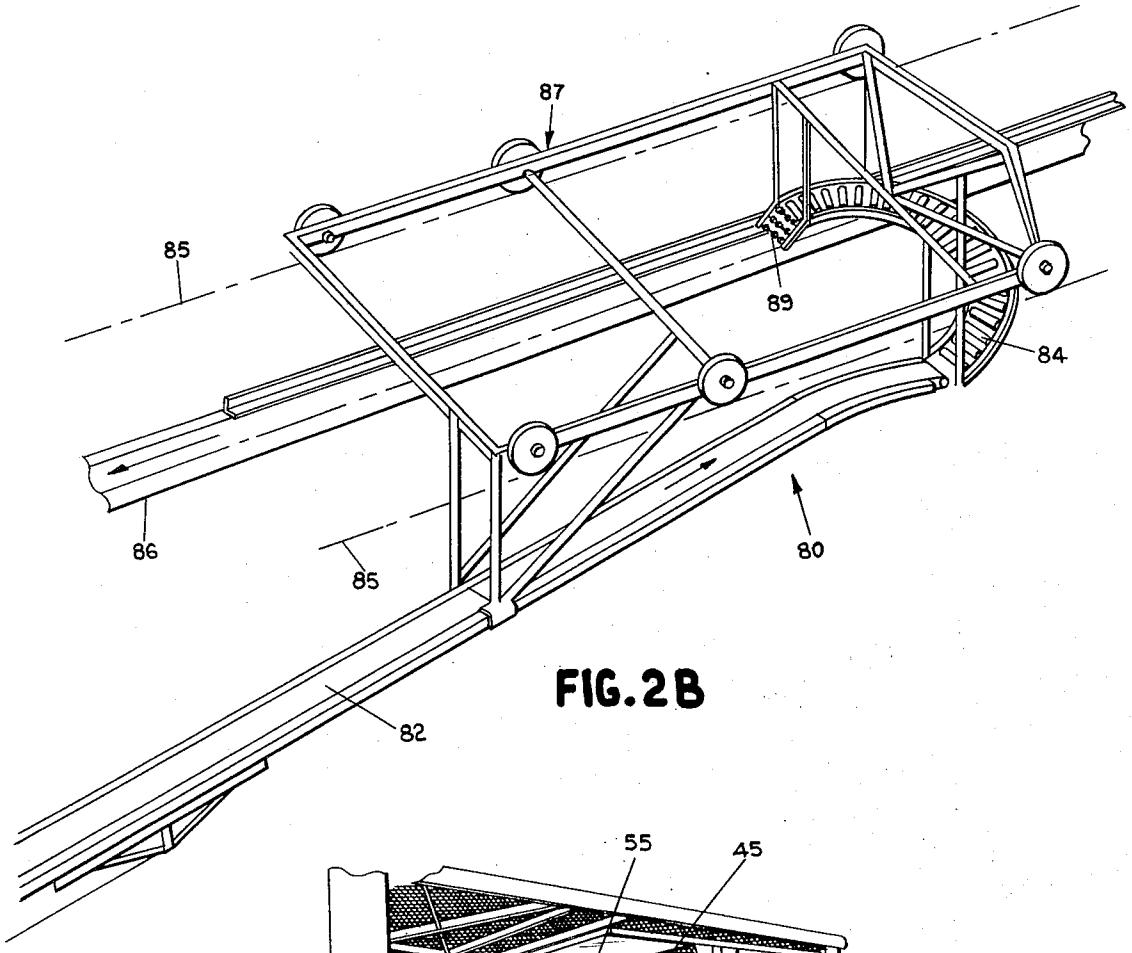

87
85
89
84
86
85
80
82

FIG. 2B

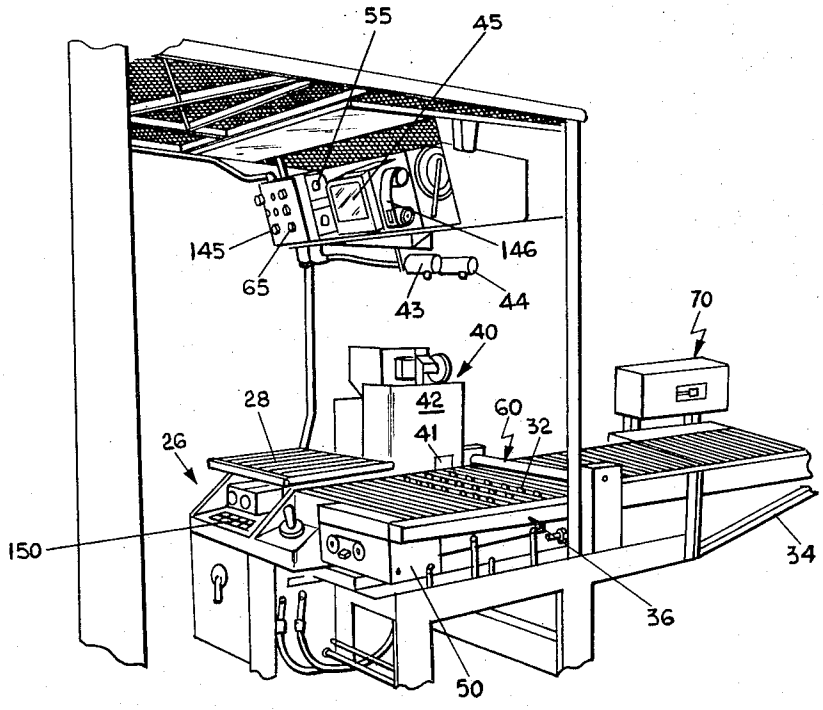

55
45
145
146
65
43
44
70
40
42
41
28
60
32
26
150
34
36
50

FIG. 3

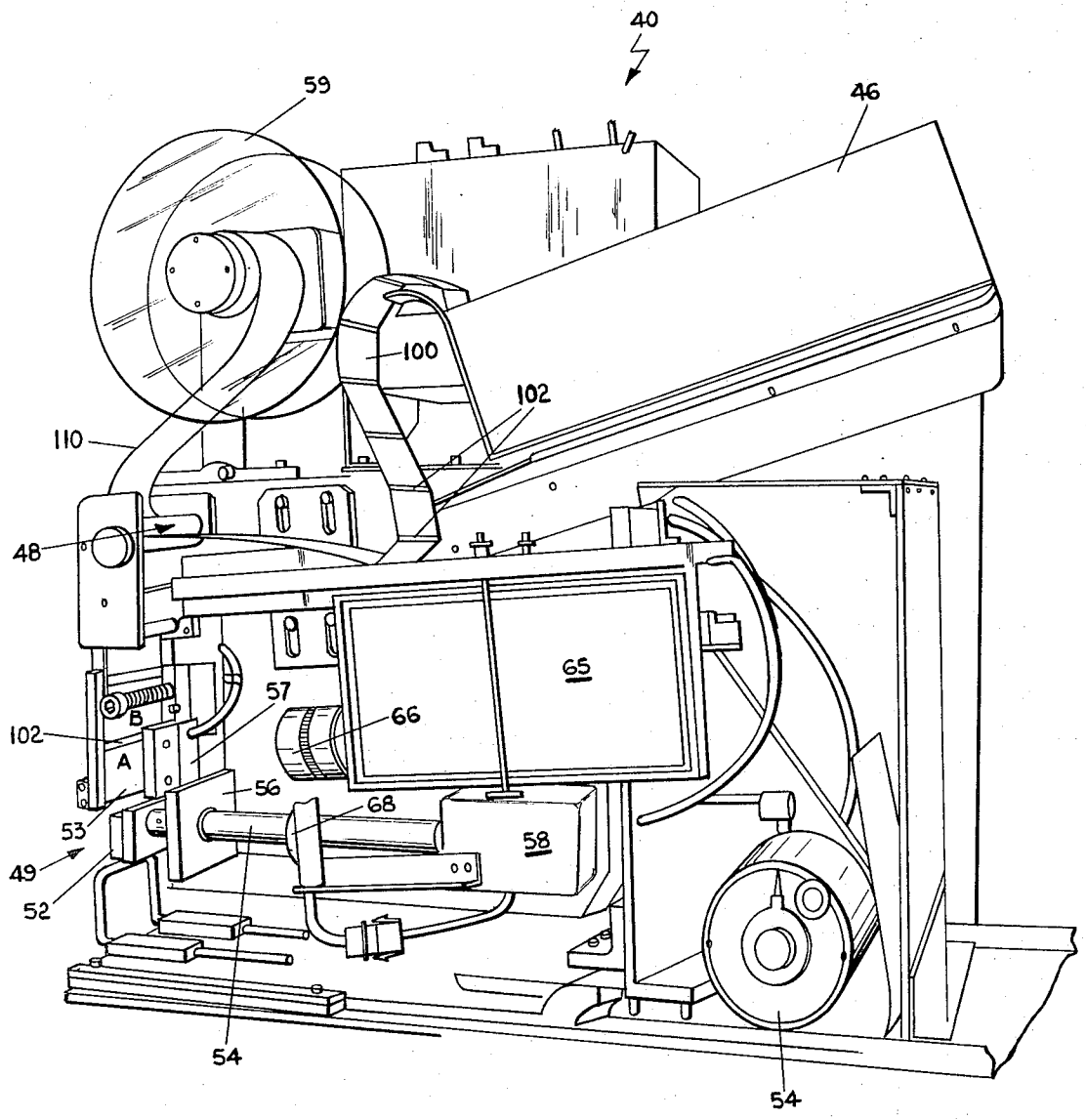


FIG. 4

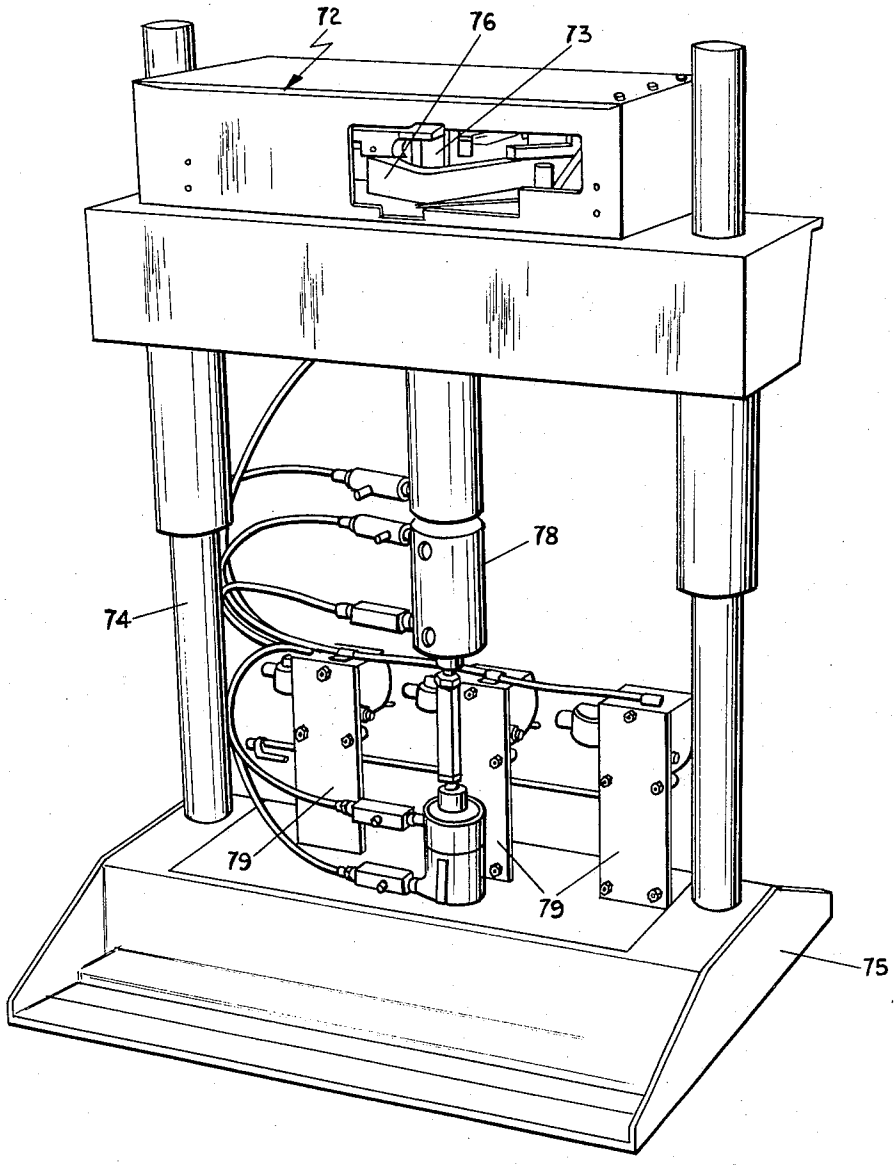


FIG. 5

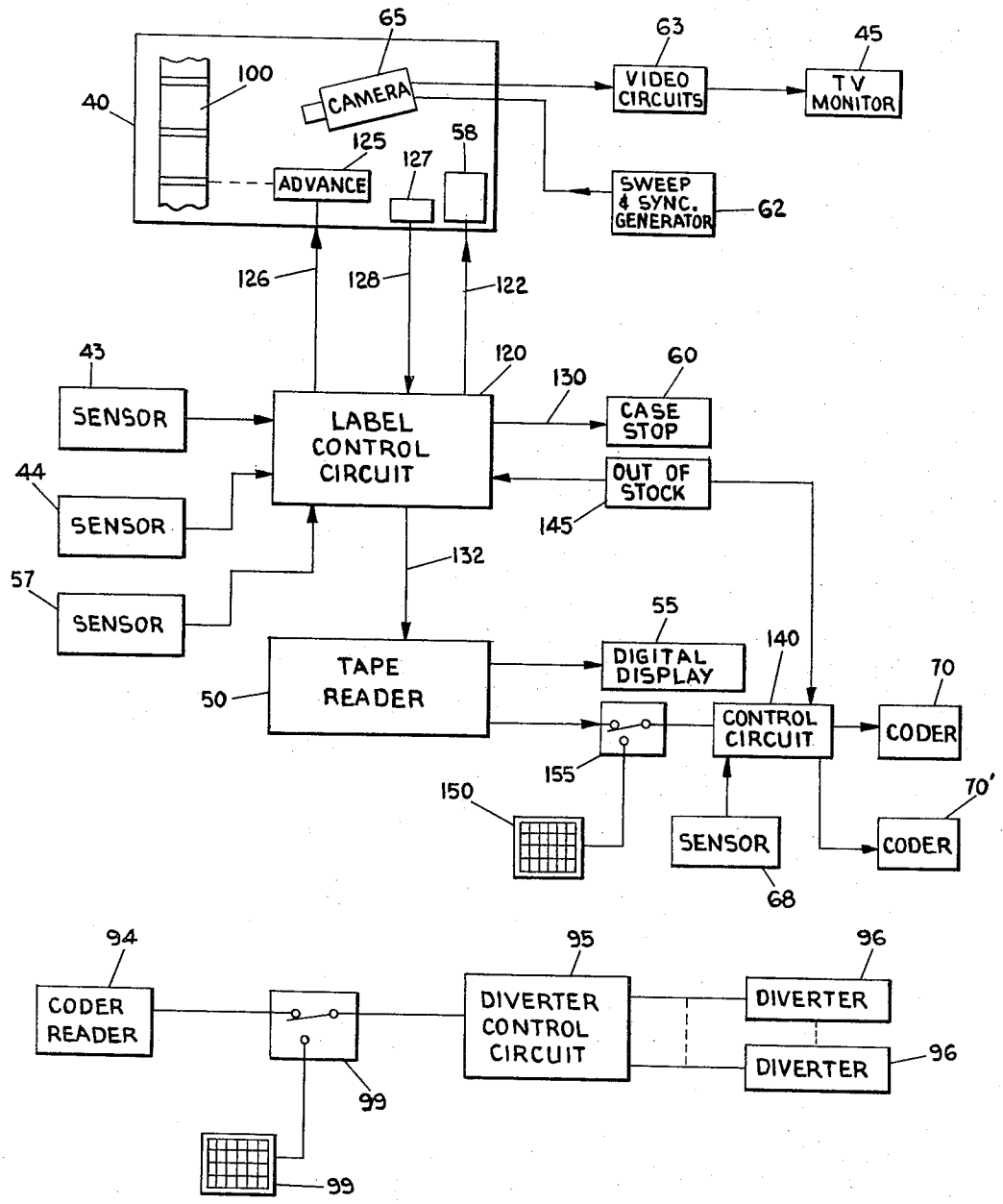

65
63
45
100
CAMERA
VIDEO CIRCUITS
TV MONITOR
40
125
58
127
ADVANCE
SWEEP & SYNC. GENERATOR
62
126
128
122
43
120
60
130
SENSOR
LABEL CONTROL CIRCUIT
CASE STOP
44
SENSOR
OUT OF STOCK
145
57
SENSOR
132
55
140
70
TAPE READER
50
DIGITAL DISPLAY
CONTROL CIRCUIT
CODER
155
150
70'
SENSOR
68
CODER
94
95
96
CODER READER
DIVERTER CONTROL CIRCUIT
DIVERTER
DIVERTER
96
99
99

FIG.8

APPARATUS AND METHOD FOR APPLYING LABELS TO ARTICLES IN A WAREHOUSE SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates to an article picking system for use in batch picking of customer orders for articles stored in a warehouse.

In retrieving articles stored in a warehousing system with a plurality of storage locations positioned in various rows and columns, it has long been recognized that batch picking (i.e., the picking of multiple customer orders at the same time) is more efficient than individual order picking. This results since the picking vehicle can remain at a given location and pick several orders before shifting to a new location instead of moving from location to location as required when filling a single order at a time. When, however, batch picking is employed, it becomes necessary to place identifying indicia on each article picked which will identify the destination of the articles so they can later be sorted to different destination areas.

Various systems have been proposed for providing the operator of a picking car with picking information which indicates to the operator the storage bin location of the articles to be picked, as well as the number of articles to be picked from that location. Additionally, picking cars have included labelers thereon for labeling a carton as it is picked. U.S. Pat. No. 3,379,321 issued Apr. 23, 1968 to S. M. Weir is representative of such systems. In some of these systems, sorting information is placed directly on the relatively small label and is also relied upon to provide sorting indicia for actuating sorting controls used to divert batch picked articles to their predetermined destination points. Such systems, however, have not proven reliable in use with picking and sorting sytems which handle relatively large volumes of articles and have large through-put capacities. One reason for the difficulties with prior systems which combine sorting and label information is that if a single link in the chain of applicating or detecting unit fails, the entire system may be disabled causing a back-up of articles which must then be manually labeled and/or sorted until the equipment is repaired. The system of the present invention separates the labeling and sorting processes with components less likely to fail, and provides back-up units which can maintain the through-put of articles in the event of a breakdown of one of the components.

SUMMARY OF THE INVENTION

Apparatus embodying the present invention includes a picking vehicle adapted to be movably positioned within a warehouse for carrying an operator thereon to various storage locations for manually picking stored articles and placing them on a conveyor bed of the picking vehicle. A labeling apparatus including display means provides the operator with picking location information and number of articles to be picked information and applies a label to each article. Tape reading apparatus is provided with a tape programmed with sorting information for each article which is synchronized with the sequence of labels employed with the labeling apparatus. The tape information controls coding apparatus positioned on the picking vehicle such that each article will receive destination code indicia as it leaves the picking car and is transferred to a sorting area.

The sorting area includes means for identifying the destination indicia on each article and for diverting each article to a preassigned destination chute corresponding to the unique destination code thereon.

It is an object of the present invention to provide an improved batch picking system employing a labeler and destination coder means positioned on a picking vehicle.

Another object of the present invention is to provide a picking vehicle with prerecorded sorting destination information which is synchronized with a sequence of article labels employed with a labeling apparatus positioned on the picking vehicle and which controls sorting indicia applying means also positioned on the vehicle.

An additional object of the present invention is to provide a picking vehicle with automatic sort coding means thereon and a semi-automatic back-up system.

Another object of the present invention is to provide a picking vehicle with labeler and sort coding means thereon and to display article label information including article picking location, quantity to be picked, and destination information for each article to be picked.

These and other objects of the present invention will become apparent upon reading the following specification together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram of the article picking apparatus of the present invention;

FIG. 2 is a perspective view of a picking vehicle embodying the present invention. FIG. 2 is divided into a segment 2A showing the main body of the picking vehicle and a segment 2B showing an output conveyor associated therewith;

FIG. 3 is an enlarged perspective view of the picking vehicle showing the relative position of the various components;

FIG. 4 is an enlarged perspective view of the automatic labeling mechanism employed with the apparatus of the present invention;

FIG. 5 is an enlarged perspective view of the sort destination code applying apparatus employed with the picking vehicle embodying the present invention;

FIG. 6 is a schematic view of the portion of the labels which is displayed to the operator and corresponding synchronized segments of a prerecorded tape employed with the apparatus of the present invention;

FIG. 7 is a schematic view of a carton with one of the several possible sort destination code combinations thereon; and

FIG. 8 is an electrical circuit diagram in block form showing the control circuits for the apparatus embodying the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to FIGS. 1, 2 and 3, the preferred embodiment of this system includes a warehousing area indicated generally by the reference numeral 10. A series of aisles 11 extend therethrough bounded on either side by article receiving racks 12. The racks are divided into individual bays 13 into which the articles are placed for storage and picking in palatized units. Each of the bays or select grouping of bays will

contain cartons of a specific product and the location of that product within the warehouse may be referred to by bay number, level, and aisle side. Thus, an operator of a picking vehicle such as unit **15** can locate a given article once given this information.

The picking vehicle **15** comprises a wheeled base member **16** powered by suitable reversible motor and drive unit **17.** Ordinarily, the picking vehicle will be guided along the aisles of the warehousing system by tracks or the like (not shown). A verticle column **18** extends upwardly from the base **16** and supports a vertically movable picking car **20** including an operator platform **21** having a protective cage **22** thereover. Lifting mechanism **24** including a reversible motor is provided for raising and lowering the picking car on the vertical column such that the operator can position the picking platform with respect to any desired storage bay in the warehouse. Operator control of the vehicle **15** is provided by means of a suitable control panel **26** positioned on the picking car.

Also positioned on the picking car **20** is a receiving platform **28** which comprises a plurality of freewheeling rollers which permits the operator to transfer a carton **29** manually removed from a predetermined storage bin and momentarily rest the carton on the receiving platform. Extending adjacent and perpendicular to the receiving platform is a conveyor **30** which includes powered roller or belt sections for transferring the cartons along the conveyor past a labeling unit **40,** a vertically movable case stop **60,** and a pair of corner coding units **70, 70'** which are reflective tape applicators, and finally onto an inclined output conveyor **80.**

The conveyor **30** includes a skewed powered roller section **32** which, once the operator has positioned a carton from the receiving platform onto the input end **31** of the conveyor **30,** shifts the carton into abutment against a front surface **42** of the labeling unit **40.** The case stop **60,** which is normally in its raised position, holds the carton in alignment with the labeler until, as described below, a label is applied to the carton at which time the case stop retracts thereby permitting the powered conveyor **30** to transport the carton along the conveyor line and into contact with the first and second code applicators **70** and **70'** respectively. Suitable support brackets **34** support the end of the conveyor **30** remote from the picking car **20** in a cantilevered fashion and drive means (not shown) is positioned within the conveyor bed **36** to power the movable conveyor during the use of the picking vehicle.

The output conveyor **80** (FIG. **2**) is an elevated conveyor including a powered belt section **82** having an input end **81** pivotally coupled at **83** to the remote end **38** of conveyor **30.** The opposite end of section **82** couples to a powered curve **84** which transfers articles onto an accumulation conveyor **86** shown schematically in FIG. **2B.** The pivotable elevator conveyor **80** and curve **84** are movably supported on overhead tracks **85** (shown schematically in FIG. **2B**), by means of a trolley assembly **87.** The discharge end **89** of the powered section **84** is therefore free to move along the aisle **11** with the picking vehicle, the height variations of the picking car being accommodated by the pivotable coupling of the elevator conveyor **80** to conveyor **30.**

Once on the accumulation conveyor **86,** cartons from the picking vehicle shown, as well as other picking vehicles, illustrated in block form as **15'** in FIG. **1,** enter a sorting area **90** (FIG. **1**) which includes a sliding belt conveyor **92** having a code indicia reader **94** at the input end **93** thereof. The reader **94,** as described below, detects the unique sort code positioned on each carton and actuates a plurality of diverters **96** positioned downstream conveyor **92** from the reader **94.** The diverters actuate gate means **97** for diverting the cartons to preselected output chutes **98** whereupon the cartons for an individual shipment are gathered together for shipment.

The sorting area **90** may include a plurality of diverters **96,** eight being employed in the preferred embodiment, although only two are shown in FIG. **1.** Additionally, several picking vehicles **15** can be employed with a single accumulation conveyor **80** such that the entire warehousing system can be serviced with a single accumulation conveyor extending through the warehouse and communicating with an output conveyor of each of the picking vehicles to transport labeled and coded cartons therefrom to the sorting area. The conveyors maintain the aligned relationship of the cartons such that the applied sort code will be generally properly oriented when the cartons enter the sorting area and can thereby be detected by the reader **94.**

In addition to the labeler **40** and the corner coding apparatus **70** and **70',** the picking car includes thereon a tape reader **50** positioned to be easily accessible by an operator so that tapes **51** with prerecorded sort code information can be placed in the reader **50.** A television monitor **45** is also positioned at eye level on the picking car **20** and, as described below, displays to the operator information from a pair of adjacent labels before their application to a carton. Also mounted on the picking car adjacent the T.V. monitor **45** is a digital display **55** adapted to display sorting code information from the tape reader **50** as described in detail below.

A pair of photoelectric sensors **43** and **44** are positioned above the labeler **40** to detect the aligned presence of a carton against surface **42** of the labeler and provide signals for actuating the labeler once a carton is so positioned. A photoelectric carton sensor **62** is also positioned on the conveyor downstream from the case stop **60** to provide signals indicative of the release by the case stop of a carton and the movement of a carton from the labeling area to the coding area. The function of these sensors will be explained in greater detail below together with a description of the overall operation of the system.

The labeler employed with the apparatus of the present invention is shown in detail in FIG. **4** and comprises a modified Tuck Automatic Labeler, Model No. A-2 unit which is commercially available from the W. Ralston Company, Inc. Basically, the labeler comprises a label holding and dispensing chute **46** adapted to receive a plurality of preprinted labels **100** which are releaseably affixed to a strip of backing material **110.** The labels and strip are folded in convolutions and placed in the chute **46** with the leading edge of the tape structure threaded around a plurality of guide rollers **48** and then downwardly to the label applicating area **49.** It is noted that the front surface **42** of the cover for the labeler **40** includes an aperture **41** therein which permits a label applicating pad **52** to extend through wall **42** and contact a carton. Pad **52** includes a plurality of apertures therein (not shown) which are coupled to a vacuum pump **54** which operates to hold a label on the applicating pad once the label is peeled from the backing material **110.** The separation of the label takes place as

the backing material is returned upwardly to a take-up reel 59 over a knife edge 53.

The label applicating pad 52 is attached to an electrically operated ram 54 comprising a rod which is slidably mounted within a sleeve block 56 mounted to the frame of the labeler. Ram 54 is actuated by means of an electrical solenoid 58 coupled to an end of the rod remote from pad 52. Positioned on the labeler 40 adjacent and slightly above the pad 52 is a label detecting switch 57 which detects the gap 102 between individual labels and provides a control signal utilized as explained below.

In addition to the conventional label applicating structure of labeler 40, the labeler includes a television camera 65 positioned on the labeler such that the lens 66 of the camera scans the left portion of a pair of labels (A and B in FIG. 4) which are adjacent labels to be successively applied to the next and the succeeding carton positioned adjacent the labeler. A sweep and sync pulse generator 62 (FIG. 8) supplies the camera with these necessary drive signals. A light source 68 is positioned to illuminate the labels to provide sufficient light for the camera operation. By using the camera, information printed on the left portion of the label can be displayed by means of the T.V. monitor 45 coupled to the camera 65 via conventional video processing circuits 63 (FIG. 8) to indicate to the operator information relating to the next two cartons to be picked including their location within the warehouse, the quantity to be picked, and the sort destination of each. The labels are printed such that similar items for different shipments will be on adjacent label sequences to effectively utilize the batch picking process.

One of the identical corner coders employed for providing sort destination indicia which is applied to the carton on-the-fly as it travels along the conveyor past the coders is shown in FIG. 5. The corner coders 70 and 70' are commercially available units manufactured by Minnesota Mining and Manufacturing Company, Model No. RP 303 with digital elevator mechanisms. Each coder comprises a head assembly 72 vertically movable on a pair of shafts 74 mounted to a base structure 75 which is attached to the side of the conveyor bed 36. The head assembly 72 includes an applicating arm 73 extending outwardly thereof for applying a strip of reflective tape 76 threaded over the arm and having an adhesive outer surface to a carton. The applicating arm extends over the conveyor to contact a carton as it passes thereby and when actuated, will automatically position a piece of the reflective tape 76 on a predetermined vertical position on the carton as it passes the corner coder.

The head assembly 72 is vertically moved by means of a cylinder 78 which is actuated by valves 79 for shifting the head assembly between discrete upper and lower positions. With the two corner coders therefore, four unique vertically spaced coding areas are available on the cartons. By selectively programming the two corner coding units to provide one or two strips of reflective tape on the four available positions, eight unique sorting codes are provided as seen in FIG. 7. By adding additional coding units, this number can be expanded as required in particular installations.

OPERATION

Having described the various structural components of the system, a description of the overall operation of the system is now presented. The operator places a roll of preprinted labels 100 (FIG. 4) and a corresponding roll of prepunched tape 51 (FIG. 6) with the sorting code information thereon into the labeling apparatus and the tape reader respectively. As seen in FIG. 6, each of the discrete tape locations corresponds to an individual label. The labels and tape are printed and punched respectively in a sequential manner such that the corresponding labels and tape positions will be in the same sequence as they are fed through the labeler and reader respectively.

The labeler and tape reader are advanced to a position at which information on the first two labels is displayed on the television monitor 45 while simultaneously the digital display 55 displays the corresponding sort location information from the tape. The television display provides the operator with information, as seen in FIG. 6, as to the storage location of the item being picked, the quantity of the items to be picked, and the sort location or destination for the items. The digital display provides sort location information from the tape and is used as an operator check to insure that the tapes and labels are synchronized. The primary function of the tape reader, however, is to program the corner coders 70 and 70'.

FIG. 6 shows the portions of the labels which are displayed by the T.V. monitor and the corresponding sort location information which can be apertures punched into the paper tape 51. It is seen that the portion of label 100A displayed relates to an article or carton stored in bay 20 and the operator is to pick from the right side of the picking car at level 5. Two items remain to be picked and they are to be sorted to a destination chute identified as number 3. Once the operator has picked one of these articles and positioned it on the conveyor 30 for automatic labeling and coding, and the label has been applied to the article, the labels and the tape are synchronously advanced to the next position, as described below, and portions of labels 100B and 100C are displayed by the T.V. monitor while the digital display indicates the sort location.

Label 100B is the last carton of the shipment to destination 3 while label 100C represents the initiation of a two-unit shipment of the same articles to a destination 6. After the two articles for destination 6 have been picked, labeled, and coded, a portion of labels 100E and the subsequent labels (not shown) will be advanced and displayed on the T.V. monitor. At this point, the operator is to begin picking a different article which is located on the left side of the aisle and is destined for sort location 1. It is seen that there are six articles in this shipment to be picked by the operator.

Tape 51 includes left and right sides 51A and 51B respectively for storing the sort code information which is punched in side 51A and new location information which is punched in the side 51B. Thus, when the operator is to move to a new location for picking, an aperture such as 51*c* in the section 51B of the tape and in alignment with the destination code information for label 100E, is detected by the tape reader 50 and actuates an indicator light 65 on the picking car thereby providing an additional signal to the operator which indicates that the picking location has changed.

Returning now to the overall description of the operation of the system, the operator will, having the necessary picking information for the first article to be picked, control the picking vehicle to move to the de-

sired picking location indicated on the T.V. monitor. The operator then begins picking the number of cartons indicated. Once the operator places a carton on the conveyor **30**, it is fed to the label area and abuts the normally raised case stop **60**. Photocell detectors **43** and **44** detect the presence of the carton and apply control signals to the label control circuit **120** (FIG. 8) when the two detectors sense the carton. Two detectors are employed to insure the label receiving face **29'** (FIG. 7) of the carton **29** is flush against the surface **42** (FIG. 3) of the labeler before actuating the labeler. Upon the coincident interruption of light beams associated with the detectors **43, 44**; control circuit **120** develops a control signal which is applied to the labeler solenoid **58** (FIGS. **4** and **8**) via conductor **122** and to a label advancing unit **125** via conductor **126** to advance the first label onto pad **52** and then actuate ram **54** to supply a label to the carton. Upon the return stroke of the ram, a limit switch **127** (FIG. 8) on the labeler provides a signal to the label control circuit **120** via conductor **128**. The label control circuit responds to the signal from switch **127** to generate a signal applied to the case stop **60** by means of conductor **130** to actuate the stop to release the labeled carton.

It is noted here that the label advance unit **125** is automatically turned off by means of sensor **57** which is coupled to the label control circuit **120** to inactivate the advance signal on line **126** once the label gap **102** has been detected. As the label is applied, the label control circuit **120** applies a control signal to the tape reader **50** by means of conductor **132** to advance the tape **51** within the reader to the next location corresponding to the next or second label.

During the time when the labeler is being actuated, the tape reader **50** applies a signal to the corner coder control circuit **140** to program the corner coders **70** and **70'**, as well as providing a signal to the digital display unit **55** which indicates the sort code information to the operator. Since the tape **51** advances with the actuation of labeler **40**, and the carton passes the coders when the label and tape information being read is for the next carton, control circuit **140** includes storage means which operates to delay the new information from programming the coders until the preceding carton has been coded. This insures that the applied coding will always correspond to the label applied to the carton. Thus, the coders are programmed from the stored information while new information is being read into the storage circuit. A photodetector **68** (FIGS. **1** and **8**) positioned at the end of the conveyor **30** (i.e., downstream from the coders) is employed to clear the old coding information and shift the new programming information into use once the carton has cleared the picking car.

In the event that the articles to be picked are out of stock, the operator will actuate an out of stock switch **145** which is located on the picking car (FIG. 3) and which applies a signal to the label control circuit **120** and the coder control circuit **140** to accomplish two functions. First, the labeler and tape reader are actuated to clear the labels from the labeler and advance the tape to the next different article to be picked. The operator manually removes the articles from the pad **52** as the labeler is actuated and places the out of stock labels on a suitable storage area such as a scroll **146** (FIG. 3) on the picking vehicle for later use for restocking the articles. During this period of time, the second function performed by actuating the out of stock switch is to inhibit the programming of the corner coders **70** and **70'** and the actuation of case stop **60** thereby eliminating needless motion of these devices.

When a carton is present in storage and has been picked and automatically labeled and released by the case stop **60**, conveyor **30** transports the carton from the labeling area to the coding area. The case stop **60** is designed to automatically return to the raised position as soon as a carton has cleared the stop. After clearing the case stop **60**, a carton travels down the conveyor line **30** and past the programmed corner coders **70** and **70'** to receive a sort code. As indicated above, the coders are programmed by tape reader **50** and can be at different vertical levels and can be activated or inactivated so that either one or two strips of reflective tape are applied to the carton to provide eight possible unique codes.

As a back-up to the tape reader **50**, a keyboard **150** is provided on the picking vehicle (FIGS. **3** and **8**), and in the event of the breakdown of the tape reader **50**, can be coupled to the control circuit **140** by means of switch **155** to control the programming of coders **70** and **70'**.

When a carton has reached the output conveyor **80**, it has received a label and sort code information and is then transferred to the remote sorting area **90** (FIG. **1**). The reader **94** (FIGS. **1** and **8**) on the input end of the sorting area can be any one of several commercially available units which read the corner code placed on each of the cartons and controls divert gates **96** by means of a control circuit **95**. Thus, as the carton moves along the conveyor **92**, it is automatically diverted to a shipping area for shipment to the particular destination indicated by the sorting code.

In the event that the corner coders on the picking cars become inoperative or the reader at the sorting area becomes inoperative, the divert control system includes a back-up keyboard **99** which can be switched into operation to provide divert control signals by changing the position of a switch **99**. The operator will, under this mode of operation, visually check the destination information on the label and key the sort code into control **95** by means of the keyboard. Thus, the use of the sort key, both on the labels and on the prepunched tape, permits the operator on the picking car to occasionally check the synchronism of the label and tape, as well as provides a back-up destination code in the event the tape reader, corner coders or code readers become inoperative during a breakdown.

In addition to the equipment already described, the system may include a label detector **160** (shown in phantom form in FIG. **1**) mounted on the picking car downstream the conveyor from the labeler and having a sensor positioned to detect the presence or absence of a label which may include a reflective area thereon. In the event a label is not detected, the corner coders are programmed to apply a predetermined code which automatically causes the diverting mechanism to divert the unlabeled carton to an area assigned for receiving such cartons for later restocking. These and other modifications to the present invention will become apparent to those skilled in the art and can be made without departing from the spirit or scope of the present invention as defined in the appended claims.

What is claimed is:

1. For use in a warehouse for storing predetermined articles at preselected storage locations, a system for batch picking articles and labeling and sorting the articles by destination, said system including a mobile picking vehicle comprising:

a vehicle movable to desired storage locations within said warehouse;

labeling means positioned on said vehicle for sequentially applying labels to articles, said labels including article location and quantity to be picked information thereon;

means for displaying said information on a label to be applied to the next article to be picked;

tape playback means positioned on said vehicle for reproducing article sort location information recorded on a tape in a sequence corresponding to the sequence of labels to be applied to articles retrieved from storage;

coding means programmed by said tape playback means for applying a sort code to each article;

conveying means positioned on said vehicle for receiving an article from storage and transferring said article into position to receive a label and a separate sort code from said labeling means and said coding means respectively; and

control means for synchronizing the application of labels and sort codes to articles such that labeled articles receive corresponding sort code information.

2. The apparatus as defined in claim 1 wherein said labels include sort location information displayed by said display means, and wherein said picking vehicle further includes additional display means for displaying corresponding sort location information reproduced by said tape playback means.

3. The apparatus as defined in claim 1 and further including manually operable data generating means selectively coupled to said coding means to provide sort location programming information thereto.

4. The apparatus as defined in claim 1 wherein said system further includes a sorting area for receiving labeled and coded articles, and an accumulation conveyor for transferring articles from a plurality of picking vehicles to said sorting area.

5. The apparatus as defined in claim 4 wherein said sorting area includes:

a plurality of discharge chutes for articles having different destinations, said chutes identified by unique sorting codes assigned to each chute;

a sort code detector for detecting the sort code information on each article transferred to said sorting area;

conveying means transferring articles from said sort code detector to said discharge chutes; and

divert means controlled by said sort code reader for diverting articles to a discharge chute corresponding to the sort code information on the article.

6. A method of batch picking articles stored in a warehouse and applying sort code indicia thereon comprising the steps of:

providing a plurality of labels for individual articles to be picked;

displaying information from preselected ones of said labels indicative of the storage location and quantity to be picked of each article;

providing prerecorded sort location information corresponding to each label;

applying labels to articles retrieved from storage;

applying code indicia to each article retrieved from storage in accordance with the prerecorded sort location information;

synchronizing the label applying and code applying steps such that a labeled article receives corresponding code indicia thereon.

7. The method of claim 6 and further including the additional step of sequentially displaying sort location information corresponding to one of said preselected labels.

8. A warehouse article picking vehicle for carrying an operator to preselected storage locations within the warehouse and positioning the operator for manually transferring articles from storage onto the picking vehicle, said picking vehicle including:

labeling means receiving a sequence of individual preprinted labels corresponding to articles to be picked for applying a label onto each article;

means for displaying preselected label information prior to the application of the displayed label onto an article;

tape means including article sorting information programmed therein in a sequence corresponding to the sequence of labels to be applied by said labeler;

tape playback means adapted to receive said tape and provide signals representative of the information thereon;

coding means programmed by said tape playback means for separately applying sort code indicia to an article; and

control means for synchronizing the application of labels and sort code indicia such that labeled articles receive corresponding code information.

9. The apparatus as defined in claim 8 and further including a digital display for displaying to an operator on said picking vehicle, the sort code information on said tape.

10. The apparatus as defined in claim 9 wherein said labels include article location, quantity to be picked, and sort location information; and wherein said first named display means includes a television camera positioned to scan this information on adjacent labels and a television monitor positioned to display this information to an operator on said picking vehicle.

11. The apparatus as defined in claim 10 and further including an electrical data keyboard, and means coupling one of said keyboard and tape playback means to said coding means.

12. The apparatus as defined in claim 11 wherein said coding means includes a control circuit receiving data from said tape or keyboard, and at least one indicia applicating device positioned on said picking vehicle and movably programmed by said control circuit to apply sort indicia on an article.

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