

[54] **COMPUTER-CONTROLLED ARTICLE MERCHANDISING SYSTEM FOR PRESCRIPTION DRUGS AND LIKE ARTICLES**

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[58] Field of Search **340/172.5; 221/7, 221/2, 9, 30, 2; 222/76, 80; 206/56; 312/39; 444/1**

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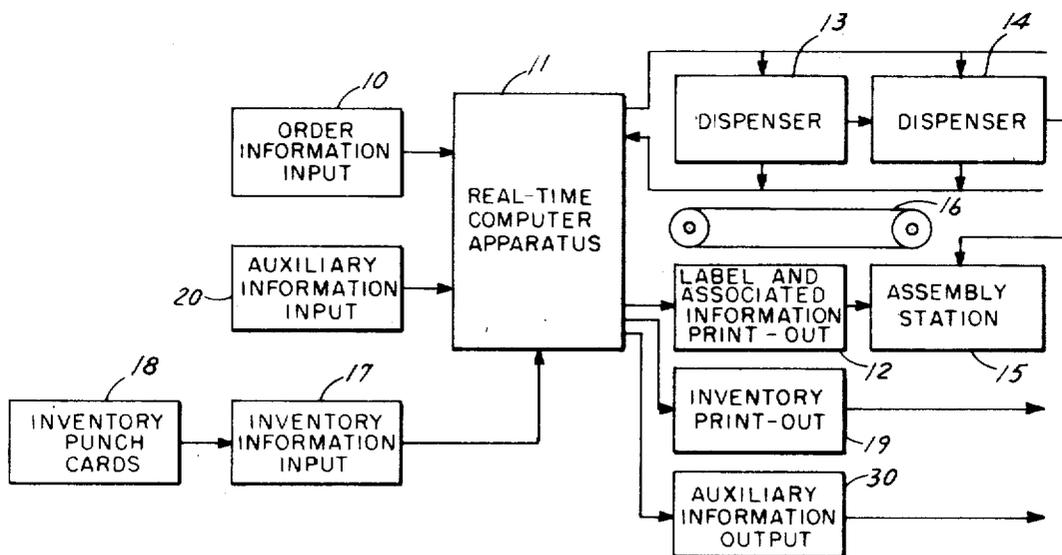
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Primary Examiner—Raulfe B. Zache
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[57] **ABSTRACT**

An automatic merchandising system for prepackaged articles such as prescription drugs. The drugs are stored in individual prepackaged units on a continuous strip which is wound on a reel in an individual dispenser unit for each type of drug. An information input device, preferably a typewriter input apparatus, receives the order information and converts the information to computer language signals. A real-time central computer control apparatus stores the information and a print-out device reads the order information from the computer and prints it on a label. The dispensing units respond to the computer apparatus to select an ordered quantity and type of drug with the ordered drug and label being delivered to a common assembly point where the pharmacist will bring them together and deliver them to the customer. The computer memory stores information relating to dispenser unit inventory which is readily obtainable from the computer apparatus for inventory control purposes. Auxiliary information input and output devices are operatively associated with the computer apparatus and operate independently of the dispenser units.

12 Claims, 7 Drawing Figures



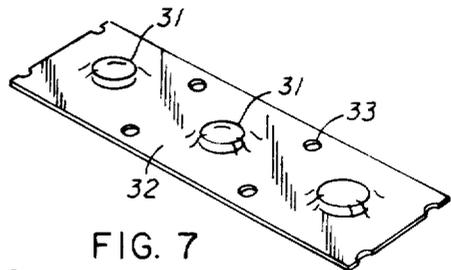
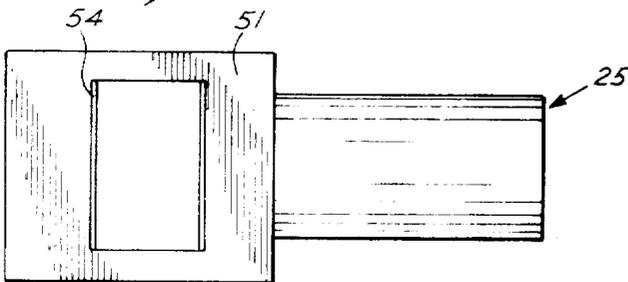
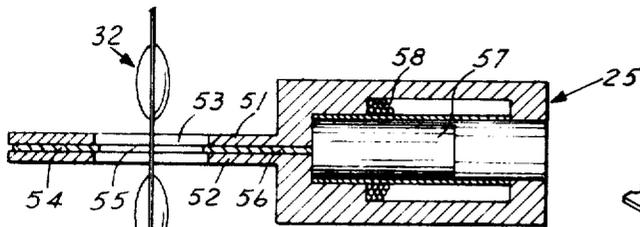
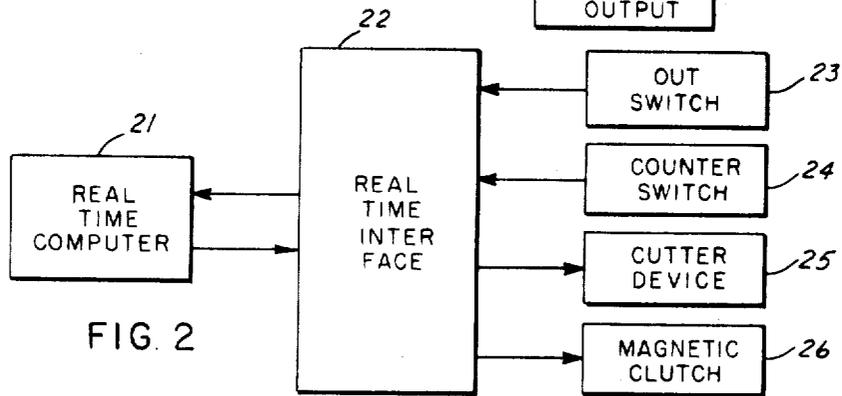
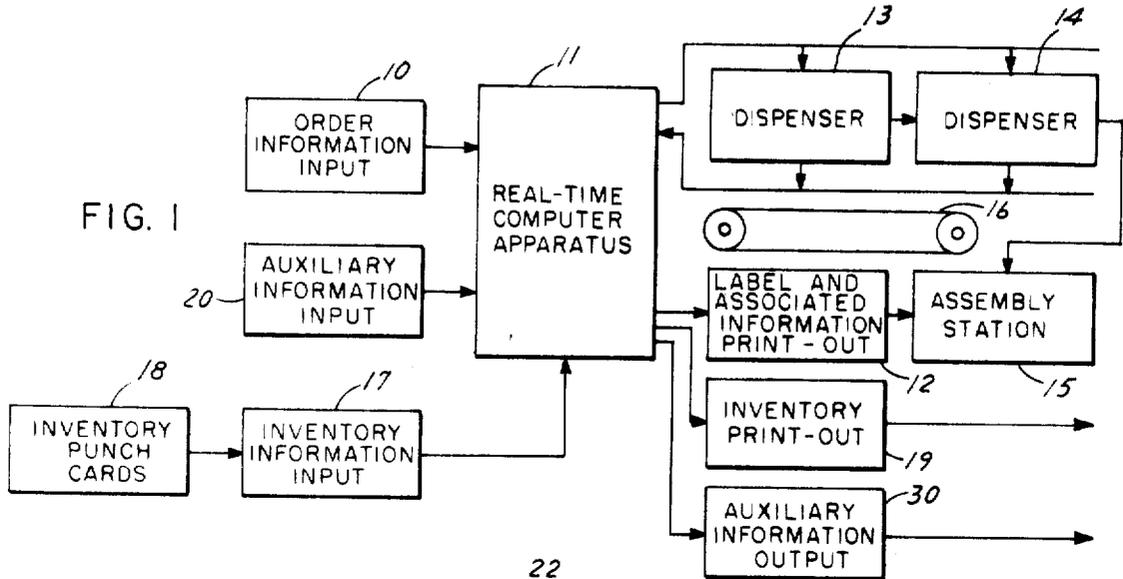
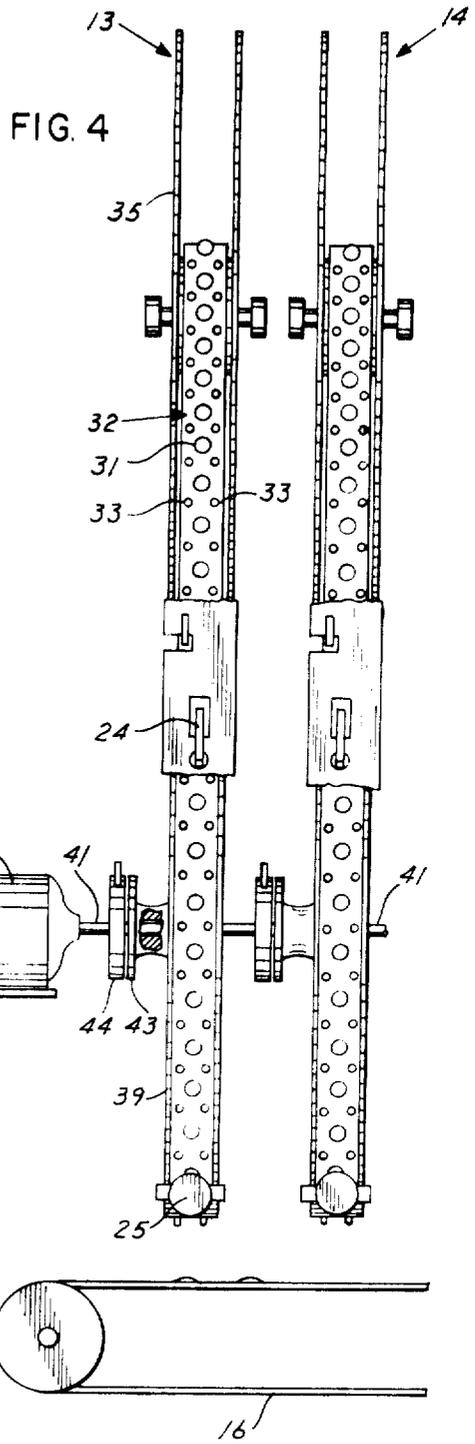
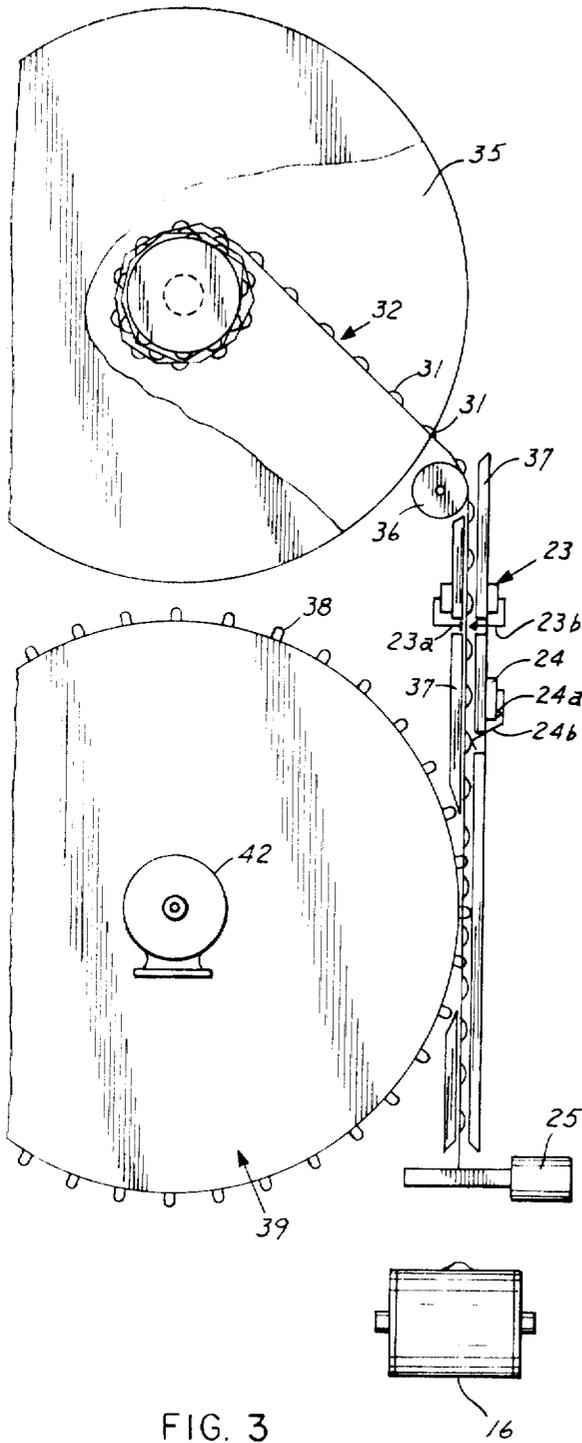


FIG. 6

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COMPUTER-CONTROLLED ARTICLE MERCHANDISING SYSTEM FOR PRESCRIPTION DRUGS AND LIKE ARTICLES

This invention relates to automatic merchandising systems for the delivery of a selected type and quantity of ordered articles and is specifically adapted for use as an automatic prescription drug dispenser system for use by pharmacists in the merchandising of drugs.

It has been the practice to furnish prescription drugs in tablet and capsule form and to store them in bulk-type containers making it necessary that the pharmacist manually remove and count the drugs and load the drugs in a prescription vial as well as type the label and apply the label to the filled prescription vial. Some attempts have been made to store the drugs in tablet or capsule form in bulk containers equipped with a counter device which will automatically count the drugs when set by hand to a predetermined amount and deliver them into a vial so that the pharmacist only has to type the label and apply it to the container. This technique, however, does not provide the most convenient and time-saving merchandising system for prescription drugs. Accordingly, it is an object of this invention to provide a fully automatic merchandising system suitable for the fast and reliable filling of orders for a wide variety of types of articles being merchandised.

Another object of this invention is to provide a novel and improved computer-operated, automatic dispensing system for filling of orders of prescription drugs and the like inclusive of dispenser units which can be readily refrigerated and locked.

Still another object of this invention is to provide a computer-operated merchandising system suitable for providing instantaneous information concerning drug usage, purchase and inventory reports as well as provide required information relative to auxiliary stock not directly dispensed by the computer.

Yet a further object of this invention is to provide an automatic merchandising system for prescription drugs and the like whereby a selected quantity and type of drug may be selected by furnishing the information to a common input which will not only instruct the dispenser unit as to quantity and type but also provide a label and deliver the label and measured quantity and amount of drug to a common dispensing station.

In accordance with the present invention in a preferred embodiment shown, there is provided a stock of drugs each stored in a prepackaged continuous strip wound on a supply reel for each drug, an information input device such as a view-tube typewriter or the like which converts order information taken from the customer to computer language signals which are received by a real-time computer apparatus which has been pre-programmed according to the type and quantity of the drugs in stock. The computer instructs a selected dispenser unit to release the type and number of units ordered and produce an output for a print-out machine which types a label. The label and dispensed drugs are combined by the pharmacist and delivered to the customer. Inventory input and print-out devices are operatively associated with the computer apparatus for inventory control purposes and other auxiliary information input and output devices provide an instantaneous readout as to price, quantity in stock, and quantity sold, for accounting and report purposes.

Other objects, advantages and capabilities of the present invention will become more apparent as the description proceeds taken in conjunction with the accompanying drawings in which:

FIG. 1 is a schematic block diagram of an automatic computer-controlled merchandising system embodying features of the present invention;

FIG. 2 is a more detailed schematic block diagram of computer apparatus and the various load and sensor devices associated with the computer apparatus;

FIG. 3 is a side elevational view of dispenser apparatus embodying features of the present invention;

FIG. 4 is an end elevation view of dispenser apparatus shown in FIG. 3;

FIG. 5 is a side elevational view of the cut-off device with the prepackaged drug strip shown passing through the cutter device;

FIG. 6 is a top plan view of the cutter device shown in FIG. 5 without the drug strip; and

FIG. 7 is a perspective view of a section of prepackaged drug strip.

Referring now to the schematic diagram in FIG. 1, there is shown order information input device 10 for receiving order information and converting the information into a computer language output suitable for use by a real-time computer apparatus represented at 11. Information is stored in a peripheral storage device and/or the memory core of the computer apparatus 11 and is selectively read out by an output printing device 12 capable of printing information on a label and at the same time the computer produces output signals for regulating the dispenser apparatus which stores the drugs. A series of independently operable dispenser units represented in FIG. 1 at 13 and 14 store the articles and selectively release them in accordance with output signals from the computer to be carried to an assembly station 15 by a conveyor 16. An inventory information input device 17 is shown coupled to the computer apparatus which may be a punch card reader unit which is supplied by punched cards represented at 18. An inventory print-out device 19 is coupled to the computer apparatus to read out inventory information from the computer apparatus as required. An auxiliary information input device 20 is operatively associated with the computer apparatus to deliver additional information into the computer which is not necessarily related to the dispenser units. This information may relate to drugs in stock but not in the dispenser unit. An auxiliary information output device 30 is operatively associated with the computer apparatus to print out information delivered into the auxiliary information input device as required. This information could be drug usage reports, purchase reports, price, a count-out from the dispenser, and label information for additional drugs not in the dispenser units.

The order information input device 10 may preferably be one of several typewriter input devices such as an electric magnetic typewriter, an electronic view-tube typewriter or a teletypewriter. Similar input devices may be used as the auxiliary information input device 20. Examples of commercially available apparatus suitable for use as input devices are the IBM SELECTRIC Magnetic card-tape typewriter, the EAI Model No. 8440 Console Unit, the Univac Uniscope Model No. 300, the Honeywell Model No. 51655 or the

EAI Model No. ASR35. Commercially available inventory punched cards and inventory information input devices are the Univac Model No. 9200 or 9300, the EAI Model No. 8452, Honeywell Model No. H 1603, Univac Model No. 44 III and EAI Model No. 8400 II. For the real-time computer apparatus a Honeywell Model H 316 general purpose digital computer may be used. The teletypewriter 12 may be a Honeywell Model No. 516-55 and the inventory print-out 19 may be a Honeywell line printer Model No. 516-7056.

The computer apparatus 11 has real-time performance characteristics. As further shown in FIG. 2, the computer apparatus includes a general purpose, real-time digital or analog computer 21 and a real-time interface 22 which converts or conditions the signals from the various input sensor devices for storage in the computer apparatus. The sensor devices include an OUT switch 23 and a COUNTER switch 24 associated with each dispenser unit. The real-time interface 22 also converts the computer signals from the computer storage to voltage and current levels which are usable to actuate load devices which include a cut-off solenoid 25 and a magnetic clutch 26 associated with each of the dispenser units.

The drugs represented at 31 in capsule or tablet form are prepackaged within a continuous strip 32 at equally spaced intervals along the strip with each drug being held between a pair of layers of thin plastic film, foil or other material to form a blister-type pack. The packaged strip has a series of holes 33 of uniform spacing along both edges. In the dispenser units shown in more detail in FIGS. 3 and 4 the strip is wound on a supply reel 35 and the free end of the packaged strip 32 extends over a guide roll 36 and through a vertical guide 37 so that the side holes 33 fit into radial projecting portions such as pins or teeth 38 on a drive sprocket 39 located below and in alignment with the supply reel which serves to advance the continuous strip as required. These sprocket wheels are driven by a constant speed shaft 41 on a motor drive 42. Each sprocket wheel carries one plate 43 of a magnetic clutch with the other plate 44 of the clutch being coupled to the motor common shaft 41 so that upon energization of clutch plate 43 the two clutch plates are magnetically coupled and cause the selected sprocket wheel 39 to rotate conjointly with the shaft 41 and thereby advance the selected package strip downwardly through the guide 37 and through the cutter device 25. After a selected number of units have passed through the cutter device 25, the cutter solenoid is actuated to cut the strip and the cut strip falls into a take-away conveyor 16.

The counter switch 24 shown in FIGS. 3 and 4 is positioned on the side of the vertical guide 37 and has a set of contacts 24a and 24b which are closed each time one drug capsule 31 passes between the contacts in its travel through the guide 37. The OUT switch 23 also has a set of contacts 23a and 23b which are normally held open by the strip passing therebetween and will close when the reel is empty and thus provide an indication that the supply reel 35 must be reloaded.

The cutter device 25 comprises an outer housing formed by upper and lower sections 51 and 52 held in a spaced-part relationship and is provided with a central window 53 forming vertical cutting edges along the inner side thereof. The drug-filled strip 32 passes verti-

cally through the window 53. A generally flat cutter blade 54 is disposed between the upper and lower sections 51 and 52 and also has a central window 55 to form an inner cutting edge. An end portion 56 of the cutter blade 54 extends through one end of the outer housing and attaches to the reciprocal piston rod 57 of the solenoid. The solenoid is conventional and has a coil 58 encompassing the rod 57 so that upon energization of the coil it moves the piston rod 57 to move the blade 54 out of the housing to force the cutting edges of the housing and blade against the side of the package to sever the package laterally and thereby cut a selected number of units from the continuous strip. The severed units will then fall by force of gravity upon the take-away conveyor 16 located below the cutter device which takes them to a dispensing station.

OPERATION

The real-time computer apparatus 11 is programmed using conventional computer programming techniques and a language to operate the program in the following manner:

Example prescription:

John Jones 9/30/70
Aspirin EC 5grs No. 100
Sig: ii tid prn for headache.
(signed) Homer Smith, M.D.

The pharmacist, after receiving the prescription or order from the customer, types it on the order information input device 10 which for explanation purposes is a view-tube typewriter. This information is typed in a special format so that the name would be typed on one line, the date and prescription directions on another, with other lines relating to the medicine strength, size, amount, etc. The pharmacist checks over the information displayed on the view tube to ascertain if it is correct. The drug code number and amount, which are obtained from a master listing, are then typed on the view tube. An example of the display on the view tube would be as follows:

Line 1	(Rx number)	134367	9/30/70
" 2		John Jones	
" 3		TAKE 2 TABLETS THREE	
		TIMES DAILY	
" 4		AS NEEDED FOR HEADACHE.	
" 5		ASPIRIN EC 5 GRS. No. 100	
" 6		HOMER SMITH (MD)	
" 7		81-100	

The pharmacist will then press the input feed button on the input device to transfer the information into the core memory of the computer apparatus 11. The program for the operation of the computer would specify the core storage areas and receive such information. The computer, through programming, is instructed to print out a prescription label within a certain chosen format. On the first line of the label would be printed such information as the prescription number and date, on the second line the name and address, on the third, fourth and fifth lines the directions, etc., and the doctor's name on line 6, etc. The computer then takes the drug code No. 81 in the case above and through programming takes the number and checks it against each stored number until it finds a match (the match number is hooked to dispenser No. 81) and is triggered to start counting out tablets. The computer also has the

number 100 as a second part of the drug code and 100 core spaces are set aside in the core storage area. The computer is also programmed to take a core space for the solenoid cutter operation and a core space for the magnetic clutch. As a drive sprocket revolves the counting switch 24 sends pulses back into the computer causing each pulse to count back against the allotted core storage area and proceeds to count down until it reaches the magnetic clutch cut-off point. The magnetic clutch is deactivated and the selected dispenser unit stops. The computer continues to count back to the preset starting position. When the computer reaches the solenoid cutter point it is automatically activated and cuts off, for example, a strip of 100 tablets from the selected dispensing unit. The pharmacist then will coil a strip of tablets and put it into a container, affix the container with a label, and deliver it to the customer.

From the foregoing it should be apparent that the present invention eliminates many of the prescription-filling procedures previously done manually and eliminates the unproductive time spent by the pharmacist walking back and forth. The system described will clearly allow a pharmacist to fill many more prescriptions with greater accuracy and efficiency. It will improve the time utilization of professional manpower and eliminate waiting by the customer during peak business periods. The use of a computer with a memory storage allows for an accurate inventory print-out at any time and is also adaptable for keeping records and is operable with other inventory not in the dispenser units.

One significant benefit of the present invention is that the use of a computer in this system will provide both control and storage capabilities. Desired statistical reports are available to management, i.e., statistical reports such as quantities used vs. time, current year vs. previous year, financial reports, etc. With regard to accounting functions when printing the label, the charge may also be computed and printed out on the label. Further benefits are in the area of biopharmaceutics whereby the present invention extends purity, stability and affords reliable drug identification. Further the system prevents breakage, powdering or contamination of the drugs. Other benefits include decreased losses through pilferage and loss by handling.

Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made by way of example and that changes in details of structure and programming may be made without departing from the spirit thereof.

What is claimed is:

1. In an automatic article merchandising system the combination comprising:

article dispensing means including a plurality of simultaneously operable dispenser units storing a supply of prepackaged articles, each dispenser unit having an input;

input means having an input adapted for receiving article order information identifying selected articles and number of articles selected and producing corresponding output signals at an output thereof;

control apparatus having an input coupled to the output of said input means and an output coupled to

the input of each of said article dispensing means, said control apparatus producing control signals at the output thereof in response to the output signals from said input means causing said dispenser units to dispense the correct number of articles from each of said dispenser units as selected at the input means; and

means to deliver said articles delivered by said selected dispenser units to a preselected location.

2. In an automatic merchandising system as set forth in claim 1 further including an inventory information input device having an input operatively coupled to the input of the control apparatus and an inventory print-out device having an input operatively coupled with the output of said control apparatus to provide inventory information on the articles.

3. In an automatic merchandising system as set forth in claim 1 further including an auxiliary information input device having an output operatively coupled to the input of the control apparatus and an auxiliary print-out device operatively coupled with the output of said control apparatus and independent of said dispenser units for printing out selected information relative to said articles from said control apparatus.

4. In an automatic merchandising system as set forth in claim 1 wherein said input means includes a view-tube typewriter for visual display of the order information impressed on the view-tube typewriter as well as the conversion of the article information to control signals.

5. In an automatic merchandising system as set forth in claim 1 wherein said control apparatus includes a core memory and peripheral storage device for storage of information furnished from said input means, interface means operatively coupled to the output of said input means and the output of said control apparatus for changing the input signals from the input means to a format suitable for storage in the core memory and peripheral storage device and the output signals from the control apparatus to a format suitable for use by the print-out means.

6. In an automatic merchandising system as set forth in claim 1 wherein each said article dispenser means includes a plurality of independent reels loaded with a continuous strip of prepackaged articles, each said strip being wrapped on a supply reel.

7. In an automatic merchandising system as set forth in claim 6 further including a sprocket wheel for each supply reel mounted on a common shaft to advance the strip from the associated supply reel and magnetic clutch means on the shaft operatively associated with each said sprocket wheel to selectively couple a reel to the shaft for conjoint rotation therewith.

8. In an automatic merchandising system as set forth in claim 7 wherein said article dispensing means includes a cutting device operatively associated with each sprocket wheel for cutting said strip after the strip has advanced past the cutting device a preselected distance.

9. In an automatic merchandising system as set forth in claim 8 wherein said strip has a plurality of equally spaced apertures along opposite side edges and said sprocket wheel includes a series of equally spaced, radially extending portions for selectively advancing the strip from the selected supply reel.

10. In an automatic merchandising system as set forth in claim 8 wherein said cutter device includes an outer housing with a central window, a blade with a second window slidable in the housing, and solenoid means responsive to a signal from the control apparatus to move the blade relative to said housing to sever the strip by reciprocal movement of said blade.

11. In an automatic article merchandising system the combination comprising:

article dispensing means including a plurality of simultaneously operable dispenser units storing a supply of prepackaged articles, each dispenser unit having an input;

input means having an input adapted for receiving article order information identifying selected articles and number of articles selected and producing corresponding output signals at an output thereof; real-time computer apparatus having an input coupled to the output of said input means and an output coupled to the input of each of said article dispensing means, said computer apparatus producing control signals at the output thereof in response to the output signals from said input means for causing said dispenser units to dispense the correct number of articles from each of said dispenser units as selected at the input means and producing print-out signals at the output thereof;

print-out means coupled to the output of said computer apparatus to print out the information stored in the computer apparatus on a label in response to said print-out signals; and

means to deliver said articles dispensed by said dispenser units to a preselected location for attachment with the associated label.

12. In a computer-operated drug dispensing machine,

a plurality of independent supply reels each loaded with a continuous strip of prepackaged drugs, each said strip having a series of longitudinally spaced apertures,

drive means for rotating said reels including a common shaft driven at a constant speed, a sprocket wheel for each said supply reel having a series of radially spaced projections for engaging the as-

sociated strip, and a magnetic clutch operatively coupled to said shaft for each said reel, said magnetic clutch being arranged to selectively couple one of the sprocket wheels to the shaft to rotate the associated supply reel,

a cutter device for each said supply reel including a housing with a blade disposed below the associated sprocket wheel, including a drive for the blade to move the blade for cutting the strip after the strip has advanced past the cutter device a preselected distance,

a counter switch selectively engaged by each said strip to count the number of drugs in the strip in its movement,

input means having an input adapted for receiving drug order information identifying a particular drug and the number of drugs required and producing corresponding output signals at an output thereof,

a real-time computer apparatus having an input coupled to the output of said input means and an output, said computer apparatus producing control signals at the output thereof in response to the output signals from said input means for causing said magnetic clutch to couple the sprocket wheels to the shaft and the drive to move the blade of each cutter device as selected at the input means and producing print-out signals at the output thereof,

print-out means coupled to the output of said computer apparatus to print out the information stored in the computer on a label in response to said print-out signals,

interface means coupled between said computer apparatus and said counter switch magnetic clutch, and cutter device to couple the control signals from the computer apparatus to the inputs of said magnetic clutch and said cutter device and to couple the output of each said counter switch to an input of said computer apparatus whereby a selected strip is moved through the associated cutter device a selected distance and the associated blade cuts off the strip, and

means to deliver said strip to a preselected location.

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