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SORTING MACHINE

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7 Claims. (Cl 209—110)

The present invention relates broadly to sorting machines for record cards and more especially to that kind of machines which are able to sort the cards according to combinational index points

As is well known in the art to which this invention refers, any numeral may be represented by one or a combination of index points, preferably consisting of perforations. The appliance of combinational index points permits a more economical use of card space as for example, for the ten numerals only four index point positions need be provided instead of ten as it is necessary in the well known single index point system

The present invention has for its principal object to provide a new and efficient mechanism for analyzing and sorting cards according to combinational index points

Another object of the invention is to provide record controlled elements reciprocally operating with each other and to control the sorting mechanism in accordance with said different reciprocal cooperation

Another object of the invention is to control electrical sorting circuits by index points and to complete the circuits after a predetermined delay to effect sorting

A further object of the invention is to provide a sorter which picks the record data during one cycle and controls the sorting mechanism in accordance with the data during the subsequent cycle

Still a further object of the invention is to provide alternately operating means to read in record data of one card during one cycle while at the same time the sorting mechanism is controlled according to the previously read in data of the preceding card

A further object of the invention consists in the provision of special commutators alternately cooperating with the controlling circuit for the sorting mechanism

Other objects and advantages will be hereinafter set forth in the accompanying specification and claims and shown in the drawings which show by way of illustration what is now considered to be a preferred embodiment of the invention

Referring to the drawings

Fig 1 shows a sorting machine according to the present invention

Fig 2 is a circuit diagram of the sorter

Fig 3 is a diagram illustrating the meaning of hole combinations

Reference numeral 3 in Fig 1 designates the card stack from which the cards are picked by a picker 4 and fed through the machine in usual way by transport rolls 2. Picker 4 is moved reciprocally by link 1 connected by link 5 eccentrically with a disk, rotated by toothed wheel 6 which in turn is driven by the motor. When the cards are fed through the machine a certain selected column will be analyzed by brush 7 contacting roller 8 each time the brush 7 encounters a hole in the column. The analyzing brush is fastened to a brush holder 9 which is adjustable to any card column

Sorting of the cards is effected in the known way by means of blades 10 leading to the individual sorting boxes. Blades 10 are constructed in the form of fingers lying upon a plate forming the armature of control magnets 11. This plate is normally held by pressure spring 12 level with guiding plate 13. When the card passes between plates 10 and guiding plate 13 the armature of magnets 11 will be energized in a manner corresponding to the meaning of the card perforations. Blades 10 under which the card is passing will be retained by the card but the remaining spring blades may follow the armature plate and the card will be guided between the separated blades unit to the coordinated sorting box

While in the ordinary sorting machines of this kind using single hole cards the distance between analyzing brush 7 and sorting blades 10 is such that the card may directly control the sorting plates while it is passing under the brush, in the present case the distance between the brush and sorting blades corresponds to the width of a record card because the controlling operation effected by a certain card takes place during the cycle subsequent to its analysis

Toothed wheel 6 drives a set of toothed wheels 12-16 meshing with each other in synchronism with the card feed mechanism but with such a ratio that each of the wheels 12-16 turns only half a revolution each machine cycle. Coordinated and fixed to each of the wheels 12-16 is a commutator, designated at 12a-16a (see also Fig 2). Each of the commutators 12a-15a comprises a metal cylinder upon which an insulating sleeve is fastened. Metal pins are fixed on the commutator surface passing through the insulating material to provide an electrical connection between the metal cylinder and brushes sliding in the surface of the commutator

In Fig 2 is schematically shown a development of the commutators. Numerals 17 indicate the conducting pins on the insulating surface of the

commutators which are electrically connected to the inner metal cylinder, this electrical connection is indicated in Fig 2 by vertical connecting lines

5 Both commutators 12a and 14a on the one hand and 13a and 15a on the other hand form a cooperating set and the two sets operate alternately under the control of the successive record cards and in turn control the sorting magnet
10 To each set of commutators four magnets 18a-d and 20a-d respectively, are coordinated, each controlling a brush 19 The brushes 19 carried by pivotally mounted links 21 are normally held in latched position by the pivoted armatures
15 22 as will be clearly seen from Fig 2 In the normal position as shown in this figure all brushes 19 are in position to engage the contacts 17 in the first and third circumferential rows from the top while a brush will be shifted from the first
20 to the second or from the third to the fourth row when its coordinated magnet is energized and unlatches members 21

Energization of these magnets is under the control of the combinational holes as will now
25 be explained and shifting of brushes 19 occurs when those brushes are free of that portion of the commutator surface on which the contacts are located Released members 21 are restored at the end of each machine cycle to their normal
30 positions by means of lugs provided upon wheels 12-15

Commutator 16a is constructed in a different manner than the other commutators It is provided with four contacts 23a-23d located as
35 shown The brushes 24a-24d and 26a-26d may contact the pins 23a-23d connected with the inner metal cylinder and thus provide electrical connection with slip ring 25 upon which brush
40 27 slides to connect the commutator with the current supply

The machine is provided with the usual selector 28 to assort only cards with a certain combination of index perforations The driving motor is designated at 29 and is started by depressing
45 start key 30, whereby relays 31 and 32 will be energized When card feed has been initiated by motor 29 card lever contacts 33 are closed in the usual manner and relay 31 will maintain its own stick circuit until contacts 33 are opened upon failure of the card supply and consequent
50 opening of contacts 33 or by depressing of stop key 34 In either case relay 32 will be deenergized and the motor circuit will be interrupted

The operation of the sorter with respect to analyzing combinational holes and to controlling
55 the sorting mechanism by a single impulse will now be explained

When main switch 35 is closed and the operator depresses the start key 30, relays 31 and 32 will
60 be energized and the motor circuit will be closed Starting of the motor initiates the card feed and consequently closing of contacts 33 Relays 31 and 32 will remain energized and maintain the continuous operation of the machine

The cards passing under the analyzing brush 7 are provided with single or combinational holes whereby four index spaces are provided to symbolize the numerals 0 to 9 as may be seen from
65 Fig 3 In this figure the different index spaces are designated with A, B, C and D and these different positions of a column are analyzed successively when the card passes under the brush

The adjustment of commutator 16a relative to brushes 24a-d and 36a-d is such that points
70 23a-d are passing under brushes 24a-d and

36a-d respectively simultaneously with the passage of the A, B, C and D index spaces of a certain column under the analyzing brush

If therefore there is a hole in the B position current will flow in the following circuit From
80 left line 37 of the current supply, wire 38, brush 27, slip ring 25, pin 23b, brush 24b, magnet 18b, line 39, analyzing brush 7 now contacting contact roller 8, supply brush 40, to the right line 41
85 of the current supply As the brushes 24a-d contact subsequently points 23a-d of commutator 16a which is moved in the direction indicated by the arrow, the corresponding magnets 18 will be energized in accordance with the hole combination In consequence thereof the corresponding
90 brushes 19 will be shifted While the analyzed card is fed to the sorting plates 10 commutators 15a and 13a turn in the direction indicated by the arrows and one cycle after the analyzing period the brushes will encounter pins 17 and at a
95 certain moment a circuit will be established through brushes 19, commutators 13a and 15a and sorting magnet 11, this movement is identical with the incoming of the combinational holes and the card now being under the plates
100 10 will be sorted accordingly An example will show this more clearly Assume that the analyzed column was punched in the B and C positions meaning numeral 8 When B position is analyzed magnet 18b will be energized and shift its brush 19
105 to the lower position and the same operation will take place with magnet 18c and coordinated brush 19 when the punched C position is being analyzed When commutators 13a and 15a are turning synchronously with the card passage no
110 current circuit will be established through brushes 19 until position "8" of pins 17 of the commutators is under these brushes Then a current impulse will be effected in the following way From current supply over line 37, relay 42,
115 line 43 the shifted brush 19, lower pin 17 in 8-position, upper pin 17, shifted brush 19 coordinated to magnet 18b, line 44, brush 19 of magnet 18c now shifted to its lower position, pin 17 in 8-position, upper pin 17, the shifted brush 19 of
120 magnet 18d to line 41 and back to the current supply

By energization of relay 42 a current impulse will be effected over selector 28 and sorting magnets 11 now controlling the plates 10 and guiding
125 the card to station 8 of the sorter

As there is one cycle difference between the analyzing operation and the sorting operation, the two sets of magnets 18 and 20 operate alternately It may be easily recognized from Fig 2 that
130 brushes 26a-d read in the indications of the following card and control magnets 20 accordingly, while brushes 19 coordinated to magnets 18 read out from commutators 13a and 15a and control the sorting mechanism according to the previous
135 analysis as has been explained On the other hand during reading-in of brushes 24, the brushes 19 coordinated to magnets 20 read out from commutators 12a and 14a and control the sorting magnet accordingly Thus continuous
140 card feed and high sorting speed may be obtained though analyzing and sorting operation occur at different machine cycles Though the foregoing specification will give a complete understanding of the invention, reference may
145 be made to my prior application Serial No 222,467, filed September 28, 1927 in which the structural features of the device used in combination with this invention are explained in detail

While there has been shown and described and 150

- pointed out the fundamental novel features of the invention as applied to a single modification it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims
- 10 I claim
- 1 A sorting machine for records having combinational index points, analyzing means, reading-in means controlled by said analyzing means and consisting of a commutator having a plurality of differentially spaced contacts on its surface, a sorting mechanism, controlling means therefor, reading-out means for controlling said controlling means, said reading-out means comprising also a commutator having a plurality of differentially spaced contacts on its surface
- 15 2 A sorting machine for records having combinational index points, analyzing means for analyzing said records while they are in motion, reading-in means controlled by said analyzing means and consisting of a commutator having a plurality of differentially spaced contacts on its surface, a sorting mechanism, controlling means therefor and reading-out means for controlling said controlling means, said reading-out means comprising also a commutator having a plurality of differentially spaced contacts on its surface
- 20 3 In a sorting machine, the combination with a single element for successively searching the index point of a combination, of a plurality of electrical contacts settable in combinations under control of the searching element, a commutator device for selectively associating said contacts successively with said searching element, a card distributing mechanism, and means for converting the combinational setting of said electrical contacts into a single reading to control the card distributing mechanism
- 25 4 In a sorting machine, a single element for reading combinational holes of records, means for setting up electrical contacts in different combinations, a commutator having differentially positioned contacts for successively connecting the setting means with said reading element, means for converting the combinational reading of the set electrical contacts to a single reading, and a card distributing means under control of the last named means.
- 30 5 In a sorting machine, a single element for analyzing combinational index points of a card, a plurality of settable elements, a commutator rotatable in timed relationship with the card analyzed for rendering said elements successively settable in combinations under control of the single analyzing element, means for interpreting the setting of said elements as a single timed electrical impulse, and a card distributing mechanism energized by the transmitted electrical impulse including a single magnet for effecting selective distribution of the card by card passage forming means of the distributing mechanism, said impulses being timed to occur with the correlation of a card and the passage forming means
- 35 6 In a sorting machine comprising in combination, a plurality of sets of reading-in devices and a corresponding number of sets of reading-out devices, means whereby either set of the reading-out devices control a card distributing mechanism, a single reading element for analyzing the combinational hole records, and a commutator for associating the single reading element with each set of reading-in devices to effect a representation thereon.
- 40 7 In a sorting machine comprising in combination, a card sorting control device, a reading-out commutator having contacts on its periphery, and means under control of the combinational holes in the cards for shifting contacts laterally along the commutator periphery in different combinations to coact with the commutator contacts to effect a differentially timed electrical impulse to the card sorting control device at a certain position of the commutator
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