

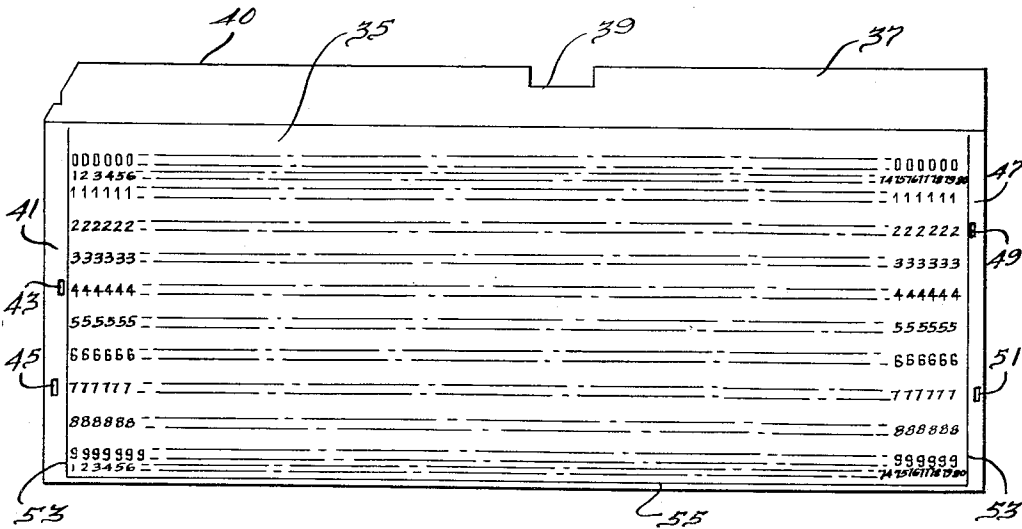
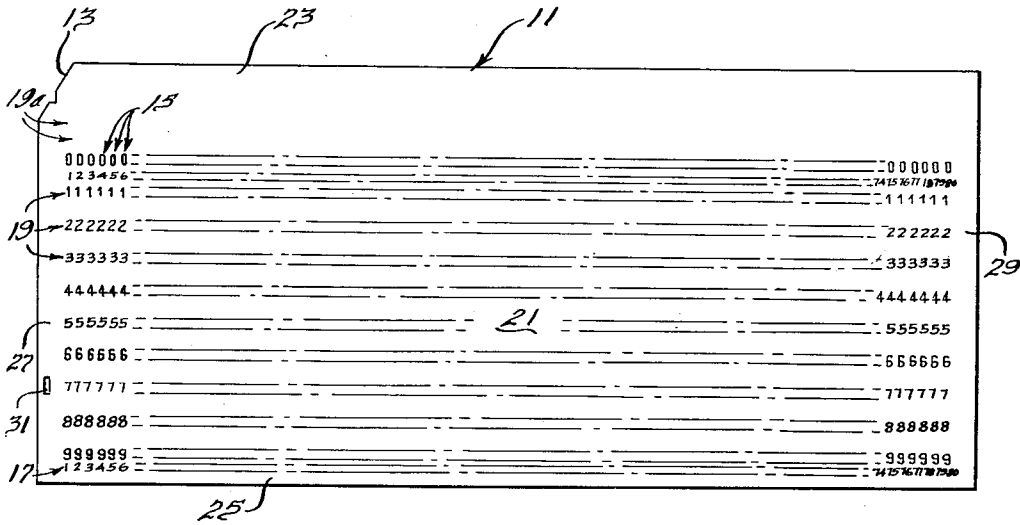
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PUNCH CARD

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PUNCH CARD

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This invention relates to data processing and particularly to a punch card of the type adapted to serve as a data storage medium.

It is an object of the present invention to provide a punch card having a pre-punched hole therein located outside of the field adapted to be punched by a card user and in a position denoting an instantly recognizable physical characteristic of the card whereby a group of such cards may be sorted by sensing the location of said hole and the accuracy of the sorting operation verified by observation of the physical characteristics of the cards.

It is another object of the present invention to provide a punch card having a pre-established marginal punch in a location corresponding to the color of the card, whereby a group of cards may be sorted by sensing of the margin and the sorted cards checked for color to corroborate the accuracy of the sort.

It is another object of the present invention to provide a punch card having means for the sorting thereof which does not interfere with pre-established informational programs occupying the field normally available for punching in a given card system.

It is still another object of the present invention to provide a punch card of the above character having additional means for being sorted which may be utilized on existing sorting machines with only minor and easily made adjustment of such machines.

It is another object of the present invention to provide means for verifying the accuracy of a sorting operation which eliminates the necessity for visually sighting through aligned punch holes in a stack of cards or threading a needle through the aligned holes in a stack of cards but in which the verification of the sorting operation and detection of improper cards may be made instantly upon observation of a stack of cards.

These and other objects of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a view of a punch card illustrating one form of the present invention; and

FIG. 2 is a view of a punch card illustrating another form of the present invention.

The standard punch card consists of a rectangular sheet of heavy paper having opposite lateral margins and top and bottom margins, all located on the opposite sides of what is known as the "field." The field comprises an area within the card which is divided into a series of vertical columns each having vertically spaced numbered locations therein adapted to be sensed by the machines with which the cards are used to detect the presence of holes in such locations. In one punch card system currently in use, the card is divided into eighty vertical columns with each column extending from the top to the bottom margin of the card and there are twelve locations within each column adapted to be punched. This system is referred to as an eighty field card and the cards illustrated in FIGS. 1 and 2 of the drawings are of this type. However, in another popular system, the card is divided in half across its horizontal mid-line and the upper half of the field contains forty-five vertical columns and the bottom half of the card contains an additional forty-five columns, for a total of ninety columns. While the present invention is illustrated in the form of an eighty field punch card, the invention is equally applicable

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to any card system having a distinct field adapted to be punched and a marginal portion outside said field.

While a card user may establish any desired code by which the presence of a hole or holes in particular locations in each of the columns is given a particular meaning, certain conventions are frequently followed. For example, in one system, the presence of a hole in a given one of ten locations in a column indicates numbers from zero to nine. The presence of holes in particular combinations of locations represents the various letters of the alphabet or mathematical or other printed symbols.

In normal practice, cards are supplied to the users by the manufacturer in an unpunched condition and the user punches the cards in the desired locations by means of a card punching machine. The card thus becomes a permanent record of the information punched thereon. In addition, there generally is a space available on the card for printing in which the subject matter, name or heading of the information stored on the card may be placed. The card may thereafter be used in conjunction with many other cards in the operation of computing machines, tabulating machines, printing machines or other machines for the performance of a wide variety of accounting, reporting, computing, billing or other functions.

There exist many machines which function only in the handling of the cards themselves. Examples of such machines are sorters, collators and verifiers. A sorter is a machine capable of rapidly scanning a given column of each one of a group of cards and sorting the cards into separate groups according to the punched information in that column. For example, in one sorter for use with cards having twelve punchable locations in each column, the sorted cards are distributed into one of thirteen different pockets; a separate pocket for each card having a punch in one of the twelve possible locations and a pocket for cards having no punch in the selected column. Such machines are built to scan each of the columns which make up the "field" of the card. In operation, the card is held against the electrically conductive surface of a rotating drum. When a given column is to be sensed, an electrically conductive brush is held against the card in alignment with the selected column and the brush moves over all locations on the column with the rotation of the card. A potential exists between the drum and the brush but the card serves as an insulator to prevent the passage of current therebetween. However, when a punch or hole comes into alignment with the brush, a circuit is completed between the brush and drum. The location of the hole is determined by the angular position of the drum at the instant the circuit is established. Hence, the location of each hole is electrically sensed by the sorting machine. According to the present invention, each punch card is provided with a predeterminedly located punch hole outside of the normal field adapted to be punched by the user but in a location which may be sensed by a sorting machine to sort the cards according to a readily identifiable physical characteristic thereof, thus permitting instantaneous observation of such physical characteristics for verifying the accuracy of the sorting operation.

FIGURE 1 illustrates one form of the present invention in which a generally rectangular punch card 11 is made of the customary heavy paper material. The card is of a uniform, solid color, as, for example, blue. The upper left-hand corner of the card is angularly cut off, as indicated at 13, which is a standard practice to facilitate the handling of the card and forms no part of the present invention. There is printed on the card a series of vertical columns 15 comprising numbers from zero to nine. In the type of card illustrated, these columns total 80 in number and each is identified by a number at the bottom of the column, said numbers forming a horizontal row 17

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across the bottom of all of the columns. The like numbers of each column are aligned in horizontal rows 19. Although not printed on the card, the space immediately above the top row 19 is included within what is normally termed the "field" 21, that is, the area on the card which is adapted to be punched by the card user. The unprinted portion of the card immediately above the top row 19 is of sufficient size to accommodate two additional rows and the location of each is indicated at 19a. In one conventional code system, one or the other of the rows 19a is punched in a given column along with one of the rows 19 in the column to indicate certain of the letters of the alphabet. The field thus occupies the area of the card defined by the rows 19 and 19a, as well as by the columns 15. The field 21 is bounded on its several sides by a top margin 23, a bottom margin 25 and opposite side or lateral margins 27 and 29. The top margin 23 is considerably wider than the other margins, in order to permit printing on the upper part thereof, if it is desired, to provide the card with a visually readable title or heading. The opposite lateral or side margins 27 and 29 are of a width slightly greater than the width of the columns 15 and serve to provide means for holding the card during handling or processing in certain of the machines.

The present invention comprehends the use of one or more of the marginal portions of the card as an additional data storage media. I have discovered that with minor modifications presently available commercial sorting machines can be made capable of scanning or sensing the lateral margins 27 and 29. Such modification only involves the substitution of different brush units for those normally intended to cover the number 1 and 2 columns (for scanning the margin 25) or for the number 79 or 80 columns (for scanning the margin 29). The substituted brushes are provided with angled or bent shanks or supporting portions so that the head of the brush is positioned in the desired location in the margin. Such substitution may be made with a minimum of difficulty on presently available sorting machines and would involve only the minor expenses of having available substitute brushes for use when it is desired to scan or sense the margins.

In recognition of the above discovery, I have provided one or more punch holes in one of the lateral margins, such as the punch hole 31 in the margin 27. The punch hole 31 is predeterminedly located according to an established system to indicate a physical characteristic of the card, such as its color. Thus, in the card illustrated, the presence of the marginal punch 31 in the number 7 row would indicate the assumed blue color of the card. According to any desired system, the presence of the marginal hole 31 in other horizontal rows 19 would indicate various other colors. It is my intention that cards made in accordance with the present invention would be supplied to card users in a variety of colors with a pre-established marginal punch hole 31 located in a position indicative of the color of the card. Thus, all blue cards supplied to a user would have a marginal punch 31 in the number 7 row; all pink cards would have a pre-punched hole in the number 5 row, etc. By this means, the field 21 normally adapted to be punched by the user is in no way interfered with and card users will not have to interrupt or discontinue previously established programs or systems in order to avail themselves of the present invention.

The system of which the individual cards of the present invention form a part may be used in a variety of situations in order to identify cards of a given type or sub-class but which are normally grouped under a different or separate major class. For example, in personnel records where a number of separate cards are maintained to record different categories of information about each employee, a different colored card could be utilized for payroll deductions, hours worked, master personnel card, etc. When it is desired to sort out all "hours worked"

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cards, this could be done in a sorting machine by scanning the margin which has been punched. Inasmuch as all "hours worked" cards are of a given color, the accuracy of the sort may then be determined at a glance, as all non-blue cards in the supposedly "hours worked" group would be readily apparent by their contrasting color. Inasmuch as the marginal punch corresponding in location to the color of the card is made at the time of the card's manufacture, complete assurance exists that all cards of a given color are punched and punched in the correct location, thereby avoiding errors on the part of individual punching machine operators in the employ of the card user. Inasmuch as twelve vertically spaced locations exist in each marginal column which may be spaced, it will be readily apparent that the color coded system of the present invention may be utilized to indicate cards representing information for each of the months of the year. Similarly, different colored cards could be used for different areas or territories in maintaining sales or other type of geographically divided records. It will thus be apparent that the system of the present invention is adaptable for use in any situation where it is desired to sort out cards of a given sub-class from different groups of cards in distinct main classifications.

FIG. 2 illustrates another form of the present invention in which a card 35 which is primarily of a given solid color (for example, green) is provided with a top marginal strip 37 of a differing color (such as yellow). By this means, the readily identifiable physical characteristic of the card is defined not by one given solid color, but by two different colors, each in a particular location on the card. In addition, another form of readily identifiable physical characteristic is provided on the card by means of a notch 39 cut out of the top margin 37 and extending inwardly from its top edge 40. Thus, the readily identifiable physical character of the card is defined by three separate means: the color of the main portion of the card, the color of the top margin 37, and the horizontal position of the top marginal notch 39. In order to indicate the precise physical character of this card, one of the lateral margins 41 of the card is provided with two marginal punch holes 43 and 45, which are located in each of the two available columns in the margin 41 and, in addition, the opposite lateral margin 47 of the card is provided with punch holes 49 and 51 in separate vertical columns. One of said marginal punch holes is adapted to indicate by its location the position of the notch 39. Thus, the embodiment illustrated in FIG. 2 illustrates that the card may be provided with a variety of physical characteristics which are visually and instantaneously ascertainable and which do not interfere with the field adapted to be punched. In addition, FIG. 2 shows the use of multiple marginal punches which may be sensed by separate sorting operations and each of which is correlated to a separate physical characteristic of the card. In checking on the location of the notch 39, it is only necessary to sight down the top of a stack of cards or to run the finger down the groove formed by the aligned notches 51 in order to detect the presence of a card which is not notched in the correct location. While cards of a given color are ordinarily made so that the color may be detected by observing their edges when stacked in a large group (and thus permitting detection of a dissimilarly colored card) if it occurs that the color of the strip 37 is printed on the card in a manner in which it does not appear on the edge of the card (such as the edge 40), a deck or stack of cards may be quickly fanned to detect a dissimilarly colored margin 37.

While the punch cards 13 and 35 have been illustrated as being provided with printed numbers in ten out of the twelve punchable locations in each row 15, it frequently occurs that such printing is omitted. Under such circumstances, the card is generally provided with other indicia by means of which at least the lateral limits of the field are defined. For example, the numbers de-

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fining the row 17 of the card 11 are often printed on the card and thus indicate the horizontal position of each row 15. Additionally or alternatively, the card may have printed thereon opposite lateral margin lines such as the lines 51 on the card 35, which are shown as being connected by a bottom margin line 53. The margin lines 51 define the lateral limits of the field adapted to be punched by the card user and also indicate the width of the lateral margins 41 and 47. Thus, the field on a card may be indicated by a variety of indicia and is not to be considered as being limited to a printed number in the punchable locations in the columns which make up the field.

From the foregoing, it will be seen that the present invention provides a system for visually and instantaneously verifying the accuracy of a sorting operation. The system is established and built in to the cards at the time of their manufacture, at which time the marginal punches may be inexpensively formed under mass production methods and the possibility of error is drastically reduced. The individual card user is thus provided with an additional means for the sorting of cards, is relieved of the burden of having to punch the cards to establish the sub-class or group identity of each card, and is assured of better verification of the accuracy of sorting operations. Heretofore, in order to verify the accuracy of a sorting operation, it has been necessary to have a machine operator carefully stack a group of cards with their edges in precise alignment, hold the stack of cards up to the light and sight through the aligned holes in the column from which the sort was made. If an unpunched card obstructs the ability of the operator to sight through the cards, the cards had to be placed at rest in a stack and an elongated needle run through the aligned holes until the improperly sorted card was reached. This process is an extremely tedious and time-consuming one. Frequently, when machine operators are tired or overworked, the accuracy of the sorting operation is left unverified, which can result in serious mistakes and the completely erroneous processing of a stack of cards.

While it will be apparent that the preferred embodiments herein illustrated are well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. A punch card having a field provided with a plurality of horizontal rows, each of said rows having spaced locations thereon adapted to be selectively punched by a card user, said card having a pair of vertically extending margins on opposite sides of said field adjacent the side edges of said card, one of said margins having a pre-punched hole therein disposed in alignment with one of the horizontal rows of said field, said one margin being unpunched in locations aligned with the majority of the other of said rows whereby said card may be sorted by electrically sensing the particular row with which said hole is aligned and thereby segregated from cards which do not have marginal holes in a like location.

2. A punch card having a field provided with a plurality of horizontal rows, each of said rows having spaced locations thereon adapted to be selectively punched by a card user, said card having a pair of vertically extending margins on opposite sides of said field adjacent the side edges of said card, one of said margins having a

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pre-punched hole therein disposed in alignment with one of the horizontal rows of said field, said one margin being unpunched in a location disposed in vertical alignment with said hole whereby said card may be sorted by sensing the particular row with which said hole is aligned.

3. A set of punch cards, each of said punch cards having a field provided with a plurality of horizontal rows, each of said rows having spaced locations adapted to be selectively punched by a card user, each of said cards having vertically extending margins on opposite sides of said field adjacent the side edges of the card, one of the margins of each of said cards having a pre-punched hole therein disposed in alignment with one of the rows of the field thereof, said cards being divided into groups with the cards of each group having the holes thereof disposed in like locations which differ from the locations of the holes of each of the other groups whereby all of said cards may be sorted into their respective groups by sensing the location of the pre-punched marginal holes thereof.

4. The structure set forth in claim 1 in which the other vertical margin of said card is provided with at least one pre-punched hole therein in alignment with one of said horizontal rows which may also be sensed electrically for sorting the card from other cards which do not have a marginal hole in a like location.

5. The structure set forth in claim 1 in which said card is provided with a visually distinguishable indicating media other than said hole adjacent one margin thereof correlated to the location of said hole whereby the indicating media of a stack of said cards sorted by the electrical sensing of the location of said hole may be observed to verify the accuracy of the sorting operation.

6. The structure set forth in claim 1 in which said card is provided with a coloring adjacent at least one margin thereof correlated to the location of said hole whereby a stack of said cards sorted by the sensing of said hole may be visually observed to verify the accuracy of the sorting operation.

7. The structure set forth in claim 1 in which said card is provided with a notch in another margin thereof extending inwardly from the adjacent edge of the card and correlated in location to the location of said hole whereby a stack of said card sorted by the electrically sensing of said hole may be observed to verify the accuracy of the sorting operation.

8. The structure set forth in claim 3 in which the cards of each group are provided with a common visually distinguishable indicating media adjacent one edge thereof which is distinguishable from the indicating media of the cards of the other groups whereby a stack of cards of any one of said groups sorted by the electrical sensing of the said holes thereof may be visually observed to verify the accuracy of the sorting operation.

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