Nov. 27, 1934. L. MOMON 1,982,013

SORTING MACHINE

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FIG. 1.

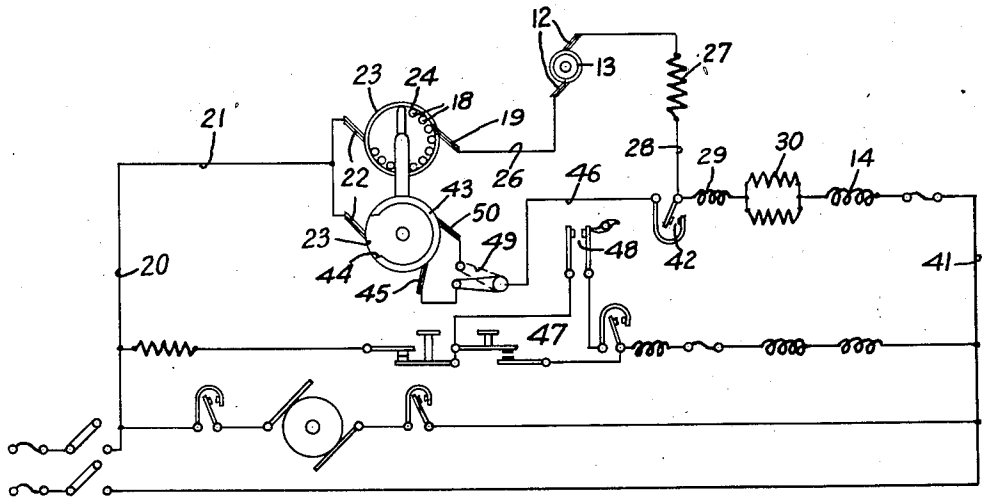
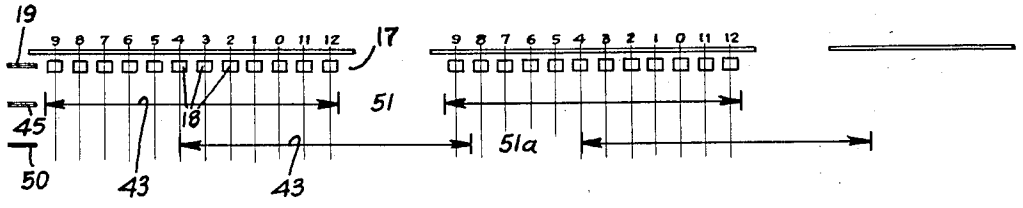


FIG. 2.



Inventor
Louis Momon
By his Attorney
W. M. Wilson

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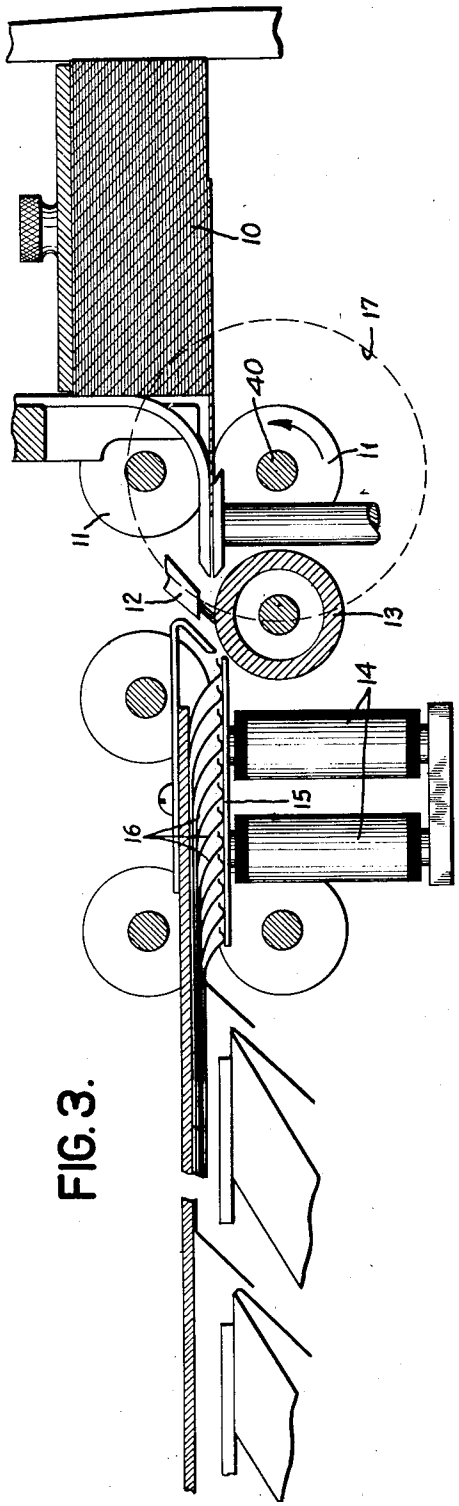


FIG. 3.

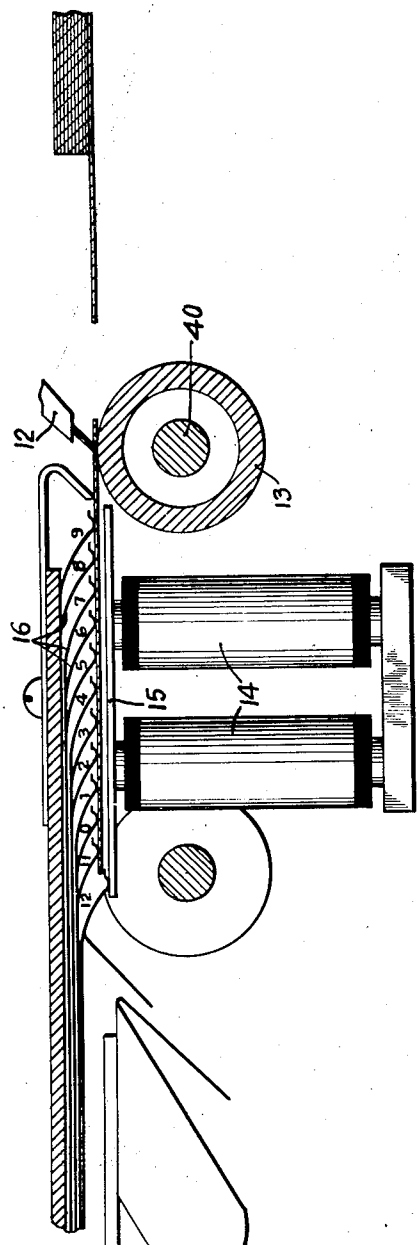


FIG. 4.

Inventor
Louis Momon
By his Attorney
W. M. Wilson

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FIG. 5.

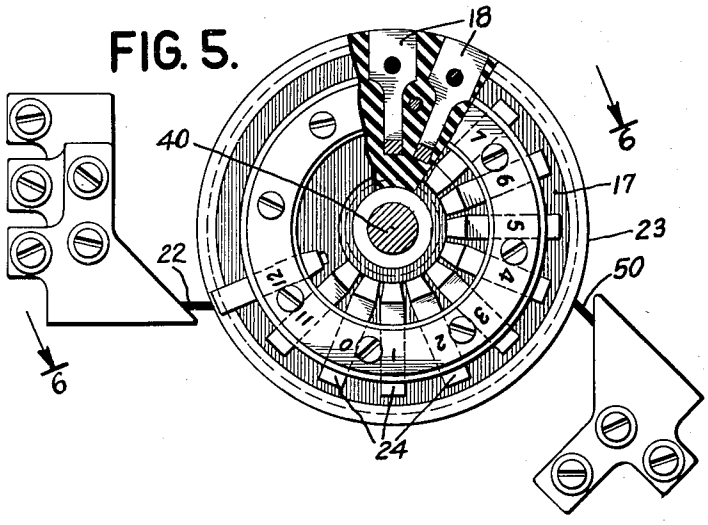


FIG. 6.

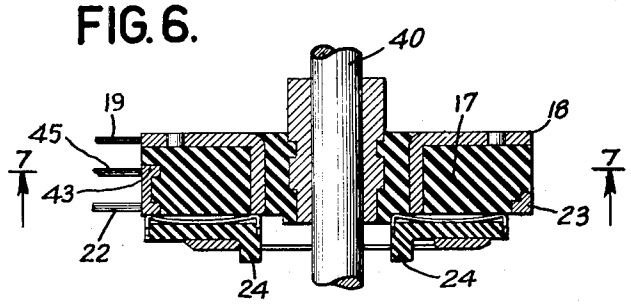
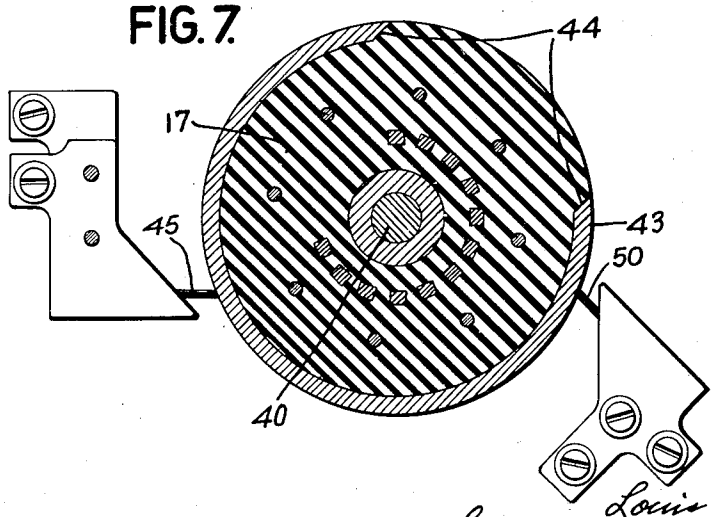


FIG. 7.



Inventor
Louis Momon
By his Attorney
W. W. Wilson

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1,982,013

UNITED STATES PATENT OFFICE

1,982,013

SORTING MACHINE

Louis Momon, Paris, France, assignor, by mesne assignments, to International Business Machines Corporation, New York, N. Y., a corporation of New York

Application February 12, 1930, Serial No. 427,784

4 Claims. (Cl. 209—110)

This invention relates to sorting machines in which record cards having index point perforations according to the well known Hollerith system are sorted according to such perforated indices.

More particularly this invention is directed to sorting cards in a manner such that certain cards are selected in accordance with their relation to other cards. For example, cards that are normally directed to a pocket in accordance with a perforated index point position in a particular column may be directed to another pocket, if and when preceded by a card lacking perforations in the column under consideration.

Insurance short term policies, periodical subscriptions, automobile licenses in those states where licenses are renewable yearly, require frequent changing of record cards. For example, let us take insurance policies that run for three months only. The record of these policies may be kept on perforated record cards and filed numerically according to the serial number of the policies. Each time a policy is renewed, new cards are substituted for the old and it is for the purpose of facilitating this substitution of the new cards for the old and for the withdrawal of the old that this invention is directed.

It is therefore an object of this invention to provide a machine for selecting cards and replacing them by other cards of the same type but of modified form.

The invention is an improvement of the machine disclosed in detail in Patent No. 1,741,985, issued to E. A. Ford for Sorting machine, which discloses a sorter of the horizontal type designed to sort Hollerith cards electrically and deposit each class in its proper station.

Various other objects and advantages of my invention will be obvious from the following particular description of one form of mechanism embodying the invention or from an inspection of the accompanying drawings; and the invention also constitutes certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the drawings:

Fig. 1 is a circuit diagram of the device.

Fig. 2 is a graphic respresentation of certain timing devices.

Fig. 3 is a section of a sorting machine showing the distributing blades.

Fig. 4 is a position view of parts in Fig. 3.

Fig. 5 is a view of the impulse distributing commutator.

Fig. 6 is a section taken on line 6—6 of Fig. 5.

Fig. 7 is a section taken on line 7—7 of Fig. 6.

Consider a group of cards for the sake of explanation hereinafter termed old or active cards which are arranged in some order of classification. A group of cards which we will call new cards may be related to certain of the old cards as to the data contained thereon and are to replace such corresponding old cards. For this purpose the separate groups of both old and new cards are run through the sorting machine illustrated in the usual way wherein, after certain operations of the machine, the cards will finally be arranged according to some particular classification number in such a way that each new card will have been sorted to a position adjacent its corresponding old card. The mechanism for effecting this sorting is that shown in the aforementioned patent, the essential elements of which are shown in Fig. 3 in which 10 represents the feeding magazine from which the cards are fed singly from the bottom of the stack to a pair of constantly running feed rollers 11. From the feed rollers 11 the card is advanced between an analyzing brush 12 and a contact roller 13. The brush 12 is so mounted that it may be moved laterally into such position that it will traverse the desired index column of the card as it passes thereunder. During the passage of the card under the brush the occurrence of a perforation in the column in question will cause energization of the sorter magnet 14 to lower its associated armature 15 so that the leading edge of the card will be directed between a pair of blades 16 which conduct the card to the pocket associated with the index point position in which the perforation occurred (see Fig. 4).

It is to be noted that the timing of the machine and the relation of the parts is such that as the leading edge of the card passes the openings of the channels associated with the various pockets, the corresponding index point positions are presented to the brush 12 for analysis so that the occurrence of a hole in any index point position will find the leading edge of the card at the proper channel opening, and will enter such channel if the magnet 14 should be energized to cause the lowering of the guide blade 16 in advance of the leading edge of the card. The circuits involved in the selection of the sorting pocket to which the analyzed card is to be directed is as follows:

Referring to Figs. 3 and 5, a commutator device 17 mounted on shaft 40 is shown as having twelve segments 18 therein corresponding to the twelve index point positions of the cards adapted to make contact with a brush 19 successively. Assuming the card to have a perforation in the position 5, when such perforation reaches the anlyzing brush 12, a circuit will be established from the line 20 (see also Fig. 1) through wire 21 to a common brush 22 which has contact with a common commutator ring 23, and thence through the slider 24 to the segment 18 corresponding to the five positions, to the brush 19, wire 26, contact roll 13, analyzing brush 12, resistance 27, wire 28 and

brush relay coil 29, resistance 30, sorting magnet 14 to line 41. This energizes the sorter magnet to cause the lowering of the armature 15 to select the five channel along which the card is to be directed to the five pocket.

The foregoing brief description of a sorting operation is more fully detailed in the patent referred to and needs no further consideration here. Mention may be made, however, that the sliders 24 (Figs. 5 and 6) may occupy either of two positions as shown in Fig. 6 where the slider is adapted to connect the common ring 23 to the associated insert 18.

The energization of the brush relay magnet 29 attracts its armature to close a contact 42 through which a holding circuit is established to the sorting magnet. This circuit follows from line 20, wire 21, to the common brush 22, to the common commutator ring 23 as before. Integral with this common ring is a commutator section 43 having a cutaway portion 44 cooperating with a brush 45 which directs the circuit through wire 46, to the contact 42, thence through magnet 29, resistance 30, magnet 14, back to the line 41. The commutator section 43 is adapted to hold the circuit until the twelve position of the card has passed the analyzing brush. This insures that the guide blades 16 remain in their displaced relationship until such time as the holding circuit is broken. Figs. 5 and 6 show the construction of the commutator device 17 and the associated segments. This device is well explained in the patent referred to and requires no further detailed explanation.

In the wiring diagram (Fig. 1) is shown the operating motor and the control circuit therefor generally designated 47 which is operative in the usual manner to control the machine. The usual card lever contacts 48 are provided to cause stoppage of the machine upon exhaustion of the cards in the feed magazine 10. The sorting circuit above described is the usual circuit involved in sorters of this type and is the circuit which functions to cause the aforesaid association of the new card with its corresponding old card. The combined group of cards will now consist of a number of old cards immediately preceded by a corresponding new card and a number of old cards for which there were no corresponding new cards. The entire group of cards, it is to be understood, are arranged in some certain numerical order.

The manner in which the old cards are distinguished from the new is by the presence in a particular selected column of a special designating perforation which may be made in this column preferably in the twelve index point position.

The purpose now of the machine is to remove from the group of cards such old cards as have an accompanying new card so that the remaining group of cards will consist only of new cards and such old cards which have not been replaced. To accomplish this, the cards are placed in the feed magazine 10 and run through the machine with the new cards preceding their corresponding old cards. Switch 49 is moved from the position shown to its dotted line position to discontinue the holding circuit through the brush 45 and switches such circuit to a brush 50 lying in the same plane as the brush 45 and cooperating with the same commutator section 43 (see Fig. 7). The effect of such circuit switching is to change the time relation of the holding circuit. Fig. 2 shows diagrammatically the relation between the card as it passes under the analyzing brush 12 and the duration of the holding circuit. In the line marked 51, it is indicated that where normal sorting operations are being performed and the switch 49 is in its normal full line position, the holding circuit may be established at any point beginning at the nine position of the card and is broken after the twelve position has passed the analyzing brush so that in the interval between cards there is no circuit established. Also as shown by the diagrammatic representation of the commutator device 17, no circuits can be established through the sorting magnet during this interval between cards since at such time the brush 19 is not in cooperation with any of the commutator segments 18. When, however, the switch 49 is shifted as pointed out above, the subsequent shifting of the timing of the holding circuit is as indicated on the line 51*a* so that as may be observed, if any circuit is established from the analyzer brush 12 through the card and the commutator segments 18 within the range between the three position and the twelve position, a circuit will be established through the sorting magnet as before, which circuit will be picked up by the holding commutator 43 and maintained until after the nine position of the following card has passed the card analyzing position.

In connection with this sorting operation, all the slides 24, with the exception of the twelve slide in Fig. 5 may be shifted radially towards the center of the ring 23 to their inoperative position. This then will permit closure through the sorting magnet at only such times as a perforation occurs in the twelve position of a card.

With this explanation of the timing of the holding circuit in mind, the first card to approach the analyzing brush 12 will be directed over the top of all the guide blades 16 and conducted to the nine position due to the following. While this first card was being advanced from the magazine 10, the commutator 23 was successively presenting its segments 18 to the brush 19 and when the twelve position which as we have seen is live for this operation, approaches the brush, a circuit is established in a familiar manner through the contact roller 13, analyzer brush 12, there being no card thereunder at such time. The holding circuit coming into play at this instant establishes a holding circuit from the line 20, wire 21, brush 22, common ring 23, commutator section 43, brush 50, switch 49, wire 46, contact 42, relay magnet 29, resistance 30, sorting magnet 14, back to line 41. Such circuit obviously causes attraction of the armature 15 by the magnet 14 lowering all the guide blades 16 to the position shown in Fig. 3, and the holding circuit will maintain the magnet 14 energized until the leading edge of the first card has moved to a position above the uppermost blade 16.

If this leading card is an old card, that is a card which is not to be replaced by a new one, it will, as it continues in the direction of the nine pocket, establish a circuit through the sorting magnet at the twelve position due to the presence of the old card designating perforation in such position and the sorting magnet so energized will be held in such position until the leading edge of the succeeding card has also been started along the path to the nine pocket in the same manner as the preceding card (see Fig. 4).

Should this card be a new card, the absence of a perforation in its twelve position will fail to reenergize the magnet 14 and the blades will be permitted to move to their upper position to permit the following card to pass thereunder. Due to the previous arrangement of the cards, as has

been mentioned, this card which follows a new card is one which it is desired to remove from the general file. When the twelve position of this card approaches the analyzing brush, the circuit established through the perforation therein will establish the now familiar circuit through the sorting magnet to direct the next succeeding card to the nine pocket. This next succeeding card is either a new card or an unaccompanied old card, in either of which cases it is desired to direct it to the nine pocket.

Recapitulating, the machine is adapted during a sorting cycle such as described to pre-select the pocket to which a particular card is to be directed, this pre-selection depending upon whether the card in question is preceded by a card having a particular perforated designation or not. If the preceding card has no such perforation, the succeeding card, which as we now know it is to replace, is directed to the pocket adapted to receive such rejected cards. If the preceding card has such perforated designation, the following card will remain with those which comprise the active file.

After this sorting operation, it is obvious that the group selected for filing comprises a number of cards having designating perforations and the rest having none. These cards may now be run through a gang punching machine wherein a hole is punched in the designating position in each card, those cards already having such perforations therein not being materially affected so that after such gang punching operation all the cards have the designating hole and any may be replaced through subsequent operations by other cards according to the system outlined.

Another type of problem which the device is adapted to solve is the separation of card groups comprising several cards, which we may arbitrarily call production cards, accompanied by a single "master" card from groups which have no production cards but simply a single master card.

In such a system the cards are arranged with the production cards of a group preceding their associated master card and in some selected column each production card is perforated in the nine and twelve index point positions to designate it as such. The master cards, however, will have no perforation in this same column.

With the switch 49 in the dotted line position of Fig. 1, the cards are placed in the magazine 10 (Fig. 3) and advanced singly to the analyzing brush 12. The first card is a production card having a nine and a twelve perforation and as we have heretofore seen the circuit established at the twelve point in the preceding cycle caused energization of magnet 14 and the holding of such circuit until the first card entered the passageway to the nine pocket, this first production card will do likewise. In a familiar manner the sensing of the twelve hole of this card as it passes under the analyzing brush causes reenergization and reholding of the circuit through magnet 14, so that the next succeeding card will also follow into the nine pocket. Thus each production card through its twelve hole controls the selection of the following card. When finally the last card of the group, namely the master card has been advanced toward the nine pocket, the absence of perforations in such card will not set up a selecting circuit for the following card, and if this next card happens to be another master card it will pass beneath all of the blades 16 to the usual reject pocket.

It may be mentioned at this time that for this sorting operation the sliders 24 of Figs. 5 and 6 corresponding to the nine and twelve position are in their outward or operative positions. Upon the presentation of a production card to the brush 12, which card will, of course, be the first of a new group, a regular sorting circuit will be established through the nine hole to select the nine pocket and later the twelve hole will cause selection of the same pocket for the following card.

Upon completion of the sorting of all the cards they will have been separated into two pockets, the nine pocket containing all groups of cards, consisting of one or more production cards accompanied by a master card, and the reject pocket containing all master cards which were unaccompanied by production cards.

While there has been shown and described and 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.

I claim:

1. In a cyclically operable card sorting machine, analyzing means comprising devices which cause electric energy to pass through holes in the card, a plurality of distributing passageways, a magnet controlled by said analyzing means during a cycle of the machine to open the receiving end of a passageway for the card, the position of the card itself determining which passage shall be opened, and means including a holding circuit for maintaining said magnet energized throughout the remainder of said cycle and during a part of the next cycle to open the receiving end of another passage for another card.

2. In a card sorting machine, receiving pockets, means for feeding record cards successively, means controlled by the machine for selecting the pocket to receive the first card and further means controlled by said first card and cooperating with said machine controlled means for selecting the pocket to receive the second card.

3. In a card sorting machine, a plurality of receiving pockets including a common pocket, card feeding mechanism for feeding control cards having differentially located perforations and associated record cards, means controlled by the control cards for selecting different receiving pockets for said control cards in accordance with the location of the perforations, further means controlled by said selecting means and rendered operative by said control cards for selecting said common pocket for the associated record cards and means for feeding the associated record cards to said common pocket.

4. In a sorting machine adapted to sort records having index point positions, receiving pockets, a sorting magnet for controlling the disposition of cards with respect to said pockets, means brought into operation whenever a predetermined index point position causes energization of said sorting magnet for prolonging the energization of said magnet and means for varying the extent of prolongation.

LOUIS MOMON.