Aug. 3, 1926. 1,594,888

K. E. L. LIEDSTRAND

CARDS ADAPTED FOR STATISTIC OR SIMILAR PURPOSES AND APPARATUS FOR SORTING THE CARDS

Filed July 16, 1919 3 Sheets-Sheet 1

Fig. 1

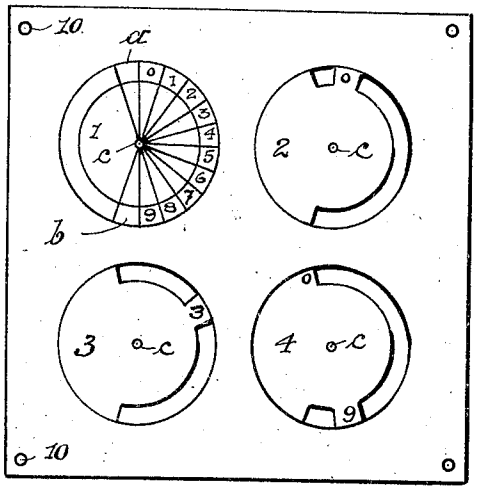


Fig. 2

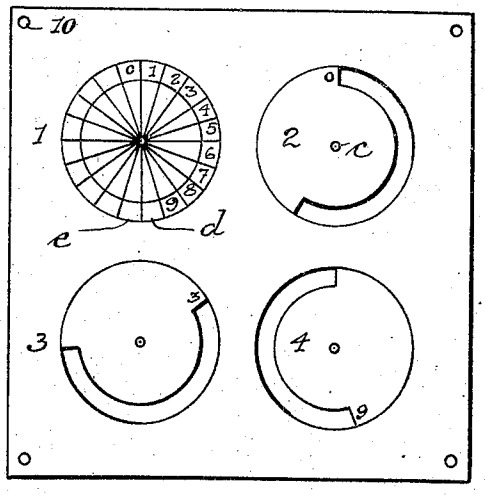


Fig. 3

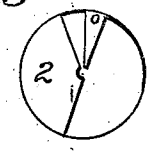
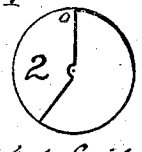


Fig. 4



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Brownell & Ward

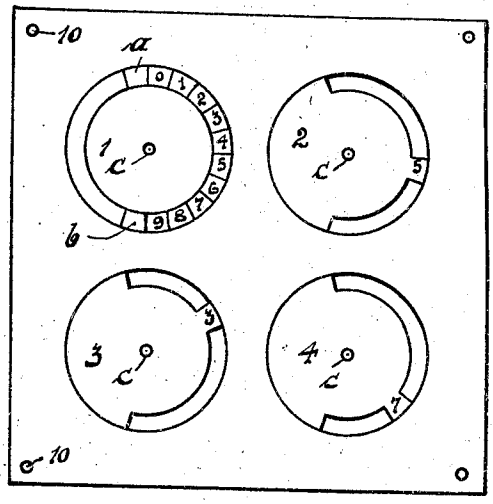
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CARDS ADAPTED FOR STATISTIC OR SIMILAR PURPOSES AND APPARATUS FOR SORTING THE CARDS

Filed July 16, 1919 3 Sheets-Sheet 2

Fig. 1*



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CARDS ADAPTED FOR STATISTIC OR SIMILAR PURPOSES AND APPARATUS FOR SORTING THE CARDS

Filed July 16, 1919 3 Sheets-Sheet 3

Fig. 5.

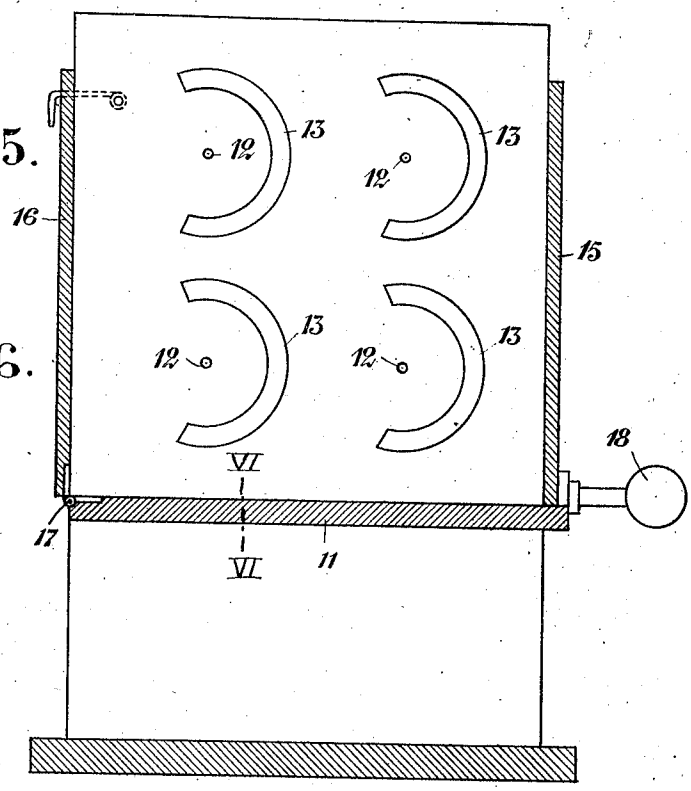


Fig. 6.

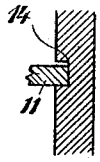
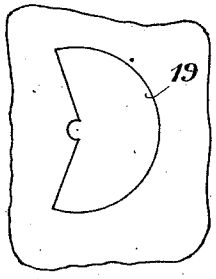


Fig. 7.



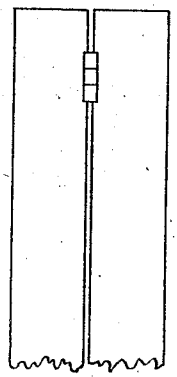


Fig. 8.

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Patented Aug. 3, 1926. 1,594,888

UNITED STATES PATENT OFFICE.

KARL EMIL LEONARD LIEDSTRAND, OF STOCKHOLM, SWEDEN.

CARDS ADAPTED FOR STATISTICS OR SIMILAR PURPOSES AND APPARATUS FOR SORTING THE CARDS.

Application filed July 16, 1919, Serial No. 311,389, and in Sweden August 19, 1918.

This invention relates to modifications of such cards for statistic or similar purposes as are described in the U. S. Letters Patent No. 1,261,413 and No. 1,334,957 (patent application No. 298,561) whereby the cards by being rotated or moved along curve-shaped paths as, for instance, around a pivot needle, are brought into different positions on one or more sorting needles or the like threaded into the cards at points having the same positions on the same, a relative movement between the cards and the said needles being thereby effected. The invention also relates to a modification of the sorting apparatus stated in the said Letters Patent No. 1,334,957 (patent application No. 298,561) corresponding to modifications of the cards.

The principle of the invention is as follows.

In accordance with the said Letters Patent one or more sections are provided on the cards for each ground of classification, for instance age, confession of faith, civil status and so on. In each of the said sections there are starting points for slots, which points have the same position in all cards. From the said starting points, according to this invention, slots extend in different directions of curve-shaped slots of different lengths and, it may be, also of different directions in such manner, that the mutual position of the terminal points of the slots corresponding to a certain classification is the same on all cards. If the slots extending between the starting points and terminal points consist of curves of suitable curvature, it is evident, that

1. A sorting needle or the like may be threaded into the collection of cards through each starting point of slots belonging together;

2. The cards may be brought to occupy changed positions on the said needle;

3. The cards, as the needle has reached the terminal points of the slots, occupy different positions with relation to one another, according to the different lengths and directions of the slots.

The starting point and the terminal point of one of the sections, belonging together, may coincide. In such case the moving of the cards consists of a rotary motion around the said point.

If slots starting from one point only are used, in which one sorting needle or the like is placed, a positive sorting of the cards can not be effected exclusively by these means. For that reason preferably cooperating slots starting from two different points at least are used. However two starting points of the slots may be located in the immediate vicinity of one another, so that two sorting needles, located close by one another, may be put into the slots. If in such case the slots are so arranged, that two sorting needles or the like may be moved toward or from one another, a positive movement of the cards into positions determined by the different arrangements of the terminal points of the slots may evidently be effected for reasons stated above.

A plurality of different types of slots arranged in accordance with the general principle stated above may easily be suggested. In the following specification one of the cooperating slots is characterized by the fact, that the starting point and terminal point coincide, so that, as stated above, the cards are rotated around the said point as the sorting needles are moved along the other slots. For the withdrawing of the cards by groups from the collection, the cards are provided with one or more holes or the like, into which needles or the like are inserted.

Figs. 1 and 2 of the accompanying drawings show as examples two cards of the type stated above. Fig. 1* shows a card of the same collection as the card shown in Fig. 1 but having the slots cut in the sections of the same located differently. Figs. 3 and 4 show modifications of the slots shown in Figs. 1 and 2 respectively. Fig. 5 shows in a vertical section an apparatus for sorting the cards of the type shown in Figs. 1 and 2. Fig. 6 is a section taken in the plane of the line VI—VI of Fig. 5, Fig. 7 shows in a side view a portion of an apparatus for sorting cards of the type shown in Figs. 3 and 4, and Fig. 8 shows sticks used in the apparatus last mentioned.

The cards, shown in Figs. 1 and 2, are provided with four circular sections, which are adapted for different grounds of classifications and in which the slots are effected. The said sections are designated by 1, 2, 3 and 4 and may be adapted for civil status, confession of faith, business, etc., as grounds of classification. As a guidance in produc-

ing the slots the sections are divided into approximate squares, provided, for instance, with the figures 0, 1, 2 . . . 9. In Fig. 1 each section has two squares *a* and *b*, which portions always are perforated. Besides the slots a hole *c* is provided at the center of the circular sections. In the said squares *a*, *b* and the hole *c* needles or the like are located for the sorting of the cards in accordance with a certain classification. In Fig. 1 the section 1 has no perforation. In section 2 squares 1 to 9 inclusive are perforated, besides the squares *a* and *b*. The squares *a* and *b* serve as starting points of the slots. In the section 2 of another card shown in Fig. 1* of the collection the squares 0 to 4 inclusive and 6 to 9 inclusive are perforated while in section 3 of the same card the squares 0 to 2 and 4 to 9 inclusive and in section 4 the squares 0 to 6 inclusive and 8 and 9 are perforated. In each case also the squares *a* and *b* are perforated, so that the total length of all slots is constant. Also in this case section 1 has no perforation. If now two needles or the like are threaded into the squares *a* and *b* and a pivot needle into the hole *c* and the two sorting needles first mentioned are moved toward one another the cards are turned around the pivot needle located in the hole *c*, in consequence whereof the corners of cards provided with slots having the same position, will have the same position, while the corners of cards provided with slots of a different position occupy another position. The corners of the cards are provided with holes 10, loops or like. Needles or the like are then inserted into the said holes of such cards as by the sorting operation have been brought into the same position. After the removing of the needles by means of which the sorting operation has been effected, the cards belonging to the same group may be withdrawn from the collection.

In the section 3 the squares 0 to 2 and 4 to 9 inclusive are perforated and in the section 4 the squares 0 to 8 inclusive are perforated in addition to the squares *a* and *b* as usually. Owing to the fact that the first square of each section is designated by 0, the square remaining after the performance of the perforating operation, designates by its figure the group to which the card belongs.

The slots of the card shown in Fig. 2 are such that the two sorting needles, threaded into the curve shaped slots of the cards and adapted to turn the cards around the pivot needle mounted in the hole *c*, are moved from one another during the sorting operation. Also in this case the slots are located on circular lines and extend in opposite directions from two fixed squares *d* and *e* in the sections 1, 2, 3 and 4 respectively, which squares always are perforated for the inserting of the needles. Also in this case the total length of the slots, adapted for the effecting of the sorting operation, is constant. The squares *d* and *e* may be located at some distance from one another or, as shown, close by one another, so that the slots of each section form a single, continuous slot, as shown in Fig. 2. The squares of the one half of the sections respectively are provided with figures from 0 to 9, which serve as a guidance during the perforating operation. In the section 2 the squares 1 to 9 inclusive, the squares *d* and *e* and the square located nearest to the square *e* at the left hand side of the same are perforated. In the section 3 the squares 4 to 9 inclusive, the squares *d* and *e* and the next four squares located at the left hand side of the square *e* are perforated. In the section 4 the squares *d* and *e* and all squares, located at the left hand side of the square *e* and besides the square 0 are perforated. In this case the remaining square having the figure of the highest value indicates the group of the section, to which the card belongs, thus the group 0, 3 and 9 respectively in the illustrated examples.

For effecting the sorting operation needles are inserted into the squares *d* and *e* and into the hole *c* and the former needles are then moved from one another, during which operation the corners of cards belonging together are brought into the same position, so that needles may be inserted into the holes provided in the corners for the withdrawing of the cards from the collection after the removal of the needles first mentioned.

Instead of parts of circular lines being perforated, as shown in Figs. 1 and 2, sectors may be stamped out, as illustrated in Figs. 3 and 4, which show sections 2 corresponding to the sections 2 of Figs. 1 and 2 respectively. For the sorting of cards provided with slots of the types shown in Figs. 3 and 4 two sticks are used as shown in Fig. 8, which are connected with one another at one of their longitudinal edges by means of hinges and either in open or in clasped condition are inserted into the slots and then are turned toward or from one another respectively.

The apparatus adapted for sorting cards arranged as stated above may be constructed in many different manners. For instance it may consist of a casing, Figs. 5 and 6, on the bottom 11 of which the cards are placed edgewise. In the front and rear side walls of the said casing, holes 12 and circular slots 13 are provided, into which and the holes and slots of the cards needles are inserted, by means of which the cards are sorted, the the said slots 13 of the casing guiding the needles during the sorting operation. The bottom 11 is slidably mounted in guides 14 provided in the front and rear side walls of

the casing. The end wall 15 is fixed to the bottom 11 and the end wall 16 is connected to the bottom 11 by hinges 17 and may be fixed to the front and rear walls by means of hooks. After the needles have been inserted, the end wall 16 of the casing is dropped and the bottom 11 together with the end walls 15, 16 is withdrawn by means of a handle 18, so that the cards become free and may be turned by means of the needles. The arrangement of the sorting apparatus is adapted to the type of the slots. Thus Fig. 7 shows a portion of the front or rear side wall of a casing adapted for cards of the type shown in Figs. 3 and 4, the said walls being provided with sector shaped openings 19.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. Cards for statistic or similar purposes having one or more sections for different grounds of classification, which sections are provided with slots, the slots of corresponding sections of the cards having corresponding starting points and their terminal points located in different angular directions from the said starting points, one slot provided in a certain section and having its terminal point located on a certain line, designating a certain group of the classification corresponding to the section.

2. Cards for statistic or similar purposes having one or more sections for different grounds of classification, which sections are each provided with two cooperating slots, the slots of corresponding sections of the cards having corresponding starting points and their terminal points located in different angular directions from the said starting points, the total length of the said angular directions belonging to the pairs of slots respectively being constant and two slots, provided in a certain section and having their ends located in certain directions, designating a certain group of the classification corresponding to the section.

3. Cards for statistic or similar purposes having one or more sections for different grounds of classification, said sections being provided with slots which extend from corresponding starting points in corresponding sections of the cards and have one curve-shaped boundary, the said boundaries of the slots having different lengths, one slot with a certain length of the said boundary and provided in a certain section, designating a certain group of the classification corresponding to the section.

4. Cards for statistic or similar purposes having one or more sections for different grounds of classification, which sections are each provided with two cooperating slots, the slots of corresponding sections of the cards having corresponding starting points and the slots having one curve-shaped boundary of variable lengths, the sum of the lengths of the said boundaries of the pairs of slots respectively being constant and two slots, which are provided in a certain section and the boundaries of which have certain lengths, designating a certain group of the classification corresponding to the section.

5. In a sorting apparatus for cards for statistic or similar purposes having one or more sections on the cards for different grounds of classification, which sections are provided with slots, which extend from corresponding starting points in corresponding sections of the cards and have one operative curve-shaped boundary, a casing or the like in which the cards are adapted to be mounted and which is provided with guides for selector needles or the like adapted to be inserted into the slots of a collection of cards, the shape of the guides being similar to the curve-shaped boundaries of the slots of the cards.

In testimony whereof I have affixed my signature.

KARL EMIL LEONARD LIEDSTRAND.