

[72] Inventor **Marvin Felcheck**
Monsey, N.Y.
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[73] Assignee **AMF Incorporated**
[32] Priority **May 9, 1967**
[33] **Great Britain**
[31] **21510/67**

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Primary Examiner—Gareth D. Shaw
Assistant Examiner—Paul R. Woods
Attorneys—George W. Price and Eli Weiss

[54] **BUSINESS EVENT DISPLAY DEVICE**
33 Claims, 21 Drawing Figs.

[52] U.S. Cl..... **340/172.5,**
235/92
[51] Int. Cl..... **H01J 31/16**
[50] Field of Search..... **340/172.5,**
324.1; 178/6.8; 315/18, 22, 24, 26; 235/92

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ABSTRACT: A business machine which presents on the face of a cathode-ray tube a visual display of item and quantity of item selected wherein the face of the cathode-ray tube is divided into discrete area, the areas being worked to identify specific items and item and amount selecting controls which, when activated effect the generation of a digit on the face of the cathode-ray tube within a specific discrete area to identify the item selected and the quantity of the item selected.

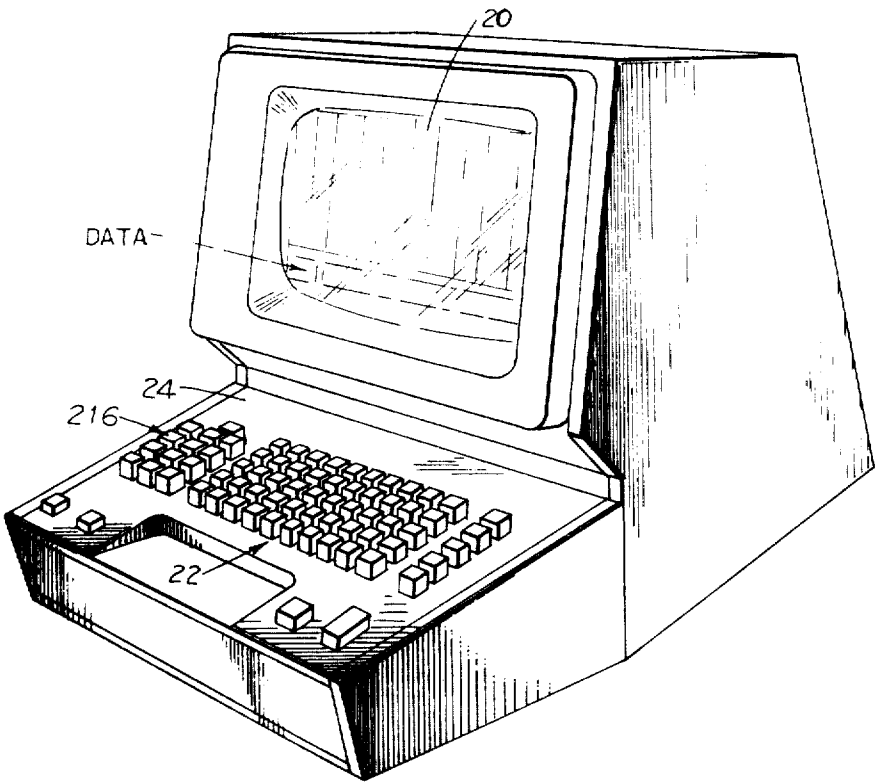


FIG. 1

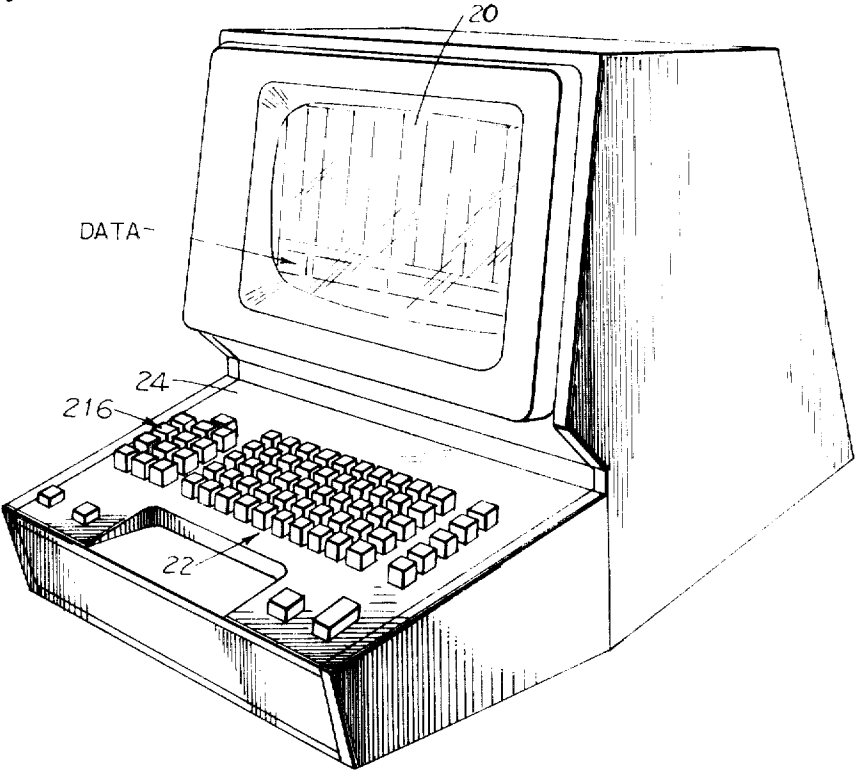


FIG. 3

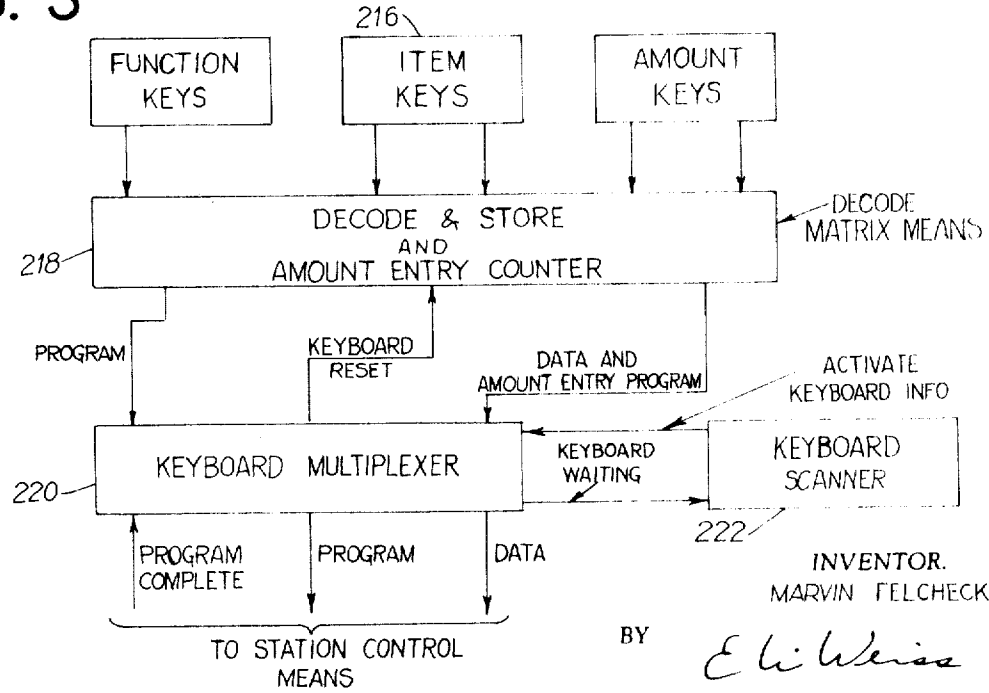


FIG. 2

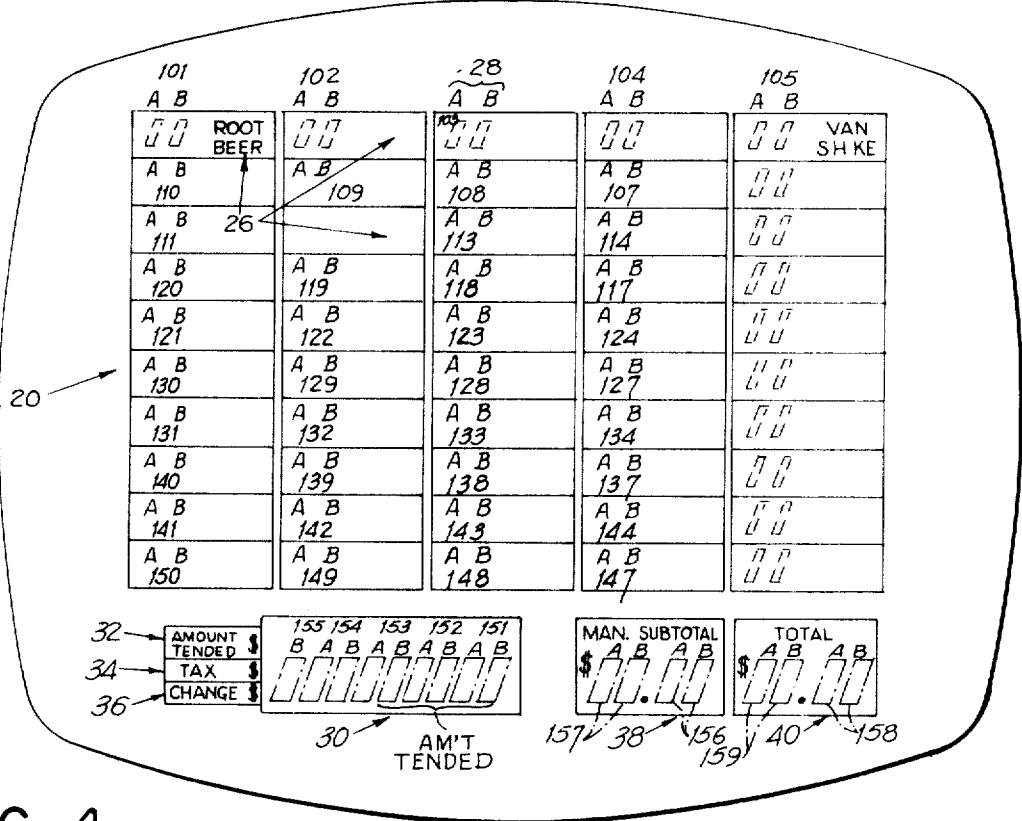


FIG. 4

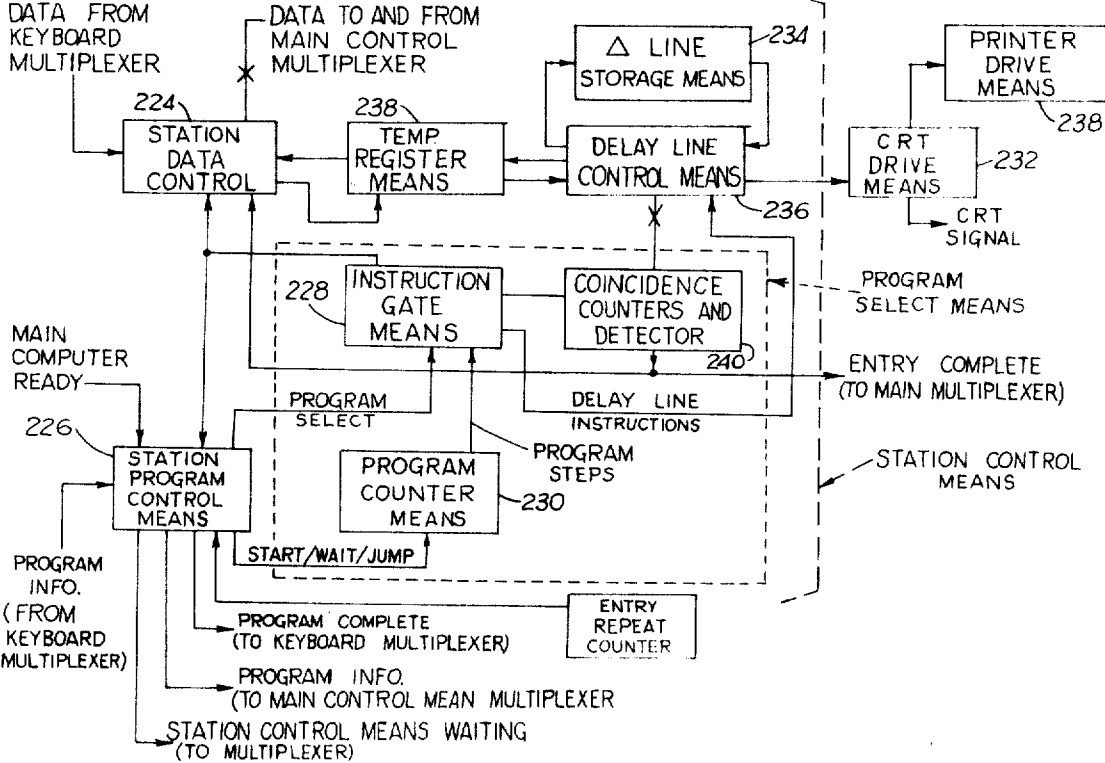


FIG. 5

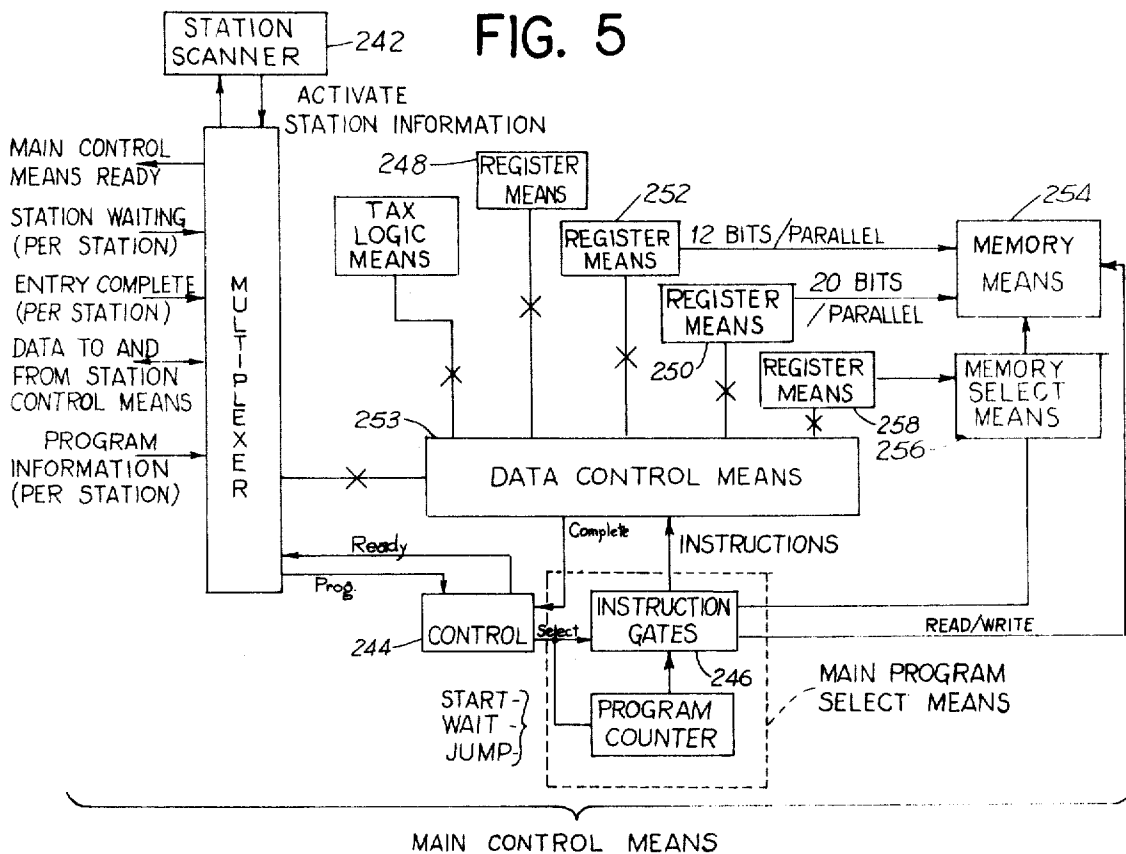


FIG. 6

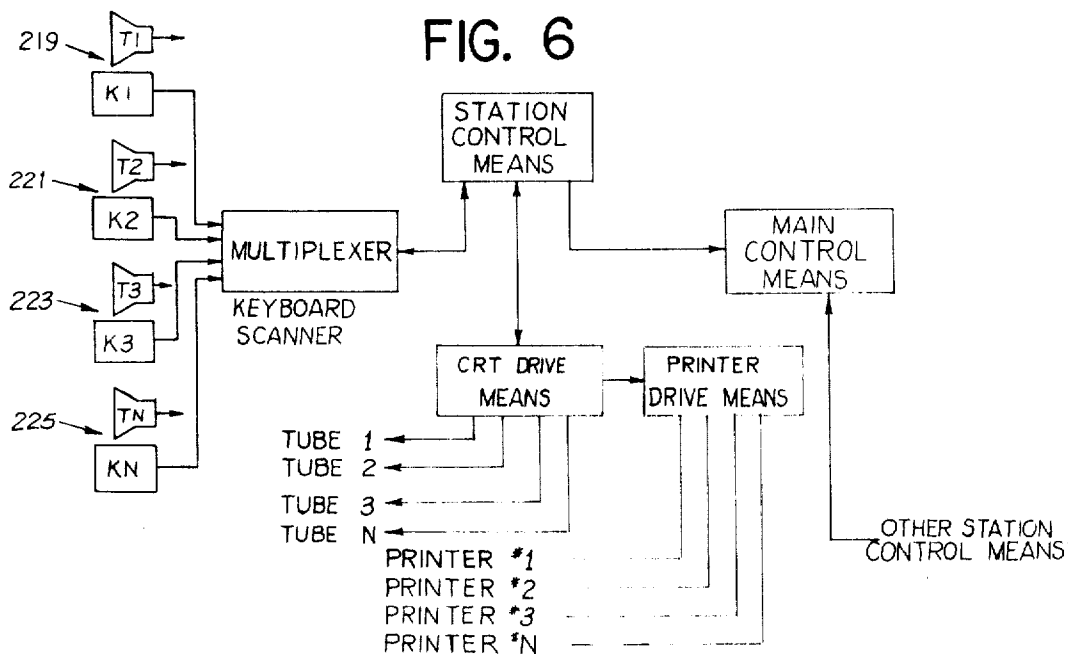


FIG. 7

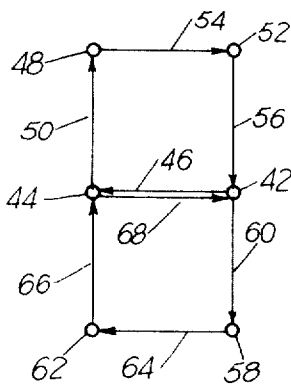


FIG. 8

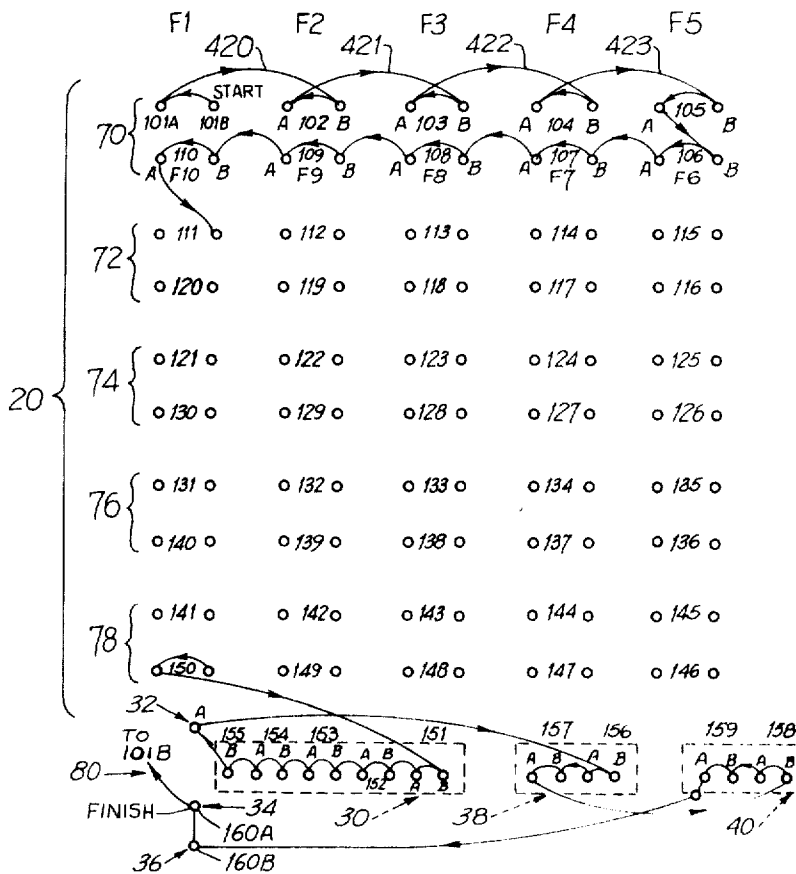


FIG. 9

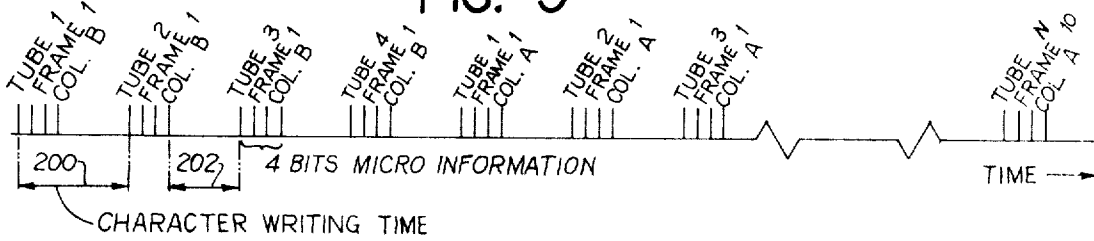


FIG. 10

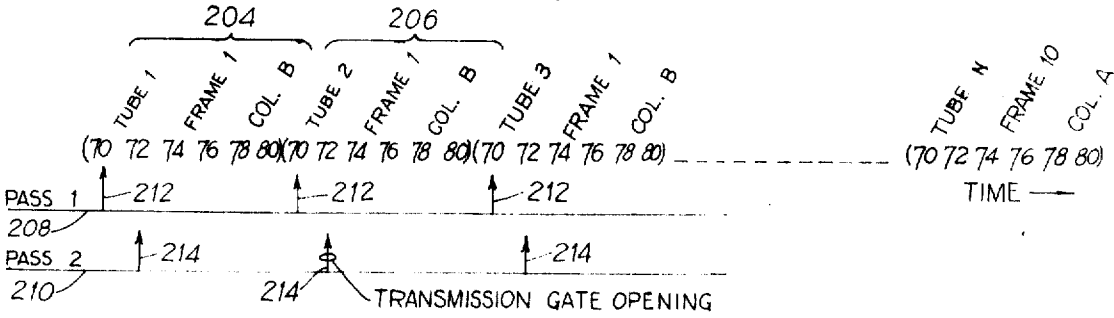


FIG. 11

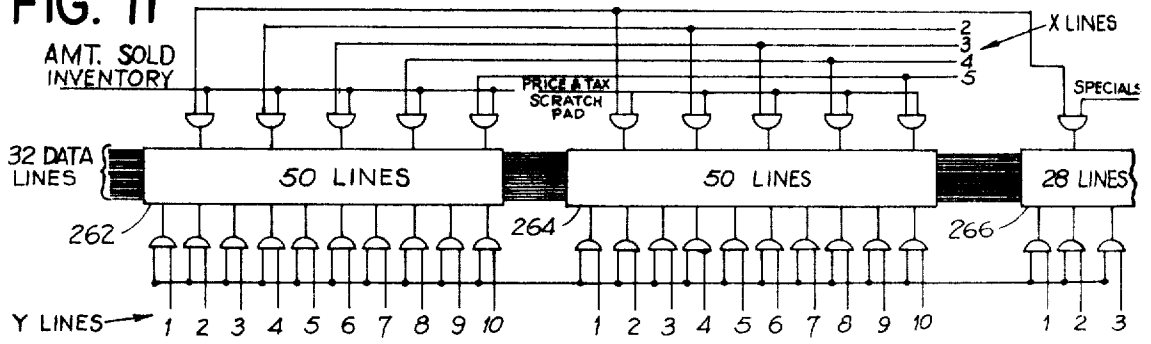


FIG. 12

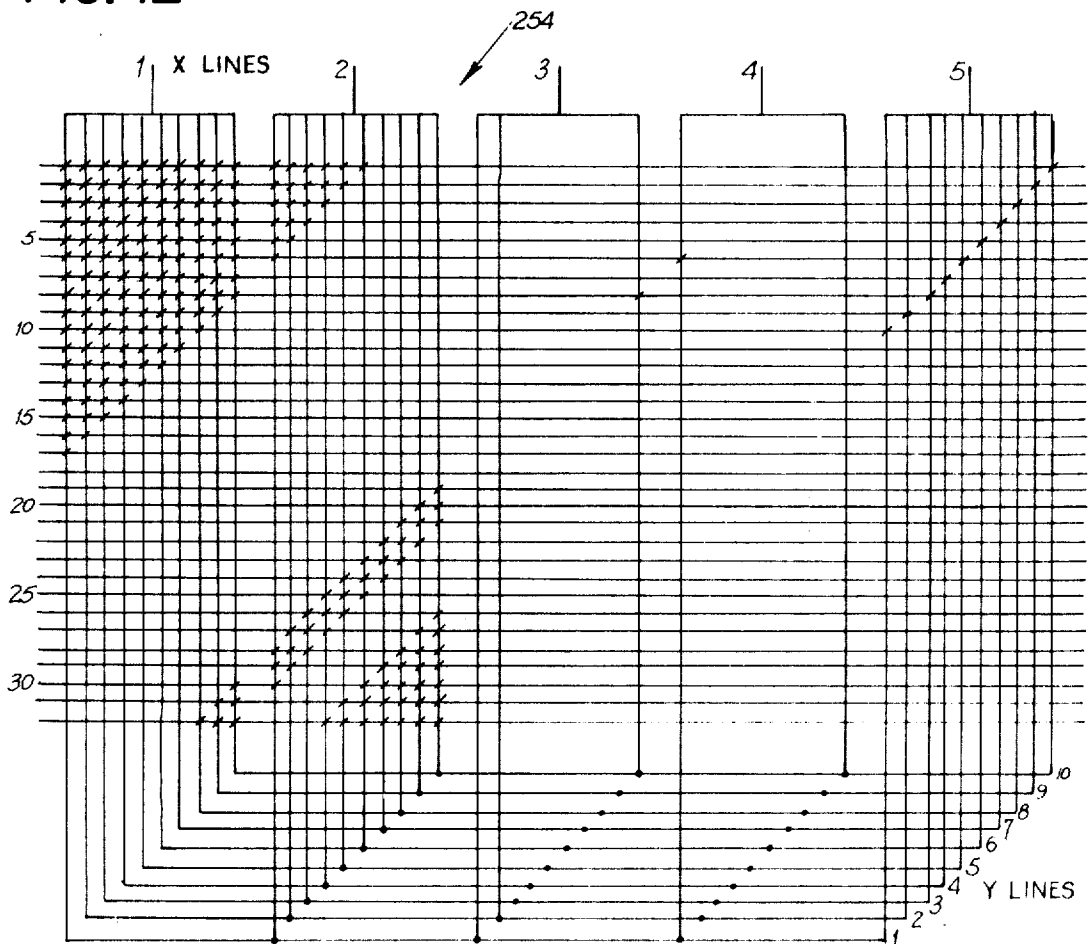


FIG. 13

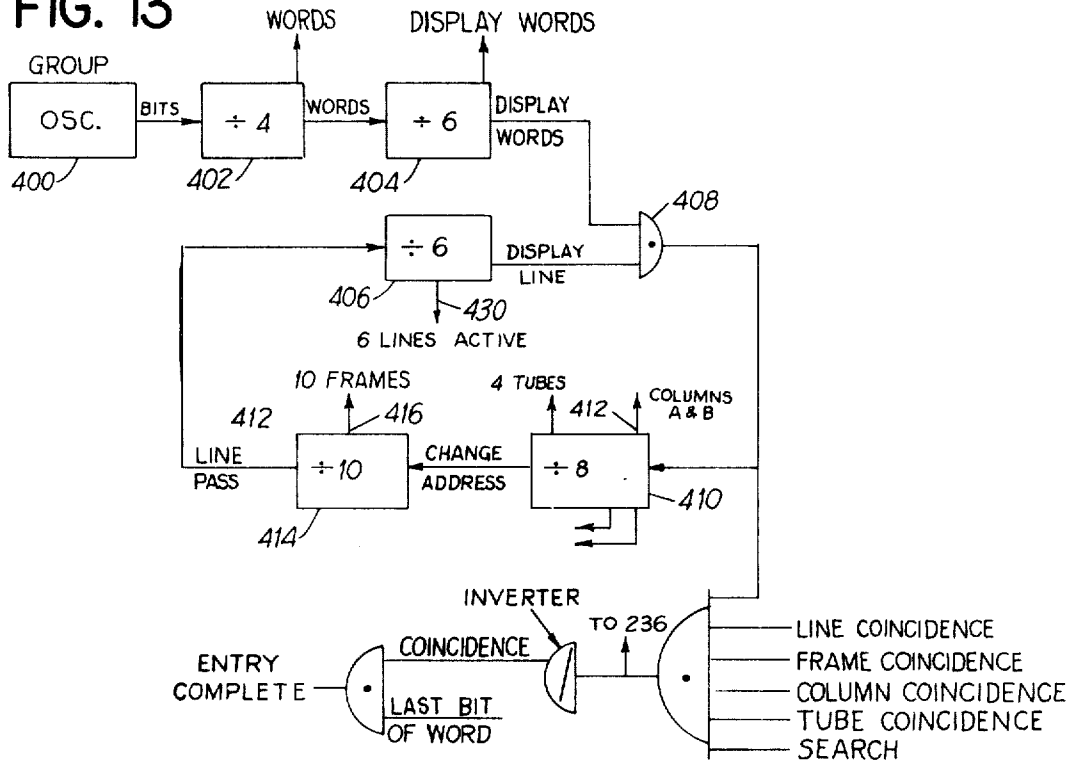


FIG. 14

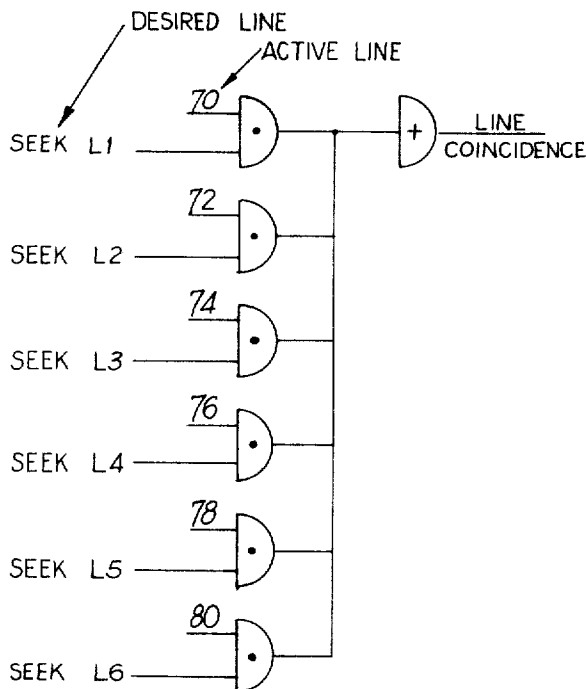


FIG. 15

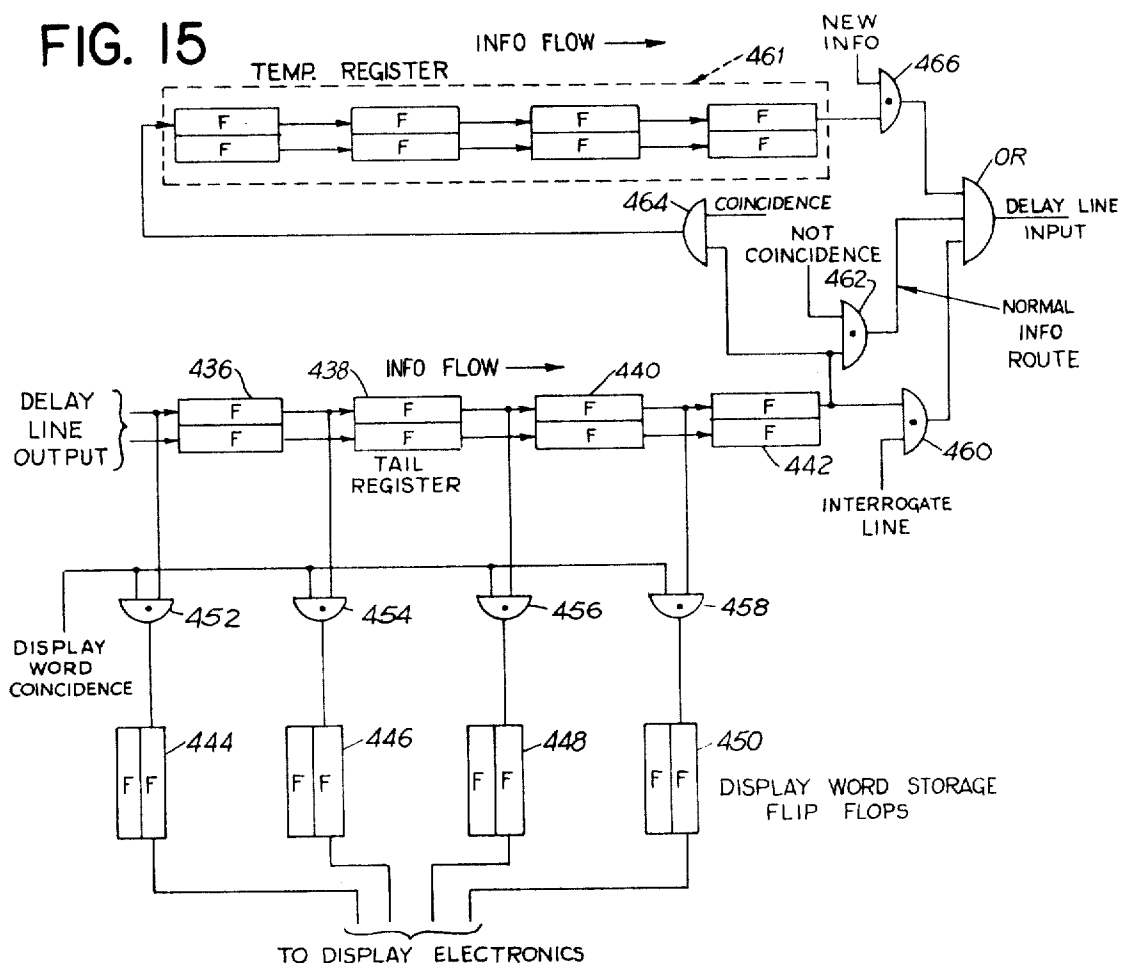


FIG. 17

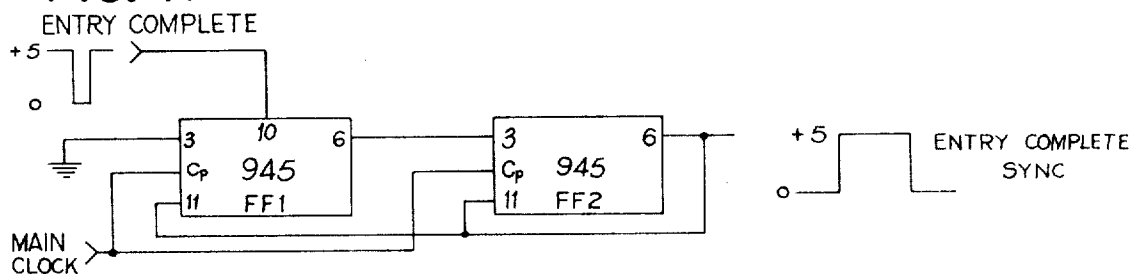


FIG. 18

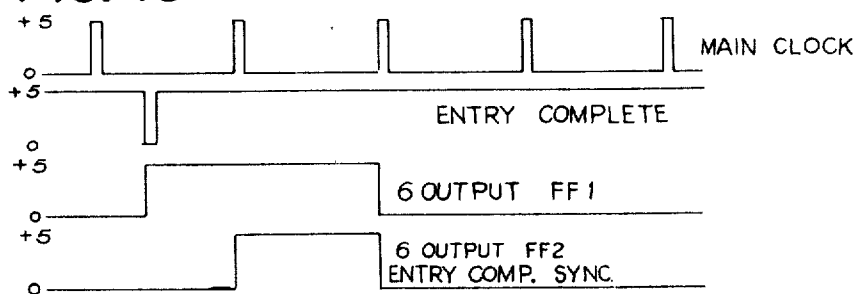


FIG. 16

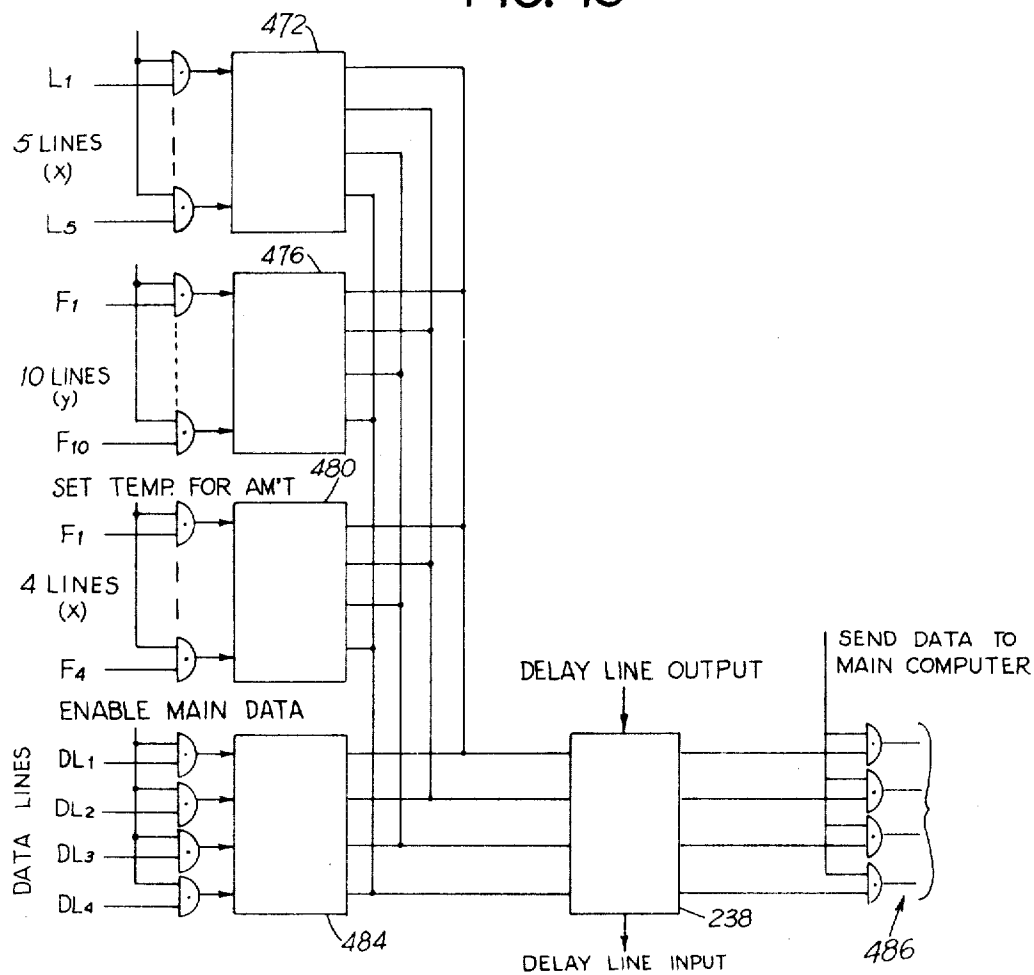


FIG. 19

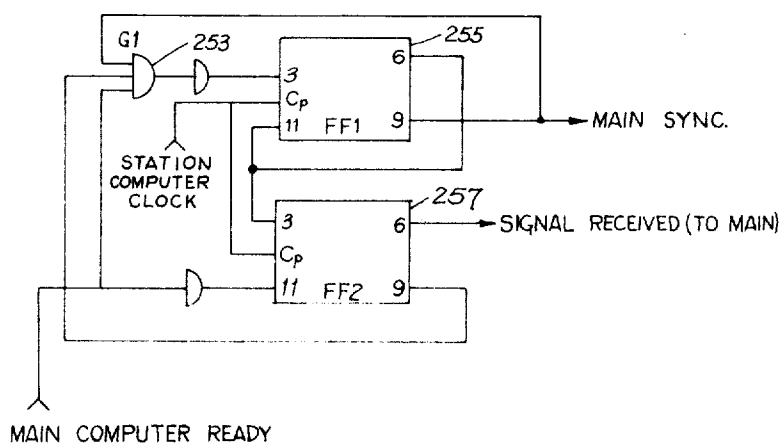


FIG. 20

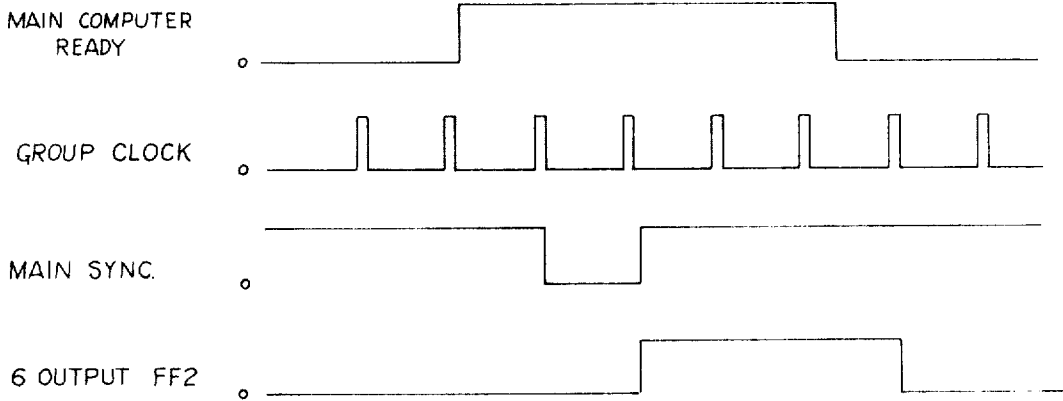
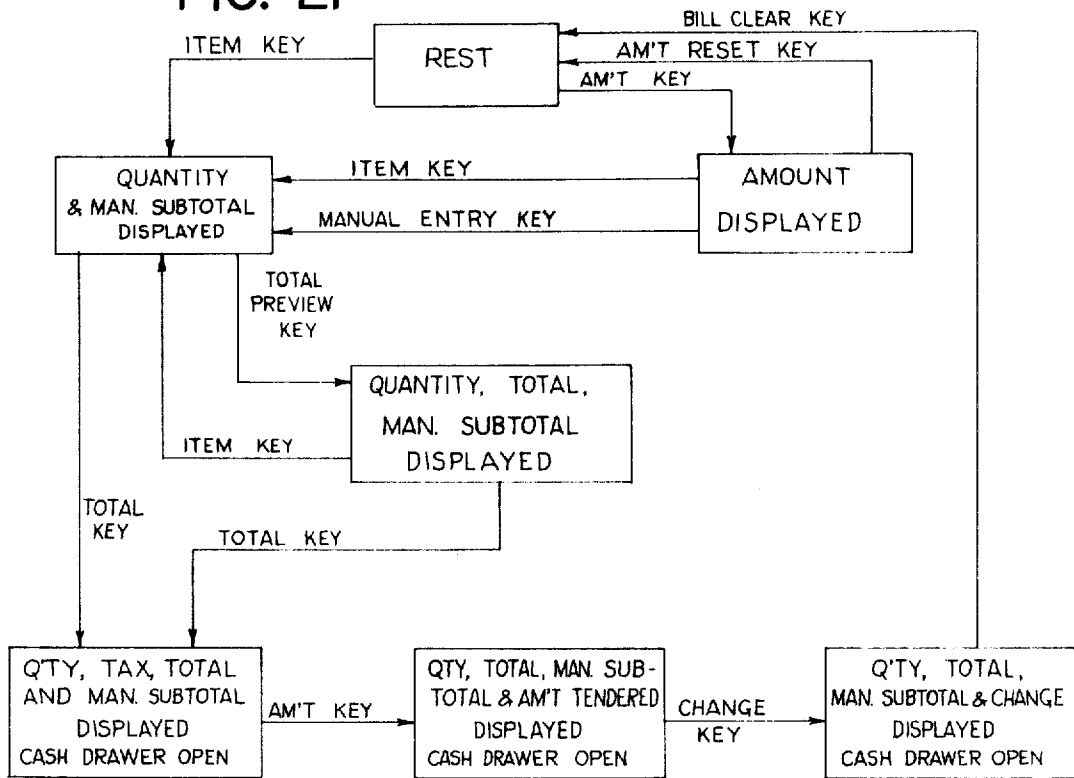


FIG. 21



BUSINESS EVENT DISPLAY DEVICE

This invention relates generally to an information handling system and more particularly to a method of and apparatus for presenting a full and complete itemized display of a business transaction.

Currently, in many business and commercial enterprises, a cash register located at the point of sale provides a record of the total price of a business transaction, a record of the cost of the various items that went into the making of the total price and, in some instances, a change computation showing correct change from amount tendered.

The pricing of each item, however, is subject to error as it cannot be entered unless it is memorized by the operator or marked clearly on the item. The correct pricing of each item is important to avoid losses to the business or commercial enterprise and to prevent customer dissatisfaction.

Additionally, the record of the cost of the various items is not available for review by the purchaser until after the sale has been entered into the register nor are corrections to amounts entered possible. Furthermore, tax computations for taxable items are not automatically made and must be separately calculated and entered. In some establishments, such as food stores where different items may have different tax rates, the calculations of the various taxes can be time consuming and wasteful.

It is an object of this invention to provide a device which can be used for ordering control in a business establishment.

It is another object of this invention to provide a device which can be used for item count control in a business establishment.

It is also another object of this invention to provide a device which can be used for total sales control in a business establishment.

It is still another object of this invention to provide a device which can be used for billing control in a business establishment.

It is still another object of this invention to provide a device which can be used for tax computation in a business establishment.

It is still another object of this invention to provide a device which can be used for cash transactions in a business establishment.

It is an additional object of this invention to provide a device which combines the total functions of an item-input cash register with those of a calculator, item counter and check printer to visually display all information of every transaction, store it, and flash it back instantly when required.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is an outline in perspective of an operator console housing and keyboard in accordance with the principles of this invention;

FIG. 2 is a view of the cathode-ray tube display associated with the console of FIG. 1;

FIG. 3 is a block diagram of the keyboard circuit of the console in accordance with the principles of this invention;

FIG. 4 is a block diagram of a station control means in accordance with the principles of this invention;

FIG. 5 is a block diagram of a main control means which is coupled to operate with the station control means of FIG. 4;

FIG. 6 is a block diagram of a system having a plurality of operator consoles;

FIG. 7 illustrates the trace of a beam on the face of a cathode-ray tube for digit generation;

FIG. 8 illustrates the dwell positions of a beam on the face of a cathode-ray tube for digit generation;

FIG. 9 illustrates the positioning of information within the delay line;

FIG. 10 illustrates the packing of information within the delay line;

FIG. 11 and 12 illustrate the memory of the main computer;

FIG. 13 illustrates, in block form, the station coincidence counters and detectors of FIG. 4;

FIG. 14 illustrates a typical coincidence matrix;

FIG. 15 illustrates, in block form, the station delay line control means of FIG. 4;

FIG. 16 illustrates, in block form, the station data control means of FIG. 4;

FIGS. 17, 18, 19 and 20 illustrate buffer circuits and associated signal wave forms for synchronizing the transfer of information between the station control means and the main control means; and

FIG. 21 illustrates the normal flow of information in accordance with the principles of this invention.

Referring to FIGS. 1 and 2, there is illustrated an operators console in accordance with the principles of this invention which can replace the present cash register in limited item store such as cafeterias, drive-ins and the like.

The console comprises a cathode-ray tube-type of display 20 operatively controlled by a plurality of keys or buttons 22 on a sloping keyboard 24. The display 20 can be positioned at a location remote from the keyboard, or it can be mounted into a cabinet onto which the keyboard is located.

The keyboard of the console can include item keys or buttons, multiplier keys or buttons and function keys or buttons such as change computation, manual entry, total preview, tax disregard and the like.

The item keys are clearly identified and color-coded to represent the various items in an establishment. In a restaurant, each item button would represent an item on the menu such as a hamburger, a sea-food platter, coffee, apple pie and the like. The multiplier keys, when depressed, automatically increase the quantity required of the item selected. For example, in a restaurant, if a hamburger were selected, depressing of multiplier key number three would automatically extend the hamburger order to 3 portions. The function keys initiate the normal operating needs such as no sale, total and the like and comprise additional procedural keys such as error correction, change computation, manual entry, total preview, and the like. The error correction key clears incorrect information before an order is registered; the change computation key shows correct change from amount tendered; the manual entry key is used to enter miscellaneous items not covered by the item keys such as cigarettes, mints, and the like in a cafeteria; restaurant; or the like, and the total preview key presents, on the display, the complete order, item by item, servings or portions of each, and the total cost including tax without entering the order into the system. At this time the customer has an opportunity to scan the order for accuracy and completeness, note the full cost of the order, and make additions or deletions, if desired.

Referring to FIG. 2, the face of the cathode-ray tube is masked and marked to present discrete areas of information. In a cafeteria type of operation, the upper portion of the tube 20 contains a plurality of marked areas 26 which contain identifying means such as the item names or labels of the various food items offered on the menu. Immediately, to the left of each identifying means or marker is an exposed area 28 of the cathode-ray tube sized to permit the display of two characters. Thus, if four servings of root beer are ordered, the number four will appear immediately to the left of the root beer marker to indicate the order. If the quantity ordered is in excess of nine, then two characters or digits will appear in area 28 to designate the quantity ordered.

The lower portion of the cathode-ray tube is divided into discrete areas each having a specific purpose. Area 30 presents all numerical read back and entries of information. For example, when ordering food items in quantities in excess of one, the quantity or servings will first appear in area 30, and then be transferred to the appropriate area 28. Area 30 also presents tax cost, the amount of money tendered in payment of an order, and the change owed to the customer.

To avoid confusion as to what the numbers in area 30 represent, three areas 32, 34, 36 labeled "Amount Tendered;"

"Tax;" and "Change" positioned to the left of area 30 can be selectively illuminated.

During that time when an order is being entered into the invention, and the numbers which appear in area 30 represents quantities or portions of an item on the menu, none of the identifying areas 32, 34, 36 are illuminated.

The area 30 is sized to display a number having nine digits. However, when the numbers displayed in area 30 represents dollars and cents, then the third character position from the left becomes a decimal point to help the operator to distinguish between dollars and cents.

Another area 38 located within the lower portion of the cathode-ray tube 20 displays subtotal information; and an area 40 located adjacent to area 38 displays total information.

The generation of characters on the face of the cathode-ray tube is by a seven stroke technique. Referring to FIG. 7, there is illustrated the trace of a beam on the face of a cathode-ray tube for the generation of a character.

The electron beam is driven through seven positions and a return position to effect the generation of a character. The beam starts at position 42 and is driven to position 44 to generate stroke 46. The beam is then sequentially driven to position 48 to generate stroke 50; to position 52 to generate stroke 54; to position 42 to generate stroke 56; to position 58 to generate stroke 60; to position 62 to generate stroke 64; to position 44 to generate stroke 66; and, then back to the start position 42 by stroke 68. Now, if the electron beam were normally on, a figure 8 would be generated. However, as stroke 46 traces a path similar to stroke 68, stroke 46 can always be blanked and strokes 50, 54, 56, 60, 64, 66 and 68 (7 strokes) become the active figure 8 generating strokes.

All digits can be generated by selectively blanking the appropriate strokes. For example, if strokes 56 and 66 were blanked the figure 5 would be generated. If strokes 50 and 66 were blanked, the figure 3 would be generated, and if stroke 56 were blanked, the figure 6 would be generated. In a similar manner, by the selective blanking of discrete strokes, the digit desired can be generated. The blanking information required to generate a desired digit is hereinafter referred to as "micro information." The positioning of the electron to a specific spot on the face of the cathode-ray tube about which the figure 8 is generated is hereinafter referred to as "macro positioning."

Referring to FIG. 8, there is illustrated the macro positioning and time sequence of the electron beam on the face of the cathode-ray tube having 120 discrete positions marked as areas 26.

The 120 positions on the face of the tube are divided into 60 A positions and 60 B positions. The 120 discrete positions are further divided into six lines 70, 72, 74, 76, 78, 80 the first five lines being folded back upon themselves wherein each line contains 20 positions. The A and B positions for the same number is called a frame. There are 10 frames per line.

The sequence of positions of the beam for line 70 is as follows: 101B, 101A, 102B, 103B, 103A, 104B, 104A, 105B, 105A, 106B, 106A, 107B, 107A, 108B, 108A, 109B, 109A, 110B, 110A, 111B.

The horizontal positioning and sequencing of the beam for each of the lines 72, 74, 76, 78 and 80 is the same as the horizontal positioning and sequencing of the beam for line 70. The sequential positioning of the beam for line 80 is as follows: 151B, 151A, 152B, 152A, 153B, 153A, 154B, 154A, 155B, 155A, 156B, 156A, 157B, 157A, 158B, 158A, 159B, 159A, 160B, 160A, 101B.

Functionally, the above noted sequencing of the beam results in the items identified by the marked areas 26 being displayed first, then the amount in area 30, subtotal in area 38 total in area 40, and identifying area lights 32, 36, 34.

At each of the stations or dot dwell positions shown in the face of the cathode-ray tube in FIG. 8, a seven stroke figure 8 is generated, stroke 46 having been blanked. A figure 8 is not generated at dwell positions 32, 34, 36. At these positions a splash of light is generated which, when unblanked, indicates the appropriate function of "Received or Amount Tendered," "Tax" and "Change."

In some instances, it may be desirable to operate more than one unit. If it is desired to operate four units simultaneously, the macro positioning of the electron beam is done in pairs for the four cathode-ray tubes. The beams of tubes one and two follow the same macro positioning and the beams of tubes three and four follow the same macro positioning.

In this manner it is possible to stagger the macro positioning of the pair of tubes one and two relative to the pair of tubes three and four. Explaining this further, if it is assumed that the micro information required to generate the character desired at position 101B consists of four bits of information, then four bits of micro information are fed to each of the four tubes.

Naturally, as none of the tubes are slaved together, the micro information fed to each of the tubes will be different. In this invention, the micro information for the four tubes is stored in a single delay line. Therefore, the micro information emerges from the delay line in a serial manner; the micro information tube 1 appearing first; then the micro information for tube 2, thereafter the micro information for tube 3, and finally the micro information for tube 4.

A finite interval of time is required to write the digit on the cathode-ray tube, the time required being that time required to trace the figure 8. New information representative of the next occurring digit cannot be presented to cathode-ray tube 1 until the finite figure 8 writing time or "time to write a character" has expired. In this invention, after the micro information representative of a digit is fed to cathode tube one, cathode tube two becomes active and receives micro information representative of a digit. No time delay is required to permit the writing of digits on cathode-ray tubes one and two. After tube two has received its micro information, tubes three and four receive their micro information sequentially. After receipt of the micro information by tube 4, the next group of four bits of micro information from the delay line is for tube one, position 101A. If the electron beam or macro position of tube 1 is at position 101B, then a finite time is required in moving the electron beam or macro position of tube 1 to 101A. Therefore, after tubes one and two have written the digits as directed by the micro information received, they move to the new macro position, tubes three and four remain at their old position as they are still writing digits. After tube four has written the digit as directed by the micro information received, tubes three and four move to their new macro position. In this manner, time is not lost in waiting for the electron beams to move to their required macro positions before feeding micro information to the tubes.

When utilizing four cathode-ray tubes, two macro scan generators are required, one for each pair of cathode-ray tubes, and only one micro scan generator is required. Only one micro scan generator is required because the tubes are activated one at a time and the delay line information is serial. As such, the same micro information can be fed to each of the two tubes of the pair, however, only the selected or proper tube will display the information.

The information in the delay line is retained serially on a tube-frame-column-line basis. In those instances where four units are used, the information for the four cathode-ray tubes must be repeated four times. From FIG. 8, it is apparent that there are 10 frames per line. Each frame is further divided into Column A and Column B. Thus, each tube requires 20 groups or blocks of serial information, each group or block being representative of a station or position on the face of the cathode-ray tube. As there are four cathode-ray tubes, and as each tube requires 20 blocks of serial information, therefore, 80 blocks of serial information is required, each block being broken into tube-frame-column information. For example, the digits to be displayed at positions 101B of the four tubes are displayed, in sequence, on tube one, tube two, tube three, and then tube four. Thereafter, the digits that are to be displayed at positions 101A of the four tubes are displayed, in sequence, on tube one, tube two, tube three, and tube four. In a like manner, the digits for the other positions of the four tubes are displayed sequentially.

FIG. 9 illustrates the positioning of information in the delay line for line 70 for four cathode-ray tubes. The interval of time 200 between each four bit section of information is that time which is required for the cathode-ray tube to write the basic figure eight. The digit information for line 72 follows line 70 information, and the order of positioning information is repeated for lines 74, 76, 78 and 80. The unused space 202 between each occurring four bit section makes the delay line unnecessarily long. In practice, the time interval 202 is of such duration that it could contain the information for lines 72, 74, 76, 78 and 80 if the information within the delay line were scanned in proper time sequence.

Referring to FIG. 11, there is illustrated the packing of the delay line to eliminate wasteful unused space. If, in FIG. 11, L 70 represents the four bits of information for line 70, L 72 represents the four bits of information for line 72, L 74 represents the four bits of information for line 74 and the like for lines 76, 78 and 80, then the information in the delay line would appear as illustrated in FIG. 10. Starting at the very beginning, the first block of information 204 represents the digits which are to be displayed on each line 70, 72, 74, 76, 78 and 80 of Column B, frame one of the first tube. In a similar manner, the next block of information 206 represents the digits which are to be displayed on each line 70, 72, 74, 76, 78 and 80 of column B, frame one of the second tube. The information within the delay line continues in a similar orderly manner until the last bit of information required is stored.

Now, the delay line is scanned in a time sequence manner as illustrated partially by the lines 208 and 210 and the arrows thereon, the first pass being indicated by line 208 and the second pass being represented by line 210. During the first pass, the information in the delay line detected at each instant the L 70 information digits occur as indicated by the arrows 212, and the L 70 or line 70 digit information is detected. Similarly, during the second pass the information in the delay line is detected at each instant the L 72 information digits occur as indicated by the arrows 214, and the L 72 or line 72 digit information is detected. In this manner, six passes of the line are required to obtain all of the information needed to write the six lines of digits on all of the four tubes.

The arrows 212 and 214 illustrated in FIG. 11 represent the conditioning of a gate drive to pass information, the gate being a four bit transmission gate which opens every six words, allows four bits to pass through and, after each line pass, steps or "ducks" the first four bits and starts again.

The delay line of FIG. 9 illustrates the macro positions shown in FIG. 8. For a flicker rate of approximately 60 cycles where 480 characters are to be written (120 per tube time 4 tubes) the time to write one character is:

$$t_c = 1 / 480 \times 60 = 36 \text{ m seconds}$$

However, eight strokes are required for each character, therefore, the time per stroke is:

$$s = 36 \text{ m seconds} / 8 \text{ strokes} = 4.5 \text{ m sec./stroke}$$

Thus, the figure 8 generator (micro generator) operates at:

$$f_g = 1/t_g = 1/4.5 \text{ m sec.} = 222 \text{ KC}$$

Since there are six lines of information packed in between characters to be written (i.e. L70, L72, L74, L76, L78, L80, L70) each "L" being four bits in length and there are 24 bits of information between character writings, it takes 36 m. seconds to write a character. Therefore, the delay line "bit time" is:

$$T_{DL} = 36 \text{ m sec.} / 24 \text{ bits} = 1.5 \text{ m sec./bit}$$

or a delay line frequency of:

$$f_{DL} = 1/T_{DL} = 1/1.5 = 666 \text{ KC}$$

The total number of bits in the delay line is (number of characters) (4 Bits per character) or $480 \times 4 = \text{bits}$.

The approximate delay line length—1920 bits $\times 1.5 \text{ m sec./bit} = 2.8 \text{ ms}$.

Therefore, a delay line of 3.3 milliseconds was selected.

Naturally as the number of cathode-ray tubes is increased or decreased, the length of the delay line can be increased or decreased accordingly.

It is to be understood that a delay line of 3.3 milliseconds was selected for use with four station consoles each having a cathode-ray tube display. Naturally, if the number of station consoles is changed; that is, if they are either increased or decreased in number, the length of the delay line and a corresponding change in frequency should be made.

FIG. 6 illustrates in block form the structure of this invention wherein four operator consoles or stations, each having a cathode-ray tube display, are coupled through a keyboard multiplexer to a single station control means having a delay line storage means. Information from the station control means is fed to the cathode-ray tube drive means which drives the cathode-ray tube display associated with the console. If a printed record is desired, printer means fed by the cathode-ray tube drive means is provided. A multiplexer 221 selects an appropriate station control means and couples it to the main control means which stores desired information in a magnetic core memory means.

Obviously, the number of station consoles utilized can be varied from one to any desired number. In FIG. 6, four consoles 219, 221, 223, 225 are illustrated, console 225 being representative of any additional number of consoles. Under certain circumstances, when a multitude of consoles are required, it may be most desirable to divide the multitude of consoles into groups and provide a station control means for each group. When this is done, the output of each station control means is fed to the main control means. It is to be understood, however, that while a number of station consoles are illustrated as being coupled to a station control means, this invention will perform in a very satisfactory manner with a single station console coupled to a station control means.

FIG. 3 illustrates, in block form, the keyboard networks of an operators console. As mentioned previously, the keyboard of the console can include item keys, multiplier keys and function keys. When an item or amount key 216 is depressed, it is decoded and stored in the decode matrix means 218 consisting of decode and store means and amount entry counter to permit the selected program and data information to be presented to keyboard multiplexer 220. A signal herein identified as "keyboard waiting" signal is generated to indicate the presence of information waiting for processing. If a function key is depressed, the information represented by the key is decoded and stored, and only program information is fed to the keyboard multiplexer 220, and the "keyboard waiting" signal is also generated.

The "Keyboard Scanner" 222 samples each keyboard in turn when two or more consoles are being used to determine which keyboard or operator's console of the plurality of consoles has information waiting to be processed and, therefore, requires the service of the Main control means. When an "active" keyboard is formed, the keyboard scanner 222 stops searching and activates the Keyboard multiplexer 220 to establish a direct channel from the active keyboard to the station control means. Program information as determined by the function keys, and data information as determined by the item and amount keys is now presented to the station control means.

The station control means performs the proper program functions and, when completed, transmits a Program Complete signal back through the keyboard multiplexer to the keyboard of the console to reset the Keyboard waiting signal and generate a Keyboard Reset signal which clears the keyboard.

The block diagram of the station control means is illustrated in FIG. 4. Data and program information signals are accepted from the keyboard multiplexer 220. Data information signals are fed to the station data control 224, and the program infor-

mation signals are fed to the station program control 226. The station program control 226 acts on the program information signals received and generates the proper signals to start the station program counter. The station program control also generates program select signals which are fed to the station instruction gates 228 to initiate the generation of proper program information signals. Program information signals which are fed to the main control means multiplexes and programs complete signals which are fed to the keyboard multiplexer are also generated by the station program control 226. Additionally, the station program control 226 generates a "station control means waiting" signal which is fed to the multiplexer if the main control means is required to assist in the program.

The station program counter 230 supplies instructions in a step by step sequence to insure the performance of the desired operations. At the completion of a program, the station program control 226 generates a program complete signal which is fed to the keyboard multiplexer.

The cathode-ray tube drive means or display electronics 232 received information signals from the storage means which can be delay line 234 through the delay line control means 236 to generate the proper signals to control a cathode-ray tube. If a printed record of the information displayed by the cathode-ray tube is desired, output signals from the display electronics are fed to a printer drive means 238.

The information in the delay line 234 is controlled by the delay line control means 236. The delay line control means permits the selective readout of signals to the display electronics to permit the information in the delay line to be displayed or presented. Additionally, the delay line control means is coupled to transmit or receive signals from the temporary register means 238. Upon command from the station instruction gate means 228 and coincidence counters and detector means 240, selected information signals can be inserted into or removed from the delay line 234. The information inserted into the delay line 234 is received from the temporary register means 238; and, the information removed from the delay line is stored in the temporary register means 238.

The station data control 224, upon receiving instruction signals can insert data from the main control means multiplexer 221, or keyboard multiplexer 220 into the temporary register 238. Information signals from the temporary register can be sent through the station data control 224 to the main control means.

The station coincidence counter and detector means 240, upon commands from the station instruction gates 228, act on signals received from the delay line control means to permit the information desired to be selected from the delay line. When coincidence between the information desired and the information which appears from the delay line is detected, the information can be inserted or removed from the delay line through the station temporary register means. After the occurrence of coincidence, an "entry complete" signal is generated for use by the main control means and/or station data control.

Referring to FIG. 5, there is illustrated in block diagram form, the structure of the main control means in accordance with the principles of this invention.

When the station control means requires the services of the main control means, the station control means sends a waiting signal. When the station scanner 242 which scans each of the station control means, senses a station waiting signal, the scanning of the station control means stops and an activate station information signal is generated which establishes a direct line from the specific station control means to the main control means. The program information received is fed to the main program control means 244; and, the main program control means 244 and main instruction gates 246 generated the proper instructions.

The calculations performed by the main control means occur in the register means 248, 250 and 252. Information signals can be shifted from any register means into any other register means through the data control means 254. Data information signals from the station control means can be en-

tered into any register and information from any register can be sent to the station control means through the data control means.

The memory means 254 of the main computer can be of the core-type having 4096 bits. 32 bits are read out or written into the memory under control of the main memory selection means 256 and a read or write signal. The interchange of memory information and control information occurs between register means 250 (20 bits), register means 252 (12 bits) and the memory means 254. The memory address register means 258 and main instruction gates 246 furnish information to the main memory select means 256 to permit the information desired to be selected from the memory.

The speed of the memory 254 determines the main control means clock rate while the speed of the delay line 234 determines the station control means clock rate. Thus, two different clock pulse rates can exist. Thus, information transfer which occurs between the main control means and the station control means should be synchronized through buffer circuits. The signals which represent Entry Complete and main control means ready are synchronized while the data and program information signals are DC levels.

The transfer of information between registers 250, 252 and 248 provides all of the calculations required. Register 248 which is a total or adding register performs count up calculations. Data control means 254 serves to transfer information between registers 250, 252, 248 and also inserts data from the station control means into registers 250 and 252. The memory select means selects or locates positions in the memory means 254; and, registers 250 and 252 function as storage for information fed to or received from the memory means 254. Main program select means selects the proper sequence of a program. The tax logic means provides an output signal which increases a preset amount for predetermined amounts in a selected register.

Referring to FIGS. 17 and 18, there is illustrated a buffer circuit and its associated signal wave forms for synchronizing the transfer of information from the station control means to the main control means. The network of FIG. 17 synchronizes the station control means "entry complete" signal to the main control means clock. The "entry complete" signal can occur at any time with respect to the main control means. The "entry complete" signal is fed to and sets flip-flop 249 through the asynchronous input terminal 10. The output 6 of flip-flop 249 goes to its logical "1" level and, at the occurrence of the next main control means clock pulse, sets flip-flop 251. The output signal of flip-flop 251 which appears at terminal 6 now goes to its logical "1" level, and at the next occurring main control means clock pulse signal, both of the flip-flops 249 and 251 return to their reset states.

Referring to FIGS. 19 and 20, there is illustrated a buffer circuit and its associated signal wave forms for synchronizing the transfer of information from the main control means to the station control means. The network of FIG. 19 synchronizes the main control means "ready signal" to the station control means clock. At the instant that the main control means "ready signal" goes to logical "1," and AND gate 253 acts to set flip-flop 255 at the next occurring clock pulse. The signal which appears at the output terminal 9 of flip-flop 255 acts to disable AND gate 253. At the next occurring clock pulse signal, flip-flop 255 is reset, and flip-flop 257 is set. The output signal appearing on terminal 9 of flip-flop 257 acts to disable gate 253. The output signal on terminal 6 of flip-flop 257 acts to inform the main control means that the main control means "ready signal" has been received and that the signal can be reset. This condition is necessary for the condition where the "ready signal" arrives when the station control means clock is off due to the delay line operation. In this instance, the "signal received" signal would not occur until the station clock again runs. The flip-flop illustrated in FIGS. 17 and 19 are of the Fairchild type number 945, it being understood, however, the flip-flop networks manufactured by other manufacturers can be used.

The main control means memory 254 is a 4096-bit core memory. Referring to FIGS. 11 and 12 the cores of the memory 254 are arranged in a 32 by 128 matrix to form 128 words each having 32 bits. For a console having 50 item keys or buttons 22, the memory 254 is further subdivided into two sections 262, 264 of 50 lines or words each and one section 266 of 28 words.

Section 262 (50 lines by 32 bits) can be used for inventory purposes. Each line of section 262 is used for a five digit inventory—total 20 bits; two digits (optional) having a total of 8 bits; and, one digit (space) total 4 bits.

Section 264 (50 lines by 32 bits) can be used for price and tax information. Each line of section 264 is used for a three digit price—12 bits; a one digit tax category—4 bits; a two digit scratch pad or temporary storage—8 bits; and a two digit optional item—8 bits.

Section 266 (28 lines by 32 bits) can be used for special items. In this section, eight digits—32 bits are used for each of the following: cash (per console); No Sale (per console), Transactions (per console); Overall cash; and Overall Tax. Five digits—20 bits are used for each of the following: Bill total; first Subtotal; Second Subtotal, Third Subtotal; Scratch pad or internal memory for a five digit number; and 18 lines for spare.

Reduction in the cost of addressing the memory is obtained by wiring the two 50 line sections in groups of 5 by 10. In this manner any one of the 50 lines can be selected by choosing one of five on top and one of 10 on the bottom (see FIG. 12). Thus, only 15 gates are required to address 50 lines.

Referring now to FIG. 13 there is illustrated in block form the coincidence counters and detector means 240 of the station control means of FIG. 4.

The output pulses of an oscillator 400 which is the station control means oscillator, is divided by four in divide network 402 to establish "words;" each word having a duration of four pulses or bits from the oscillator 400. The output pulses or words from the network 402 are further divided by six in divide network 404 to establish display words.

The output of network 404 and the output of a divide by six network 406 are fed to the input terminals of AND gate 408. The output of AND gate 408 is fed to a divide by eight network 410 also having a divide by four terminal 412; and, to an input terminal of AND gate 414. AND gate 414 is also coupled to receive signals representative of Line coincidence, Frame Coincidence, Column Coincidence, Tube Coincidence and Search.

The divide by four terminal 412 establishes a reference signal for identifying columns A and B; and, the divide by eight output terminal of network 410 establishes a reference signal to identify a specific one of four operating cathode-ray tubes.

The output signals from network 410 are fed to a divide by 10 network 414 having a terminal 416 which provides a signal to mark the moving of the beam of the cathode-ray tube to a new position; and, a terminal 418 which provides a signal to mark the start of a new line by the beam of the cathode-ray tube. Referring briefly to FIG. 8, the 10 pulse signals appearing at terminal 416 represent the jumps 420, 421, 422, 423, 424, 425, 426, 427, 428, and 429.

Returning to FIG. 13, the output signals of network 414 are fed to the input terminal of network 406 having a terminal 430. The pulse signals which appear at terminal 430 marks the various lines 70, 72, 74, 76, 78, 80 on the face of the cathode-ray tube.

The output pulse signal of the AND gate 414 is fed to the station delay line control means 236, and to an input terminal of an AND gate 432. The last pulse or bit of a word is fed to the other input terminal of AND gate 432. The output signal from AND gate 432 signifies an entry complete and is fed to the multiplexer 221 (see FIG. 5).

FIG. 14 illustrates a typical coincidence matrix which can be used to feed a signal to AND gate 414 to indicate line coincidence. Six AND gates, each having two input terminals, are

coupled to receive two signals, one of the line desired, and one of the line which is occurring. At the occurrence of coincidence of the two signals, a pulse signal is passed to indicate the occurrence of the line desired.

FIG. 15 illustrates, in block form, the station delay line control means 236 of FIG. 4. Referring to FIG. 15 pulse signals from the delay line are fed to the tail register consisting of four flip-flops 436, 438, 440, 442 and capable of holding one word or four bits.

The information in the tail register is transferred to a display word storage network consisting of the flip-flops 444, 446, 448, 450 through AND gates 452, 454, 456, 458 each time a display word coincidence pulse signal occurs. The display word storage is coupled to feed the micro cathode-ray tube drive means 232.

The output of the tail register is fed to an input terminal and AND gates 460, 462, 464.

During normal operation, the information coming out of the delay line passes through the tail register and flows through AND gate 462 back into the delay line.

During an interrogate procedure, the pulse signals from the tail register are fed simultaneously through AND gate 460 back into the delay line, and also through AND gate 464 into the temporary register 462. A read-out network similar to the read out for the display word storage network can be used to retrieve the information in the temporary register.

During a read out procedure where the information is to be removed from the delay line, the information from the tail register is fed through AND gate 464 only, gate 460 remaining closed.

New information is fed into the delay line through AND gate 466.

Referring now to FIG. 16, there is illustrated in block form the structure of the station data control means 224. The memory 254 can be addressed by selecting one of five lines for the Y-axis; and, one of 10 lines for the X-axis. The initial addressing of the memory is in excess three code which is then connected into binary coded decimal form. One of five gates 470 is activated and the signal is converted into binary coded decimal form by the network 472 to provide the X-axis address for the memory. One of 10 gates 474 is activated and the signal therefrom is converted into binary coded decimal form by the network 476 to provide the Y-axis address. This is done only when it is desired to address the main computer memory from the keyboard only.

When a number only is to be entered as in the amount entry program, AND gates 478 are activated and the signals converted to excess three code by the network 480 and fed to temporary register 238.

The outputs of the networks 472, 476, 480, 484 are coupled in parallel and fed to the temporary four bit shift register means 238. Information retrieved from the delay line is stored temporarily in the temporary register 238, and then fed to the main control means through AND gates 486.

This invention, which can replace the present day cash registers in limited item establishments such as cafeterias, drivins, and the like offers many more advantages than a conventional cash register in addition to the normal functions performed by a cash register.

Referring to FIG. 17, there is illustrated the normal flow of information within this invention. Referring to FIGS. 2 and 17 amount entries are effected by depressing an amount key which enters the corresponding number into the position marked 151B. All previous numbers are indexed one position to the left. Thus, to enter the number 41, first the amount key representative of the number 4, and then the amount key representative of the number 1 is depressed.

To effect an item quantity entry—depressing an item key will enter the quantity or number desired, the number having been previously entered into position 151A and 151B through the amount keyboard, the number appearing in the marked area 26 which corresponds to the item key. If no number had previously been entered into positions 151A and 151B, a one

will be entered and appear within the marked area 26. For example, if the number 12 had been entered by depressing the appropriate amount keys of the keyboard, then depressing, for example, the root beer key will place the number 12 in the marked area 26 bearing the notation—root beer. Upon depressing the root beer key, positions 151A and 151B are cleared automatically.

Effecting manual entry. When it is desired to add an amount directly to the bill or total the cost of all of the items, the amount section of the keyboard is used. The amount to be added is entered and appears in locations 151B, 151A, 152A and 153B. The manual entry key is now depressed and the amount manually entered is transferred and added to the previous MAN-SUBTOTAL which appears in locations 156 and 157.

Effecting total preview. When it is desired to obtain a total preview the total preview key is depressed. The total preview appears in the total position 158 and 159. All previous entries currently being displayed will remain. Depressing either the item keys or amount keys clears the total preview from position 158, 159. In total preview procedures, the cash draw does not open, and a permanent record of the transaction is not made. These procedures are effected when a total is obtained.

Effecting a total. To obtain a bill total, the total key is depressed. The subtotal plus tax, if any, will appear in the total slot 158, 159. The tax will appear in positions 151B, 151A, 152A. A decimal point will appear in position 152B and the tax indicated 34 will be lit. All previously displayed information will remain and the cash draw which can be located immediately below the keyboard will open. If desired, a printer can be provided to print the entire bill.

To calculate the amount of change due on a sale, the amount tendered must first be entered through the amount keyboard. The amount tendered will appear in positions 151B, 151A, 152A and 153B. Position 152B will be a decimal point and the amount tendered indicator 32 will be lit.

After the amount tendered has been entered, depressing the change key will cause the change to be calculated and to appear in the position previously occupied by the amount tendered. Position 152B will be a decimal point and the change indicator 36 will be lit.

Before proceeding with the next customer, the cash drawer must be closed or the bill clear key depressed.

For inventory and record purposes, a read-back mode of operation is provided. When it is desired to obtain information from the main control means memory, the invention is switched to its read-back mode of operation and a read-back selector means having push button activated switch or the like is activated. The switches select what specific information is desired for read-back such as inventory, total cash, tax and the like. The item keys on the console select the specific item of which information is desired. The switches of the selector means are normally maintained in a deactive state by a key controlled switch. The desired read-back item is selected and the appropriate key on the keyboard will cause the computer to read-back data of the item selected by the key into positions 151-155 on the display. If the overall cash, overall tax, station cash, station transactions or station no sales is desired, the total key would be depressed. Position 152B is a decimal point for cash items and a number for numerical quantities. If inventory is desired, depressing any item key will cause that items five digit inventory count to be displayed in positions 151, 152 and 153.

To enter data into the main control means memory which is representative of price of an item, tax category and the like, the main control means is switched to its entry mode and an entry keyboard is utilized. For obvious reasons, the entry keyboard is activated by a key controlled switch as this keyboard controls the price of each item entered into the memory. The desired entry item is selected and the amount keyboard is used to enter the desired data.

To enter a price into the main memory, an eight-digit number is entered through the amount keyboard. Starting

from the right, the first three digits are the price the next two digits are special information the next two digits are scratch pad or temporary storage the last digit is the tax category (0 through 9). For example, the number 20000135 represents a price of \$1.35; a tax category of 2 (This would indicate the proper tax rate to charge). To effect entry into the main control means memory, the item key which corresponds to the desired item is depressed.

In the operation of this invention the sequence of operations for the various operating cycles can be as follows:

Item Entry

A. Item Key depressed

B. Test Amount entry counter for a zero or not a zero.

Presence of a zero means one order or portion of the item is being ordered. Presence of a number greater than a zero means more than one order or portion of the item is being ordered.

If the Amount entry counter signal is not a zero,

C. Search and read information in delay line representative of information appearing at position 151 column B.

D. Transfer information from position 151 column B to Column B of marked area which corresponds to item key depressed.

E. Search and read information in delay line representative of information appearing at positions 151 column A.

F. Transfer information from position 151 Column A to Column A of marked area which corresponds to item key depressed.

G. Program Complete—Amount entry counter cleared. If the Amount entry counter signal is equal to zero,

H. Search and read-out information in delay line representative of information appearing at position 151, Column B and destroy.

I. Search and read-out information in delay line representative of information appearing at position 151 Column A and destroy.

J. Search and read-out information in delay line representative of information appearing at position 152 Column A and destroy.

K. Search and read-out information in delay line representative of information appearing at position 153 Column B and destroy.

L. Search and read-out information in delay line representative of information appearing at position 158 column B and destroy.

M. Search and read-out information in delay line representative of information appearing at position 158 column A and destroy.

N. Search and read-out information in delay line representative of information appearing at position 159 column B and destroy.

O. Search and read-out information in delay line representative of information appearing at position 159 column A and destroy.

P. Set temporary register to one.

Q. Jump to step D and continue until the end of the program; to step G.

Referring now to the general purpose of the above noted steps in the Item Entry Program:

Step B tests the Amount entry counter for the presence or absence of a zero. If a zero is not present, then;

Step C transfers the first digit of the quantity or amount ordered to the Temporary Register.

Step D transfers the information in the Temporary Register to Column D of the selected item or marked position.

Step E transfers the second digit of the quantity or amount ordered to the Temporary Register.

Step F transfers the information in the Temporary Register to Column A of the selected item or marked position.

Step G clears the Amount Entry counter and the program is complete.

If, in Step B, the signal from the amount entry counter indicates that a zero is present, then;

Steps H through O occur to clear the Data and Total information in the marked areas 151B, 151A, 152A, 153B, 158B, 158A, 159B, 159A.

Step P sets the temporary register to one and the program jumps to step D and then proceeds until the end of the program is reached to step G.

Amount Entry

A. Amount key depressed

B. Set entry repeat (double or triple zero key depressed)

Set temporary register to indicate amount of key depressed.

Count Amount Entry.

Test amount entry counter for presence of absence of a zero.

Amount entry counter is not at zero, then:

C. Search and read-out information in delay line of new digit and insert back into delay line at position corresponding to position 151 at Column B.

D. Search and read-out information in delay line of digit which appeared at position 151 Column B and insert back into delay line at position corresponding to position 151 Column A.

E. Search and read-out information in delay line of digit which appeared at position 151 column A and insert back into delay line at position corresponding to position 152 Column A.

F. Search and read-out information in delay line of digit which appeared at position 152 Column A and insert back into delay line at position corresponding to position 153 Column B.

G. Search and read-out information in delay line of digit which appeared at position 153 Column B and insert back into delay line at position corresponding to position 153 Column A.

H. Search and read-out information in delay line of digit which appeared at position 153 Column A and insert back into delay line at position corresponding to position 154 column B.

I. Search and read-out information in delay line of digit which appeared at position 154 column B and insert back into delay line at position corresponding to position 154 column A.

J. Search and read-out information in delay line of digit which appeared at position 154 Column A and insert back into delay line at position corresponding to position 155 column B.

K. Test Entry Repeat for the presence or absence of a zero. If a zero is present then proceed to step L; if a zero is not present, then proceed to step M.

L. Program complete.

M. Count entry repeat, count amount entry counter, jump to step T.

N. Search and read-out information in delay line representative of information appearing at position 151 column B and destroy.

O. Search and read-out information in delay line representative of information appearing at position 151 Column A and destroy.

P. Search and read-out information in delay line representative of information appearing at position 152 Column A and destroy.

Q. Search and read-out information in delay line representative of information appearing at position 152 column B and destroy.

R. Test to see if total Preview Keys have been previously depressed, if yes, search 158 Column B and clear; and, then proceed to step S.

S. Search and clear information in delay line representative of information appearing in 158A, 159B, 159A.

T. Set Temporary Register for Amount, jump to Step C and proceed to completion of program.

Referring now to the general purpose of the above noted steps in the Amount entry program:

Step B Tests the amount entry counter, sets the temporary register through the keyboard, sets the entry repeat counter, and reads the count in the Amount entry counter.

If the amount entry counter is not zero step C occurs next. If the amount entry counter is zero, then step N occurs next.

C through J—Insert the new digit into the first position of the data slot position 151 Column B and indexes the other appearing digits one position to the left.

K—tests the entry repeat counter for the presence of absence of a zero.

If a zero is present, then Step L occurs next. If a zero is not present, then Step M occurs next.

L—program complete.

M—count entry repeat counter.

N—Q—clear "data" slot.

R—Test if total preview, if yes go to Step S, if no, proceed to Step T.

S—Clear "TOTAL" slot and proceed to Step C.

T—Set temporary register via keyboard and continue from Step C.

CHANGE PROGRAM

Step A—Depress change key after having a total and an amount entry. Set call main signal, wait for computer ready signal.

Step B—Search and read-out information in delay line representative of information appearing in position 158 column B and store in temporary register prior to transmitting to main computer. A blank now appears where information appeared.

Step C—Search and read-out information in delay line representative of information appearing in position 158 column A and transmit to main computer.

Step D—Search and read-out information in delay line representative of information appearing in position 159 column B and transmit to main computer.

Step E—Search and read-out information in delay line representative of information appearing in position 159 column A and transmit to main computer.

Step F—Wait for signal indicating that the main computer is ready.

Step G—Search and read-out information in delay line representative of information appearing in position 151 column B and transmit to main computer.

Step H—Search and read-out information in delay line representative of information in position 151 column A and transmit to main computer.

Step I—Search and read-out information in delay line representative of information in position 152 column A and transmit to main computer.

Step J—Search and read-out information in delay line representative of information in position 153 column B and transmit to main computer.

Step K—Wait for a signal indicating main computer is ready.

Step L—First digit of change due transmitted to temporary register.

Step M—Search and read-out information in delay line representative of information in position 151 column B.

Step N—Wait for a signal indicating main computer is ready, feed next occurring digit of change information to delay line.

Step O—Search and read-out information in delay line representative of information in position 151 column A and display.

Step P—Wait for a signal indicating main computer is ready; feed next occurring digit of change information to delay line.

Step Q—Search and read-out information in delay line representative of information in position 152 column A and display.

Step R—Wait for a signal indicating main computer is ready; feed next occurring digit of change information to delay line.

Step S—Search and read-out information in delay line representative of information in position 153 column B and display.

Step T—Program complete.

Referring now to the general purpose of the above noted steps in the change program:

- A. Calls main computer, waits for main computer ready signal, activates change light.
- B—E. Sends four digits to main computer.
- F. Wait for main computer ready signal.
- G—J. Send and clear four digit amount tendered.
- K. Wait for main computer ready signal.
- L—S. Receive four digit change from main computer and insert into "DATA" slot.
- T. Program complete.

Total; Subtotal; Review:

- A. Total or total preview key depressed.
- B. Send Call Main computer signal, wait for ready signal from main computer.
- C. Interrogate line 70, frame 1 column B also referred to as position 101 column B.
- D. Interrogate all of the positions of line 70 and transmit all of the data to the main computer.
- E. Interrogate all of the positions of line 72 and transmit all of the data to the main computer.
- F. Interrogate all of the positions of line 74 and transmit all of the data to the main computer.
- G. Interrogate all of the positions of line 76 and transmit all of the data to the main computer.
- H. Interrogate all of the positions of line 78 and transmit all of the data to the main computer.
- I. Interrogate position 156 column B and transmit to main computer.
- J. Interrogate position 156 column A and transmit to main computer.
- K. Interrogate position 157 column B and transmit to main computer.
- L. Interrogate position 157 column A and transmit to main computer.
- M. Wait for receipt of computer ready signal.
- N. Receive from Main Computer digit for insertion into position 151 column B.
- O. Wait for receipt of computer ready signal.
- P. Receive from Main Computer digit for insertion into position 151 column A.
- Q. Wait for receipt of computer ready signal.
- R. Receive from Main Computer digit for insertion into position 152 column A.
- S. Wait for receipt of computer ready signal.
- T. Receive from Main Computer digit for insertion into position 158 column B.
- U. Wait for receipt of computer ready signal.
- V. Receive from Main Computer digit for insertion into position 158 column A.
- W. Wait for receipt of computer ready signal.
- X. Receive from Main Computer digit for insertion into position 159 column B.
- Y. Wait for receipt of computer ready signal.
- Z. Receive from Main computer digit for insertion into position 159 column A.
- AA. Program complete.

Referring now to the general purpose of the above noted steps in the Total; Subtotal; Review program:

- A. Total or total preview key depressed and total light activated.
- B. Call main computer—wait for main computer ready.
- C—H. Send item quantity information to main computer.
- I—L. Send manual subtotal to main computer.
- M. Wait for main computer ready.
- N—R. Receive three digits of tax from Main Computer and insert into "DATA" slot.
- S—Z. Receive four digits of total from main computer and insert into "Total" slot.
- AA. Program Complete.

Bill Clear

- A. Depress bill clear button
- B. Search position 101 column B

- C. Search all positions for information, read-out and destroy.
- D. Program complete.

Manual Entry (cash-no quantity)

- 5 A. Depress entry key.
 - B. Send call main computer signal, wait for ready signal from main computer.
 - C. Interrogate position 151 column B and send information to main computer.
 - 10 D. Interrogate position 151 column A and send information to main computer.
 - E. Interrogate positions 152 column A and send information to main computer.
 - F. Interrogate position 153 column B and send information to main computer.
 - G. Interrogate position 156 column B and send information to main computer.
 - H. Interrogate position 156 column A and send information to main computer.
 - 20 I. Interrogate position 157 column B and send information to main computer.
 - J. Interrogate position 157 column A and send information to main computer.
 - 25 K. Wait for receipt of main computer ready signal, insert first digit of new manual subtotal into temporary register.
 - L. Insert information in temporary register into 156 column B.
 - M. Wait for receipt of main computer ready signal. Receive from main computer digit for insertion into position 156 column A.
 - 30 N. Insert information in Temporary register into 156 column A.
 - O. Wait for receipt of main computer ready signal, receive from main computer digit for insertion into 157 column B.
 - 35 P. Insertion of information in temporary register into position 157 column B.
 - Q. Wait for receipt of main computer ready signal.
 - R. Receive from main computer digit for insertion into position 157 column A.
 - 40 S. Insert information in temporary register into 157 column A.
 - T. Program complete.
- Referring now to the general purpose of the above noted steps in the Manual Entry program:
- 45 A. Manual entry key depressed.
 - B. Call main computer—wait for main computer ready signal.
 - C—J. Send and clear three digit amount to main computer. Send and clear four digit manual subtotal to main computer.
 - K. Wait for main computer ready signal.
 - 50 L—S. Receive four digit manual subtotal and insert into manual subtotal slot positions 156B, 156A, 157B, 157A.
 - T. Program complete.

Amount Reset

- 55 A. Clear position 151 column B, insert new digit, wait for entry complete signal.
- B. Clear position 151 column A, insert new digit, wait for entry complete signal.
- 60 C. Clear position 152 column A, insert new digit, wait for entry complete signal.
- D. Clear position 153 column B, insert new digit, wait for entry complete signal.
- E. Clear position 153 column A, insert new digit, wait for entry complete signal.
- 65 F. Clear position 154 column B, insert new digit, wait for entry complete signal.
- G. Clear position 154 column A, insert new digit, wait for entry complete signal.
- 70 H. Clear position 155 column B, insert new digit, wait for entry complete signal.
- I. Program complete.

Special read-out or read-into main computer memory.

- 75 A. Depress item key.

B. Four bits of data corresponding to the units digit of the number are inserted into the temporary register; signal sent to Group multiplexer to indicate that the group computer is waiting for service from the main computer; Group Computer "Waits" on the program step until a "Computer Ready" signal is received from the Main computer; the four bits of data in the temporary register are fed, in parallel, to the main computer.

C. Four bits of data corresponding to the tens digit of the number are inserted into the temporary register; Signal sent to group multiplexer to indicate that the group computer is waiting for service from the main computer; group computer "Waits" on the program step until a "Computer Ready" signal is received from the Main Computer; the four bits of data in the temporary register are fed, in parallel, to the main computer.

D. Test for presence or absence of an entry. If it is an entry proceed to step D; if it is not an entry, then proceed to step O.

E. Search and read-out information in delay line representative of information appearing in position 151 column B and store in temporary register; a blank is substituted for the information read out of the delay line; the information is then transmitted to the main computer and a wait occurs for an Entry Complete signal.

F. Search and read-out information in delay line representative of information appearing in position 151 column A and store in temporary register. A blank is substituted for the information read out of the delay line. The information is then transmitted to the main computer and a wait occurs for an entry complete signal.

G. Search and read-out information in delay line representative of information appearing in position 152 column A and store in temporary register. A blank is substituted for the information read-out of the delay line. The information is then transmitted to the main computer and a wait occurs for an entry complete signal.

H. Search and read-out information in delay line representative of information appearing in position 153 column B and store in temporary register. A blank is substituted for the information read-out of the delay line. The information is then transmitted to the main computer and a wait occurs for an entry complete signal.

I. Search and read-out information in delay line representative of information appearing in position 153 column A and store in temporary register. A blank is substituted for the information read-out of the delay line. The information is then transmitted to the main computer and a wait occurs for an entry complete signal.

J. Search and read-out information in delay line representative of information appearing in position 154 column B and store in temporary register. A blank is substituted for the information read out of the delay line. The information is then transmitted to the main computer and a wait occurs for an entry complete signal.

K. Search and read-out information in delay line representative of information appearing in position 154 column A and store in temporary register. A blank is substituted for the information read-out of the delay line. The information is then transmitted to the main computer and a wait occurs for an entry complete signal.

L. Search and read-out information in delay line representative of information appearing in position 155 column B and store in temporary register. A blank is substituted for the information read out of the delay line. The information is then transmitted to the main computer and a wait occurs for an entry complete signal.

M. Program wait.

N. Program complete.

O. Four bits of information in parallel from the main computer are fed to the temporary register and then "wait" on the program step until the Main Computer sends back a "Computer Ready" signal.

P. Search and read-out information in delay line representative of information in position 151 column B.

Q. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until the main computer sends back a "Computer Ready" signal.

5 R. Search and read-out information in delay line representative of information in position 151 column A.

S. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until the Main Computer sends back a "Computer Ready" signal.

10 T. Test for presence or absence of a cash item. If not a cash item, advance to step U; if it is a cash item, advance to step W.

U. Search and read-out information in delay line representative of information in position 152 column B.

15 V. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until the Main Computer sends back a "Computer Ready" signal.

20 W. Search and read-out information in delay line representative of information in position 152 of column B.

X. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until Main Computer sends back a "Computer Ready" signal.

25 Y. Search and read-out information in delay line representative of information in position 153 column B.

Z. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until the Main Computer sends back a "Computer Ready" signal.

30 AA. Search and read-out information in delay line representative of information in position 153 column A.

35 AB. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until the Main Computer sends back a "Computer Ready" signal.

40 AC. Search and read-out information in delay line representative of information in position 154 column B.

AD. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until the Main Computer sends back a "Computer Ready" signal.

45 AE. Search and read-out information in delay line representative of information in position 154 column A.

AF. Test for a cash item or not a cash item. If not a cash item, proceed to step AG; if a cash item, then proceed to step AH.

AG. Program complete.

50 AH. Four bits of information in parallel from the main computer are fed to the temporary register and then "waits" on the program step until the Main Computer sends back a "Computer Ready" signal.

55 AI. Search and read-out information in delay line representative of information in position 155 column B.

AJ. Program complete.

Referring now to the general purpose of the above noted steps in the Special Program:

A. Item key depressed.

60 B. Call main computer, wait for receipt of main computer ready signal, send units digit of item No. into temporary register and send to main computer.

C. Send tens digit of item No. into temporary register and send to main computer.

65 D. Test to determine if entry or not entry. If entry, advance to step E; if not entry, advance to step O.

E—L. Send and clear 8-digit "data" to main computer. Wait for main computer ready signal.

MN. Program complete.

70 O. Wait for main computer ready signal.

P—AI. Receive 8 digits from main computer and insert into "DATA" slot.

A—J. Program complete.

75 Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is,

therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described herein.

I claim:

1. A business machine for presenting on a cathode-ray tube a visual display to identify an item and the quantity of the item selected comprising a cathode-ray tube having a display face, the display face being divided into discrete areas where each area represents an item which can be selected, identifying means including means having an opaque area in each discrete area to identify the item represented by the discrete area, digit generating means coupled to said cathode-ray tube, amount selecting means coupled to cause said digit generating means to generate a digit to indicate the amount of an item selected, digit positioning means to position the digit generated to the discrete area which represents the item selected to identify the item selected and the quantity of the item selected.

2. The combination of claim 1 wherein said identifying means comprises item names.

3. The combination of claim 1 wherein said amount selecting means comprises manually activated switches numbered 0 through 9.

4. The combination of claim 2 wherein said item selecting means comprises manually activated switches having item names reproduced in said discrete areas.

5. A business machine for presenting on a cathode-ray tube a visual display to identify an item and the quantity of the item selected comprising a cathode-ray tube having a display face, the display face being divided into discrete areas where each area represents an item, identifying means including means having an opaque area in each discrete area to identify the item represented by the discrete area, digit generating means, quantity selecting means coupled to cause said digit generating means to generate a digit corresponding to the quantity of an item selected, item selecting means, digit positioning means fed by said item selecting means to position the digit generated to the discrete area of the item selected, storage means fed by said digit generating means and said digit positioning means to store digit and digit position information, and control means coupled to feed digit and digit position information from said storage means to said cathode-ray tube to display the digit generated within the selected discrete area to identify the item and quantity of the item selected.

6. The combination of claim 5 wherein said identifying means comprises item names.

7. The combination of claim 5 wherein said quantity selecting means comprises manually operated switches.

8. The combination of claim 7 wherein said item selecting means comprises manually operated switches.

9. The combination of claim 8 wherein said storage means comprises a delay line.

10. A business machine for presenting on a cathode-ray tube a visual display to identify an item and the quantity of the item selected comprising a cathode-ray tube having a display face, the display face being divided into discrete areas where each area represents an item, identifying means including means having an opaque area associated with each discrete area to identify the item represented by the discrete area, a decode matrix, quantity selecting means coupled to cause said decode matrix to generate signals representative of the quantity of an item selected, item selecting means coupled to cause said decode matrix to generate signals representative of the function selected, cathode-ray tube drive means coupled to said cathode-ray tube, and station means fed by said decode matrix coupled to feed signals to said cathode-ray tube drive means to display the digit generated within the selected discrete area to identify the item and the quantity of the item selected.

11. The combination of claim 10 wherein said station means comprises storage means, control means coupled to feed signals from said storage means to said cathode-ray tube drive means to control said cathode-ray tube, temporary register means coupled to feed signals to or receive signals from said

storage means through said control means, station program select means coupled to said control means to feed into or remove from said storage means select signals, data control means coupled to said program select means to feed signals from said decode matrix to said temporary register, and station program control means coupled to receive signals representative of functions selected from said decode matrix to activate the program select means.

12. The combination of claim 11 wherein said program select means comprises program counter means to generate step by step instructions, gate means coupled to receive signals from said counter means and said control means, and coincidence counter and detector means coupled to receive signals from said gate means and said control means.

13. The combination of claim 11 wherein said storage means comprises a delay line.

14. The combination of claim 13 wherein said identifying means comprises item names.

15. The combination of claim 14 wherein said quantity selecting means, said item selecting means and said function selecting means comprises manually activated switches.

16. The combination of claim 15 wherein said cathode-ray tube drive means includes digit generating means.

17. The combination of claim 16 including printer drive means fed by said cathode-ray tube drive means to print a record of the item and the quantity of the item selected and displayed on the face of the cathode-ray tube.

18. A business machine for presenting on a cathode-ray tube a visual display to identify an item and the quantity of the item selected comprising a cathode-ray tube having a display face, the display face being divided into discrete areas where each area represents an item, identifying means associated with each discrete area to identify the item represented by the area, a decode matrix, quantity selecting means coupled to cause said decode matrix to generate signals representative of the quantity of an item selected, item selecting means coupled to cause said decode matrix to generate signals representative of the item selected, function selecting means coupled to cause said decode matrix to generate signals representative of the function selected, cathode-ray tube drive means coupled to said cathode-ray tube, station means fed by said decode matrix coupled to feed signals to said cathode ray tube drive means to display the digit generated within the selected discrete area to identify the item and the quantity of the item selected, and the identifying means including a mask having opaque areas and transparent areas coupled to the display face of said cathode-ray tube, said transparent area defining said discrete areas.

19. The combination of claim 11 wherein said temporary register means comprises bistable elements.

20. A business machine for presenting on a cathode-ray tube a visual display to identify an item, the quantity of the item and the price of the item selected comprising a cathode-ray tube having a display face, the display face being divided into discrete areas where each area represents an item, identifying means including means having an opaque area associated with each discrete area to identify the item represented by the discrete area, a decode matrix, quantity selecting means coupled to cause said decode matrix to generate signals representative of a digit of the quantity selected, item selecting means coupled to cause said decode matrix to generate signals representative of the item selected, function selecting means coupled to cause said decode matrix to generate signals representative of the function selected, cathode-ray tube drive means coupled to said cathode-ray tube, main means having price information; and station means coupled to said decode matrix and said main means to feed signals to said cathode-ray tube drive means to display the digit generated within the selected discrete area to identify the item, the quantity of the item and the price of the item selected.

21. The combination of claim 20 wherein said station means comprises storage means, control means coupled to feed

signals from said storage means to said cathode-ray tube drive means to control said cathode-ray tube, temporary register means coupled to feed signals to or receive signals from said storage means through said control means, program select means coupled to said control means to feed into or remove from said storage means select signals, data control means coupled to said program select means to feed signals from said decode matrix to said temporary register and program control means coupled to receive signals representative of function selected from said decode matrix to activate the program select means.

22. The combination of claim 21 wherein said program select means comprises program counter means to generate step by step instructions, gate means coupled to receive signals from said counter means and said control means, and coincidence counter and detector means coupled to receive signal from said gate means and said control means.

23. The combination of claim 21 wherein said storage means comprises a delay line.

24. The combination of claim 23 wherein said identifying means comprises item names.

25. The combination of claim 24 wherein said quantity selecting means, said item selecting means and said function selecting means comprises manually activated switches.

26. The combination of claim 25 wherein said cathode-ray tube drive means includes digit generating means.

27. The combination of claim 26 including printer means fed by said cathode-ray tube drive means to print a record of the item and the quantity of the item selected and displayed on the face of the cathode-ray tube.

28. The combination of claim 25 wherein said main means comprises memory means, memory select means coupled to said memory means, memory address register means coupled to cause said memory select means to select a desired bit of information from said memory means, and data control means interposed between said memory address register and said station means.

29. The combination of claim 28 including main register means coupled to feed information to and receive information from said memory means.

30. The combination of claim 29 including main program select means coupled to feed control signals to said main register means and said main memory select means, and main program control means coupled to feed said main program select means and fed by said station program control means.

31. The combination of claim 29 wherein said memory means comprises a core register.

32. A business machine for presenting a visual display to identify an item and the quantity of the item selected comprising a display means having a face, the face of said display means being divided into discrete areas where each area represents an item which can be selected, identifying means including means having an opaque area in each discrete area to identify the item represented by the discrete area, digit generating means associated with each discrete area, amount selecting means coupled to cause said digit generating means to generate a selected digit to indicate the amount of an item selected, and positioning means to display the digit generated within the discrete area which represents the item selected to identify the item selected and the quantity of the item selected.

33. A business machine for presenting on a cathode-ray tube a visual display to identify an item and the quantity of the item selected comprising a first cathode-ray tube having a display face, the display face being divided into first discrete areas where each area represents an item, identifying means including means having an opaque area in each first discrete area to identify the items represented by the first discrete areas, a second cathode-ray tube having a display face, the display face being divided into second discrete areas where each area represents an item, identifying means including second means having an opaque area in each second discrete area to identify the items represented by the second discrete areas, digit generating means, first quantity selecting means coupled to cause said digit generating means to generate a digit of the quantity selected, first item selecting means, second item selecting means, second quantity selecting means coupled to cause said digit generating means to generate a digit of the quantity selected, digit positioning means fed by said first item selecting means and said second item selecting means to position the digits generated to the discrete areas of the items selected on said first cathode-ray tube and said second cathode-ray tube, storage means fed by said digit generating means and said digit positioning means to store digit and digit position information for said first and second cathode-ray tubes, and control means coupled to feed sequentially digit and digit position information from said storage means to said first and second cathode-ray tubes to display the digits generated within the selected first discrete areas to identify the item and quantity of the item selected by said first quantity selecting means and to display the digits generated within the selected second discrete areas to identify the items and quantity of the item selected by said second quantity selecting means.

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