July 15, 1947. A. A. REMBOLD 2,424,053

CARD FOR SEQUENCE SORTING

Filed June 7, 1944

Fig. 1.

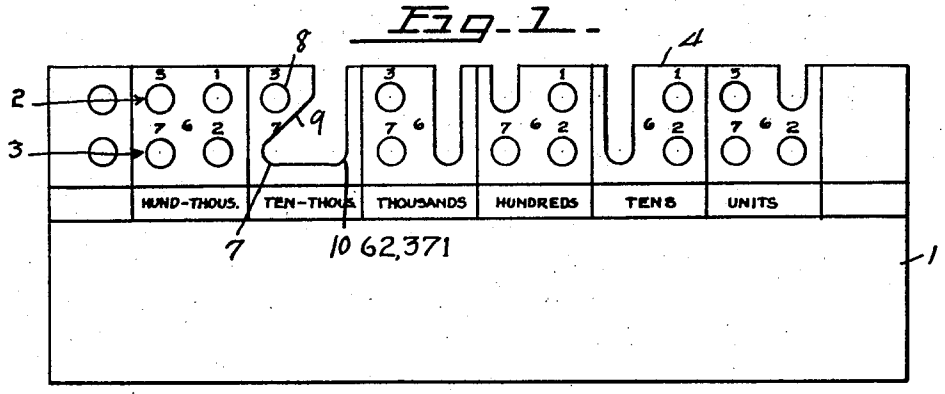


Fig. 2.

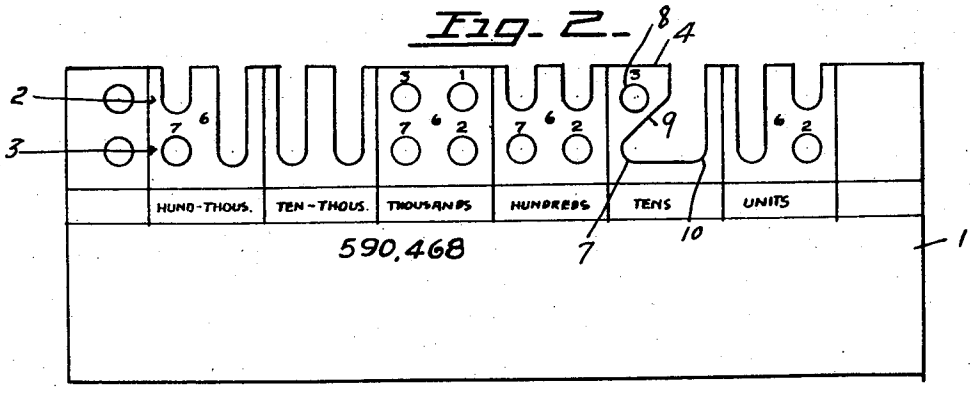


Fig. 3.

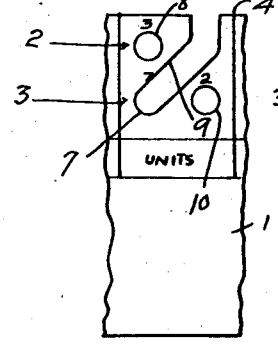


Fig. 5.

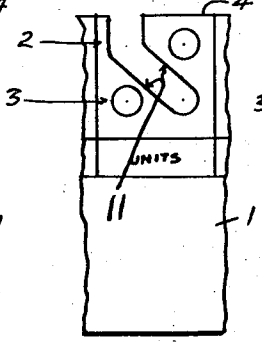
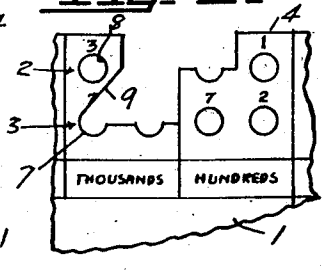


Fig. 4.



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Patented July 15, 1947 2,424,053

UNITED STATES PATENT OFFICE

2,424,053

CARD FOR SEQUENCE SORTING

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Application June 7, 1944, Serial No. 539,102

5 Claims. (Cl. 129—16.1)

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This invention relates to cards, flat sheets, and the like (hereinafter referred to as cards), for classification purposes and for sequence sorting. These cards are formed adjacent one or more edges thereof with openings or perforations, one or more of which are slotted out to the edge of the card adjacent thereto to provide a notch or pattern of notches identifying the card. The openings in all cards are arranged to register with each other when the cards are in a stack so that a separating rod thrust through one set at a time of any sets of registering openings, and then lifted, will carry with it all cards in which said openings are not slotted out, leaving the others free to fall from the stack.

The method employed for sequence sorting is old. Broadly speaking, the general structure is old. Openings to be slotted out have heretofore been arranged in one, two or three rows that are parallel with an edge of the card. These rows are divided into "fields," and these fields ordinarily have the same number of openings in each, and the openings in each field usually have numbers identifying them. They are called coded openings. The fields, in series from one end of the rows to the other are customarily identified for "units," "tens," "hundreds," "thousands," etc., according to the length of the card and the extent to which the numerical classifying system may be required.

Heretofore the openings in each field have been one of the following: two wide (in direction parallel with the edge adjacent thereto) and three deep (in direction perpendicular to the edge adjacent thereto); three wide and two deep; or four wide and one deep. Four numbers, such as 1, 2, 4, 8 or other providing for single and combination identifications of from 1 to 9 inclusive, have been used. In the latest developments only four openings are provided in each field and these have been in one or the other of the above arrangements. Inasmuch as the card space exclusive of that required for the openings is the highly important space for printed or written data, the efforts of those skilled in the art has been constantly devoted to attempts to restrict the space required for the openings without sacrificing the capacity thereof for classificatory work. Thus, if an arrangement of openings could be provided in which the four openings required in each field could be two wide and two deep, the space heretofore required for the openings could at once be reduced by a third. This is what applicant has accomplished, as will hereinafter be disclosed more in detail, and in addition, applicant has increased by one, the capacity of each field for classifying purposes without increase in the number of openings in each field.

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In the drawing:

Fig. 1 is a plan view of a card that is illustrative of the invention, and Fig. 2 is a plan view of a similar card but with a different pattern of notches.

Fig. 3 is a fragmentary plan view of a card showing a field slotted out in accordance with the invention, but which slotting is slightly different from the fields identifying the same numeral in Figs. 1, 2.

Fig. 4 is a fragmentary plan view of a card showing a still further manner of slotting out the fields than is shown in Figs. 1 to 3.

Fig. 5 is a fragmentary plan view of a card showing a field slotted out in a manner for obtaining an additional classification in each field, if so desired.

The cards and openings in each example are identical, so they will be similarly numbered in describing them. The structure providing the variations in the invention will be differently numbered to avoid confusion.

Each card 1 is provided with a row of openings 2 close to an edge thereof and parallel therewith, while a second row of openings 3 is parallel with said edge but spaced slightly farther therefrom. Thus, a pair of parallel rows of openings is adjacent one edge 4 of the card. Of course, a pair of rows of such openings may also be along any one or more of the other edges of said card, if desired.

The openings in these rows are the same in number and are arranged for providing adjacent pairs with the openings of each pair in alignment perpendicular to the edge so each pair comprises an opening from rows 2, 3 respectively. The openings of said rows are divided by lines extending perpendicular to said edge 4 into groups of two of said adjacent pairs, thereby providing four openings in each group arranged two wide (in direction parallel with edge 4) and two deep (in direction perpendicular to said edge).

The openings in row 2 of each group may be identified by the numerals "1," and "3," and the openings in row 3 of each group may be identified by the numerals "7" and "2."

Following the usual practice of slotting out such openings singly or in combinations of two, it will be clear from Figs. 1, 2 that all digits from one to nine are readily obtained by directly slotting out openings in either row 2 or row 3 directly to the edge 4, except in the case of the

numeral "6." In this latter instance, one opening 7 in row 3 of one of said adjacent pairs in ten thousand field is slotted out to edge 4 through the opening in row 2 that is in the other pair of openings in said field. Thus one edge 9 of the notch or slot that opens outwardly of the edge 4 extends slantingly downwardly to opening 7 and below the other opening 8 that is the companion of opening 7 but in row 2. Thus opening 8 in row 2 is left unimpaired.

In the above manner, provision is made for sorting of the digit "6," and whether the numerals identify the openings in a manner to make another specific numeral "6" the one identified with the generally diagonal slotting, or under cut, as described above, is immaterial inasmuch as the same or equivalent structure will be used.

In Figs. 1, 2 the opening identified by numeral "1" is not only slotted out, but also the opening 10 directly therebelow, although this is not necessary, as is seen in Fig. 3 wherein a true diagonal slot from opening 7 to the opening in row 2 in the adjacent pair of openings is used, leaving opening 10 unimpaired. In the type of notching shown in the "ten-thousand" field of Fig. 1, the No. 6 card will drop from the sorting pin when the latter is thrust through the hole coded with the numeral "2," whereas in the type of notching shown in Fig. 3, the No. 6 card will not drop until the pin is thrust through the opening coded with the numeral "7." The final result, however, is the same, and card No. 6 will always be in its correct order after a complete sorting operation for placing the cards in their proper sequence. The only thing is that it makes an additional drop from the pin in the type of coding used in the "ten-thousand" field of Fig. 1 over the type of coding used in Fig. 3.

In Fig. 4, the system of punching is used as shown in my United States Letters Patent No. 2,339,519, of January 18, 1944.

In Fig. 5, a diagonal slot 11 is provided that extends in a direction opposite to the slot shown in Fig. 3. This structure may be used to identify the digit not represented by a possible slotting out along the shortest line directly to the edge of the card, such as numeral "6" provided the coding is arranged to cause the card to drop in the same order as where the slot extends in the opposite direction, as in the card of Fig. 3. If the coding of the card of Fig. 3 were used on the card of Fig. 5, then in the sorting operation the card of Fig. 5 would finally appear between the No. 4 and No. 5 cards instead of between the No. 5 and No. 7 cards. The punching of the card shown in Fig. 5 may represent a symbol in addition to numeral "6" according to the arrangement of the code numerals and the numerals used. Of course, similar structure to that illustrated in Figs. 1, 2 and 4 (except for the opposite inclination of edge 9) may be employed with respect to the card of Fig. 5.

The sorting for one field, from "0" to "9" will be described to explain how the cards are sorted, it being assumed that the stack of cards are numbered from "0" to "9." Inasmuch as resort must be had to a second field to obtain the numeral "10," the operations described will be restricted to only the one field, and which may be assumed to be the field designated "units" on the cards.

The sorting pin is first thrust through the opening numbered "1" and upon lifting the pin the cards identified as "0," "3" and "7" will stay on the pin, while the cards identified as "1," "2," "4," "5," "6," "8," and "9" will drop.

The cards on the pin are removed therefrom, and those that dropped are placed in the rear of the stack and the pin is then inserted in through the openings that are numbered "2," thus freeing the cards identified as "2," "5," "6," and "9."

The above freed cards are placed in the rear of the stack and the pin is next thrust through the opening designated "3" and is lifted to free the cards identified as "3," "4," "5," "7," "8," and "9," which cards are placed in the rear of the stack.

At this point it is pertinent to note that neither of the cards designated "6" came out, hence will be ahead of the card designated "7" in the final arrangement.

The next operation is to thrust the pin through the opening designated "7," which will free the cards designated "6," "7," "8" and "9" in exactly that order, with card No. 6 being the first card. These cards are placed in the rear of the stack, and cards of the stack are now in accurate sequence with the "0" cards in front and the others following from "1" to "9" in order.

It is clear that some modifications may be made in the exact structure shown in the drawings, but in each instance the diagonally extending edge 9, so arranged as to clear the upper opening of the pair, will be used. The inclination of this edge is such as to permit substantially free sliding on a conventional separating needle or implement in a sorting operation without tilting the stack or otherwise manipulating the same in an unusual manner. Only four sorts are required for each digit in each field, which is the lowest number used heretofore in sequence sorting where the digits to be sorted run from one through nine. As illustrated in Figs. 1, 2, the absence of slotted out openings in a field indicates a zero for that field.

Having described the invention, I claim:

1. A card for classification purposes that is provided with a plurality of adjacent pairs of coded openings formed therein adjacent an edge thereof with the openings of each pair being in alignment perpendicular to said edge whereby one opening of each pair is closer to said edge than the other, the said other opening of one pair of said openings being slotted out to said edge through the said one opening of the pair adjacent thereto leaving the oppositely aligned opening of the said one pair unimpaired.

2. A card for classification purposes that is provided with two rows of openings along an edge thereof parallel therewith, means dividing said rows transversely thereof into groups of two adjacent pairs of openings in each whereby each group comprises a first pair and a second pair in which the first pair is closer to said edge than the other, the openings of said second pair being respectively aligned with the openings of said first pair along lines extending substantially perpendicular to said edge, one of the openings in the second pair of at least one group being slotted out to said edge through the opening in the first pair of the same group that is laterally offset relative to the opening with which said one opening is aligned leaving unimpaired the opening in said first pair with which it is so aligned.

3. A stack of cards for sequence sorting each being provided adjacent an edge thereof with a plurality of groups of coded openings arranged in a pair of rows parallel with said edge, the openings in the respective rows being equally spaced apart and the openings in both rows being in pairs aligned with each other in direction perpen-

dicular to said edge, the said openings in said rows being in separate groups of two adjacent pairs of such aligned openings in each group, patterns of notches in said edge of each card extending to various of said openings, one of said notches in certain of said cards extending from said edge to one of the openings of one of said aligned pairs in the row that is most remote from said edge leaving the other opening in such pair unimpaired.

4. A stack of cards for sequence sorting each being provided adjacent an edge thereof with a plurality of groups of coded openings arranged in a pair of rows parallel with said edge, the openings in the respective rows being equally spaced apart and the openings in both rows being in pairs aligned with each other in direction perpendicular to said edge, the said openings in said rows being in separate groups of two adjacent pairs of such aligned openings in each group, patterns of notches in said edge of each card extending to various of said openings, one of said notches in certain of said cards extending from said edge to one of the openings of one of said aligned pairs in the row that is most remote from said edge leaving the other opening in such pair unimpaired, and said one of said notches extending through the opening nearest the said edge in the pair of aligned openings adjacent the said unimpaired opening.

5. A stack of cards for sequence sorting each being provided adjacent an edge thereof with a plurality of groups of coded openirgs arranged in a pair of rows parallel with said edge, the openings in the respective rows being equally spaced apart and the openings in both rows being in pairs aligned with each other in direction perpendicular to said edge, the said openings in said rows being in separate groups of two adjacent pairs of such aligned openings in each group, patterns of notches in said edge of each card extending to various of said openings, one of said notches in certain of said cards extending from said edge to one of the openings of one of said aligned pairs in the row that is most remote from said edge leaving the other opening in such pair unimpaired, one of the side edges of each of said one of said notches extending slantingly toward said edge below said unimpaired opening.

ALBERT A. REMBOLD.

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