Jan. 18, 1944. A. A. REMBOLD 2,339,519

CARD FOR SEQUENCE SORTING

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Fig. 1.

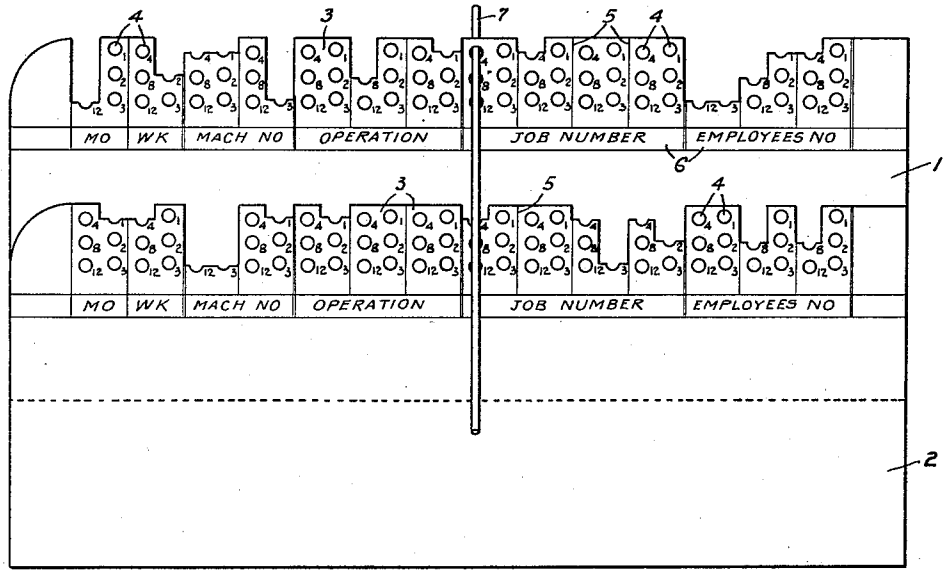
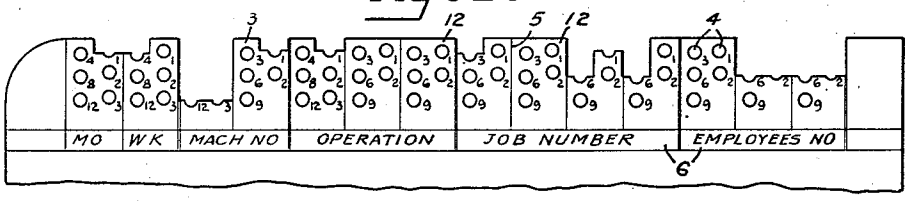


Fig. 2.



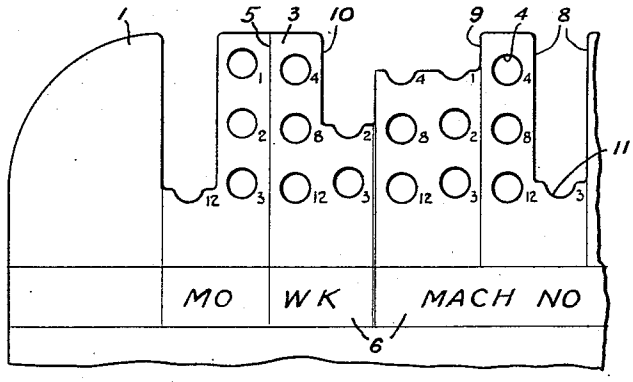


Fig. 3.

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CARD FOR SEQUENCE SORTING

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5 Claims. (Cl. 129—16.1)

This invention relates to perforated record cards, sheets, etc., for sequence sorting.

Sequence sorting of cards utilizing coded perforations along one or more edges, some of which perforations are notched out to the edge of the card, is not new in itself. United States Letters Patent to Perkins, No. 1,739,087, December 10, 1929, discloses one of the most common arrangements in which cards are adapted to be sorted numerically.

Record cards employed where sequence sorting is desirable ordinarily carry many different classifications, and the cards may be sorted in proper sequence in any one or more of the different classifications. The most sought after improvements in cards for sequence sorting are those that increase the capacity of the cards for carrying classifications along one of the edges thereof (generally the upper edge) without increasing the size of the cards, and without so weakening the cards as to make them unduly susceptible to tearing or breaking. Also, the cards must be so formed as to facilitate separation of the desired cards from the separating implements employed in performing the sorting operations.

Insofar as the conventional arrangements of openings in cards is concerned, the Perkins patent above mentioned is typical, as is also the arrangement shown in United States Letters Patent to Nevin, No. 2,213,607, September 3, 1940, in which the perforations are arranged in a pair of rows in adjacent fields, the rows extending longitudinally of the edge adjacent thereto.

It is pertinent to note that in the conventional constructions, the fields in which the perforations are positioned extend longitudinally of the edge of the card along which the fields are positioned, and in each instance where any perforations are slotted out, the edge of each slot extends convergently from the edge of the card toward the perforations. Thus, where adjacent slots in the first row are slotted out, there remains a partition between the slots in the form of a weak pointed tab, and unless the openings in the first row along said edge are staggered with respect to the openings in the row adjacent thereto (and extending parallel with said edge) the side edges of slots extending to openings in the second row, are spaced the same width as the perforations in both rows, as best seen in the Nevin patent mentioned above. Any slight misalignment of the perforations in the second row relative to those in the first row would result in an objectionable roughness in the edge of a slot extending to a perforation in the second row, and in any event there would be objectionable friction against the separating needle or implement during sorting of the cards, particularly where columns of perforations extend at least three deep from the edge of the card in direction perpendicular to the latter.

One of the objects of this invention is the provision of a plurality of similar fields along one of the corresponding edges of cards, each of which field is provided with one pair of rows or columns of coded perforations, neither of which exceeds three perforations, and which columns extend perpendicular to the edge along which the fields are disposed, and some of which perforations are slotted out to said edge.

Another object of the invention is to provide along one edge of each card a plurality of rows of equally spaced, uniform sized perforations extending perpendicular to such edge and dividing these rows into groups not exceeding one pair of rows to each group by printed lines. The perforations in each group are preferably coded numerically, and the depth of each row does not exceed three perforations, while the spacing between the rows and between the perforations in each row is substantially equal to the diameter of the respective perforations and at least one of the rows in each field has three perforations.

Another object of the invention is to provide along one edge of each card a plurality of rows of equally spaced, uniform sized perforations extending perpendicular to such edge, some of which perforations are slotted out to the said edge along lines parallel with the rows and positioned midway between the rows adjacent the perforation so slotted out to facilitate sorting of the cards.

A still further object of the invention is to provide along one edge of each card a plurality of rows of equally spaced, uniform sized perforations extending perpendicular to such edge, some of which perforations in adjacent rows are slotted out to the said edge along lines extending parallel with said rows midway between the perforations in the outermost of such rows and those so slotted out to provide a relatively wide slot defined by parallel edges, and the inner or closed edge of said slot along that portion between the adjacent rows being perpendicular to the said parallel edges to eliminate pointed projections directed toward the open end of the slot.

A still further object is the provision of perforated cards for sequence sorting formed to provide an increase of at least a third in the capacity of the card for sorting without increase

in the size of the card over cards heretofore provided, and which cards are constructed to insure sufficient strength for severe usage.

Other objects and advantages will appear in the following description and in the drawing.

In the drawing,

Fig. 1 is a perspective view of several cards in a stack with a needle, wire or rod shown in position for releasing the front card.

Fig. 2 is a fragmentary elevational view of the upper edge of a card that embodies substantially the same structure as that shown in Fig. 1 with a slight difference.

Fig. 3 is an enlarged fragmentary front view of the upper left hand corner of the rear card shown in Fig. 1.

The cards 1, 2 (Fig. 1) are several in a stack of many cards of the same size, and which may be supported in a tray, drawer, or the like. Along one of the edges of each card is a plurality of fields 3 respectively having a pair of parallel rows of substantially uniformly spaced circular openings 4 therein. These rows in the cards of Fig. 1, have three of such openings in each, or, as shown in Fig. 2, at least three openings may be in one of the rows in each field, while the other row may have only two openings, but in each instance the rows extend perpendicularly from the edge of each card along which the row of fields is disposed, and this feature is essential to the invention.

The rows of openings 4 in each field are preferably equally spaced apart, and the adjacent pair of openings in each pair of adjacent fields have the same spacing, thus all rows along the edge of the card and extending perpendicularly from such edge are preferably equally spaced apart.

Lines 5 extending perpendicularly from the edge of each card and parallel with the rows of openings 4, are imprinted on the card and define the lateral limits of each field, such lines being disposed midway between the two adjacent rows in each adjacent pair of fields.

While the perforations or openings in the alternate rows are slightly offset relative to the adjacent openings in the rows therebetween, as indicated in Fig. 3, this invention is in no way dependent upon this feature, since the slotting out of the desired openings and the manipulation of the cards may be performed with equal facility where there is no offsetting in the openings relative to each other and to the nearest edge of the card.

The openings in each field are preferably numerically coded. For example, in the fields shown in Fig. 1, where six openings are shown in a pair of rows of three openings in each, the left hand row (as seen in the view) in each field may be coded in series with the numerals "4," "8," "12," the coded opening "4" being nearest the edge of the card, while the openings in the second, or right hand row are coded "1," "2," "3" with the coded opening "1" adjacent the edge of the card and adjacent coded opening "4."

By slotting out any one of the coded openings in any one field to the edge of the card, the numerical value given to the coded opening so slotted out is the one used for the sorting operation, and where an opening in each of the rows in a field is slotted out, the sum of the numerical values of the coded openings so slotted out represent the desired number. There is nothing novel in using this coding system, generally, but where the openings are arranged and coded as in the cards of Fig. 1, it is seen that fifteen successive numerical classifications from one to fifteen in each field is possible whereas with the rows extending parallel with the edge as in the prior art, the number of different classifications possible in each field would not exceed ten. The capacity of applicant's cards for designating different classifications in each field and for sequence sorting is thus greatly increased in comparison with a conventional card having the same number of openings adjacent the edge thereof.

It is common practice to arrange fields of openings in groups for extending the numerical classification possible in one field from units to tens, hundreds and thousands, etc., and to differently identify single or groups of fields for sorting according to data so identified, and in Fig. 1, the fields 6 below fields 3 so identify the latter. The identity of the fields 3 or groups thereof will vary according to the data desired, but in the card 1 of Fig. 1, for example, the designations in field 6 and the manner in which fields 3 are slotted out are such as to identify card 1 as being for employee 1594 for work done on job number 400 in operation 81 on machine number 53 in the second week of the twelfth month. Card 2 of Fig. 1 is for employee number 88, job number 4076, operation 100, machine number 151, and the fourth week of the first month.

The physical structure of the cards is the same for all in the stack insofar as the arrangement of openings and fields is concerned, although it is obvious that different openings in different fields will be slotted out. However, all of the cards have openings that are slotted out, and the form of the slots that I provide is very important.

Heretofore, where one or two rows of openings are along an edge of each card, it has been the practice to slot out the openings generally as shown in the United States Letters Patent to Nevin, No. 2,213,607, September 3, 1940, or as shown in the patent to Welk et al., No. 2,062,155, November 24, 1936. This conventional form of card is not found to be entirely satisfactory even where the slots extend to the openings in the second of a pair of rows extending along one edge of the card, since where needles or separating implements such as indicated at 7 in Fig. 1, are used (and which are likewise employed in the above patents) there is a decided tendency for the needle in one or more of the slots that extend to the second row to scrape against the edges of the slots and in many instances the cards that should drop from the needle by reason of the slots will remain in the stack, and the desired sorting is not accurately performed. Also, in conventional structure where openings in adjacent rows in one field are slotted out to the edge of the card, a weakened, pointed tab projecting toward said edge is left between the adjacent rows, and there may be many such tabs, some of which may be accidently frayed or folded over in a manner to partially or wholly close the slots that should freely pass the needles or separating implements, but what is particularly objectionable is the fact that these tabs engage openings in adjacent cards in a stack and seriously interfere with sorting and the arranging of the cards for sorting. No such interference either in the sorting or the arranging of the cards for sorting occurs where my structure is used.

In the present invention, as best seen at the right hand edge of the portion shown in Fig. 3, where any one opening in one row in a field is slotted out, the side edges 8 of such slot are parallel with the row of openings 4 and are posi-

tioned midway between the openings in the rows adjacent thereto at opposite sides thereof. These edges 8 are spaced apart a substantially greater distance than the diameter of any of the openings 4, consequently said edges cannot under normal operation, engage the needle or separating implement 7, as best seen in Fig. 1, since passage of the needle through the aligned, unslotted openings in some of the cards will generally center the needle between the edges 8 even though there is considerable difference between the diameter of the needle and the diameter of the openings.

Where adjacent openings in one field that are the same distance from the edge of the card are slotted out, as best seen in the second field from the right in Fig. 3, it is seen that there is no pointed tab between such openings projecting toward the edge of the card and the one edge 9 of the slot is parallel with the rows of openings. The opposite edge 10 of the slot in this instance is disposed between the pair of rows of openings in the third field from the right since one of the openings in the row thereof that is adjacent the second field from the right is slotted out, hence while the slot between edges 9, 10 is wider than the space between the edges 8 of the slot already described, it will be seen that the edges 9, 10 extend parallel with the rows of openings in the fields and said edges are along lines midway between the adjacent rows of a pair thereof.

The above description is merely an example of the structure, and it is pertinent to note that the cards are not weakened between the adjacent openings 4 in each row where any one full opening remains in any row.

The contour of the edge of the card along the fields 3 constitutes spaced slots having parallel side edges that are disposed midway between pairs of adjacent rows and the minimum width slot or slots are approximately twice the diameter of the openings that are slotted out. While some of the wider slots, such as where openings in adjacent rows or in a series of adjacent pairs of rows are slotted out, may have their inner edges at different distances from the open ends of such slots, there are no slots that are closed at both ends, and the base or inner end edge of any slot preferably extends generally perpendicularly relative to the sides of the slot and not more than the lower half of the circular edge of the opening or openings slotted out define a portion of the lower or inner edge of each slot, as indicated at 11 (Fig. 3). Thus, there is no chance for a needle 7 to become stuck in any opening that is slotted out.

Fig. 2 shows practically the same arrangement of openings 4 as is shown in Fig. 1, except that in some of the fields 12 there are only five openings, but in every instance at least one of the two rows in each field has three of the five openings therein, while the other row has two. Other of the fields may be identical with fields 3 of Fig. 1, as indicated at 3 in Fig. 2. All may correspond to fields 12, only with this arrangement the coding of the openings in fields 3 may be the same as in Fig. 1, to provide for a greater number of numerical classifications in such fields, whereas in the fields having five openings therein, the possible number of different numerical classifications in each field is reduced by a third. The numerical coding of the openings in fields 12 is different from that of fields 3 due to the lesser number of openings therein, and as any numerical classification over 10 in a group of fields adapted to be slotted out to provide units, tens, hundreds, etc., can be accomplished by slotting out openings in adjacent fields in the group, it is less important that six openings be provided in the fields below that intended to be slotted out for the highest power in the group. As seen in comparing the card 2 of Fig. 1 and the card in Fig. 2, the same numerical classification can be obtained by either of the cards.

The procedure of sequence sorting being old in the art, detailed description thereof is omitted. A very pertinent fact, insofar as structure is concerned, is that the cards disclosed in the drawing are adapted to a numerical coding that will permit numerical sequence sorting to a far higher figure or figures than is possible in any other card of which I am aware having the same number of openings along the edge of the card that is slotted out. As the cost of the cards used and the filing space for the keeping of records on the cards are very large items, it is essential that the cards be such as to secure the greatest amount of information on the smallest standard or practical sized card, thus effecting the desired saving in the number of cards used, and in material used, as well as in the filing space required.

Having described my invention, I claim:

1. A sheet for classification purposes as described, having a series of equally spaced, coded perforations of uniform size adjacent one edge thereof; certain of said perforations being slotted out to said edge, and the side edges of each slot so formed being coincident with lines extending at right angles to said edge and midway between the openings so slotted out and those adjacent thereto.

2. A sheet for classification purposes as described, having a series of equally spaced coded perforations of uniform size adjacent one edge thereof, certain pairs of adjacent perforations being slotted out to said edge, and the side edges of each slot so formed being coincident with lines extending at right angles to said edge and midway between the perforations of said pairs and the perforations adjacent thereto at opposite sides of each of said pairs.

3. A sheet for classification purposes as described, having a series of equally spaced coded perforations of uniform size adjacent one edge thereof; certain of said perforations being slotted out to said one edge providing slots opening outwardly of said one edge, said slots having inner edges parallel with said one edge and coincident with lines substantially bisecting certain of said perforations, and the side edges of each slot being at right angles to said one edge and midway between the openings so slotted out and those adjacent thereto.

4. A sheet for classification purposes as described, having a pair of rows of substantially equally spaced coded perforations extending parallel with one edge thereof and adjacent thereto with the perforations in said rows in alignment in directions perpendicular to said edge; certain pairs of the said aligned perforations in said rows being slotted out to said edge, and the side edges of each slot so formed being coincident with lines extending at right angles to said edge and midway between the pairs of said aligned perforations so slotted out and the pairs of aligned perforations adjacent thereto at opposite sides thereof.

5. A sheet for classification purposes as described, having a pair of rows of substantially

equally spaced coded perforations extending parallel with one edge thereof and adjacent thereto with the perforations in said rows in alignment in directions perpendicular to said edge; a plurality of adjacent pairs of said aligned openings being slotted out to said edge, and the side edges of each slot so formed being coincident with lines extending at right angles to the said edge and midway between the outermost pairs of said plurality of pairs of aligned perforations and the perforations adjacent thereto.

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