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Continuation-in-part of Ser. No. 303,487,
Aug. 2, 1963, abandoned.
[45] Patented **Dec. 15, 1970**

[54] **APPARATUS FOR ENTERING DATA**
56 Claims, 52 Drawing Figs.

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197/20; 235/61.11, 235/145
[51] Int. Cl. B41j 5/36;
G06k 15/00, G06k 7/10
[50] Field of Search 64/84;
88/24; 178/17, 17.5; 192/84; 197/20; 235/61,
61.1, 61.11, 61.6, 61.7, 61.9, 145; 250/219;
340/146.3

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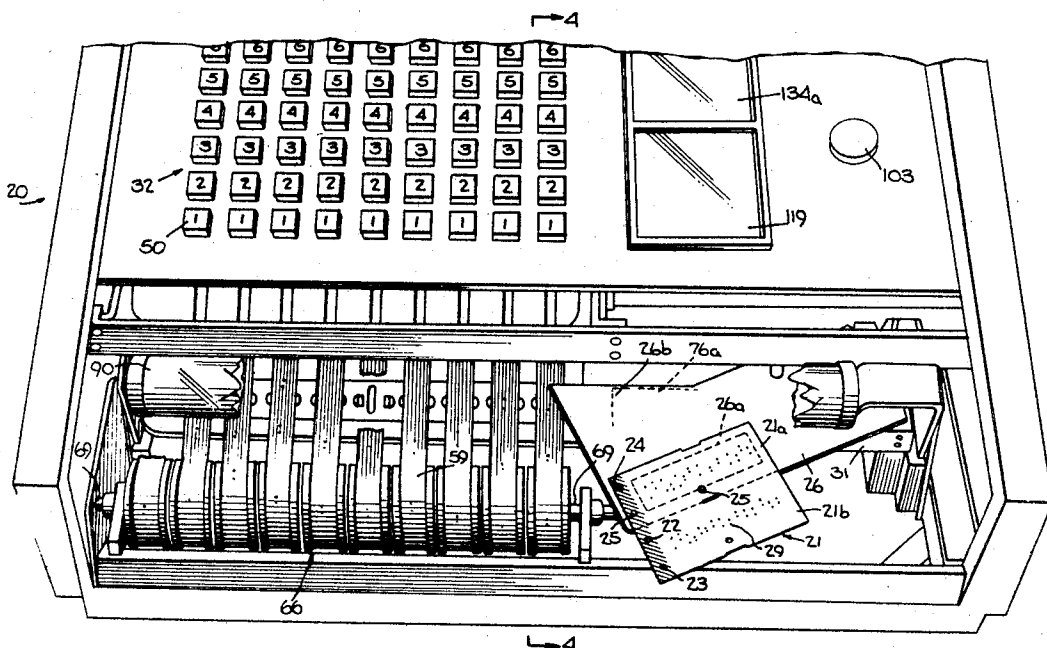
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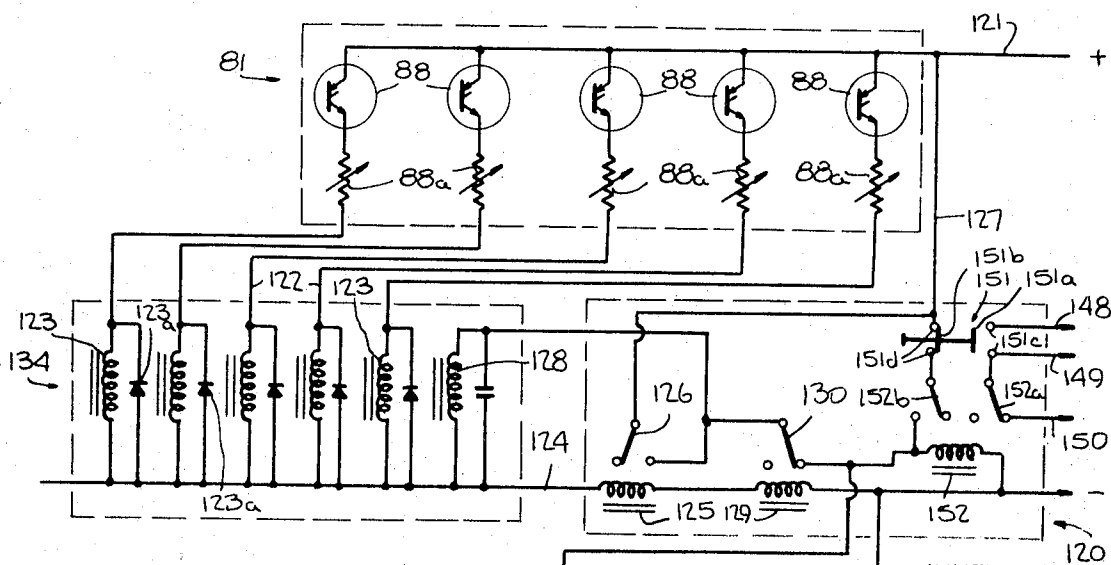
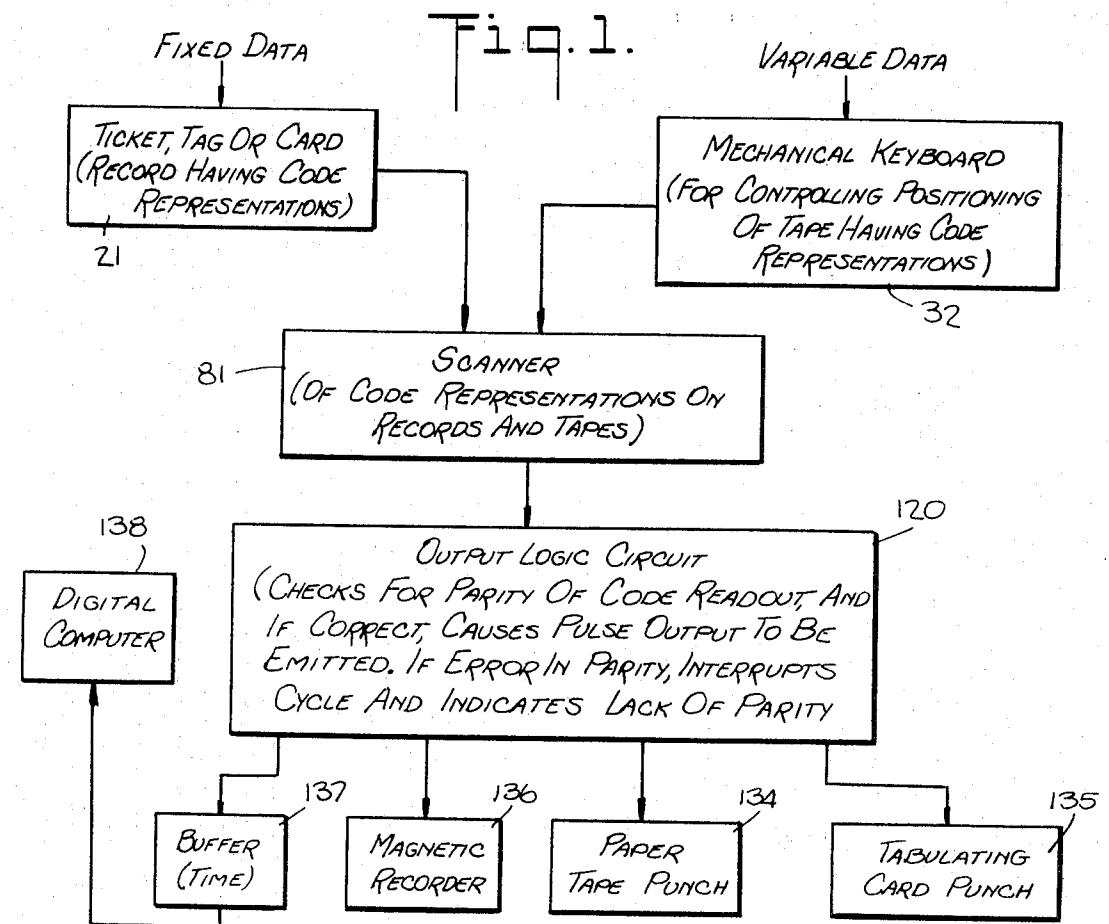
Primary Examiner—Daryl W. Cook

Assistant Examiner—Robert M. Kilgore

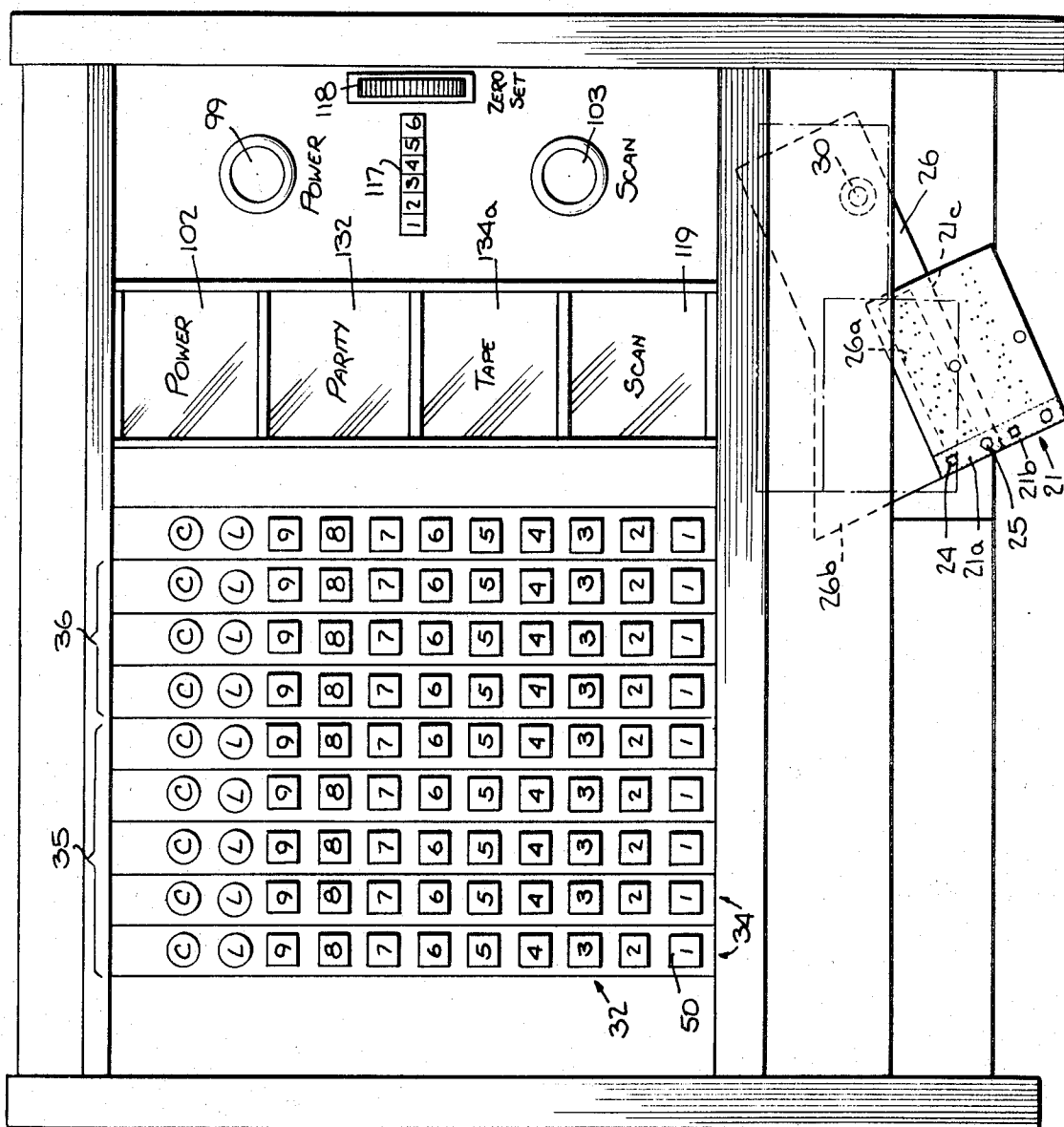
Attorney—Kenyon & Kenyon, Reilly, Carr & Chapin

ABSTRACT: Apparatus is disclosed for entering data into a data processing system comprising means for receiving a record containing fixed data in the form of a code representation thereon. Additionally means are provided for forming a code representation of the variable data in response to a manual command with the code representations of the fixed and variable data being of the same form. Means are utilized for scanning the code representations of the fixed and variable data in order to produce an output signal which can be inserted in the data processing system.





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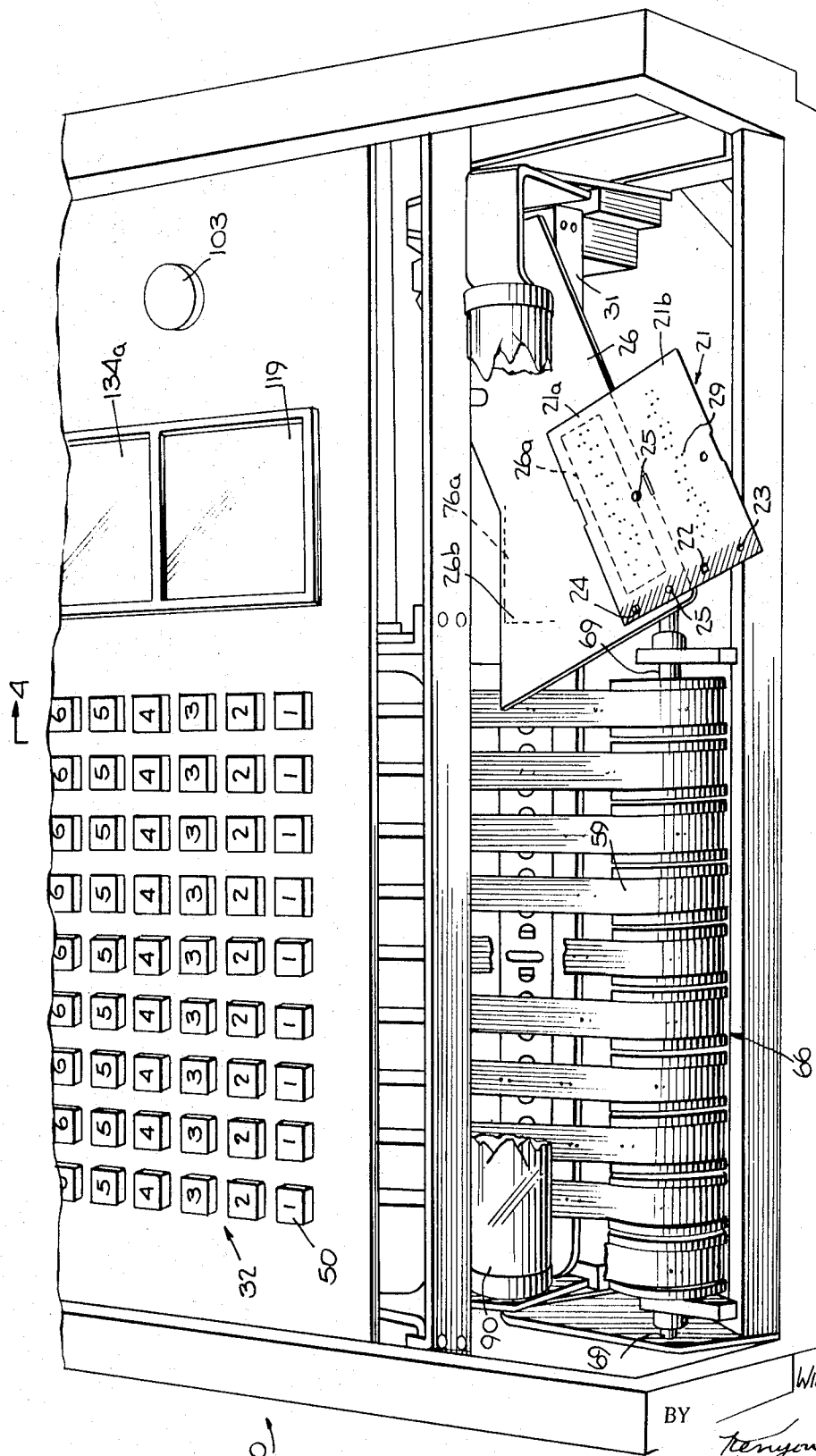


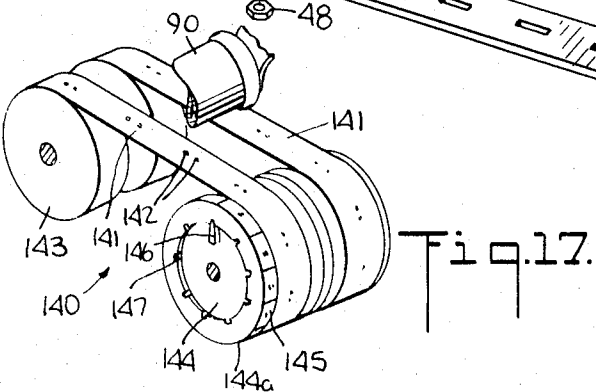
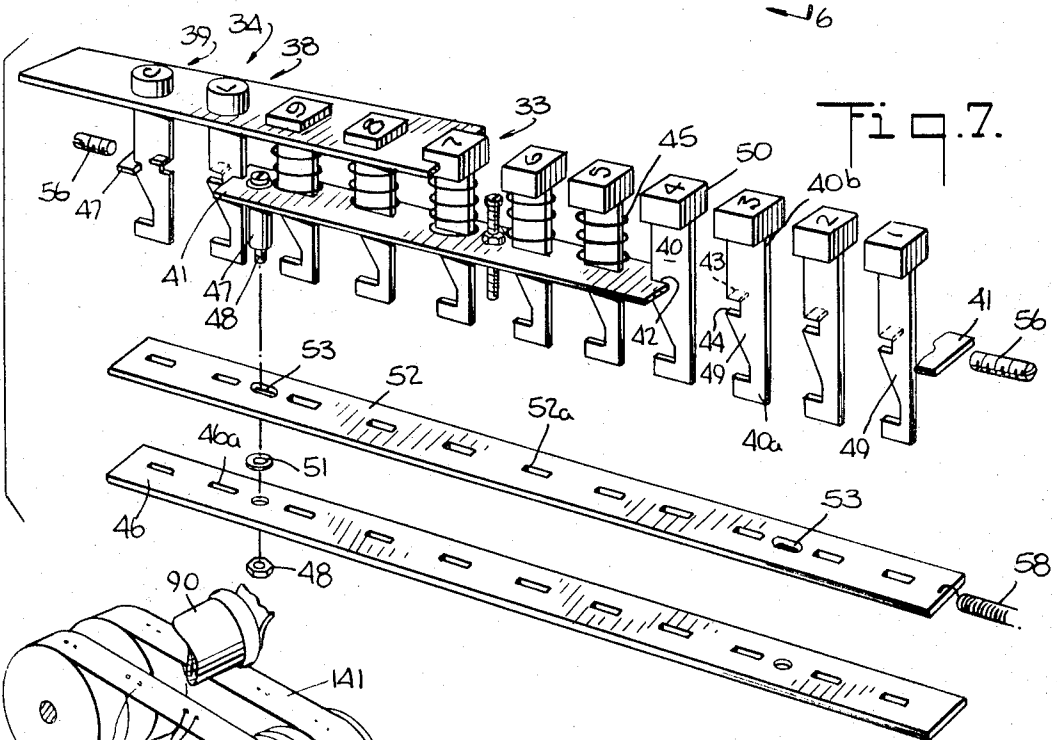
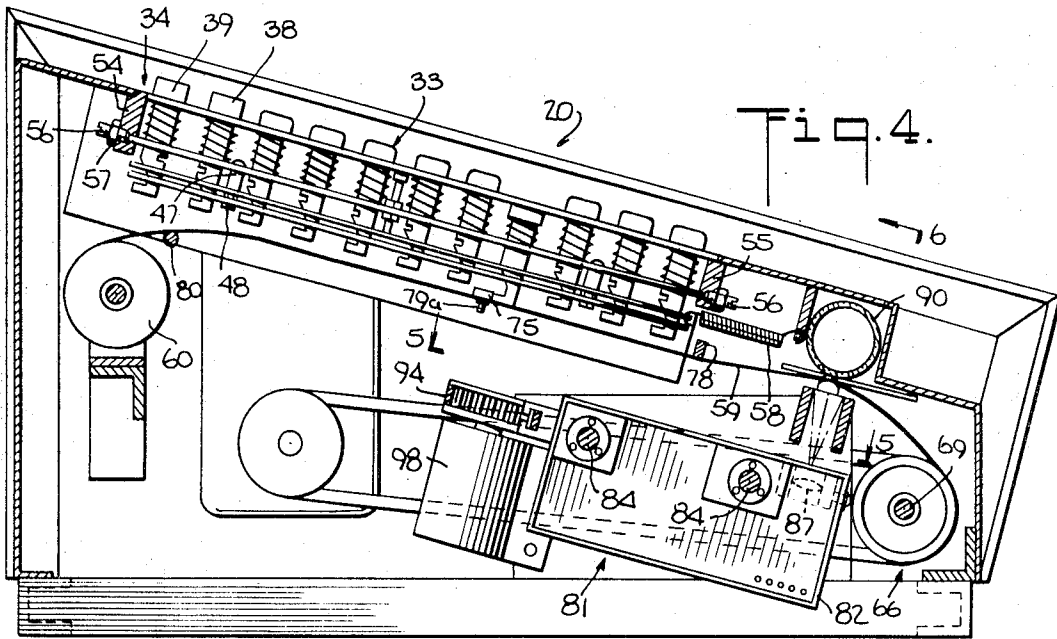
Fig. 3.

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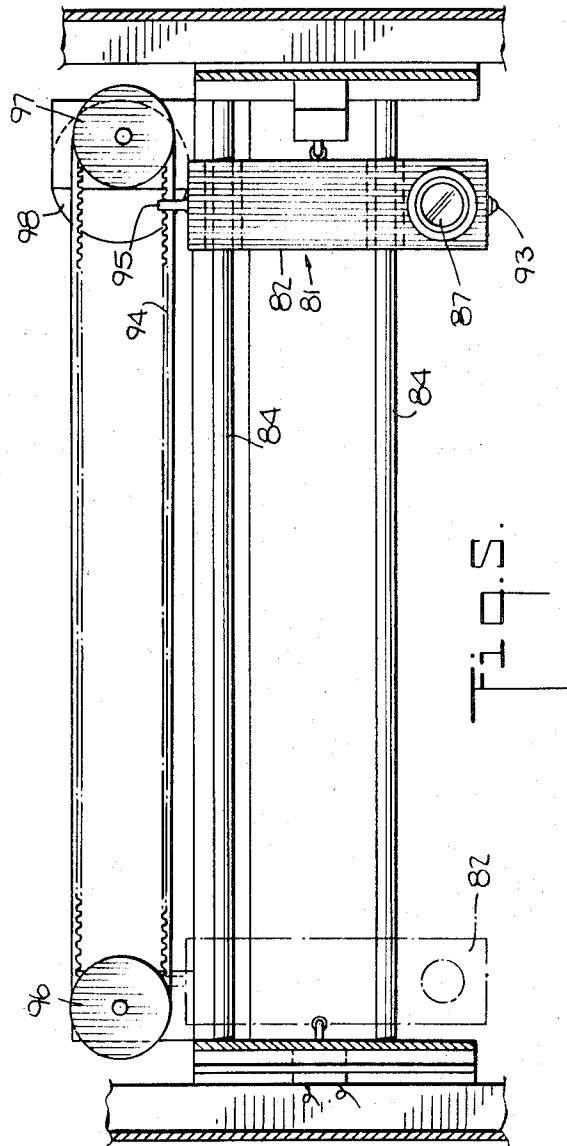
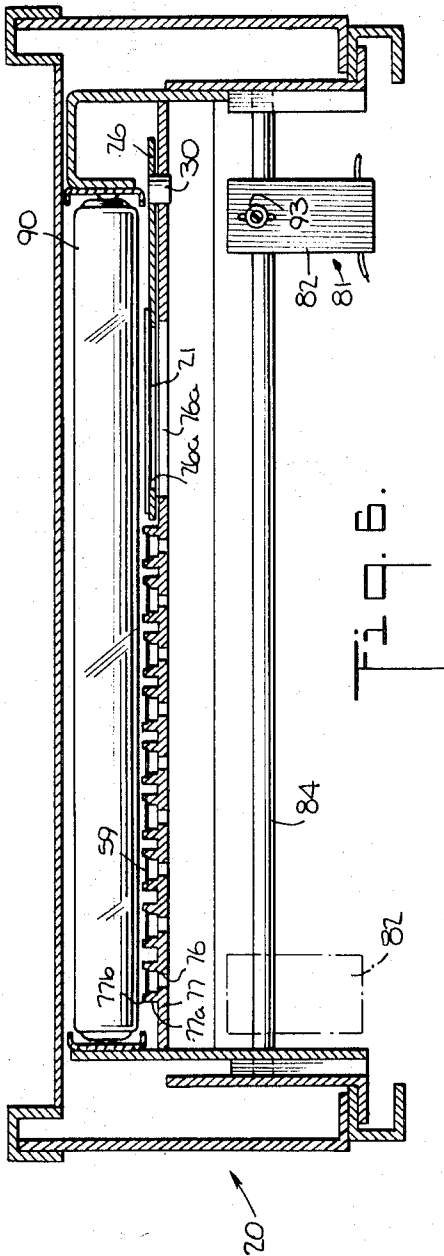
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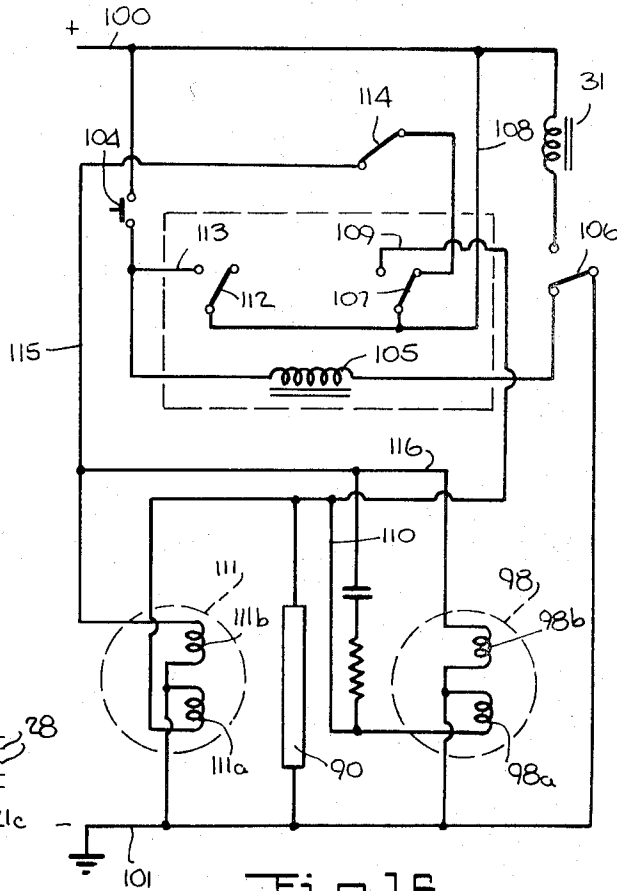
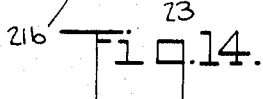
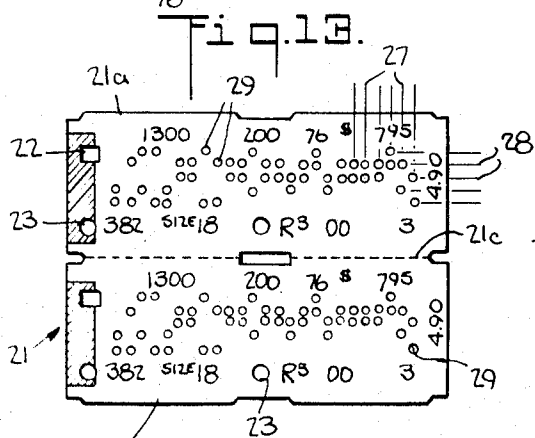
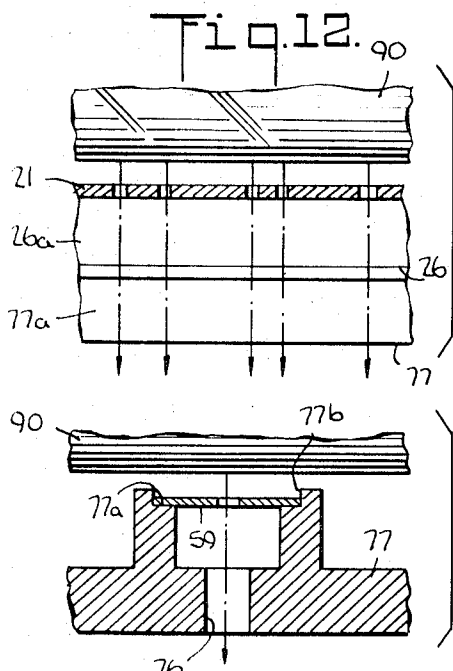
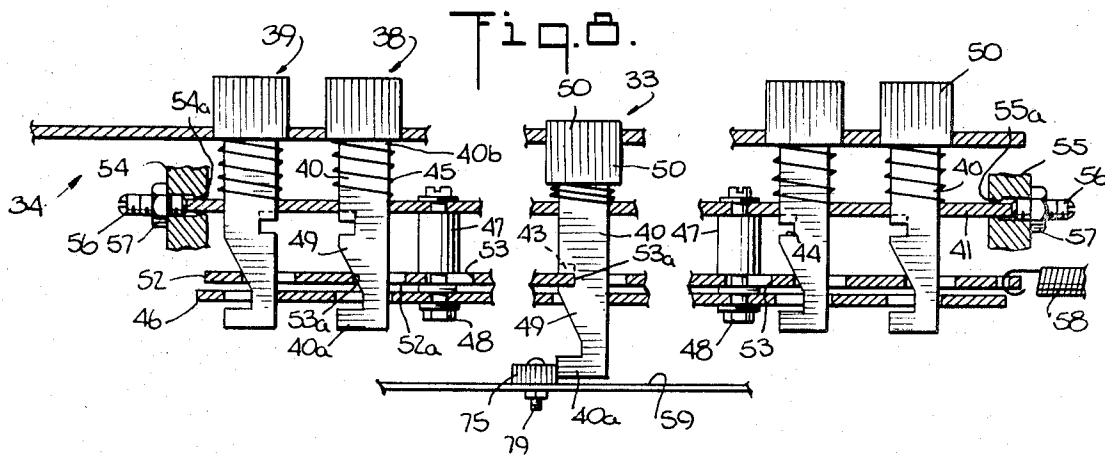
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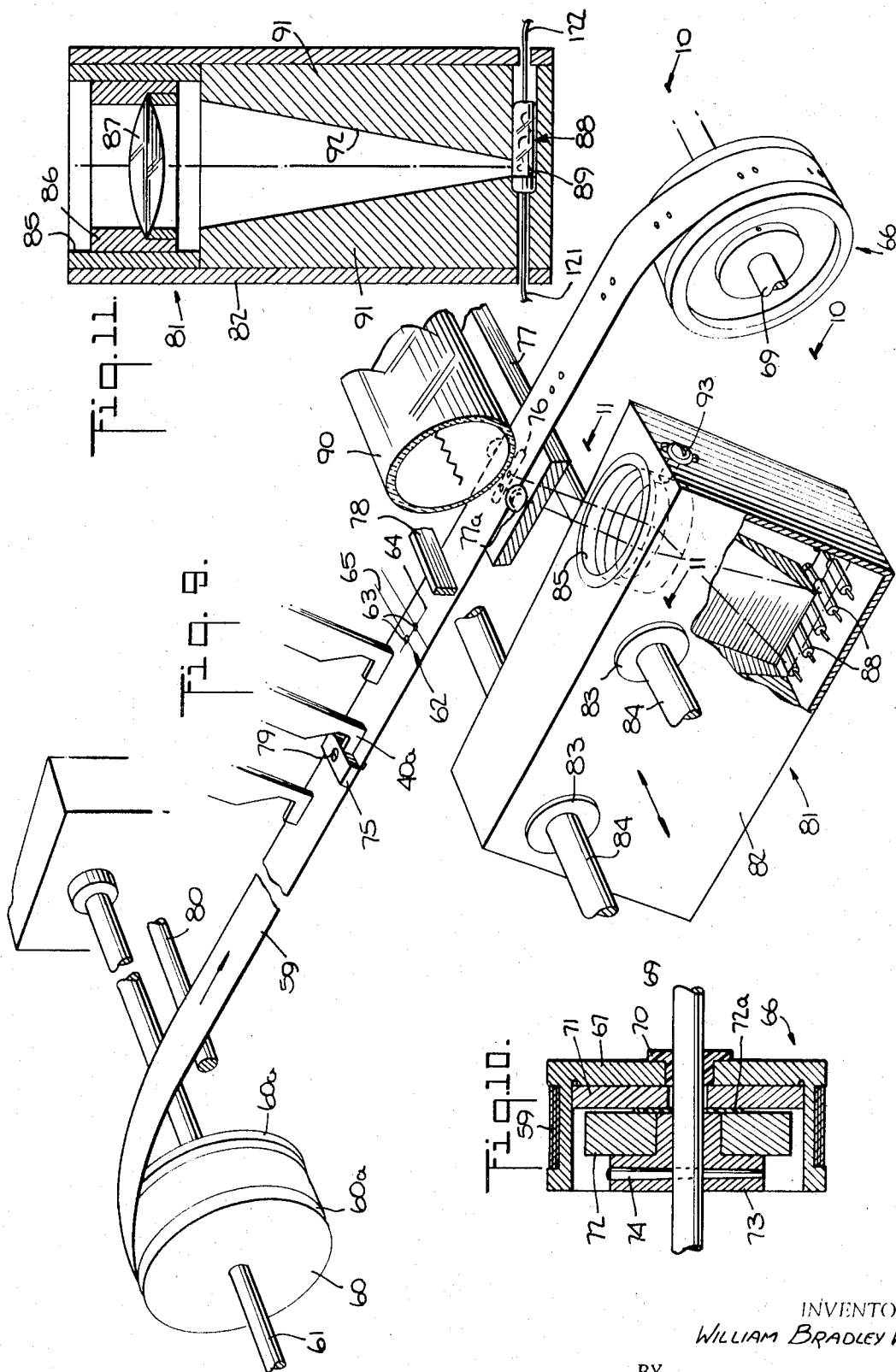
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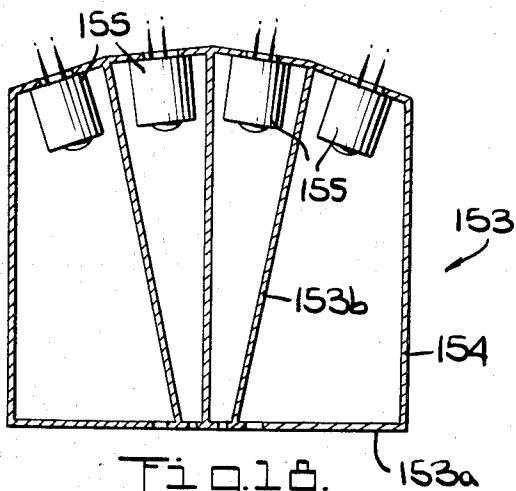


Fig. 18.

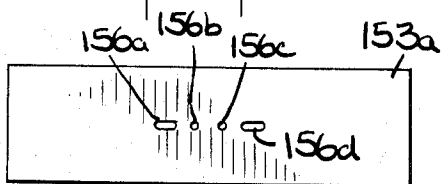


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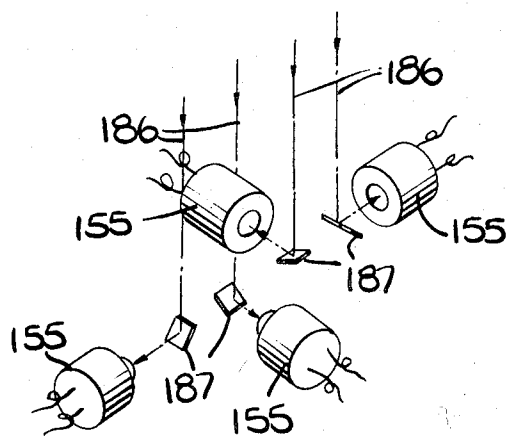


Fig. 23.

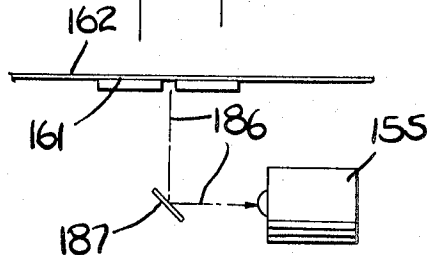


Fig. 24.

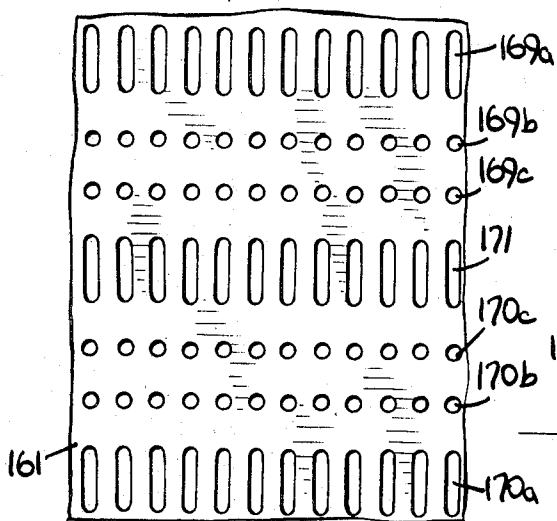


Fig. 27.

Fig. 20.

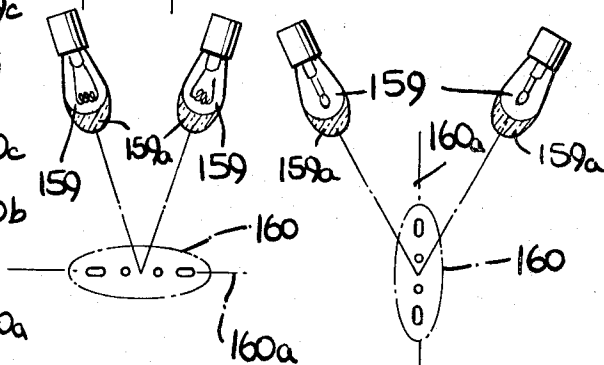


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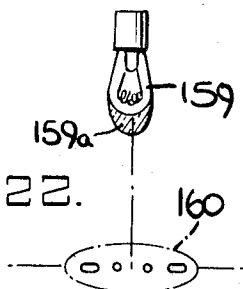
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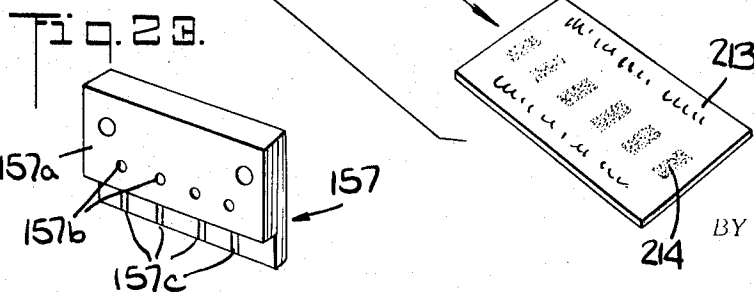
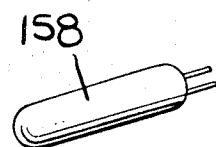
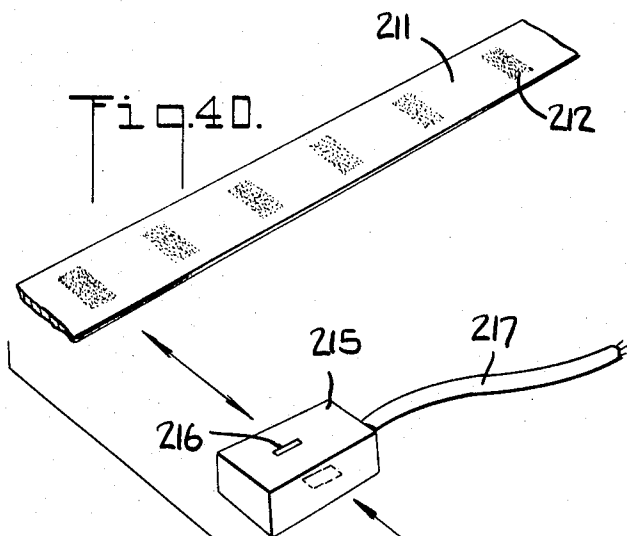
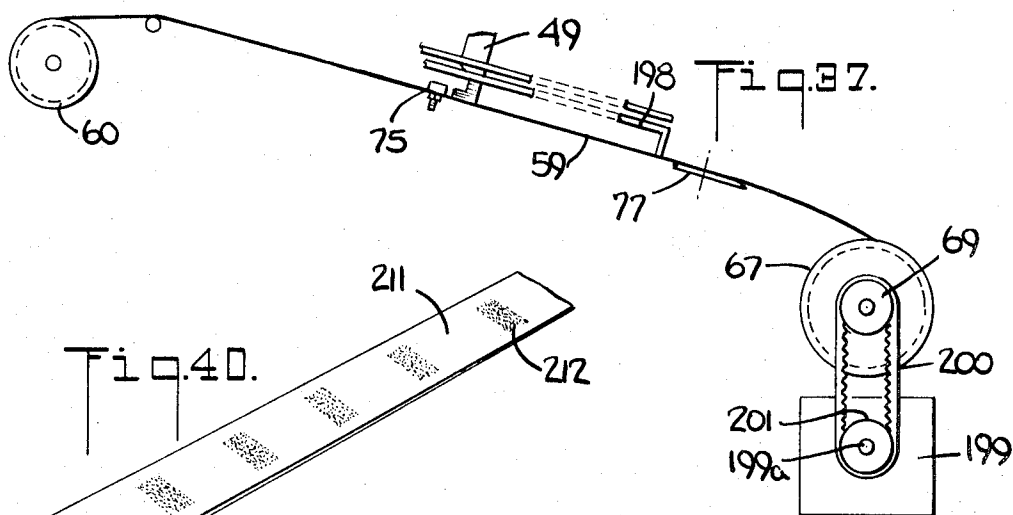
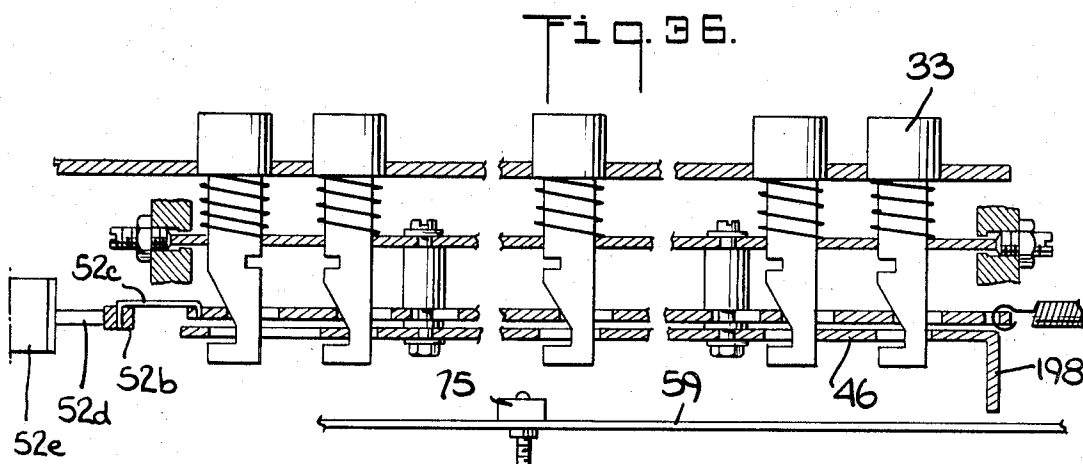
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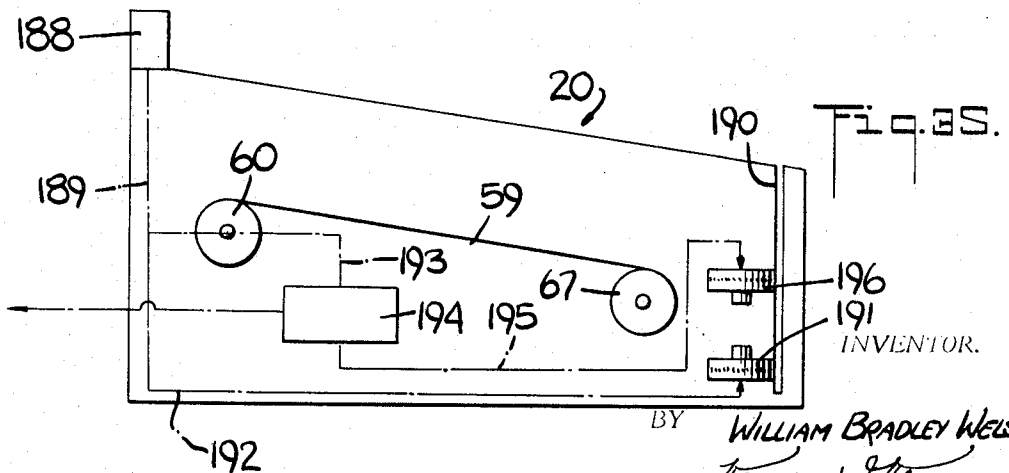
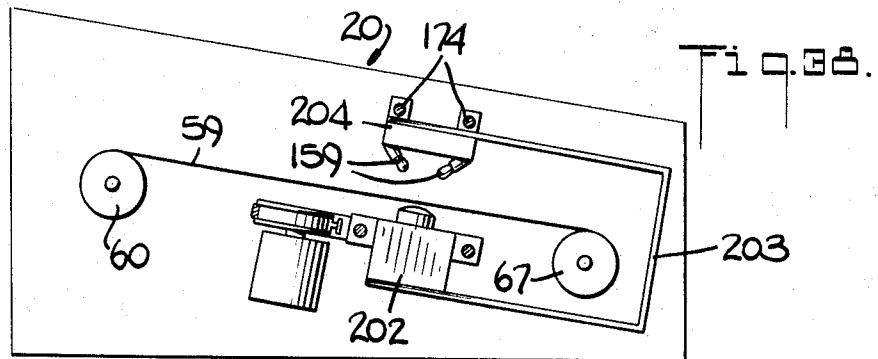
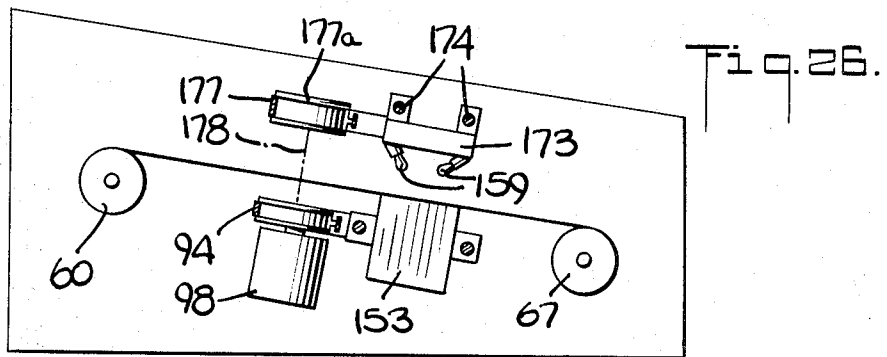
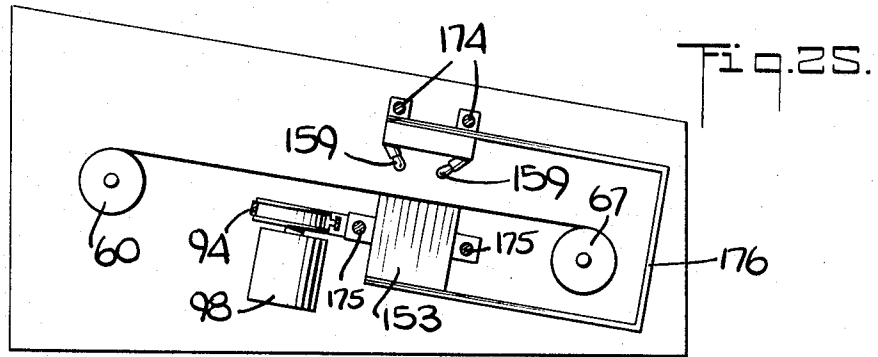
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Fig. 22.





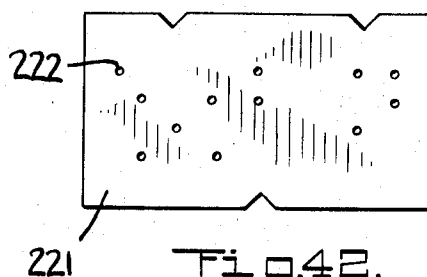
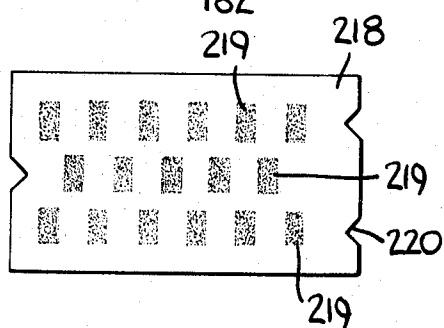
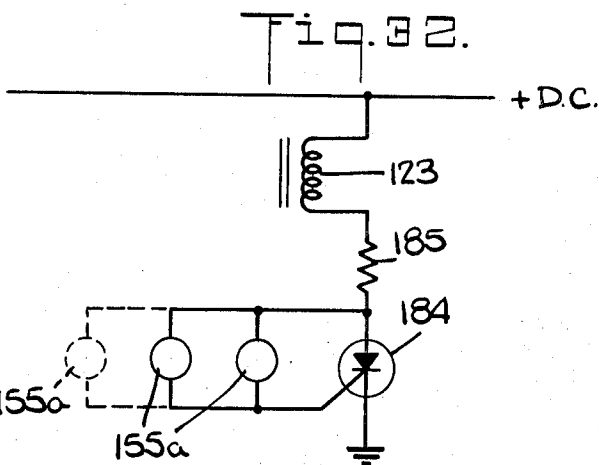
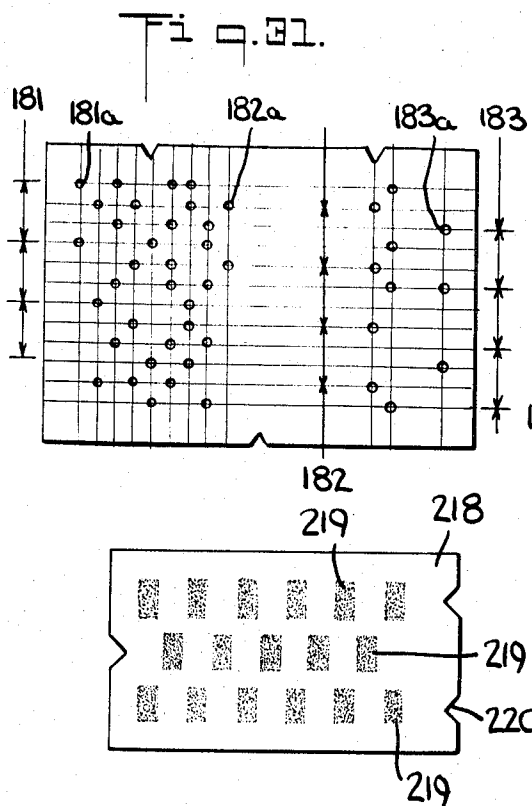
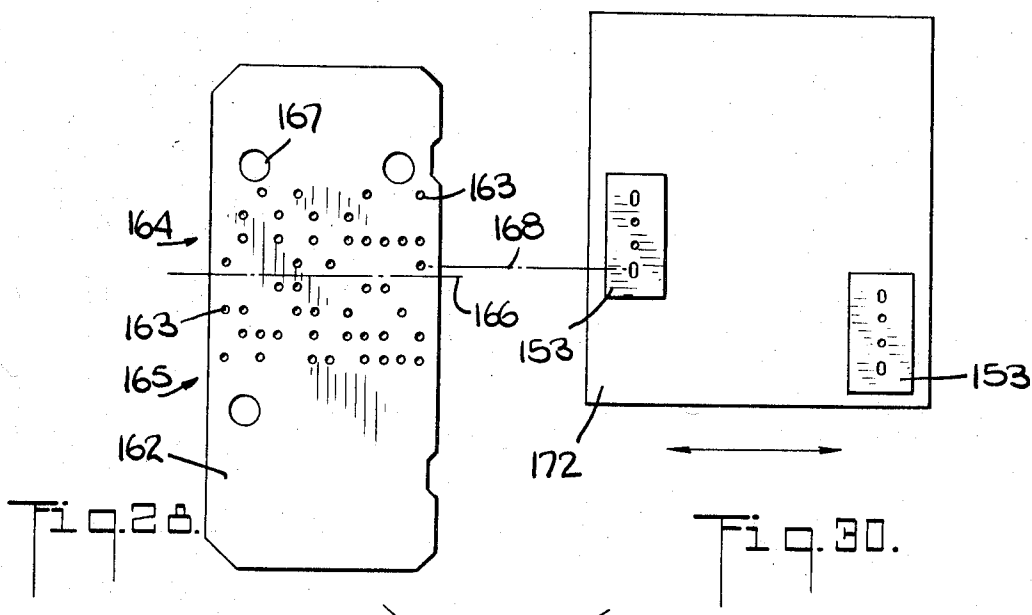
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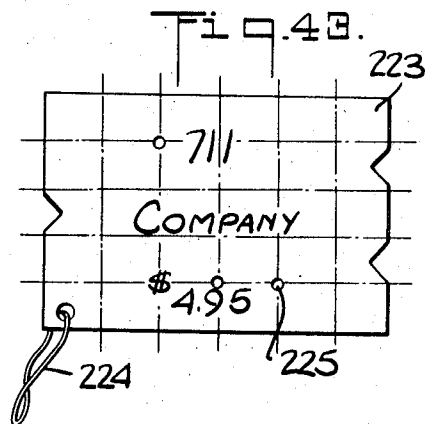
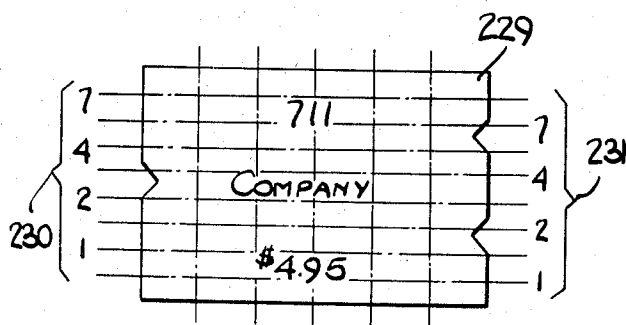
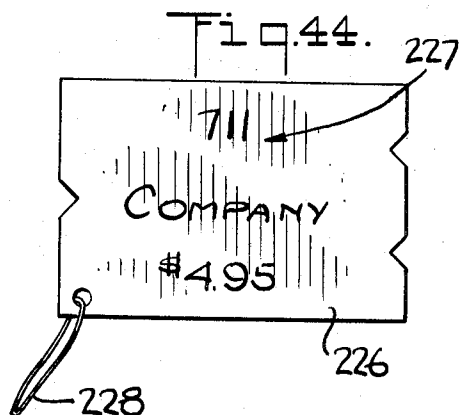
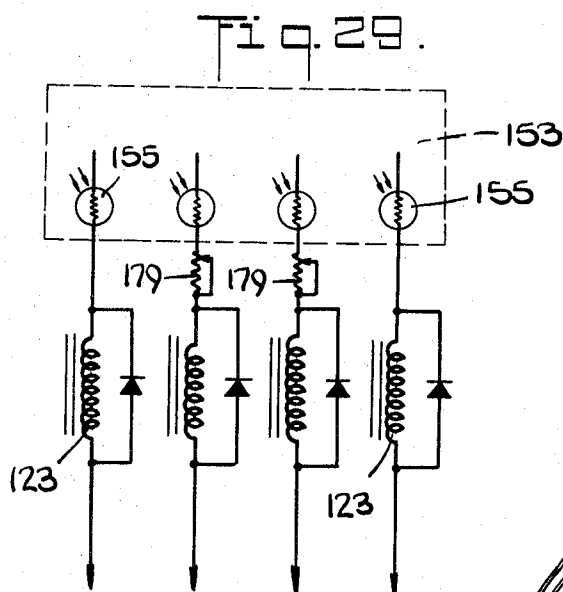
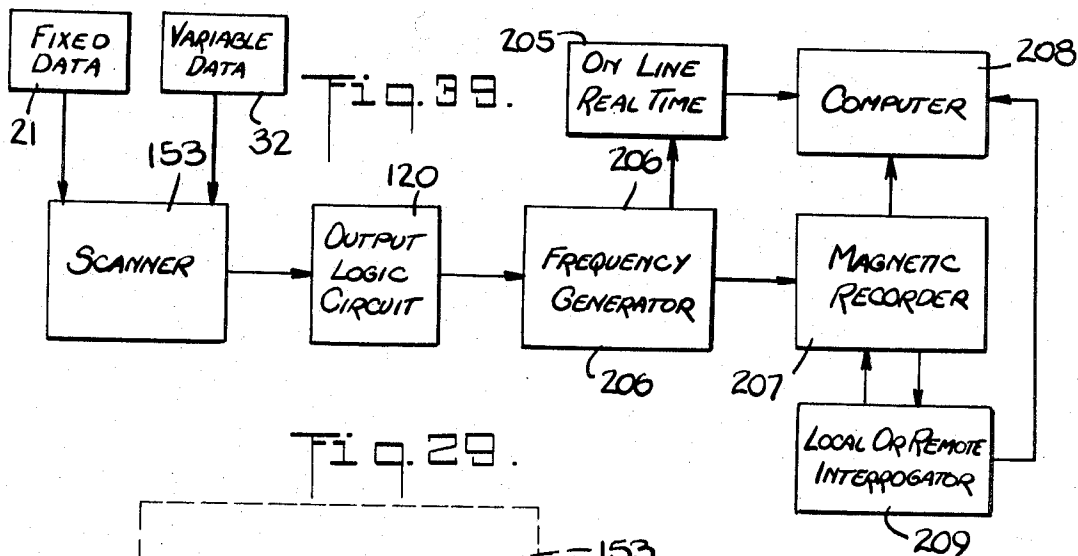
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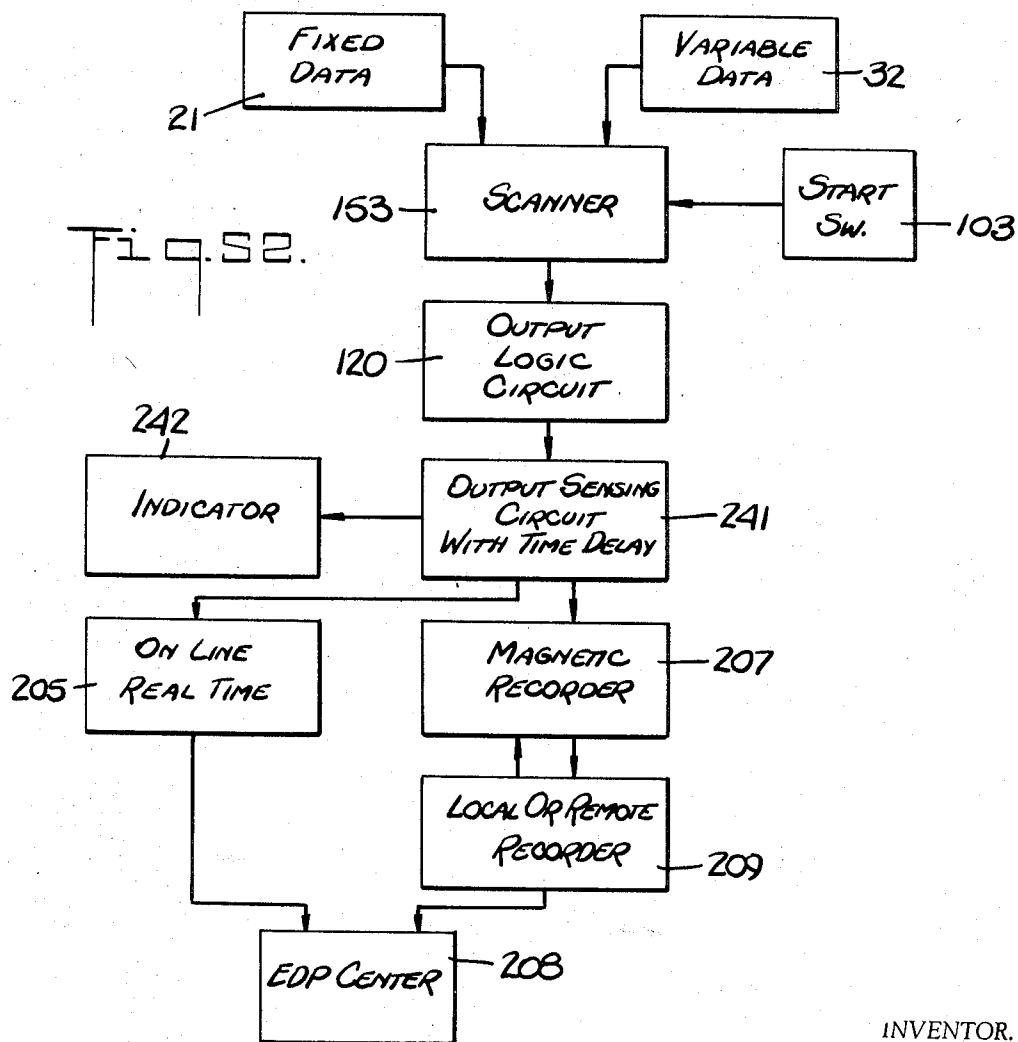
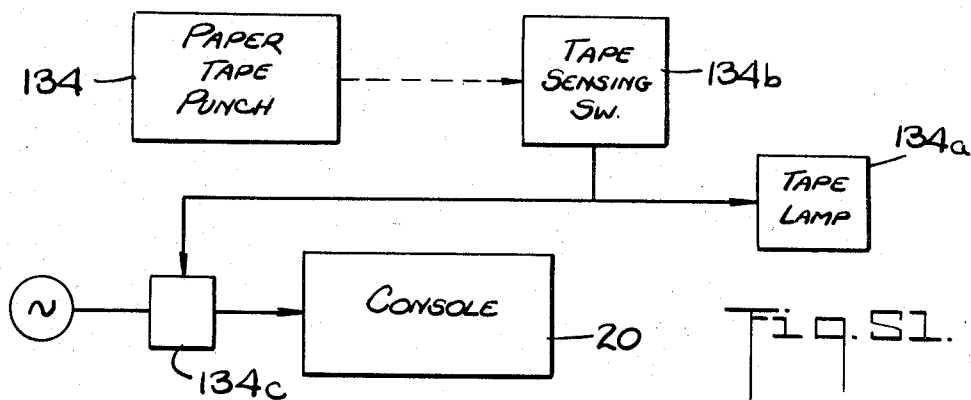
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APPARATUS FOR ENTERING DATA

This application is a continuation-in-part of my copending U.S. application Ser. No. 303,487, filed Aug. 21, 1963 and now abandoned.

This invention relates to apparatus for entering data into a data processing system and more particularly to apparatus for entering both fixed data from a code representation stored on a record as well as variable data into a data processing system.

Steps have been taken to apply automatic data processing techniques to business requirements such as those related to accounting, sales audits, credit control, billing, inventory control, and other marketing operations. For example, in connection with the retailing of articles of apparel, each article is provided with a tag containing printed and punched information related to the description of the garment, size, color, style number, ticketed price, etc. Normally upon sale of the article a portion of the tag which is generally provided in duplicate form is detached and stored by the clerk in order to have a record of the fixed data which is encoded upon the tag. At the time of the sale there is also a need to make a record of the variable data related to the transaction such as the date, the time of day, the actual sale or cash register price if different from the price on the tag, the identity of the store, the department, the clerk, etc. Tags stored by the sales clerk or cashier must later be mailed or transported to a data processing center where the tags are translated into tabulating cards or other media which are then used to process various analytical reports.

Currently certain items of variable data can be recorded by means of a cash register device, but this results in the variable data being stored in the cash register record while the fixed data remains separately stored on the tag. With such an arrangement it is evident that the fixed and variable data must be subsequently correlated and placed upon a new record in order to be available for the entering of all of the data into a data processing system. The drawback of such an arrangement is not only the increased cost resulting from the handling of the data on a piecemeal basis and the necessary duplication of operations which results therefrom but also the delay in the time at which the correlated data is available for use in connection with the business. An advantage of having data related to the identity of the articles being sold available at the end of each business day or other short period of time enables the buyers to maintain a sufficient stock of articles at all times and also prevents the undesired accumulation of an excessive quantity of any given article. A further advantage is that the quick availability of sales data can be of great value in a flexible pricing system to stimulate sales volume.

It is one of the objects of the invention to provide a system for entering both fixed data from a code representation stored on a record and variable data into a data processing system.

It is another object of the invention to provide an apparatus for entering fixed data from a tag, ticket or card or the like containing code representations and for manually entering variable data by means of code representations into a data processing system.

It is still another object of the invention to provide an apparatus in which both fixed data from a record and variable data entered manually can be scanned to provide an output signal for inserting data in a data processing system.

It is an additional object of the invention to provide an apparatus for forming a code representation of variable data corresponding to the type of code representation employed for fixed data stored on a record.

It is a further object of the invention to provide an apparatus for scanning the fixed data from a code representation on a record and for scanning the variable data from a code representation determined by a manual command in response to radiant energy conditioned by the code representations.

Still a further object of the invention is to provide an apparatus in which the output signal thereof is prevented from being inserted into a data processing system whenever a lack of parity occurs in the code representation being scanned.

It is also an object of the invention to provide a system for entering both fixed data and variable data by means of optical or magnetic code representations.

In one embodiment of the invention means are provided for receiving a record containing fixed data in the form of a code representation thereon. In addition, means are provided for forming a code representation of the variable data in response to a manual command. The apparatus further includes means for scanning the code representations of the record as well as the forming means in order to produce an output signal which is to be inserted into a data processing system. Such an apparatus enables the fixed data and the variable data related thereto to be scanned and entered together into a data processing system in order that all of the data pertinent to a transaction is correlated and made available at one time.

In another embodiment of the invention the apparatus includes means for accepting a record in the form of a tag, ticket or card having code representations for fixed data. The apparatus also includes a keyboard for entering variable data by means of code representations. This arrangement enables the fixed data to be derived from a tag, ticket or card and to be augmented at the time of the transaction by variable data.

In still another embodiment of the invention a single means is provided for scanning the code representations of not only the fixed data on the record but also those of the code representations of the forming means for the variable data in order to produce an output signal. Such a construction enables both forms of data to be entered together into the data processing system in a sequential manner which is well suited for data processing techniques. In addition, the embodiment simplifies the apparatus since a single scanning means is adapted to scan both types of data.

In an additional embodiment of the invention means for forming a code representation of the variable data in response to a manual command provides the same type of code representation that is stored on the record for the fixed data. Thus regardless of the code representation used for the fixed data, the apparatus can be conditioned to provide the same code representation for the variable data. This construction enables the apparatus to be made compatible to a variety of types of code representations.

In a further embodiment of the invention means are provided for analyzing the output signal from the scanning means to determine whether an error has occurred in order to block the transmission of an erroneous output signal to the data processing system. This embodiment eliminates the possibility of entering incorrect or incomplete data into the data processing system at the very inception of the error so that not only the processing system is safeguarded from being disrupted but corrective measures can be taken within the shortest possible time.

In still a further embodiment of the invention the code representation of the fixed as well as variable data can be one of a plurality of representations such as optical or electrical representations.

These and other objects and features of the invention will become apparent from the following description when taken with reference to the accompanying drawings, in which:

FIG. 1 is a block diagram of the elements of the system of the invention for entering both fixed and variable data;

FIG. 2 is a plan view of the keyboard of the console of the apparatus of the invention;

FIG. 3 is a fragmentary perspective view showing a portion of the keyboard of the console and a portion of the tape members of the console for forming a code representation of the variable data;

FIG. 4 is a vertical section view taken along the line 4-4 in FIG. 3 and showing a portion of the keyboard and means for moving a tape member for forming a code representation of the variable data;

FIG. 5 is a fragmentary substantially horizontal section view taken along the line 5-5 in FIG. 4 and showing the drive to the scanner;

FIG. 6 is a substantially vertical section view taken along the line 6-6 in FIG. 4 and showing the tag and the tape members aligned adjacent to the predetermined position at which they are scanned;

FIG. 7 is an exploded perspective view of a portion of the keyboard of the apparatus;

FIG. 8 is a fragmentary vertical section view of a portion of the keyboard showing a key in the actuated position engaging the stud of a tape member;

FIG. 9 is a perspective view showing a tape member moved to the predetermined position adjacent to the line of travel of the scanner;

FIG. 10 is an enlarged vertical section view taken along the line 10-10 in FIG. 9 and showing a clutch for moving a tape member;

FIG. 11 is an enlarged vertical section view taken along the line 11-11 in FIG. 9 and showing the optical and light responsive elements of the scanner;

FIG. 12 is a fragmentary vertical section view showing rays of light passing through the code openings in the punched tag toward the scanner;

FIG. 13 is a fragmentary vertical section view showing rays of light passing through a code opening in a tape member;

FIG. 14 is a plan view of a punched tag of the type upon which the fixed data is stored;

FIG. 15 is a schematic representation of the electrical output circuit of the apparatus of the invention;

FIG. 16 is a schematic representation of the electrical circuits related to the drives for the scanner and the tape members;

FIG. 17 is a perspective view of a manually controlled tape device for entering fixed data;

FIG. 18 is an enlarged vertical section view showing another embodiment of the light-responsive elements of a scanner in an inverted position;

FIG. 19 is a plan view of the apertures in the upper portion of the scanner of FIG. 18;

FIG. 20 is an elevational view of a pair of lamps used in conjunction with the scanner of the invention and shows the elongated light pattern of the lamps which is applied to adjacent the code openings;

FIG. 21 is an elevational view of another arrangement of a pair of lamps for use with the scanner of the invention and shows the light pattern of the lamps which is applied adjacent to the code openings;

FIG. 22 shows a further arrangement of a lamp for the scanner of the invention in which the lamp is disposed along an axis perpendicular to the plane in which the code openings are disposed;

FIG. 23 is a perspective view of an optical readout head having a plurality of thin photoconductive elements;

FIG. 24 is a perspective view of a photocell which can be used in the scanner of the invention;

FIG. 25 is a schematic vertical section view of the console of the invention and shows the scanning drive for both the scanner and the light source related thereto;

FIG. 26 is a schematic vertical section view of the console of the invention and showing a common power source connected to the drives for both the scanner and the lamps related to the scanner;

FIG. 27 is a plan view of a mask for supporting a coded ticket of the type shown in FIG. 28;

FIG. 28 is a view of the face of the coded ticket which can be used with the apparatus of the invention;

FIG. 29 is a fragmentary schematic representation of a circuit for compensating the photocells connected to the code magnets of the system of the invention;

FIG. 30 is a plan view of a carriage having a pair of scanners offset and in a staggered relationship with respect to one another;

FIG. 31 is a representation of the face of a printed and punched ticket having three interlaced fields of four channels of punched code openings for each field;

FIG. 32 is a fragmentary schematic representation of a circuit for connecting corresponding photocells of a plurality of scanners such as shown in FIG. 30 in parallel;

FIG. 33 is a perspective view of a mirror arrangement for directing light energy emitted by each of the code openings toward its corresponding photocell;

FIG. 34 is a fragmentary vertical section view showing a ray of light after passing through a code opening being reflected by a mirror toward a photocell related to the mirror;

FIG. 35 is a schematic vertical section view of the console of the invention showing drives for deriving data from each one of the pulleys of the plurality of tape members;

FIG. 36 is a fragmentary vertical section view of a portion of the keyboard and shows a leg member for determining the tape position at the zero-digit position;

FIG. 37 is an elevational view showing the motor and clutch for driving the shaft which in turn actuates the tape members;

FIG. 38 is a vertical section view showing the console provided with means for optically recording the code representations being scanned;

FIG. 39 is a block diagram showing a system including means for producing tone signals from the data being scanned;

FIG. 40 is a fragmentary perspective view of a system for scanning magnetic recordings from tape members and tags, cards or tickets;

FIG. 41 shows the face of a ticket having a plurality of magnetically recorded code data thereon;

FIG. 42 shows the face of a ticket adapted to be attached to merchandise and containing visual data;

FIG. 43 shows the face of a ticket adapted to be attached to merchandise and containing visual data;

FIG. 44 shows the face of a ticket adapted to be attached to merchandise and containing a reduced number of code openings;

FIG. 45 shows the face of a ticket having two overlying and interlaced fields of code openings, each of the fields having a reduced number of code openings therein;

FIG. 46 shows a portion of a tape member of the invention having a plurality of columns of code groupings disposed at locations along the length of the tape member;

FIG. 47 is a fragmentary perspective view showing a mask having an adjustable aperture used in connection with the scanning of the tape members;

FIG. 48 is a fragmentary perspective view showing an adjustable mask which can be aligned with one or more of the plurality of columns of code groupings on the tape member;

FIG. 49 is a fragmentary vertical section view of an adjustable mask overlying the code openings in the tape member;

FIG. 50 is a fragmentary vertical section view showing an adjustable mask for use in simultaneously scanning a pair of columns of code openings;

FIG. 51 is a block diagram representation of a circuit for interlocking the console of the invention with a paper tape punch device; and

FIG. 52 is a block diagram representation of the system of the invention showing an arrangement for sensing the transmission of data from the console to the recording or data processing means.

The apparatus of the invention for entering fixed data and for entering variable data into a data processing system includes console 20 (FIG. 2). The record having the code representation thereon of the fixed data to be entered into a data processing system can comprise tag 21 of the type shown in FIG. 14. Tag 21 includes portions 21a and 21b which are attached to one another along tear line 21c. Each portion which contains a duplicate of the punch code information of the other portion is provided with guide holes 22 and 23 which are adapted to engage pins 24 and 25 extending from the upper surface of tag support 26 (FIGS. 2 and 3). The tag support serves as the means for receiving the record into the console. The pins of the support and the holes in the tag are of dissimilar forms to insure that the tag is properly positioned on the tag support.

Tag 21, for example, is arranged in the form of 25 vertically extending columns 27 and five horizontally extending channels 28 (FIG. 14). Tags with a greater number of columns, such as 31, can also be employed. Two punched holes or openings 29, each one of which is disposed in different channels of the five channels in a single column, serve as code representations of numerical data, such as a digit, in accordance with a code scheme, for example a two-bit binary-type code. In the case of applying the system of the invention to a business sales operation, tags 21 are prepared in advance for each article which is to be handled within the provisions of the business data processing system. In the case of an article of apparel, tag 21 as shown in FIG. 14, is encoded to include various items of fixed data such as size, style, season, color, vendor, etc., of the article and its ticketed price. The tag also contains printed or direct reading information corresponding to the coded data such as "size 18" and the price of "\$7.95." Each digit or letter of the items of fixed information is encoded in a single column. Thus three columns are required to encode the digits of the price "\$7.95." The code scheme shown in the example of tag 21 necessarily requires two openings 29 in each column in order to correctly record the data. In the event that the device which prints and punches the tags fails to punch two bits of code in the form of two openings in any column due to a broken punch pin in the device, thousands of tags can get into the system each having one or more columns of coded data which cannot be decoded. The absence of one of the two openings in a column of the code causes a lack of parity in the code.

With tag 21 replaced upon tag support 26 and with openings 22 and 23 engaged with pins 24 and 25, respectively, the tag support is rotated about pivot 30 (FIG. 2) until the tag support is moved into its operable position within console 20. In this position solenoid 31 latches the tag support in the operable position against a spring bias force from means not shown which normally urge the tag support to its outermost position (FIG. 3).

In the combined operation of entering fixed data and variable data into a data processing system, it is necessary for the human operator to enter the variable data into the console by manual command. The means for forming a code representation of the variable data in response to a manual command includes keyboard 32 having keys 33. The keys are arranged in a number of vertically extending columns or decades 34 needed to suit the system. Where the console is used in conjunction with retailing, for example, a total of nine columns can be used. The five columns at the left of the keyboard serve as "markdown field" or "register price" 35 into which variable data representing a marked down or discount price is entered into the apparatus. The marked down or discount price is distinguished from the ticketed or list price which is both printed and punched in tag 21. Thus as is shown in FIG. 14 at the right edge of the tag as viewed in the drawing, the marked down sale price of \$4.90 has been marked on the tag by the sales clerk as opposed to the ticketed price of \$7.95 which is both printed and punched on the tag subsequent to its original preparation since only the ticketed price information is known at the time of preparing the tag. Attempts are not made to punch the marked down price in the tag since it is extremely difficult to register a later set of punched data accurately with previously applied punched data.

In "markdown field" 35 of the keyboard, the extreme right two columns can serve for the entry of the decimal portion of the price, such as for example, \$4.90. Thus "90," representing ninety cents, is entered in the extreme right column and the three columns to the left thereof are arranged to receive the dollar portion of the price, such as "4" of \$4.00, which can be entered as 004. further by way of example, the three columns to the right of "markdown field" 35 can form "clerk identity number field" 36. Column 37 at the extreme right of the keyboard can be employed to enter other data concerning the nature of the type of transaction such as cash, charge, hold, C.O.D., take, send, etc.

Each of decades 34 of keys is formed as a subassembly or module (FIGS. 4 and 7 and includes keys 33 for each of the digits from one to nine and in addition includes keys 38 and 39. Each decade includes means for supporting body portion 40 of the keys for reciprocating motion in predetermined opposite directions, that is, plate 41 containing guide slots 42 through which body portion 40 of a key extends. Stops 43 which are punched from the body portion and extend at an angle thereto form notches 44. Spring 45 biases the key in an upward direction until stop 43 engages the undersurface of plate 41. The keys are additionally supported for movement in the vertical direction by slot 46a in plate 46 which is spaced apart from plate 41 by sleeves 47 through which retaining bolts 48 extend (FIG. 8). Cam member 49 extends adjacent to end portion 40a of body portion 40 which is disposed opposite to end portion 40b of the body portion. Cap 50 is mounted on end portion 40b to receive the manual command or input to the keyboard. End 40a of the body portion adjacent to cam member 49 is adapted to engage an element to be actuated by key 33.

Positioned adjacent to plate 46 and spaced therefrom by spacer 51 is follower member 52 having slots or followers 52a. Follower member 52 includes elongated openings 53 which enable follower member 52 to be reciprocated along the axis of column 34 of keys 33. Thus follower member 52 can reciprocate between sleeve 47 and spacer 51 (FIGS. 4 and 7). Column 34 is supported with respect to frame members 54 and 55 of console 20 (FIGS. 4 and 8) by engagement with slots 54a and 55a, respectively, therein. By means of adjustment set screws 56, disposed in threaded holes 54b and 55b of frame members 54 and 55, respectively, and engaged with the opposite end portions of plate 41, the relative position of plate 41 and column 34 with respect to the frame members and therefore the relative position of column 34 with respect to the console can be determined by moving the column to the right or left as seen in FIG. 4. After adjustment, each of the set screws are locked relative to the frame members by a nut engaged therewith.

As shown in FIG. 8 upon the application of a manual command by depressing one of the plurality of keys 33, the biasing force of spring 45 is overcome and body portion 40 of the key is depressed. As the key moves downwardly, slot 42 in plate 41 and slot 46a in plate 46 support and guide the body portion of the key. As the key is moved downwardly, cam member 49 engages slot or follower 52a of follower member 52. The result of the engagement between the cam member and the follower is to urge follower member 52 toward the left against the biasing force of spring 58 as viewed in FIG. 8. As the key approaches its downwardmost position, follower 52a is engaged by the high portion of the cam member and is urged to the left as shown in FIG. 8. This movement causes any key engaged with follower 52a to be released upwardly. When the upper end portion of the cam member passes beyond follower 52a, the follower enters notch 44 under the urging of spring 58. At this point stop 43 engages the upper surface of follower member 52 and prevents any further downward motion thereof. Upon the removal of the manual command applied to cap 50 of key 33, the key remains in the downward or actuated position due to the locking action accomplished by the engagement of follower 53a with notch 44. In the actuated position of the key, end portion 40a of the actuated key is substantially below those of the remaining keys in the decade and thereby is adapted to engage an element which is to be controlled by the key.

The means for entering variable data into a data processing system further includes tape member or tape 59 (FIG. 9). The tape member can be a resilient metallic tape disposed about idler pulley 60 rotatably mounted on shaft 61. Flanges 60a of the idler pulley serve to maintain tape 59 properly aligned with the pulley as it is wound thereon. The code representation of the variable data to be entered by means of keys 33, 38 and 39 is applied to the tape in the form of groupings 62 of openings or holes 63 disposed at intervals along the length of the tape. Each grouping of openings 63 is disposed along

column 64 and in two of channels 65a with the same code scheme as that employed for tag 21. Starting at the portion of tape 59 in the right of FIG. 9 the groupings are disposed in an order that is reverse to that of keys 33 in decade 34 (FIG. 2). Thus the higher digits are located on tape 59 adjacent to clutch 66 and descend in order along the tape toward pulley 60.

Tape 59 can be formed from metal spring material of a type having a substantially constant torque characteristic, that is, the bending force necessary to maintain the spring in a tangentially arranged relationship with the remainder of the spring in the wound form is substantially constant regardless of the extent of the spring which has been unwound. Spring material of this type is manufactured by the Hunter Spring Company under the trademark "Negator." Because of the spring nature of tape 59, it maintains itself in a wound position with respect to pulley 60 and clutch 66.

Clutch 66 includes housing 67, the outer portion of which, between flanges 68, serves to receive tape 59 for both storing and moving the tape. Housing 67 is rotatively supported with respect to drive shaft 69 by means of bearing 70. Within the interior of housing 67 there is disposed member 71 of permeable material fastened adjacent to the base portion of the housing. Member 72 of permeable material is mounted on support 73 which in turn is attached to shaft 69 and secured thereto by key 74. At least one of members 71 and 72 is permanently magnetized so that the magnetic attraction between the members urges them toward one another. Thrust washer 72a maintains members 71 and 72 spaced apart from one another and thereby establishes an air gap between them. Thrust washer 72a can be formed from plastic material such as nylon. Eddy currents within the facing members in the presence of relative motion therebetween is capable of transmitting rotary motion from shaft 69 to housing 67. The strength of the magnetic field and the magnitude of the air gap between members 71 and 72 determines the torque which clutch 66 can transmit.

The rotation of shaft 69 is coupled by clutch 66 to tape 59 and advances tape 59 in the direction of the arrow shown in FIG. 9 until stud or stop 75 engages end portion 40a of the body member of the key which has been depressed. This function occurs for each of tapes 59 disposed beneath decade 34 when shaft 69 rotates the plurality of clutches 66. After stop 75 engages an actuated key, the tape is held and clutch 66 slips as shaft 69 continues to rotate. The slipping of clutch 66 applies a tensile force to tape 59 and draws it taut with respect to stop 75 engaged with the actuated key so that the positioning of the tape can be accurately controlled. The position of the actuated key in each decade determines the extent of travel of the tape so that grouping 62 of openings 63 of each tape is moved to a predetermined position, namely, that overlying window 76 in mask 77. The axial adjustment arrangement provided for decade 34 insures that the tape is accurately located with respect to the predetermined position. Bar 78 by bearing upon the upper surface of tape 59 urges the tape toward the upper surface of mask 77 so that the tape passes directly over window 76.

Key 38 at the upper end of decade 34 when depressed prevents tape 59 from advancing to engage any of the keys beyond key 38 and thus prevents the length of tape 59 having code openings from being advanced to the predetermined position adjacent mask 77. Thus key 38 effectively locks out a column of keys from causing the entry of data since it maintains an uncoded portion of tape 59 adjacent mask 77 which prevents the developing of an output signal. Key 39 is adapted to clear column 34 of any key which has been depressed. Since slot 39a is at the opposite side of key 39 as compared to keys 33, key 39 cannot be locked by follower 52. Due to the location of key 39 at a distance from tape 59, key 39 cannot engage stop 75 so that tape 59 can be advanced beneath all of the keys until the stop engages bar 78. The code in tape 59 overlying mask 77 when stop 75 is held by bar 78 is that representing zero. Thus the actuation of key 38 prevents entry of data by the column while actuation of key 39 clears all of

the keys and causes a zero to be entered automatically as in the case where keyboard entry starts with all columns cleared.

When shaft 69 is rotated in a direction which drives tape 59 in a direction opposite to that of the arrow in FIG. 9, stop 75 having screw 79 securing the stop to the tape advances toward bar 80 until a position is reached at which end portion 79a of the screw contacts the bar and prevents further reverse motion of the tape (FIG. 4). With the tape held from moving, clutch 66 slips as shaft 69 continues to rotate. The position of the tape at which end portion 79a contacts bar 80 corresponds to the rest or deactivated condition of the tape. When the tape is in the deactivated position, the portion of the tape overlying window 76 does not contain openings 63. Since tape 59 passes over bar 80 as the tape leaves idler pulley 60, bar 80 can additionally serve as a support or guide for the tape.

The means of scanning the code representations of the record, that is, tag 21, and the code representations of the forming means, that is, grouping 62 of openings 63 in tapes 59, includes scanner 81 (FIG. 9). Housing 83 of scanner 81 has bushings 83 mounted on guide rods 84. This arrangement enables the scanner to move with a reciprocating motion, that is, in a back and forth manner, along the guide rods. In an embodiment in which the scanner is to be responsive to radiant energy, the upper portion of the scanner disposed beneath mask 77 contains opening 85 in which is disposed mount 86 supporting lens 87 (FIGS. 9 and 11). Adjacent to the bottom portion of housing 82 of scanner 81 there is disposed means responsive to radiant energy such as a plurality of photosensitive semiconductor devices 88. In the case of a code representation in which there are five channels to a column, such as the code employed for tags 21 and tapes 59, a semiconductor device is provided for each of the channels. Consequently, the housing contains five semiconductor devices which are spaced apart adjacent to one another. Sensitive portion 89 of the semiconductor devices is disposed in a plane which is substantially at right angles to the plane of tape 59 and extends through the central axis thereof.

The source of radiant energy for the scanning means includes tubular lamp 90 which extends across the console above and adjacent to mask 77 in order to direct radiant energy toward the openings in the tapes passing over window 76 as well as to the openings in tag 21. Where photosensitive semiconductor devices are employed, tubular lamp 90 can be of the incandescent type.

As shown in FIGS. 6 and 7, scanner 81 is adapted to be moved along guide rods 84 from the right side to the left side of console 20. At the starting position of the scan at the right side of the console scanner 81 is positioned beneath tag support 26. Prior to the beginning of a scan, tag support 26 is moved inwardly by rotating it about pivot 30 to an activated position thereof in which opening 26a of the tag support which exposes the portion of the tag containing the columns and channels of code representation is overlying opening 76a in the mask (FIGS. 3 and 6). In the activated position of the tag support, the tag is disposed in a plane spaced at a predetermined distance from lens 87 of the scanner in order that light passing from tubular lamp 90 and through openings 29 in tag 21 can be properly focused by lens 87 upon photosensitive semiconductor devices 89.

In certain instances, tag support 26 can be provided with groupings of code openings adjacent to the location at which tag 21 is mounted an overlying opening 76a in the mask. These groupings enable fixed data to be entered independently of tag 21. Similarly a semipermanent plate having fixed data code therein can be mounted on support 26 in place of tag 21 where there is no need to vary the fixed data for each transaction. When the console is to be operated to receive variable data only, tag support 26 is left in its outward position (FIG. 2) in which portion 26b of the support overlies opening 76a in the mask and blocks the passage of light therethrough.

Prior to the beginning of a scan, the plurality of tapes 59 is moved in the direction of the arrow in FIG. 9 by the drive of clutches 66 so that stop 75 of each of the tapes is engaged by

end portions 40a of the keys related thereto. In this condition the code representation of each of the tapes which corresponds to actuated keys 33 is moved to the predetermined position overlying their respective window 76 in mask 77. As shown in FIGS. 6 and 13 at the predetermined position above windows 76, tape 59 is supported by guides 77a extending upwardly from mask 77 and having shoulders 77b which maintain the alignment of the tapes. As shown in FIGS. 12 and 13, the spacing between tag 21 and tape 59 with respect to lamp 90 is the same, that is to say, the tapes and tag are disposed in the same horizontal plane overlying the predetermined position above the line along which windows 76 and 76a are disposed in order that light passing either through the openings in tag 21 or the openings in tapes 59 is properly focused by lens 87 upon photosensitive semiconductor devices 88.

As viewed in FIG. 9 when openings 63 in the channel furthest to the right in grouping 62 are disposed at the predetermined position overlying window 76, the semiconductor device of the plurality furthest to the left is subjected to the light passing through the opening in the tape and lens 87. In a similar manner the location of the channel in which the second opening of a grouping is positioned determines the second semiconductor device that is actuated. Tapered shields 91 form wedge-shaped openings 92 therebetween which forms a slot extending parallel to the line of travel of the tape adjacent to the semiconductor devices (FIGS. 9 and 11). This arrangement prevents projected beams of light from each successive column 27 being scanned from inadvertently conflicting with the beam adjacent thereto. Thus shields 91 prevent crosstalk of light from one of columns 27 of tag 21 to the next. In order to facilitate the focusing of the light upon the semiconductor devices, lens mount 86 can be selectively positioned in the vertical direction by means of adjusting screw 93 (FIG. 9).

The means for moving scanner 81 during its cycle of operation includes toothed belt 94 which is engaged to housing 82 of the scanner by coupling 95 (FIG. 5). Belt 94 which extends about idler pulley 96 is driven by pulley 97 actuated by scanning motor 98. In order to insure that the scanner move at a predetermined accurate scanning speed, scanning motor 98 may be of the hysteresis synchronous type. As the scanner is moved from the right to the left of the console as seen in FIGS. 5 and 6, the scanner first scans the fixed data of the code representations in tag support 26, if any, and then that of tag 21. If support 26 is positioned outwardly, portion 26b thereof blocks the passage of light to the scanner during the initial portion of the scanning cycle. Thus for each column of opening in the tag, light is admitted through the pair of openings to two of the photosensitive semiconductor devices in the scanner. As the scanner advances beyond any given column of openings in tag 21, there is an interruption in the passage of light to the scanner until it passes beneath the pair of openings in the next adjacent column of the tag. In this manner the scanner scans or reads the tag in a sequential manner from the right to the left of the tag as the scanning process continues. Thus it can be seen that a pair of the semiconductor devices responds for each column of the tag containing a pair of openings.

Subsequently the scanner advances beneath the plurality of tapes 59 and again the semiconductor devices are exposed to the light passing through the pair of openings in the grouping locate at the predetermined position above the line of travel of the scanner. Since the scanner travels at a uniform speed and since the spacing between tapes 59 is greater than that between columns 27 of openings 29 in tag 21, there are greater time intervals between the response of the semiconductor devices as they pass beneath the tapes as compared to passing beneath the tag. If desired, the motor can be operated at an increased speed when driving the scanner past the tapes to maintain uniform intervals between the responses of the scanner. The scan is completed when the scanner has passed beneath tape 59 adjacent to the left side of the console as seen in FIGS. 5 and 6.

The manual actuation of switch 99 entitled "Power" (FIG. 2) energizes lines 100 and 101 (FIG. 16) of the apparatus. Indicator lamp 102 marked "Power" in FIG. 2 can be connected to lines 101 and 102 to show that the console is energized. Prior to a scanning operation, tag 21 is inserted into the console, if fixed data from the tag is required, and the manual commands are inserted into keyboard 32. At this time scanner 81 is at its starting position adjacent to the right side of the console as viewed in FIGS. 5 and 6. The actuation of "Scan" button 103 (FIG. 2) momentarily closes switch 104 connected to line 101 to begin the scan cycle (FIG. 16). The closing of switch 104 energizes relay winding 105 through switch 106 which is connected by terminals 149 and 150 (FIGS. 15 and 16) and normally closed relay switch 152a of relay 152 to line 101. Switch 106 is connected to relay winding 105 whenever the scanner is at the extreme right position by being operated by engagement with the scanner.

The energizing of relay winding 105 causes relay switch 107, which is connected through line 108 to line 100, to be connected to line 109. The actuation of relay switch 107 to line 109 serves to energize tubular lamp 90, winding 98a of motor 98 through line 110, and winding 111a of motor 111 which drives shaft 69 connected to clutches 66. The actuation of relay switch 112 in response to the energizing of relay winding 105 connects switch 112 through line 113 which completes a holding circuit for relay winding 105 after the opening of switch 104.

Motor 111 is selected to have a sufficiently high torque to cause shaft 69 and the clutches engaged therewith to drive each of the tapes to the point at which their respective stops 75 encounter actuated keys 33 of the keyboard prior to the point at which the scanner is driven by motor 98 to a position where the scanner approaches the tape beneath the right column of the keyboard. This insures that the groupings of the tapes corresponding to the variable data are properly advanced to the predetermined position prior to their scanning. At the end of the scan after the scanner has passed beneath the tape of the left column in the keyboard, scanner 81 encounters and actuates switch 106, thereby connecting it to solenoid 31 which unlatches tag support 26. Upon being unlatched, the spring bias of the tag support swings it outwardly. The actuation of switch 106 also deenergizes relay winding 105, thereby releasing switches 107 and 112. The release of switch 107 connects line 108 to switch 114 and line 115 and thereby energizes winding 111b of motor 111 and reverses it. In addition line 115 energizes line 116 connected to winding 98b of motor 98 and reverses it. The reversal of motor 111 serves to drive back all of the plurality of tapes 59 until end portions 79a of screws 79 extending through stops 75 encounter bar 80. The reversal of motor 98 drives scanner 81 toward the right portion of the console.

The release of switch 107 opens the circuit from line 108 to line 109 and results in the deenergizing of winding 98a and 111a as well as lamp 90. With the lamp deenergized there is no light transmitted to the semiconductor devices during the return motion of the scanner and consequently, no output therefrom. Return of the scanner to the starting position at the right side of the console causes it to engage switch 114 and to open it, thereby opening the connection to line 115 and deenergizing motor windings 98b and 111b. At this point the cycle of operation has been completed and the console is ready for a subsequent cycle. Counter 117 records the number of cycles which have occurred and knob 118 enables the operator to reset the digital reading of the counter. "Scan" lamp 119 is illuminated during the scanning cycle.

Output logic circuit 120 (FIGS. 1 and 15) includes the plurality of semiconductor devices 88 in scanner 81. The semiconductor devices are commonly connected to line 121 and each are connected to individual lines 122 in circuit with actuating elements 123, such as the code magnets of a paper tape punch recorder 134. Whenever such a recorder is in an inoperable condition due to a failure therein or due to the exhausting or jamming of the recording paper tape, indicator lamp 134a marked "Tape" is lighted in order to notify the

operator that the data from the console cannot be entered. The semiconductor devices when switched into a conductive condition in response to the projection of radiant energy such as light onto sensitive portion 89 can conduct sufficient current to directly operate the code magnets.

By way of an example, the semiconductor devices, such as PNP silicon light-activated switches, to be employed are selected to have a rated current capability of at least the level which is sufficient to drive the type of code magnets 123 commonly used in automatic punch tape recorders. Certain code magnets normally require a current of about 200 milliamps. In operation since two of the semiconductor devices are actuated or fired in response to the light passing thereto through the pair of openings in a column on either tag 21 or one of tapes 59, a corresponding pair of code magnets are actuated for each given column. With this arrangement the combined current flowing from the pair of energized code magnets 123 as seen in line 124 is a predetermined function of the current through each of the code magnets, as conditioned by the impedance, power factor, etc. of the circuit. With a current of 200 milliamps, for example, passing through each of the code magnets, a combined current of 400 milliamps could flow in line 124.

Relay winding 125 is current sensitive and is selected to be activated by a current level which is reflective of the energization of one or more of the code magnets and consequently, in the example, winding 125 is selected to be activated by a current slightly less than 200 milliamps flowing in line 124. Relay winding 125 when energized, actuates relay switch 126 to connect line 127 leading from line 121 to punch clutch magnet 128 in recorder 134. In turn clutch magnet 128 actuates the punching of the paper tape in accordance with the energized code magnets 123 and advances the paper tape to its next position.

In order to condition each of semiconductor devices 88 to pass a predetermined current when actuated by light, each of the devices is provided with balancing potentiometer 88a. Thus regardless of variations in the light response characteristic of device 88 and variations in the impedance of the load connected thereto, the current upon actuation can be set to a predetermined level. The connection of diodes 123a across each of code magnets 123 forms a "freewheeling circuit" with the inductance of the code magnets. The "freewheeling circuit" assists commutation in switching off the inductive load. In originally preparing tags 21, it is possible that due to a failure of the punching apparatus, one of the pair of openings 29 in a column 27 is missing in the tag. The absence of one of the openings causes an erroneous code representation in the tag which nevertheless is read by the scanner during the scanning cycle. In such a case only one of the code magnets is energized and consequently only a fraction of the normal combined code magnet current is delivered to line 124. This fraction of the normal combined current, while being sufficient to operate relay 126, is insufficient to operate relay 129 since relay 129 is selected to be actuated only in response to the flow of the complete normal combined current, that is the combined current of two of the code magnets.

In the case where the code representation in the tag includes the normal pair of openings 29, relay 125 is actuated, and by means of switch 126, energizes punch clutch magnet 128 which punches the tape in response to the activation of punch code magnets 123. Relay switch 126 when actuated is connected to relay switch 130 of relay 129. However, when the combined current of a pair of energized code magnets is passed through relay 129, relay switch 130 is actuated to a disconnected condition.

On the other hand, if one of openings 29 of a pair of missing, relay 125 responds to current from the one energized code magnet and actuates relay switch 126 to punch the erroneous code representation, consisting of a single or any desired number of openings in the paper tape by energizing a predetermined number of code magnets 123 and punch clutch

magnet 128. In this case the current from the single energized code magnet, when passing through relay 129, is insufficient to actuate relay switch 130. Consequently switch 130, connected to relay switch 126, energizes relay 152 and actuates relay switches 152a and 152b. The actuation of relay switch 152a opens the connection to terminal 150 and thereby opens the shunt across terminals 149 and 150. The opening of the shunt deenergizes relay 105, thereby releasing switches 107 and 112 and causing a termination of the scan cycle and the return of both tapes 59 and scanner 81 to their normal rest position. Thus, in part, the opening of the shunt across terminals 149 and 150 results in the same operation as that which follows the actuation of switch 106 at the end of the normal scan cycle with the exception being that solenoid 31 is not operated at this time.

The actuation of relay switch 152b in response to the energizing of relay 152 energizes "Parity" indicator lamp 132 by means of switch 151 (FIG. 2 and 15) having normally closed switch elements 151b and terminals 151d. In this way indication is made to the operator that due to a lack of parity in the coded data, no further data beyond the initial erroneous column 27 is being recorded. Here it should be understood that since the preselected error code is punched in the tape before the equipment is returned to its normal rest position and the "Parity" lamp illuminated, the single code opening is available to subsequently actuate a tape reading device in order to exclude any information which has been recorded from the tag prior to the point at which the erroneous code opening is located. The actuation of relay switch 152b connects it to the winding of relay 152 and serves to provide a holding circuit to relay 152 during and after the return of the scanner to its starting position.

After relay 152 has been energized and the scanner returned to its right hand position, the apparatus cannot be cycled again until the operator has removed the tag containing the error and replaced it with another tag 21. It is then necessary to operate switch 151 to open the holding circuit through switch element 151b and terminals 151d so that relay 152 is deenergized. At the same time the operation of switch 151 connects element 151a across terminals 151c and thereby completes the circuit from line 101 and terminal 149 to terminal 148 and solenoid 31. The energizing of solenoid 31 releases tag support 26 so that it can extend outwardly to enable the tag containing the error to be removed. The deenergizing of relay 152 by the actuation of switch 151 also extinguishes "Parity" indicator 132. At this point the apparatus is completely restored to a condition ready to receive both fixed and variable data for a new cycle of operation.

During the scanning operation, scanner 81 travels from the right to the left of the console so that the data is applied to the paper tape in that order. With respect to digital information, the scanner reads in the direction beginning with unity and proceeding through tens, hundreds, etc. During playback of the recorded information in the data processing system, the recorded information is read in the opposite direction as compared to that of the scanning cycle. Consequently, whenever an error occurs during scanning and the tape is marked in response thereto, the marking which is the last input to the recording device from the scanner becomes the first input to the data processing system with the result that the error is sensed before the system receives the erroneous data.

In place of automatic paper tape punch recorder 134, the output from control circuit 120 can be delivered to tabulating card punch equipment 135, to magnetic tape or drum recorder 136, or to buffer 137 connected to digital computer 138. Thus the apparatus of the invention is adapted to furnish impulses corresponding to the fixed and variable data obtained from tag 21 or similar and tapes 59 to a data processing system, that is to any form of equipment for the storage, computation, correlation, reduction, etc. of data. For each type of output equipment such as magnetic recorder 136, tabulating card punch equipment 135, digital computer 138, etc., lines 122 from scanner 81 are connected to the input circuit of the data processing equipment.

In place of introducing fixed data into the apparatus by means of tag 21 the console can be provided with fixed-data input device 140 shown in FIG. 17. Data input device 140 is positioned adjacent to either side of the console as viewed in FIG. 3 between lamp 90 and scanner 81. Data input device 140 can be used in conjunction with tag support 26 and in such a case mounted adjacent to it or device 140 can be used in lieu of tag support 26. The device includes one or a plurality of tapes 141 each of which is similar in construction to that of tape 59. Tape 141 therefore contains groupings 142 of code openings similar to those of the code openings in tapes 59. The tape is disposed about pulleys 143 and 144. Pulley 144 which is located adjacent to the front portion of the apparatus contains indicia disposed about rim 144a which correspond to the information represented by the groupings 142 on the tape.

By rotating pulley 144 to a predetermined position as indicated by indicia 145, the operator can move tape 141 to position a desired code grouping at the predetermined position for scanning. Thus by merely setting pulleys 144 of one or more of tapes 141, the operator can set into the device a portion of fixed or master data which will be scanned during each scanning cycle and will remain stored in the console until the operator resets the position of each of pulleys 144. Detent 146 which is adapted to engage notches 147 serves to lock pulley 144 and thereby tape 141 in the position set by the operator.

In place of scanner 81 (FIGS. 9 and 11), scanner 153 (FIGS. 18 and 19) can be used. Scanner 153 which is shown in an inverted position in FIG. 18 includes housing 154 in which are disposed a plurality of photoresponsive or photoconductive devices 155. By way of example, the photoconductive device can include photocell type 3L18 which is manufactured by Opto-Electronic Devices Division of Sigma Instruments. Photocells 155 are disposed within housing 154 in an arcuate arrangement so that each photocell is substantially equidistant from its respective aperture 156a-d in cover or mask 153a of the housing. Diverging vanes 158 extend across housing 154 and form a plurality of lighttight compartments in each of which is disposed one of the apertures and one of photocells 155. With this arrangement, the light or radiant energy applied to any one of the apertures is necessarily restricted to actuate the photocell related thereto and is in this way prevented from introducing crosstalk with the other photocells.

Photocells 155 which are connected to output logic circuit 120 (FIGS. 1 and 15) serve as the input to the circuit in the manner of semiconductor devices 88 of scanner 81.

In place of tubular lamp 90 (FIG. 9), each of tapes 59 and each of the code groupings of a record overlying window 76 and corresponding to columns 27 of tag 21 can be scanned with a moving source of radiant energy or light such as lamps 159 (FIG. 20). Lamps 159 having built-in focusing lenses 159a are positioned in a common plane extending substantially perpendicular to the plane of tapes 59 at the predetermined position where they are scanned and the plane of the record or tag 21 when the tag is positioned over window 76. In addition, the common plane extends parallel to the length of the tapes and the code grouping or tag 21. The lamps are positioned in the common plane spaced apart from one another and inclined at a common angle to an axis perpendicular to the plane of the tapes or tag. The elliptical beam of light emitted by each of the lamps forms an overlapping elliptical pattern 160 of light which is directed toward the tapes or the tag. This arrangement insures that a sufficiently intense pattern of light is directed toward all of the code openings. Thus as shown in FIG. 20, the major-axis 160a of the elliptical pattern 160 extends parallel to the longitudinal axis of the tape or to columns 27 of the openings in the tag. The use of a plurality of lamps increases the reliability of the device apparatus of the invention since in the event of the failure of one lamp, the remaining lamp casts sufficient light to actuate photocells 155 through the code openings.

In another embodiment, lamps 159 may be positioned in a transverse common plane at the opposite sides of a plane extending perpendicularly from the longitudinal axis of the tape

or columns 27 in the tag (FIG. 21). In this case, the lamps are positioned and inclined within the transverse common plane so that their filaments again form a composite elliptical pattern 160, which has its major axis 160a extending parallel to the longitudinal axis of the tape or columns 27 of tag 21.

In still another embodiment, a single lamp 159 can be mounted along an axis extending perpendicular to the longitudinal axis of tapes 59 and columns 27 of tag 21. In this way a single elliptical beam of light is projected toward all of the code openings. A single lamp is satisfactory if the service life of the lamp is sufficiently long to make the fail-safe arrangement of dual lamps unnecessary.

As shown in FIG. 19, apertures 156a and 156d in cover 153a of the scanner are elongated while apertures 156b and c are substantially circular in form. As shown in FIGS. 20-22, the central axis of the beam of light projected by each of lamps 159 is directed substantially at a point between central apertures 156b and c. Consequently, more divergent rays of light are applied to apertures 156a and d by the lamps. To insure that sufficient light passes through the code openings in tapes 59 and the code openings in tag 21, apertures 156a and d are provided with increased area, that is the elongated form shown in FIG. 19. This provision insures that sufficient light is transmitted to the two outermost photocells 155 of scanner 153 to insure their activation.

In addition to scanner 153, an optical or radiant energy responsive readout head can be formed by multiple cell arrangement 157 (FIG. 23). The cell arrangement includes an aperture plate 157a having a plurality of apertures 157b. Wafer-thin photoconductors 157c are positioned in the openings of the apertures in order to be exposed to light passing through the code openings. By way of example, the wafer-thin photoconductors can be of the type manufactured by Opto-Electronic Devices and designated model TR3L9. In addition, a readout head such as scanner 153 can be made more compact by employing miniature photocells 158 (FIG. 24). An example of such a cell is model 33F2 which is supplied by the General Electric Company.

By moving the source of radiant energy or light with scanner 153, a single source mounted adjacent to the scanner becomes sufficient and eliminates the need of a plurality of sources of light or a source which extends across the entire console, such as tubular lamp 90. As shown in FIG. 25, therefore, lamps 159 are mounted upon support 173 which is adapted for transverse motion along guide rods 174. Scanner 153 is supported by guide rods 175 in a manner similar to that of the support of scanner 81 by guide rods 84 (FIG. 9). Yoke 176 connects and aligns lamps 159 with respect to the apertures in scanner 153. The drive for scanner 153 and thereby lamps 159 can correspond to the that of scanner 81, namely a drive through scanning motor 98 and toothed belt 94, which is connected to scanner 153.

As shown in FIG. 26, scanning motor 98 is adapted not only to drive toothed belt 94 and thereby scanner 153, but is also adapted to drive toothed belt 177 by means of shaft 178 connected to pulley 177a. Toothed belt 177 is connected to support 173 similarly as the connection of toothed belt 94 to scanner 153. Thus, lamps 159 can be moved in synchronism and maintained in alignment with scanner 153 through the drive from the common scanner motor 98.

In order to insure that only light passing through code openings 29 of tag 21 is applied to the photocells, window 76 of tag support 26 (FIG. 3) can be provided with mounting plate 161 (FIG. 27) upon which the prepunched record or tag is adapted to be disposed. By way of example, mounting plate or mask 161 can be adapted for use with tag or ticket 162 which is known as a "Kimball" ticket (FIG. 28). On such a ticket the code representation may be applied by code openings 163 which are disposed in fields 164 and 165 with respect to reference line 166 which extends horizontally as shown in FIG. 28. Similarly as in the case of tag 21 (FIG. 14) the code openings 163 of ticket 162 are disposed in vertically extending columns 167 and horizontally extending channels 168 as shown in FIG. 28.

When ticket 162 is employed, mounting plate or mask 161 is provided with apertures 169a, b and c for field 164 and apertures 170a, b and c for field 165. Centrally disposed apertures 171 can serve for the openings in ticket 162 which are adjacent to either side of reference line 166. Since mounting plate 161 is formed from opaque material, it prevents the transmission of light, except through the openings thereof. Thus even through ticket 162 is translucent, light transmission is still restricted to that controlled by the openings in the ticket.

Experience has shown that even with scanner 153 and apertures 156a—d in mask 157 of the scanner, it is possible for unequal levels of light intensity to be applied to each of the plurality of photocells 155. Where the light intensity from lamps 159 is conditioned to be sufficient to project sufficient light through the outer apertures 156a and d, an excessive level of light can be applied through apertures 156b and c. The excessive intensity of light can affect the precise operating point of the photocells. With the excess intensity, the innermost photocells can have a tendency to overfire or fail to communicate and shut off within the operating cycle of code magnets 123. To eliminate this condition, photocells 155 at the innermost position of scanner 153 are provided with impedance devices, such as potentiometers or fixed resistors 179 (FIG. 29). The potentiometers enable any excess voltage transmitted by the innermost cells to be compensated and thereby enable all of code magnets 123 to have the same response characteristic. The potentiometer can be adjusted by connecting a volt meter across each of the photocells when all of the cells are exposed to light passing through the apertures. The potentiometers are then adjusted until a common response condition is obtained at all of the cells.

Where it is desired to read both fields 164 and 165 of ticket 162, a pair of scanners 153 can be employed (FIG. 30). The pair of scanners can be spaced apart in a staggered relationship as shown in FIG. 30 by carriage 172. The staggered relationship prevents clearance or interference problems which could result if a pair of scanners were to be disposed along a common line corresponding to the direction of columns 167 of the ticket. The interval between the scanners corresponding to the length of the arrow shown in FIG. 30 is conditioned to enable one scanner to scan ticket 162 before the remaining scanner initiates its scan cycle. Additional fields on ticket 162 can be scanned in a similar manner by the provision of additional scanners 163 in the staggered and offset relationship. In effect, the construction of FIG. 30 results in carriage 172 having a plurality of readout heads, each of which includes scanner 153.

Normally photocells 155 have a diameter which is appreciably greater than the interval between columns 167 or channels 168. Consequently, there is a limit to the number of channels in a column which can be sensed at one time as discussed above. In order to provide sufficient space for the photocells 155, the interval between openings 163 in ticket 162 can be increased as shown in FIG. 31 in which one field of code openings 181a in field 181 are disposed at intervals several times the normal interval of the openings of ticket 162. Additional fields 182 having openings 182a and 183 having openings 183a are provided in the staggered arrangement shown in FIG. 31. In this arrangement the interval between the channels can remain the same so that scanner 153 can be used. Thus by increasing the interval between the openings in correspondence to the number of fields which are to be staggered, the overall diameter of photocell 155 can be accommodated without the chance of the photocell seeing more than one opening at a given position.

Where a plurality of scanners are used such as in reading fields 164 and 165 of ticket 162 (FIG. 28) or fields 181, 182 and 183 in the arrangement of FIG. 31, photocells 155 in scanner 153 of each of the scanners being employed can be wired in parallel in the manner shown in FIG. 32. Thus, for example, photocells 155a which correspond to a predetermined channel of ticket 162 are connected in parallel across control rectifier or switch 184 which is connected by resistor 185 to

one of the code magnets 123. The result of this arrangement is that there remains a four-channel readout, and consequently, where the readout is to be amplified, only four amplifiers are required. In the case where two or three parallel-disposed fields of four-channel code are employed, eight or 12 photocells can be connected in parallel.

In place of the photocells disposed in a common plane and in an arcuate manner as shown in FIG. 18, photocells 155 can be disposed in the arrangement shown in FIGS. 33 and 34. As shown in FIG. 33, each of light beams 186 which have passed through the code openings in tapes 59 or the code openings in tag 21 or ticket 162 are directed toward a different one of inclined mirrors 187 for each of the four photocells. The mirrors are tilted in the manner shown in FIGS. 33 and 34 in order to reflect rays 186 into photocells 155 when the photocells are disposed along a plurality of axes. Mirrors 187 are provided with plated first surfaces and can reflect rays 186 to their corresponding photocells without reflecting stray light toward one of the other photocells. This construction can be employed when it is desired to bring the scanner for each of a plurality of fields adjacent to one another and thereby enable a plurality of fields to be simultaneously scanned or to be scanned with a predetermined interval between fields.

In certain installation it may be desired to have an indication of the input to keyboard 32 of console 20. The indication of the input to the keyboard can be derived from the rotational position of idler pulley 60 or housing 67 for each of tapes 59 since the rotational position of the idler pulley at one end or the housing at the other end of each tape correspond to the position of the tape along its path of travel and thereby the identity of the code opening being sensed by the scanner.

As shown in FIG. 35, for example, drive pulleys 60 of any desired number of tapes 59 can be adapted to actuate a digital indicating device 188 such as that used for indication in calculating machines or cash registers. In FIG. 35, dash line 189 represents the mechanical drive of gears, shafts, etc. from drive pulley 60 to indicating device 188. Where it is desired to provide a receipt, for example, of a transaction being handled by the console of the invention, console 20 can be provided with slot 190 for receiving a suitable bill or receipt form. Within the console for a predetermined number of tapes there is provided a hard-copy digital printout device 191 similar to the type commonly employed in cash registers. Drive pulley 60 for a desired number of the tapes is connected by a drive represented by dash line 192 (FIG. 35) to actuate the particular printout unit related to the given tape 59.

In addition, when it is desired to accumulate a series of inputs to keyboard 32, drive pulley 60 of each tape is connected by drive 193 to digital accumulator 194, again of the type used in adding machines, cash registers and the like. Accumulator 194 related to each tape is connected by drive 195 (FIG. 35) to printout device 196 for the same tape. The printout device is similar to device 191. With the arrangement of FIG. 35, the card or receipt is inserted into slot 190 and subsequently each of the entries into keyboard 32 are printed upon the receipt by printout device 191. At the conclusion of the series of the inputs into keyboard 32, accumulator 194 actuates printout device 196 and applies the total of the transaction to the card or receipt disposed in slot 190. Printed records of the fixed data from the tag or card can be obtained by converting the coded output and actuating a printout device in response thereto.

Further as shown in FIG. 35, the accumulator 194 can transmit its data by means of drive 197 to other accumulation counters so that data can be continuously stored with respect to the individual totals that are received by the console.

As discussed above, since rotational position of drive pulley 60 or housing 67 of each of tapes 59 corresponds to the value of an entered insert into keyboard 32, the rotational positions of either drive pulley 60 or housing 67 can be employed to repeat or indicate the input to the keyboard into other indicating or data storage equipment. Thus it is merely necessary to convert the rotational position to a mechanical or electrical out-

put corresponding to the numerical input inserted into keyboard 32.

As shown in FIG. 4, bar 78 is provided to engage stop 75 whenever tape 59 advances stop 75 past all of keys 33. In place of bar 78, plate 46 can be formed with leg 198 which is adapted to engage stop 75 at a position beyond key 33 corresponding to the number one setting (FIG. 36). In this position the zero code openings of tape 59 are advanced to a position overlying scanner 153 so that a zero signal is read by the scanner.

At the end of the scan cycle of the console of the invention, it is desirable to clear the settings of the entire keyboard. In order to provide this function, follower 52 of each of the decades is connected to bar 52b by links 52c. In turn, bar 52b is coupled to actuating rod 52d of solenoid 52e. As previously discussed, the pressing of button 39 in any given decade serves to move follower 52 against the restoring force of spring 58 so that any key, which has been previously set, is released. Upon energizing solenoid 52e, the solenoid serves to move rod 52d and thereby bar 52b, connected to the follower of each of the decades. Consequently, the entire keyboard can be cleared by the energizing of the solenoid. Finger bar 52f shown in FIG. 2 can be employed to couple solenoid 52e across the power source whenever the keyboard is to be cleared.

As shown in FIG. 16, motor 111 drives shaft 69 in a clockwise direction as shown in FIG. 4 in order to advance various tapes 59 until their respective stops 75 encounter a depressed key or bar 78. At the completion of a scan, the release of switch 107 energizes winding 111b of motor 111 and reverses the motor in order to reverse shaft 69, that is drive it is a counterclockwise direction as shown in FIG. 4. In this way the tapes are returned or rewound upon idler pulleys 60. In the arrangement in FIG. 37, shaft 69 is driven by motor 199 which corresponds to motor 111 (FIG. 16). Motor 199 is coupled to shaft 69 by means of toothed belt 200 driven by electromagnetic clutch 201 on output shaft 199a of motor 199. Clutch 201 is connected in parallel to motor 199. Prior to and during the scanning cycle, clutch 201 is energized so that the drive motor 199 is coupled to shaft 69 and drives the shaft in a counterclockwise direction as shown in FIG. 37. At the completion of the scan, the release of switch 107 is adapted to deenergize both motor 199 and clutch 201 and thereby remove the positive drive of shaft 69, allowing it to rotate freely. When shaft 69 has been released by clutch 201, the tension characteristic of the "Negator" spring material from which tape 59 is formed causes tape 59 to rewind itself about idler pulley 60.

Consequently when the tapes are rewinding themselves about idler pulley 60, they do not have to overcome the resistance to rotation which would occur if the clutch and motor remain engaged with shaft 69.

In place of deriving an electrical output during the scan of a tag or ticket and tapes 59, the console of the invention can be conditioned to provide a photographic or photocopy record of the scan. In the embodiment of FIG. 38, lamps 159 direct radiant energy or visible light through the code openings toward camera device 202 which is scanned in synchronism with the lamps by virtue of the connection provided by yoke 203 extending between camera 202 and lamp support 204. The camera device can be one which is capable of making a photographic record such as a record on microfilm or the like. In addition the camera device 202 can be adapted to produce a record by known xerographic or photocopy processes.

In the embodiment of the invention shown in FIG. 39, the electrical pulse output from the photocells of scanner 153 are connected to output logic circuit 120 which produces output signals capable of actuating frequency generator 206. The output logic circuit translates the radiant energy light pulses gated by the code openings in the ticket and the tapes of the console into output signals which correspond to the coded data. In turn the output signal of the logic circuit 120 selects a predetermined audio or other desirable frequency to represent the data. By way of example, the tones to be

generated by frequency generator 206 can correspond to the tones employed in telephone dialing systems. From the frequency generators, the output is recorded by magnetic recorder 207 or can be transmitted on line (item 205) over telephone voice grade lines to computer 208.

Magnetic recorder 207 can include a plurality of recording devices. By means of interrogator 209 which can be located at the magnetic recorder or at the computer, the recording devices can be sequentially operated to playback to computer 208.

In addition to coding the data abstracted by scanner 153 into a form which can be transmitted over conventional telephone circuitry, the tone system enables a plurality of channels of coded information to be recorded on single or multiple tracks of magnetic tape recorders.

Where it is desired to transmit the recorded information of the tape recorder 207 to a central data processing center, recorder 207 can be adapted to play back the recorded tone signals into a telephone voice circuit and thereby transmit the information to a central data processing center where the incoming information can again be recorded or in the alternative, converted into digital information suitable for direct introduction into a computer system. In one arrangement, the recorder delivers its playback to a loud speaker which in turn transmits the tone signals directly into the conventional transmitter of a telephone. Thus with the system of FIG. 39, the data derived from the console of the invention can be accumulated during, for example, the business day, and then at the conclusion of the business day, transmitted at any desirable time to a data processing center or a substation of same.

In the system of FIG. 39, the output from the photocells of scanner 153 are applied to code converter 205. In turn the code converter actuates the particular tone generator 206 corresponding to the information obtained from scanner 153. Recorder 207 then magnetically or with other recording techniques, such as a disc or drum recorder, records the data from the tone generators. In response to control device 208, data recorded by recorder 207 can be transmitted by playback unit 209 to telephone lines 210 or other output circuitry. Further in response to control 208, concurrent with or at the conclusion of the playback period, recorder 207 can be actuated to erase the magnetic recording and to be made ready to record a new sequence of data from frequency generators 206.

Tapes 59 of the console can be replaced by tapes 211 which are provided with recordings 212 corresponding to the data which is to be transmitted in response to actuation of any one of keys 33 of keyboard 32 (FIG. 40). By way of example, tape 11 can be formed from "Negator" spring material similarly as tape 59. Here the spring material can be conditioned to have suitable magnetic permeability in order to enable tape 211 to serve as a magnetic recording media. In such an arrangement, recordings 212 can be applied to tape 211 along a recording axis which extends in a transverse direction with respect to the longitudinal axis of the tape. Conventional magnetic tape recording techniques can be used to apply a suitably coded signal in recordings 212. Recordings 212 can also be applied to strips of magnetically recordable material, such as magnetic oxide or plastic tape, and then mounted upon tape 59.

Stored data to be used in conjunction with tapes 211 can be provided by tag or ticket 213 containing recordings 214. Again the recordings can be applied in the manner of conventional tape recording to magnetic recording material extending along the length of ticket 213. The recording is oriented in the direction of the arrow shown in FIG. 40.

Scanner 215 which can be scanned in the manner of scanner 81 or 153 contains a magnetic reading head 216 which is adapted to respond to the recordings 214 and 212 as the scanner is moved during the scanning cycle along the axis of the arrows in FIG. 40. Recordings 214 and 212 can include audio frequencies or tones disposed one or more hundred cycles apart from one another. Thus the different frequencies on tapes 211 correspond to the digits of 0 through 9. Serial-bit bi-

nary-code recording methods using a high and a low frequency with a high frequency indicating a bit and the low frequency indicating the lack of a bit, such as 1 and 0, can be used. Other code arrangements or tone signals can also serve as recordings 212 and 214. The output from scanner 215 is transmitted by cable 217 (FIG. 40) and can be ultimately stored in a local or remote recorder and made available at any desired time for playback to data processing equipment in a central data processing office or any local or remote substation.

Ticket 213 can be an expendable paper ticket having a suitable oxide magnetic track thereon to receive recording 214. Where it is desired to reuse ticket 213 in a merchandising operation such as where ticket 213 is a sales ticket, the ticket may be formed from more permanent material such as plastic. Again a suitable oxide coating or recording track would be applied to the plastic material in a manner similar to that employed in the manufacture of magnetic recording tape on a plastic base, such as Mylar material. In addition to tone signals, recordings 212 and 214 can be a multilevel binary code which is completely compatible with the conventional digital computer binary code. In such a case, the binary code output signals from the console of the invention would be recorded on recording tape or other recording media for later insertion into the computer system. In the alternative, the binary code signals can be connected to public utility transmission systems such as a Dataphone system, which are capable of transmitting such coded information.

In FIG. 41, there is shown a card or ticket 218 which contains a plurality of tracks 219 of recorded information. Card 218 can serve as a merchandise tag, a credit card, an employee identification card, or a bank account identification card. In the alternative, card 218 can be a master data card for introducing a standard information into the console. Standard information in the case of a department store can include data such as the store department number, the clerk's identification, etc. Positioning notches 220 are employed to insure that card 218 is properly positioned upon tag or card support 26 (FIG. 3). Similarly as in the case of card or tag 218, card 221 having code openings 222 can be employed to introduce fixed or standard data into the console of the invention (FIG. 42).

As opposed to the customary approach of applying or storing all of the fixed data upon the ticket or tag, tag 223 (FIG. 43) can be employed, for example, in a merchandising or other operation in order to address and interrogate a computer memory and thereby derive fixed or stored data from it. In the case of merchandising, a ticket such as ticket 223 can be attached to the goods by string 224. The ticket can contain two, three or more columns of code 225 of the alpha or numeric type in any desired number of levels and the code can be printed, punched or otherwise applied to the ticket. In FIG. 43, ticket 223 is shown as having a punched code representation. In this system, card 223 merely need contain a code representation of the item number of the goods. When the item or inventory number is used to address a computer memory, an extensive amount of fixed and prerecorded data can then be made available for processing the transaction. In this way, practically all of the requirement for fixed data is removed from the card or record and transferred to a computer or other memory device.

In order to prepare for the computer address system, any desired number of digits for identifying the goods, such as style number, size, color, vendor, fabrics, etc. would be fed into the computer memory in advance of issuing the item numbers to tags 223. The cards or tickets 223 need only carry the coded item number in view of the fact that the entire portion of the descriptive data is stored in the computer memory, a simple abbreviated code form can be used. Thus a minimum number of widely spaced code openings can serve the purpose of identifying only the item. Thus such a code would not carry other information such as the identity of the department, etc. By using code openings which are larger, for example, one-sixteenth inch or more in diameter, as compared to the openings employed in "Dennison" or "Kimball" tags, accurate

scanning of the openings is insured. Openings 222 can be placed apart at an appreciable distance, such as one-quarter of an inch, as compared to the close interval in Dennison or Kimball tags. As a result of the increased interval and the larger opening size, tickets which are wrinkled, bent or otherwise distorted can still be accurately read by the scanner of the invention.

In addition to ticket 223, the console of the invention can be adapted to simultaneously receive a master data plate such as ticket or plate 221 (FIG. 42). Plate 221 which can be formed from more permanent plastic material rather than paper stock is locked into the console in order to introduce into the console the department number consisting of two or more digits as a prefix of the item number contained on ticket 223. For example a ticketed item can be provided with printed and punched data for the number "711" by means of ticket 223. This data can be entered as computer address number "123711"b' when item ticket 223 is scanned in sequence with plate 221 which is punched with department number 123 locked semipermanently into the machine.

In place of ticket 223, the article of merchandise can be provided with printed but not punched tag 226 (FIG. 44) which merely bears a visual representation of the item number 227, such as "711" that is a suitable item but not department address to the computer memory. In such a case, the clerk or department manager would insert ticket 221 into the console of the invention in order to scan information such as department number, etc. from the ticket. At the same time, the clerk would insert item number 227 from tag 226 attached to the goods by string 228 manually by actuating the keyboard of the console. As a result, upon the occurrence of the scan cycle, the item number printed on tag 226 as well as the date prepunched on ticket 221 identifying the department number would be inserted into the data processing system.

Tag 229 (FIG. 45) having the code system of tag 223, that is a code based upon a minimum number of columns and channels, includes the staggering or offsetting of code fields 230 and 231. Thus any limited amount of information, such as the price can be provided in addition to the coded information of the item number.

In another embodiment of the invention, provision is made for the entry of two or more longitudinally extending columns of alpha numeric data on tape member 232 (FIG. 6) by the actuation of only one of keys 33 of console 20. In order to accomplish this, one or more columns 233 of openings 234 are positioned at intervals along the tape which align with the scanning device whenever a key of the decade is depressed. Openings 234 of each column are positioned along predetermined transverse channels 235.

Tape 232 can be scanned by any of the scanning arrangements previously described. With the provision of multiple columns 233 of code groupings on tape 232, two or more numbers or letters or any combination thereof can be read into the system as the scanner moves with respect to tape 232. As a result the depressing of a single key 33 in the keyboard can command that a variety of different data be introduced into the system. Of course where a plurality of columns of code openings are to be read simultaneously from tape 232, it becomes necessary to increase the lateral dimension of aperture or window 76 of mask 77 in order to insure that the radiant energy from the two columns in the tape can be applied to the scanner. In addition, the scanner is provided with a plurality of arrays of photosensitive semiconductive devices 88. Similarly in the case of scanner 153, it is necessary to provide a plurality of columns of openings 156a-d and at the same time a plurality of arrays of photocells 155.

In certain instances where tape 232 is provided with multiple columns of code openings 234, it is desirable to determine selectively which column or columns 233 of tape 232 are to be scanned. In such a case, mask 77 of scanner 81 or mask 153a of scanner 153 is replaced by mask 236 (FIG. 47). Mask 236 includes upper and lower plates 236a and b, respectively, each having openings 236c therein. By means of actuator 237, such

as a solenoid or other electromechanical device, openings 236c of upper plates 236a may be positioned with respect to openings 236c of lower plate 236b from a partially overlapping position where a first column is exposed, through a neutral position where the overlapping openings expose all of the columns, and to an alternate position where the column opposite the first column is exposed. Thus, solenoid 237 enables a predetermined column or columns of tape 232 to be scanned.

In the arrangement of FIG. 48, upper plate 236a is positioned with respect to lower plate 236b by solenoid 237 or other electromechanical devices mounted upon the lower plate. The movement of the upper plate with respect to the lower one is similar to that discussed with respect to FIG. 47. In addition there is provided solenoid or electromechanical device 238 for moving the upper and lower plates together as a unit. With this arrangement, solenoid 237 can be operated to position upper plate 236a and thereby determine the size of the opening by the overlapping of apertures 236c of the upper and lower plates. Subsequently, the overlapping apertures can be aligned with one or more of columns 233 by positioning the upper and lower plates together by means of solenoid 238. Thus for example, any two adjacent columns 233 can be scanned while the remaining column is masked out by the upper and lower plates.

In the arrangement of FIG. 49, mask 239 underlies tapes 232 having a plurality of openings 233. Apertures 239a in mask 239 are provided for only a single column of the openings in the tape. The particular column to be read from each of tapes 232 is selected by the transverse positioning of mask 239 as indicated by the arrow and FIG. 39. FIG. 50 shows an arrangement including mask 240 which is similar to mask 239 with the exception that opening 240a is sufficiently wide to align with the pair of columns 233 of the openings in tape 232. Thus with the arrangement of FIG. 50, two columns of tape 232 can be scanned simultaneously. The transverse movement of mask 240 as represented by the arrow in FIG. 50 enables the pair of columns which are to be scanned to be preselected.

As previously described, the exhausting of the paper tape or the failure of the paper tape punch 134 to operate is sensed by tape sensing switch 134a (FIG. 51). The actuation of switch 134b in turn causes indicating lamp bearing the legend "Tape" 134a to be eliminated. At the same time, switch 134b can actuate relay 134c which is serially connected to the power line for console 20. With this arrangement, a stoppage of paper tape punch 134 results in the deenergizing of the console. Once the stoppage or exhausting of the paper tape has been corrected, sensing switch 134 resets and enables relay 134c to energize console 20.

If for any reason, output logic circuit 120 fails to send output pulses from scanner 153 to a recorder, such as magnetic recorder 207, the output of the console must receive a warning signal concerning the lack of transmission of data from the console. As shown in FIG. 52, the output logic circuit is connected through output sensing circuit 241 to magnetic recorder 207 or to computer or electronic data processing (EDP) center 208. The sensing circuit contains a time delay device such as a time delay relay. In the case of the interruption of data through the sensing circuit for a predetermined time period, such as 1 second, the time delay device within circuit 241 completes its cycle of operation and actuates indicator 242 so that the operator is informed that an interruption in data transmission has occurred. In normal operation, the transmission of data through sensing circuit 241 has a sufficiently small interval between pulses to prevent the actuation of the time delay device. Consequently, only an excessive period of no transmission, such as more than 1 second, will result in the actuation of indicator 242.

As shown in FIG. 52, interrogator 209 is connected between recorder 207 which can include a plurality of rewinding devices and computer or electronic data processing center 208. The interrogator in response to the command of the com-

puter or a human operator is adapted to select one of the recording devices of recorder 207 and to actuate the recording device to play back the stored data into computer 208. At the end of the playback of one of the recording devices of recorder 207, the interrogator is adapted to actuate the playback of a different recording device in the recorder. In this way at a predetermined time, all of the data stored in recorder 207 can be delivered to computer 208. Interrogator 209 can be located either at recorder 207 or at computer 208.

This arrangement enables the data stored in the computer to be held for an indeterminate period of time and then to be made available to the computer. Consequently, a plurality of the console units of the invention can be serviced by a single computer.

While there has been shown what are considered to be preferred embodiments of the invention, it will be understood that many changes and modifications may be made therein without departing from the essential spirit of the invention as defined in the accompanying claims.

I claim:

1. An apparatus for entering fixed data from a code representation stored on a record and for entering variable data into a data processing system comprising means for receiving the record, a keyboard for accepting variable data in response to a manual command, a member integral with said apparatus and having code representations thereon in the same form as are on the record so that a scanner that can scan the code representations of the record can scan the code representations on the member and vice versa, means responsive to actuation of the keyboard for selecting the code representation of the variable data accepted on the keyboard on said member, and means for scanning the code representations of the record in the receiving means and the code representations selected on the member to produce an output signal therefrom adapted to be inserted into a data processing system.

2. An apparatus for entering fixed data from a code representation thereof stored on a record and for entering variable data into a data processing system comprising means for receiving the record, a member integral with said apparatus and having code representations thereon in the same form as are on the record, a keyboard having a plurality of keys, said keys being adapted to be actuated in response to a manual command to accept data, means responsive to the actuation of keys of said keyboard for selecting the code representations of the data accepted by said keyboard on said member, and single means for scanning the selected code representations on the member and the code representations on the record in the record receiving means to produce an output signal therefrom adapted to be inserted into a data processing system.

3. An apparatus for entering fixed data from a code representation stored on a record and for entering variable data into a data processing system comprising means for receiving the record, a keyboard for accepting data in response to a manual command, at least one member having code representations corresponding to the data which said keyboard accepts with the code representations on the member being of the same format as the code representations on the record, means responsive to actuation of said keyboard for cyclically moving said member until the coded representations on said member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representations of said record with receiving means and said member at said predetermined position to produce an output signal therefrom adapted to be inserted into a data processing system.

4. An apparatus for entering fixed data from a code representation thereof stored on a record and for entering variable data into a data processing system comprising means for receiving the record, a keyboard for accepting data in response to a manual command, at least one tape member having code representations disposed along the length thereof

corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the coded representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representations of said record in the receiving means and said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

5. An apparatus for entering fixed data from a code representation thereof stored on a record and for entering variable data into a data processing system comprising means for receiving the record, a keyboard, said keyboard having a plurality of keys for accepting data in response to a manual command, each of said keys having an abutment member, at least one tape member having code representations corresponding to the variable data which said keyboard accepts, means connected to said tape member for engaging said abutment member actuated in response to a manual command when the coded representation of said tape member corresponding to the data accepted by said keyboard is at a predetermined position, means for cyclically moving said tape member until said engaging means engages said abutment member, and means for scanning the code representations of said record in the receiving means and said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

6. An apparatus for entering fixed data from a code representation in the form of at least one opening stored on a record and for entering variable data into a data processing system comprising means for receiving a record, a keyboard for accepting data in response to a manual command, at least one tape member having code representations each in the form of at least one opening disposed along the length thereof and corresponding to the variable data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the coded representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representation opening of the record in the receiving means and of said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

7. An apparatus for entering fixed data from a code representation in the form of at least one opening stored on a record and for entering variable data into a data processing system comprising means for receiving a record, a keyboard for accepting data in response to a manual command, at least one tape member having code representations each in the form of at least one opening disposed along the length thereof and corresponding to the variable data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the code representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, a source of radiant energy extending adjacent to the predetermined position and said receiving means and means for scanning the radiant energy conditioned by the code representation of the record in the receiving means and of said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

8. An apparatus for entering fixed data from code representations in the form of groupings of openings on a record and variable data into a data processing system comprising means for receiving the record, a keyboard for accepting data in response to a manual command, said keyboard having a plurality of keys, a tape member disposed beneath each of said columns of keys, said tape member having a plurality of groupings of openings, said groupings of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of

said keyboard for cyclically moving each of said tape members until the grouping thereon corresponding to the data accepted by said keyboard is at a predetermined position, a source of radiant energy for directing said radiant energy toward each of said tapes adjacent said predetermined position and said record in said receiving means, means for producing an output signal in response to said radiant energy conditioned by the grouping of one of said tapes adjacent said predetermined position and said record, said output signal being adapted to be inserted in a data processing system, and means for moving said signal producing means adjacent to the grouping at said predetermined position of each of said tape members and said record, whereby the output signals of said signal producing device are adapted to be inserted in a data processing system.

9. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one elongated member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts, means including cyclically operable means responsive to the actuation of said keyboard for cyclically moving said member until the code representation on said member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representations of said member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

10. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the coded representation on said member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representation of said tape member at said predetermined position to produce an output signal therefrom to be inserted in a data processing system.

11. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one metallic tape member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said member until the coded representation on said member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representation of said member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

12. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one resilient tape member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts means spaced apart from one another for winding the opposite end portions of said tape member, means responsive to the actuation of said keyboard for cyclically moving said member until the code representation on said member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representation of said member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

13. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one resilient tape member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts, means spaced apart from one another for winding the opposite end portions of said tape member, said tape member having a substantially constant torque characteristic when its wound con-

dition with respect to said winding means is varied, means responsive to the actuation of said keyboard for cyclically moving said member until the code representation on said member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representation of said member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

14. An apparatus for entering data into a data processing system comprising a keyboard, said keyboard having a plurality of keys for accepting data in response to a manual command, each of said keys having an abutment member, at least one tape member having code representations corresponding to the data which said keyboard accepts, means connected to said tape member for engaging said abutment member actuated in response to a manual command when the coded representation of said tape member corresponding to the data accepted by said keyboard is at a predetermined position, means for cyclically moving said tape member until said engaging means engages said abutment member, and means for scanning the code representation of said member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

15. An apparatus for entering data into a data processing system comprising a keyboard, said keyboard having a plurality of keys adapted to be actuated for accepting data corresponding thereto in response to a manual command, each of said keys having an abutment member, at least one tape member having code representations disposed along the length thereof corresponding to the data which each actuated key accepts, a stud connected to said tape member for engaging said abutment member of a key actuated in response to a manual command when the coded representation on said tape member corresponding to the data accepted by an actuated key is at a predetermined position, means for cyclically moving said member until said engaging means engages said abutment member, and means for scanning the code representation of said member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

16. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having code representations each in the form of at least one opening disposed along the length thereof and corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the coded representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representation opening of said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

17. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having a plurality of groupings of openings, said groupings of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the grouping on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the grouping of openings at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

18. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having code representations each in the form of at least one opening disposed along the length thereof and corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape

member until the code representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, a source of radiant energy disposed adjacent to the predetermined position, and means for scanning the radiant energy condition by the code representation of said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

19. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having a plurality of groupings of openings, said groupings of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the grouping on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, a source of radiant energy disposed adjacent to the predetermined position, and means for scanning the radiant energy conditioned by said grouping of openings of said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

20. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts, means spaced apart from one another for winding the opposite end portions of said tape member, a clutch in engagement with one of said winding means, means responsive to the actuation of said keyboard for driving said clutch until the code representation on said tape member coupled corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the code representation of said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system.

21. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, said keyboard having a plurality of keys, a tape member disposed beneath each of said columns of keys, said tape member having a plurality of groupings of openings, said groupings of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving each of said tape members until the grouping thereon corresponding to the data accepted by said keyboard is at a predetermined position, a source of radiant energy for directing said radiant energy toward each of said tapes adjacent said predetermined position, means for producing an output signal in response to said radiant energy conditioned by the grouping of one of said tapes adjacent said predetermined position, said output signal being adapted to be inserted in a data processing system, and means for cyclically moving said signal producing means adjacent to the grouping at said predetermined position of each of said tape members, whereby the output signals of said signal producing device are adapted to be inserted in a data processing system.

22. An apparatus for entering fixed data from code representations of groupings having pairs of openings on a record and variable data into a data processing system comprising means for receiving the data, a keyboard for accepting data in response to a manual command, at least one tape member having a plurality of groupings of pairs of openings, said groupings of pairs of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the grouping on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, a

source of radiant energy extending adjacent to the predetermined position and said record, means for scanning the radiant energy condition by said grouping of a pair of openings of each of said tape members at said predetermined position and said record to produce an output signal therefrom adapted to be inserted in a data processing system, and means for interrupting the scanning by said scanning means in response to the scanning of one of said groupings which fails to condition said radiant energy through the pair of said openings thereof.

23. An apparatus for entering fixed data from a code representation thereof stored on a record and for entering variable data into a data processing system and for producing a signal indicative of the variable data so entered and the fixed data on the record comprising means for receiving the record, a keyboard, said keyboard having a plurality of keys for accepting data in response to a manual command, each of said keys having an abutment member, at least one tape member having code representations corresponding to the variable data which said keyboard accepts, means connected to said tape member for engaging said abutment member actuated in response to a manual command when the coded representation of said tape member corresponding to the data accepted by said keyboard is at a predetermined position, means for cyclically moving said tape member with respect to a rest position thereof until said engaging means engages said abutment member, means advancing from another rest thereof for scanning the code representations of said record in said record receiving means and said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted in a data processing system corresponding to the variable data entered into the apparatus and the fixed data on the record, and means for actuating the return of said tape member to said rest position and said scanning means to said other rest position in response to the completion of scanning by said scanning means.

24. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts, means spaced apart from one another for winding the opposite end portions of said tape member, means responsive to the actuation of said keyboard for moving said member with respect to a rest position thereof until the coded representation on said member corresponding to the data accepted by said keyboard is at a predetermined position, means advancing from another rest position thereof for scanning the code representation of said member at said predetermined position to produce an output signal therefrom to be inserted in a data processing system, and means for actuating the return of said tape member to said rest position and said scanning means to said other rest position in response to the completion of scanning by said scanning means.

25. An apparatus for entering fixed data from code representations in the form of groupings of openings on a record and variable data into a data processing system comprising means for receiving the record, a keyboard for accepting data in response to a manual command, said keyboard having a plurality of keys, a tape member disposed beneath each of said columns of keys, said tape member having a plurality of groupings of openings, said groupings of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving each of said tape members until the grouping thereon corresponding to the data accepted by said keyboard is at a predetermined position, a source of radiant energy for directing said radiant energy toward each of said tapes adjacent said predetermined position and said record which may be scanned after being accepted in the apparatus by the receiving means, a plurality of semiconductor devices adapted to be activated to produce an output signal in response to the application of said radiant

energy thereto, each of said plurality of semiconductor devices being disposed in a position to be conditioned by an opening disposed in a different one of the positions for an opening in one of said groupings of openings, said output signal being adapted to be inserted in a data processing system, and means for moving said signal producing means adjacent to the grouping at said predetermined position of each of said tape members and said record, whereby the output signals of said signal producing device are adapted to be inserted in a data processing system.

26. An apparatus for entering fixed data and for entering variable data into a data processing system and for producing a signal indicative of the variable data and fixed data so entered comprising a keyboard for accepting data in response to a manual command, at least one tape member having code representations disposed along the length thereof corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the coded representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, at least one other tape member having code representations disposed along the length thereof, means for manually moving said other tape member until the coded representation of said other tape member corresponding to fixed data is at another predetermined position, and means for scanning the code representations of said tape member at said predetermined position and said other tape member at said predetermined position for that tape member to produce an output signal therefrom corresponding to the fixed and variable data entered into the apparatus and which is adapted to be inserted in a data processing system.

27. An apparatus for deriving fixed data from code representations in the form of groupings of openings on a record and variable data comprising means for receiving the record, a keyboard for accepting data in response to a manual command, said keyboard having a plurality of keys, a tape member disposed beneath each of said columns of keys, said tape member having a plurality of groupings of openings, said groupings of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving each of said tape members until the grouping thereon corresponding to the data accepted by said keyboard is at a predetermined position, a lamp source for sequentially directing radiant energy toward the groupings of openings of each of said tape members adjacent said predetermined position and said record, a plurality of photoresponsive devices adapted to be activated to produce an output signal in response to the application of said radiant energy thereto, each of said plurality of photoresponsive devices being disposed in a position adapted to be conditioned by said radiant energy transmitted through a different one of the openings of said groupings of openings, each of said output signals representing one of fixed data and variable data, and means for moving said lamp and said plurality of photoresponsive devices adjacent to the grouping at said predetermined position of each of said tape members and said record, whereby the output signals represent said fixed data and said variable data.

28. Apparatus in accordance with claim 27 in which said lamp source comprises a lamp disposed along a line extending substantially perpendicular to the plane of said tape members at said predetermined position and the plane of said record, said lamp being adapted to direct a pattern of radiant energy toward said grouping of openings.

29. Apparatus in accordance with claim 27 in which said lamp source comprises a pair of lamps spaced apart from one another and adapted to direct overlapping patterns of radiant energy toward said groupings of openings.

30. An apparatus in accordance with claim 27 in which said lamp source comprises a pair of lamps disposed spaced-apart from one another, each of said lamps being disposed in a common plane along different lines therein which extend at sub-

stantially equal angles to line in said common plane and perpendicular to the plane of said tape members at said predetermined position and the plane of said record, each of said lamps being adapted to direct a pattern of radiant energy toward said grouping of openings.

31. An apparatus in accordance with claim 27 and further comprising structure forming a housing, said plurality of photoresponsive devices being disposed in said housing opposite an opening therein, a mask member for covering said opening and having a grouping of apertures corresponding to all of the positions of openings in a grouping of openings for code representation, each of said apertures being adapted to direct radiant energy toward a different one of said plurality of photoresponsive devices.

32. An apparatus in accordance with claim 31 in which said plurality of photoresponsive devices are disposed in said housing along an arcuate line whose concave side faces said mask, each of said plurality of photoresponsive devices being intersected by a different one of a plurality of divergent lines extending from said grouping of apertures.

33. An apparatus in accordance with claim 32 in which said housing contains a plurality of vane members extending across said housing in a divergent manner from between each adjacent pair of said apertures to between each adjacent pair of said photoresponsive devices, whereby said vane members restrict the radiant energy transmitted by each aperture to a different one of said plurality of photoresponsive devices.

34. An apparatus in accordance with claim 31 in which said apertures of said mask are symmetrical with respect to a central axis of symmetry, the outermost of said apertures being larger than the innermost of said apertures, whereby the difference in size of said apertures insures that each of said plurality of photoresponsive devices receives radiant energy necessary to activate the same.

35. An apparatus in accordance with claim 34 in which said outermost apertures of said mask are elongated in a direction parallel to the longitudinal axis of the grouping or openings.

36. An apparatus for deriving fixed data from code representations in the form of groupings of openings on a record and variable data comprising means for receiving the record, a keyboard for accepting data in response to a manual command, said keyboard having a plurality of keys, a tape member disposed beneath each of said columns of keys, said tape member having a plurality of groupings of openings, said groupings of openings being disposed along the length of said tape member and being related to code representations corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving each of said tape members until the grouping thereon corresponding to the data accepted by said keyboard is at a predetermined position, a lamp source for sequentially directing radiant energy toward the groupings of openings of each of said tape members adjacent said predetermined position and said record, a plurality of photoresponsive devices adapted to be activated to produce an output signal in response to the application of said radiant energy thereto, means for directing said radiant energy transmitted by each of said openings of said grouping of openings to a different one of said plurality of photoresponsive devices, each of said output signals representing one of fixed data and variable data, and means for moving said lamp and said plurality of photoresponsive devices adjacent to the grouping at said predetermined position of each of said tape members and said record, whereby the output signals represent said fixed data and said variable data.

37. An apparatus in accordance with claim 36 in which said means for directing said radiant energy transmitted by each of said openings of said grouping of openings to a different one of said plurality of photoresponsive devices comprises a mirror for each of said photoresponsive devices, each of said mirrors being positioned with respect to a different one of said photoresponsive devices to direct radiant energy passed through said opening toward said photoresponsive device.

38. An apparatus for entering fixed data from a code representation on a record in the form of at least one magnetic code representation disposed thereon and for entering variable data into a data processing system comprising means for receiving a record, a keyboard for accepting data in response to a manual command, at least one tape member having code representations thereon, each in the form of at least one magnetic portion disposed along the length thereof and corresponding to the variable data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the coded representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the magnetic code representation in the form of a magnetic portion disposed on the record in the receiving means and on said tape member at said predetermined position to produce an output signal therefrom representing the fixed data and the variable data.

39. An apparatus for entering fixed data from a code representation in the form of at least one magnetic recording disposed on a record and for entering variable data into a data processing system comprising means for receiving a record, a keyboard for accepting variable data in response to a manual command, at least one tape member having code representations each in the form of at least one magnetic recording disposed along the length thereof and corresponding to the variable data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the code representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, and means for scanning the magnetic code representation of the record in the receiving means and of said tape member at said predetermined position to produce an output signal therefrom representing the fixed data and the variable data.

40. An apparatus in accordance with claim 39 in which said code representation in the form of at least one magnetic recording comprises a magnetized portion of said tape member.

41. An apparatus in accordance with claim 39 in which said code representation in the form of at least one magnetic recording comprises a magnetic permeable material mounted upon said tape member.

42. An apparatus for entering fixed data from an optical code which can be optically scanned stored on a record and for entering variable data into a data processing system comprising means for receiving the record, a keyboard for accepting variable data in response to a manual command, means responsive to the actuation of said keyboard for forming a code representation of the variable data accepted by said keyboard, and means for scanning the optical code representations of the record for the record receiving means and said forming means to produce different output signals therefrom corresponding to each different code representation.

43. An apparatus in accordance with claim 42 in which said means for scanning the code representations of the record and said forming means to produce a different output signal therefrom corresponding to each different code representation comprises a tone generator actuated in response to each different output signal to produce a different tone frequency.

44. An apparatus for entering fixed data from a code representation thereof stored on a record in a plurality of columns and for entering variable data into a data processing system comprising means for receiving the record, a keyboard for accepting data in response to a manual command, at least one tape member having code representations in the same form as on the record and disposed in a plurality of additional columns extending along the length thereof and corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the coded representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, means for scanning the code

representations of the record in the record receiving means and said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted into a data processing system, means disposed adjacent said predetermined position for exposing only a predetermined number of said plurality of columns and said plurality of additional columns to said scanning means, whereby fixed data and variable data from predetermined columns of predetermined additional columns can be entered.

45. An apparatus in accordance with claim 44 in which said means for exposing a predetermined number of said plurality of columns and said plurality of additional columns to said scanning means comprises a mask member having at least one opening therein for the plurality of columns on the record and at least one additional opening therein for the plurality of additional columns of said tape member, and means for positioning said mask member with respect to at least one predetermined column of the plurality of columns of the record and at least one predetermined additional column of the plurality of additional columns of said tape member.

46. An apparatus in accordance with claim 44 in which said means for exposing a predetermined number of said plurality of columns and said plurality of additional columns to said scanning means comprises a plate having at least one opening therein sufficient to uncover at least a pair of adjacent columns of the plurality of columns on the record and an additional opening therein sufficient to uncover at least a pair of adjacent additional columns of said tape member, and an additional plate disposed adjacent said plate and having different aperture for alignment with each of said opening and said additional opening in said plate, each of said apertures being sufficient to uncover said opening and said additional opening when in register therewith, and means for changing the relative position of said plate and said additional plate to determine the extent of overlap of said apertures with said opening and said additional opening, whereby the relative position of said plate and said additional plate determines the number of said columns and said additional columns to be scanned.

47. An apparatus in accordance with claim 46 and further comprising means for shifting said plate and said additional plate together with respect to said plurality of columns and said plurality of additional columns to determine which of said plurality of columns and said plurality of additional columns are to be exposed to said scanning means.

48. An apparatus for entering data into a data processing system comprising a keyboard for accepting data in response to a manual command, at least one tape member having code representations disposed in a plurality of columns extending along the length thereof and corresponding to the data which said keyboard accepts, means responsive to the actuation of said keyboard for cyclically moving said tape member until the code representation on said tape member corresponding to the data accepted by said keyboard is at a predetermined position, means for scanning the code representations of said tape member at said predetermined position to produce an output signal therefrom adapted to be inserted into a data processing system, and means disposed adjacent said predetermined position for exposing only a predetermined number of said plurality of columns to said scanning means whereby data from predetermined columns can be entered.

49. An apparatus in accordance with claim 48 in which said means for exposing a predetermined number of said plurality of columns to said scanning means comprises a mask member having at least one opening therein for the plurality of columns of said tape member, and means for positioning said mask member with respect to at least one predetermined column of the plurality of columns of said tape member.

50. An apparatus in accordance with claim 48 in which said means for exposing a predetermined number of said plurality of columns to said scanning means comprises a plate having at least one opening therein sufficient to uncover at least a pair of adjacent columns of said plurality of columns, and an additional plate disposed adjacent said plate and having an aperture adapted for alignment with said opening in said plate, said aperture being sufficient to uncover said opening when in register therewith and means for changing the relative position of said plate and said additional plate to determine the extent of overlap of said aperture with said opening, whereby the relative position of said plate and said additional plate determines the number of said columns to be scanned.

51. An apparatus in accordance with claim 50 and further comprising means for shifting said plate and said additional plate together with respect to said plurality of columns to determine which of said plurality of columns are to be exposed to said scanning means.

52. A method of entering fixed data and variable data into a data processing system comprising the steps of receiving a record having fixed data thereon in a code representation and entering the fixed data being received into a data processing system, accepting variable data in response to a manual command, forming a code representation in response to the variable data being accepted by moving a member having code representations thereon to a predetermined position that corresponds to the variable data accepted with the code representation of the variable data being the same for corresponding fixed data, and sequentially scanning the code representations of the record and the code representations at the predetermined position on the member formed in response to the variable data being accepted to produce an output signal therefrom adapted to be inserted into a data processing system.

53. A method according to claim 52 wherein the step of scanning includes scanning the portion of the member at the predetermined location.

54. A method according to claim 52 wherein the step of scanning includes directing a source of radiant energy towards the record and the member and determining the amount of radiant energy transmitted through the record and the member.

55. A method according to claim 52 wherein the member is a tape having openings disposed along its length and cyclically moving the tape until the opening therein corresponding to the variable data accepted are at the predetermined position.

56. A method according to claim 54 wherein the tape and record each include representations of groupings having pairs of openings including the step of interrupting the scanning of the record and tape member in response to the scanning of one of the groupings which fails to contain radiant energy through the pair of openings thereof.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,548,160 Dated December 15, 1970

Inventor(s) William Bradley Welsh

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

- Column 1, line 53, "date" should be -- data --.
- Column 3, line 17, delete "(FIGS." and insert -- line --
- Column 5, line 13, after "shown in" delete -- in --.
- Column 5, line 69, "\$4.00" should be -- four dollars --.
- Column 5, line 70, "further" should be -- Further --.
- Column 5, line 71, "right" should be -- left --.
- Column 5, line 72, "right" should be -- left --.
- Column 6, line 1, "sub assembly" should be -- sub-assembly.
- Column 6, line 2, after "7" insert --) --.
- Column 8, line 66, "semi permanent" should be -- semi-permanent.
- Column 11, line 44, Opening ", should be on line 45.
- Column 11, line 70, after "pair" delete "of" and insert --
- Column 14, line 51, after "to" delete "the".
- Column 17, line 32, "is" should be -- in --.
- Column 20, line 19, change " "123711"b' " to -- 123711 --
- Column 20, line 45, "FIG. 6" should be -- FIG. 46 --.

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(5/69)UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTIONPatent No. 3,548,160 Dated December 15, 1970Inventor(s) William Bradley Welsh

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

Column 23, line 22, change "saidape" to -- said tape --.

Column 29, line 1, after "to" insert -- a --.

Column 29, line 49, "off" should be -- of --.

Column 32, line 52, "opening" should be -- openings --.

Signed and sealed this 27th day of April 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer.

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents