Oct. 31, 1933. H. A. WEINLICH ET AL 1,933,357

SORTING MACHINE

Filed Dec. 2, 1930 4 Sheets-Sheet 1

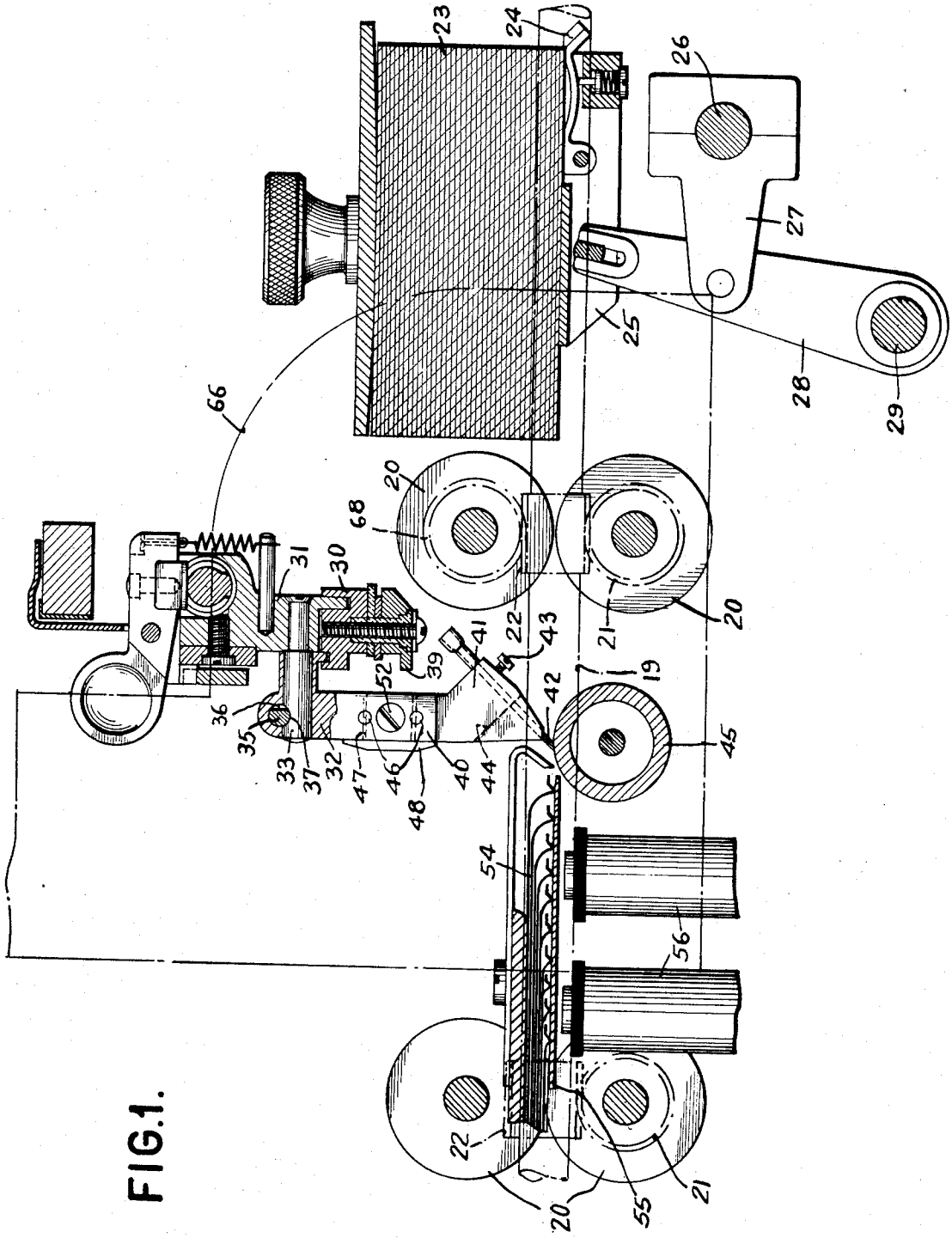


FIG.1.

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FIG. 2.

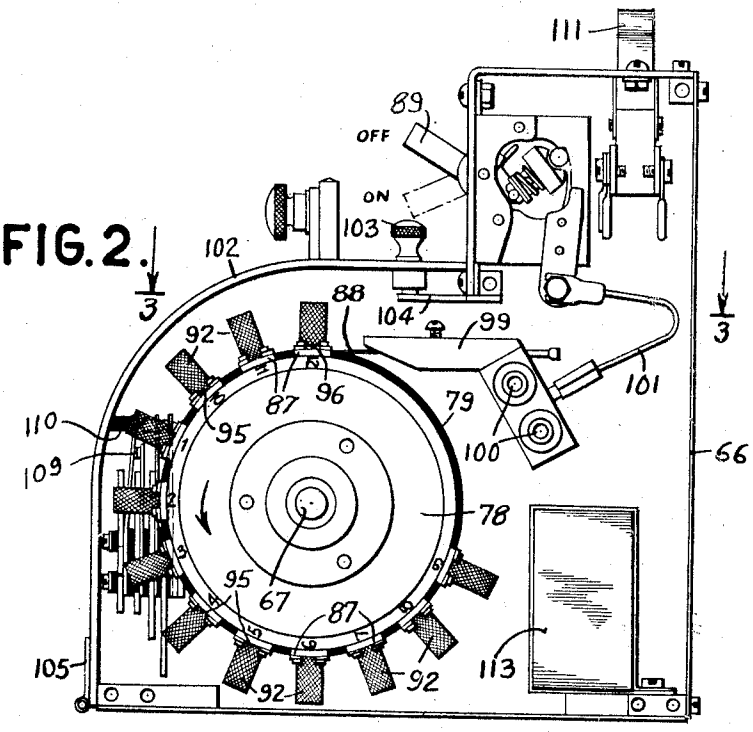
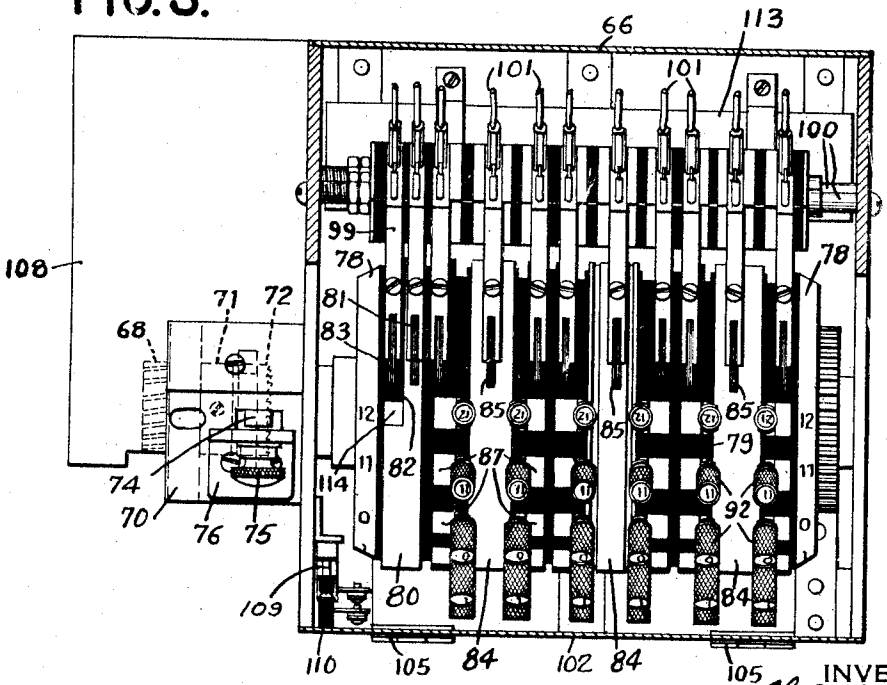


FIG. 3.



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SORTING MACHINE

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FIG. 4.

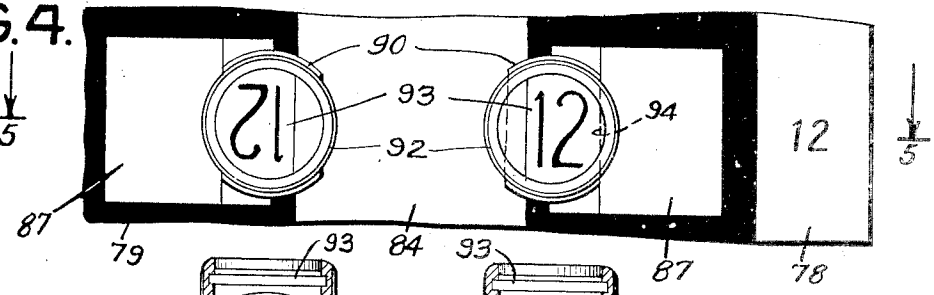


FIG. 5.

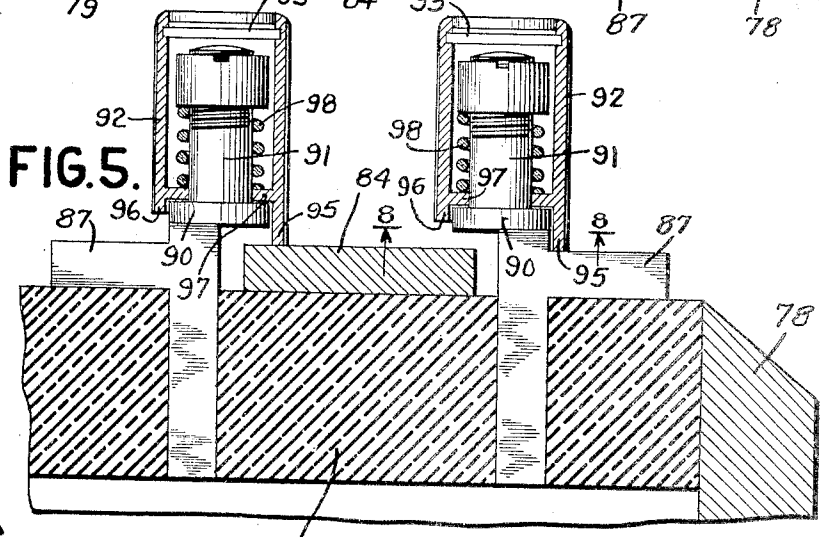


FIG. 6.

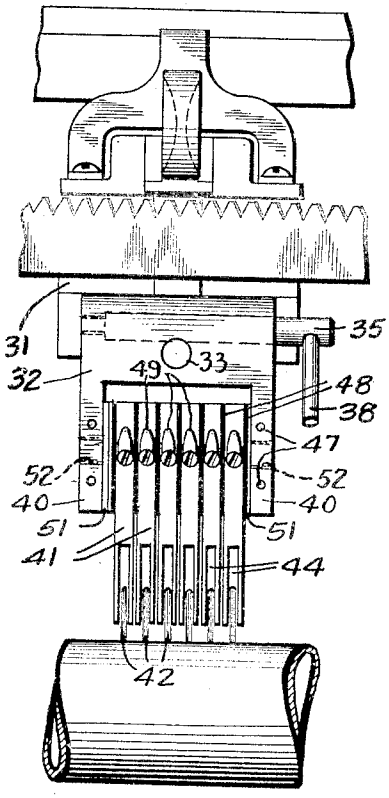


FIG. 8.

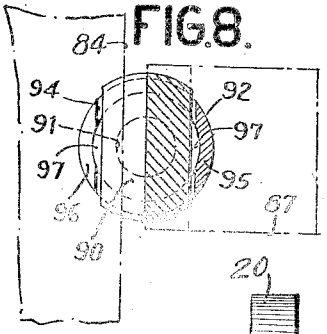


FIG. 7.

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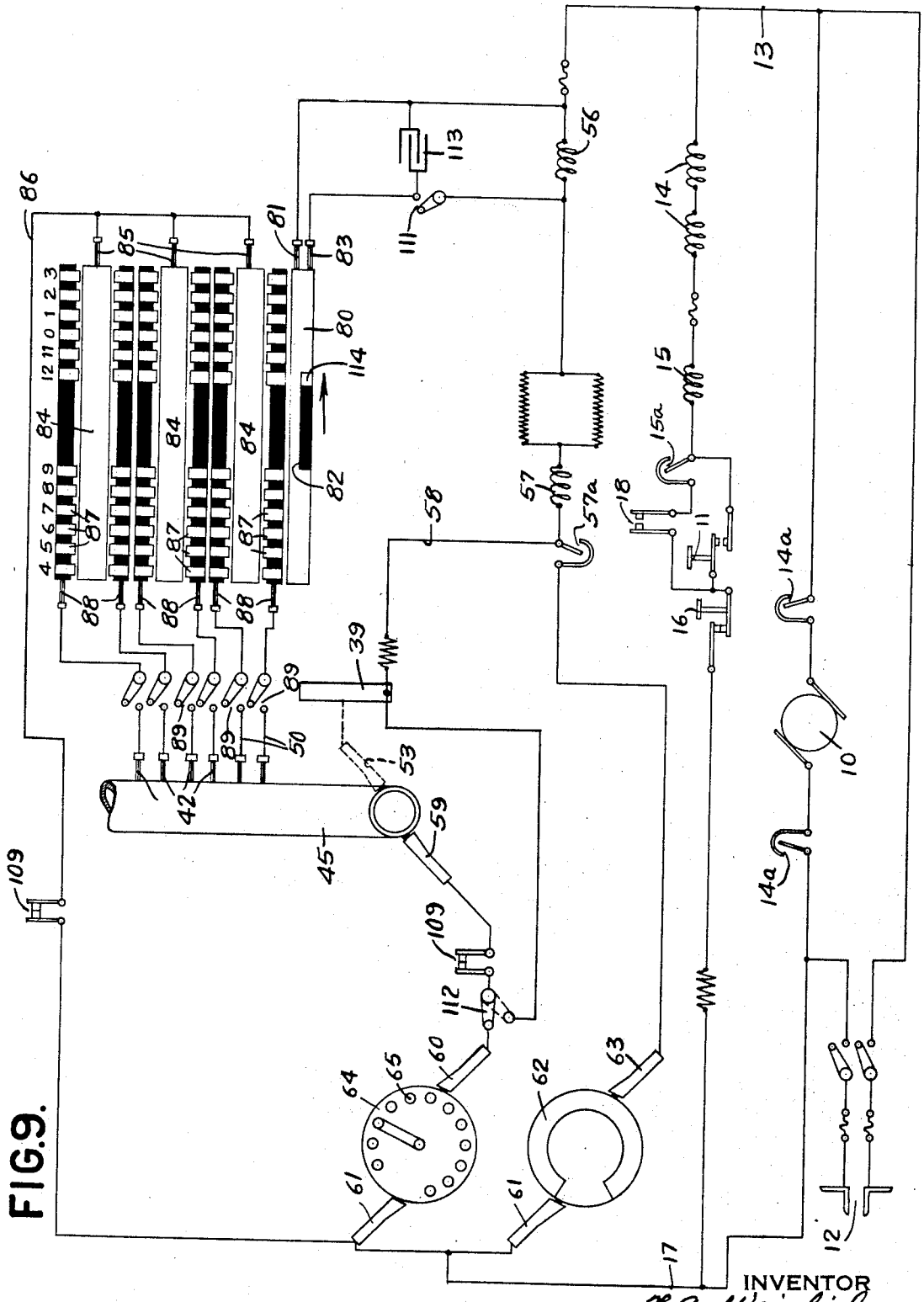


FIG.9.

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1,933,357

UNITED STATES PATENT OFFICE

1,933,357

SORTING MACHINE

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Application December 2, 1930. Serial No. 499,464

10 Claims. (Cl. 209—110)

This invention relates to improvements in record controlled machines such as those embodying the well known Hollerith system in which perforated record cards control the operation of the machine.

The primary object of the present invention is to provide a device which may be readily attached to a sorting machine without requiring extensive alterations in the machine and is capable of controlling the sorting machine in a manner to effect selective separation from a batch of record cards all of such cards which have a conforming series of perforations.

It is sometimes desirable to collect together all record cards relating to a given series of transactions or records, such as the cards representing payments on a particular account or all cards representing sales in a given territory such as a sales district or division. In the mentioned illustrations all of the record cards relating to the selected record group, which is to be used eventually to control a tabulating machine, will bear some common series of perforations such as an account number or a code number representing the district or territory to which the cards relate.

It is desirable, therefore, to equip a sorting or tabulating machine with a device capable of selecting all cards bearing the desired identifying number and convey said cards to a separate sorting pocket or, if desired, the cards selected may be conveyed directly to the tabulating machine.

The present invention aims to provide a device capable of attaining the above results and which requires no alterations in the sorting machine other than a slight rearrangement of the circuits for controlling the machine and a special analyzing brush device which may be placed in the usual brush holder of the machine in place of the ordinary single brush.

Various other objects, features, and advantages will be particularly pointed out in the following specification and claims or will be apparent from a study of said specification and the accompanying drawings which show a preferred embodiment of the invention.

In said drawings:

Fig. 1 is a diagrammatic view of a sorting machine and shows the card feeding and conveying mechanism, the card guiding devices, and the analyzing device.

Fig. 2 is a side elevation of the selector mechanism viewed from the right and with the right side plate of the casing removed.

Fig. 3 is a horizontal section taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary enlarged view of two of the selector switches.

Fig. 5 is a section taken on the line 5—5 of Fig. 4.

Fig. 6 is a vertical elevation of the brush holder and special analyzing brush shown in Fig. 1 and viewed from the left in the latter figure.

Fig. 7 is a detail view in elevation showing the driving connections between the selector device and the sorting machine.

Fig. 8 is a transverse section through one of the selector switches, the section being taken on the line 8—8 of Fig. 5.

Fig. 9 is a circuit diagram showing the manner in which the device is connected to the circuits of the sorting machine.

The present invention has been shown as applied to a sorting machine of a type now well known in the art. The construction and operation of the card selecting, conveying, and guiding mechanism and the general arrangement of the circuits are fully shown and described in Letters Patent No. 1,741,985, granted December 31, 1929 to E. A. Ford while the mechanism for feeding cards from the magazine and the brush holder for the analyzing brush are shown and described in Letters Patent No. 1,741,992, granted December 31, 1929 to Harry Kleckler.

The foregoing mechanisms will be only briefly explained herein since said patents contain a full description of well-known mechanisms of which the present invention is an improvement.

The motor 10 which drives the sorting mechanism is started by depressing a starting key 11 which establishes a circuit from source 12, line 13, motor relays 14, card relay 15, starting key 11, now closed, stop key 16, to the line 17 and back to source 12. Energization of relays 14 closes contacts 14a thereby starting the motor 10 while energization of relay 15 closes contacts 15a and connects the card lever contacts 18 in parallel with the starting key 11. The starting key 11 is held depressed until cards begin to pass the analyzing brushes after which the card lever contacts 18 close thereby establishing a holding circuit for the relays 14 and 15. The starting key 11 may be released after the contacts 18 have established the holding circuit. When the last card has been fed from the card magazine and has passed the analyzing brush the card lever contacts 18 open thereby breaking the holding circuit for relays 14 and 15 and the motor stops. The motor may also be stopped at any

time by depressing the stop key 16 which opens the holding circuit in a similar manner.

The motor 10 is connected by suitable driving connections such as a belt or gearing to a main drive shaft 19 (Fig. 1) and drives the feeding rollers 20 by means of suitable gears 21 and 22. The cards 23 are fed from the magazine by means of a picker 24 carried by a reciprocating frame 25 sliding in suitable guides and operated by eccentric pins 26 carried by a cross shaft (not shown) driven by the shaft 19. A link 27 connects each pin 26 to a rock arm 28 journaled upon a cross shaft 29, each of the arms 28 having a slot at its upper end which engages a pivoted member carried by the frame 25. It will be clear, therefore, that rotation of shaft 19 will cause the frame 25 to reciprocate from right to left (Fig. 1) to feed a card 23 from the magazine. The timing of the parts is such that a card 23 is fed from the magazine once during each revolution of the feed rollers 20.

Extending crosswise of the machine above and parallel with the shafts supporting the card feeding rollers 20 is a bar 30 adapted to support and guide a carriage 31 carrying a detachable brush holder 32. The carriage 31 is adapted to be shifted manually and crosswise of the machine or front and rear, as viewed in Fig. 1, and carries a post 33 which cooperates with a hole 34 in the brush holder 32 to hold the latter in place. The brush holder 32 is locked in place by means of a rotatable pin 35 having a notch 36 near its mid-point of about the same radius as the pin 33 while the latter has a similar notch 37 near its end of a radius about equal to the radius of the pin 35. When both notches 36, 37 are facing each other the brush holder 32 may be easily removed but if a handle 38 carried by pin 35 is turned about 90° the notch 36 in pin 35 is rotated to the position shown in Fig. 1 and the solid part of the pin 35 will be brought into the notch 37 in pin 33 and thereby prevents removal of the brush holder 32.

Ordinary sorting operations of the sorting machine require a single brush which may be of the form disclosed in Patent 1,741,992 in which the brush holder is composed of two parts which are insulated from each other, the lower part being of metal permanently fastened to the upper part and carries a card analyzing brush and a contact shoe. The contact shoe bears upon a contact rail 39 carried by the bar 30 and insulated therefrom so that the brush may be set to analyze any desired column of the card and still remain connected to the control circuits of the machine.

When it is desired to carry out the special sorting operation to select only those cards which have a particular identifying series of perforations, the ordinary brush holder is removed and replaced by a special brush holder having six brushes adapted to analyze simultaneously six adjacent columns of the record card.

The special brush holder is illustrated in Figs. 1 and 6 in which it is shown as comprising a substantially U-shaped frame 32, between the downwardly extending arms 40 of which are supported six brush retainers 41 insulated from each other and from the frame 32. The brush retainers 41 carry the brushes 42 which are held in place by set screws 43, the lower ends of the retainers being slotted as at 44 to permit the brushes to flex under the pressure they exert upon the card as it passes over the rotatable and insulated contact roll 45.

The brush retainers 41 are supported by pins 46 which pass through the arms 40 of holder 32 and are held in said arms by means of pins 47 which pass through the arms 40 and the pins 46, suitable insulating bushings surrounding the pins 46 and preventing the metal of the brush retainers from touching the pins 46. The retainers 41 are insulated from each other and from the arms 40 by means of flat separators 48 of insulating material and each is provided with a connector lug 49 to which are soldered or welded the individual wires 50 connecting the brushes 42 to the selector circuits. Interposed between the extreme right and left separators 48 (Fig. 6) and the arms 40 are plates 51 cooperating with set screws 52 carried by the arms 40. It will be clear that the set screws 52 may be turned in either direction to adjust the brushes slightly in a direction axial with respect to the set screws 52 and, when said brushes have been once set properly, said screws 52 may be both tightened to hold the brush retainers firmly in place. The individual wires 50 may be cabled and of a sufficient length to permit setting the carriage 31 to position the brushes in coincidence with any six columns of the record card as it passes over the contact roll.

Before proceeding with a detailed description of the special selector mechanism a brief description will be given of the operation of the sorting machine when operated in the ordinary manner. The single brush used for normal sorting operations is indicated by broken lines (Fig. 9) and bears the reference numeral 53. It will be understood that the special brush holder 32 has been replaced by the ordinary brush holder having a single brush and that the special selector circuits, hereinafter to be more fully described, have been disconnected by means of certain switches provided for that purpose. The brush 53 is positioned to analyze the desired column on the record card as the card is fed from the first set of feed rollers 20 (the right set, Fig. 1). The guide blades 54 rest upon the top of an armature 55 which is controlled by a sorting magnet 56, the armature lying level with and between two fixed guide plates (not shown) over which the card is adapted to slide under the influence of the feed rollers 20. The ends of the guide blades 54 are so spaced relative to the analyzing brush that the brush will sense an index-point perforation at the instant the left edge of the card underlies the end of the guide blade 54 corresponding to that index point position. Each guide blade leads to a sorting pocket (not shown) which is designed to accumulate all of the record cards having a given index-point perforation in the column analyzed.

There are thirteen such sorting pockets, the thirteenth pocket being for the reception of unperforated cards and commonly called the "reject" or "R" pocket. The other twelve pockets correspond to the twelve index-point positions of the record card and each has a guide blade 54 leading thereto. The first blade on the right (Fig. 1) corresponds to the "9" pocket, the next corresponds to the "8" pocket, and the others in order, from right to left, correspond to the "7", "6", "5", "4", "3", "2", "1", "0", "11", and "12" pockets, respectively.

As the card passes beneath the brush 53, the left edge passes beneath each blade end and, if a perforation should be present in any of the index point positions named, said perforation will be sensed by the brush 53 at the same instant the left edge of the card underlies the end of the

particular blade 54 corresponding to the sorting pocket adapted to accumulate cards perforated at that particular index-point.

When the perforation is sensed by the brush 53 contact will be made with the contact roll 45 and a circuit established as follows: Source 12, line 13, sorting magnet 56, brush relay 57, line 58, contact rail 39, brush 53, contact roll 45, contact roll brush 59, commutator brush 60, through the commutator segment corresponding to the index-point perforation sensed, common brush 61, line 17, back to source 12. Energization of the brush relay 57 closes contacts 57*a* and establishes a holding circuit for the relay 57 through a commutator segment 62, brush 63 and the common brush 61 to the source 12. The segment 62 is of sufficient circumferential length to hold the circuit until the last index-point position has passed beneath the brush after which event occurs the brush 63 passes out of contact with said segment 62 thereby breaking the holding circuit for relay 57. The energization of the sorting magnet 56 causes the armature 55 to drop thereby lowering all of the blade ends 54 not resting upon the record card analyzed and, as a consequence thereof, a gap is made between the last blade on the left (Fig. 1) which is held up by the card and the next adjacent lowered blade into which the card is carried by the feeding rollers 20. The card will thereafter be guided to the appropriate sorting pocket by means of suitable feeding rollers similar to the rollers 20.

Patent No. 1,741,985 gives a more detailed description of the construction and operation of the commutator 64 cooperating with the brushes 60, 61 and a reference to that patent will fully explain its purpose. Since the present invention, does not directly involve the said commutator it will not be described in detail herein. It will be understood that each bar or spot 65 on the commutator has been made current conducting in each index point position as explained in detail in said patent.

The special selector device is arranged to be attached to an existing sorting machine without any structural alteration in the machine and for that reason is made a compact and self contained unit contained within a casing 66, indicated in side elevation by broken lines in Fig. 1. The casing 66 is carried by suitable brackets (not shown) attached to the rear of the machine and near the right end of the machine, and is shown in detail in Figs. 2, 3, 4, 5, 7, and 8. The special selector comprises a plurality of selectively and manually settable switches carried by a drum driven in synchronism with the feeding rollers 20 and in coaxial alignment with the rear end of the shaft carrying the upper right feeding rollers 20.

Journalled within the casing 66 is a shaft 67 which extends forwardly and exteriorly of the casing (to the left, Fig. 7) and carries loosely mounted thereon a gear 68 meshing with the gear 22 carried by shaft 19 and driving the lower right feeding roller 20 (Fig. 1). The gear 68 has a hub which extends through an outboard bearing 69 carried by a bracket 70 attached to the left side of the casing 66 (Figs. 3 and 7) and is provided with a clutch element 71 adapted to coact with a clutch element 72 splined to shaft 67 and slidable on said shaft. The clutch element 72 has a circumferential groove 73 cooperating with a shift lever 74 journalled in the bracket 70.

The upper end of the lever 74 carries a thumb screw 75 by means of which the lever may be clamped in either of its set positions. For this purpose an upright bracket 76, carried by the bracket 70, has a substantially horizontal slot 77 (Fig. 7) through which passes the shank of the thumb screw 75 so that the lever 74 may be shifted to bring the clutch elements 71, 72 into engagement with each other and then locked in shifted position by means of the thumb screw 75. Fig. 7 shows the clutch elements in engagement with each other so as to establish a driving connection between the shaft 67 and the main driving shaft 19.

The shaft 67 has rigidly mounted thereon and between the end plates of casing 66, two index disks 78 graduated to correspond with the twelve index point positions of the record card. The disks 78 support a drum 79 of insulating material upon which is mounted a number of contact rings and commutator bars for controlling the selection of the desired cards.

There are four rings provided, the left ring 80 (Fig. 3) having a continuous portion cooperating with a brush 81 and a portion provided with a gap 82 and a cooperating brush 83. The other three rings 84 have cooperating brushes 85 having a common connection to a wire 86. Associated with each of the rings 84 are two circumferential rows of twelve commutator bars 87 which are insulated from each other and from the rings 84 but are capable of being individually connected to the associated ring 84 by means of manually settable selector switches. A brush 88 is provided for each row of commutator bars and is adapted to contact with said bars in succession. Each brush 88 is connected in series with a lever type snap switch 89 to one of the brushes 42 of the special brush holder 32.

Each circumferential row of commutator bars 87 corresponds to a column on the record card and each bar corresponds to an index-point position in the column with which it is adapted to cooperate. It will be seen from Figs. 2, 3 and 9 that there are twelve rows of such bars crosswise of the selector (Fig. 3), the index-point value of each row being indicated by an appropriate numeral on the edges of index disks 78 so that the selector switch corresponding to a given index-point position in any column may be readily located. The bars 87 are so timed that all of the bars corresponding to a given index point position are under the brushes 88 at the instant the brushes 42 are reading the same index-point positions on the card.

The selector switches for connecting the bars 87 to the adjacent contact rings will now be described and are illustrated in detail in Figs. 4 and 5. Each bar 87 is formed with a lug 90 and a cylindrical upright portion or post 91 upon which is rotatably and slidably mounted a knurled thumb piece 92 in the form of a hollow shell. The upper end of each shell is closed by a number disk 93 bearing a numeral corresponding to the index point position which the associated bar represents and is provided with a transverse rectangular groove or notch 94 into which fits the lug 90 which is flattened on diametrically opposite sides but is otherwise cylindrical with a radius slightly greater than the outside radius of the thumb pieces 92. One of the two downwardly extending lugs or projections formed as a consequence of the presence of said notch 94 is longer than the other as shown at 95 and is adapted to rest upon either the associated bar 87

or the adjacent ring 84. The other projection 96 is not of sufficient length to touch either the bar 87 or the ring 84. Interposed between a threaded collar carried by the post 91 and a shoulder 97 formed in each thumb piece 92 is a spring 98 which presses down upon the thumb piece and forces the lug 95 into contact with the bar 87 or the ring 84, according to how the thumb piece has been set.

It is clear, therefore, that the thumb piece 92 is securely held against accidental displacement. Normally, for non-selection of a card having a perforation in a given column and index point position on the card, the thumb piece 92 corresponding to said column and index point position is turned so that the lug 95 rests on the adjacent ring 84 thereby electrically connecting the associated bar 87 and the ring 84 and when so set the numeral on the number disk 93 will appear inverted as shown in Fig. 4. When it is desired to select cards having a perforation in a given index-point position and column sensed by a brush 42, the thumb piece 92 corresponding thereto is grasped manually and raised until the lug 95 clears the lug 90 and then turned 180° and released, permitting the lug 95 to rest upon the bar 87 corresponding thereto thus breaking the electrical connection between bar and ring and causing the numeral on the number disk to appear upright as in Fig. 4. In the latter figure, the left hand selector switch corresponding to the "12" index-point position of the second column from the right (Fig. 3) is set for non-selecting position while the right hand selector switch is set in selecting condition. Normally, therefore, all of the numbers appear inverted so that it is merely necessary to turn the knob 92 as described so that the number thereon appears upright whenever it is desired to select cards having a perforation in that index-point position.

Each of the brushes 81, 83, 85 and 88 is carried by a brush holder 99 which is insulated from the other brush holders 99 by means of insulating blocks and is mounted upon cross rods 100 supported by the side plates of casing 66, the brush holders being insulated from the supporting rods 100 by means of insulating tubes in a well-known manner. Short lengths of flexible wire 101 connected to the brush holders 99 provide the necessary interconnections between the brushes and the various control switches and circuits.

The casing 66 is provided with a door 102 which may be opened by pulling up on a spring pressed thumb piece 103 which results in withdrawing a pin formed as part of the thumb piece from a hole in an arm 104 fastened to the framework of the casing thereby permitting the door to be opened, the door being hinged to the lower front edge of the casing 66 (Fig. 3) as at 105.

In order to prevent backward rotation of the shaft 67 and the drum carrying the selector switches and possible damage to the brushes 81, 83, 85 and 88, the clutch element 72 is provided with ratchet teeth 106 which cooperate with a tooth 107 formed in the bracket 70. When the lever 74 is shifted to the left (Fig. 7) to disengage the clutch, the tooth 107 enters one of the interdental spaces in the clutch element and prevents turning the shaft 67 backwardly. A guard 108, attached to the bracket 70, prevents the operator's fingers from being accidentally caught in the gearing in the shaft 19.

In order to prevent setting the selecting switches while the current is turned on there are provided two pairs of contacts 109 which are mounted near the lower left front corner (Fig. 3) of the casing and arranged to be closed when the door 102 is closed. An insulated stud 110 is pressed inwardly by the door when it is closed and thereby effects closure of both pairs of contacts 109. When the door is opened, the stud 110 springs outwardly, opening contacts 109 thereby disconnecting the contact roll 45 and the selector mechanism from the source of current 12.

The contact ring 80 is adapted to shunt the sorting magnet 56 during special sorting operations. In order to permit normal sorting operations there is provided a switch 111 which may be opened to prevent shunting of the sorting magnet. This switch is mounted in the casing 66 as shown in Fig. 2 and is similar to the switches 89. A somewhat similarly operated switch 112 adapted for single pole, double throw service, is mounted in the casing 66 alongside of the switch 111 and when in the "off" position connects the contact roll brush 59 to the brush 60 in series with the contacts 109. When turned to the "on" position the contact roll brush 59 is connected to the contact rail 39 and also in series with the contacts 109. In the former position normal sorting operations are permitted while in the latter position the special sorting operation is permitted.

The detail construction of the special selector mechanism and its connections with the sorting machine having been described, the operation of the device in selecting certain cards will now be described. The selector device depends for its operation upon the fact that an unperforated card passing the analyzing brush will not affect the sorting magnet. Not having a perforation in any index point position, the unperforated card will pass beneath the blade ends 54 of all of the guide blades leading to sorting pockets and will be guided eventually into the "R" or "reject" pocket which usually is the first pocket to the left of the analyzing brush as viewed in Fig. 1. It will be perceived that if it is desired to separate certain specified cards from the others it is merely necessary to nullify the presence of the identifying perforations in the cards to be selected in order to permit said cards to be conveyed to the "R" pocket while the operation of the sorting magnet for the undesired cards will not be interfered with. In other words, the present invention contemplates selection by rejecting the desired cards and diversion of the undesired cards so that the former will be guided to the "R" pocket and the latter to some other pocket such as, in the present case, the "12" pocket.

The selector device is so arranged that the effect of each of the perforations representing the identifying number in the desired cards is neutralized by setting the selector switches so that an open circuit will occur when each of said perforations is sensed by an analyzing brush 42 while the perforations in undesired cards will affect the brush relay so as to set up a circuit which eventually will be effective to control the sorting magnet at the "12" position to divert the undesired card to the "12" pocket. In order to accomplish the foregoing result the selector switches are set so that no circuit can be established therethrough in any of the index point positions representing the group number of the cards to be selected while the sorting magnet is shunted except at the "12" position and during the gap between successive cards. For this reason the gap 82 in the ring 80 is of a length to per-

mit the establishment of the shunt circuit for the sorting magnet from the "9" position to the "11" position, the shunt being removed at the "12" position of one card and reestablished slightly before the "9" position of the card immediately following.

It will be assumed that it is desired to select from a given batch of cards all cards having perforations representing the number 9831 in the field assigned to the identifying number. The switch 111 is closed, the switch 112 moved to the position indicated by broken lines (Fig. 9) and the lower four switches 89 are closed. The ordinary brush holder carrying the brush 53 is removed and the special brush holder 32 put in its place then the carriage 31 is shifted in a well known manner to bring the first four brushes 42 on the left (Fig. 6), or the lower four in Fig. 9, into position to sweep the four columns on the record card corresponding to the field assigned to the identifying number. The other two switches 89 are left open when selecting cards having a number of only four digits.

The next step is to set the selector switches in the first four columns on the left (Fig. 3) so that all except those representing the digits of the identifying number are made current conducting with the adjacent ring 84. This is accomplished by turning the thumb piece 92 bearing a "9" in the first column on the left (Fig. 3) or the lowest column (Fig. 9) so that the number "9" appears upright. Similarly the thumb pieces in the next adjacent columns in order, from left to right (Fig. 3), will be set so that only the "8" in the second column, the "3" in the third column, and the "1" in the fourth column appear upright, all others being inverted. After this operation the clutch lever 74 will be shifted to the right (Fig. 7) to establish the driving connection and the door 102 closed. The machine is now ready to carry out the special sorting operation after the record cards have been placed in the magazine.

The bars 87 associated with knobs 92 having inverted numbers are current conducting with the adjacent ring 84 while the bars 87 of the switches on which the numbers appear upright are made non-conducting or insulated with respect to the rings 84. It will be clear, therefore, that a flow of current cannot be established through the bars 87 representing the desired number when the brushes 42 encounter the perforations representing that number and any card having the desired number will not affect the circuits in any way since the only way in which the brush relay 57 can be energized is jointly through a perforation in the card analyzed, a brush 42, a bar 87, and one of the rings 84, all of which bars 87 are disconnected from the adjacent rings 84 in the index-point positions involving the number. The desired cards will pass beneath all of the blade ends 54 and be conveyed to the "R" or reject box.

While a card is analyzed having a perforation in one or more other index-point positions, that is, having perforations representing a number other than the member 9831, a circuit will be established as follows: Source 12, line 13, brush 81, ring 80, brush 83, switch 111, previously closed, brush relay 57, thereby closing contacts 57*a*, line 58, switch 112, previously moved to the broken line position, contact roll brush 59, contact roll 45, a brush 42, a switch 89, previously closed, a brush 88, a bar 87 in the position having the undesired perforation, a ring 84, a brush 85, line 86, contacts 109, closed when the door 102 is closed, line 17, back to source 12. The closing of contacts 57*a* by relay 57 sets up a holding circuit for the relay through brush 63, segment 62, common brush 61, and line 17, to the source 12, however, the sorting magnet is shunted by the ring 80 so that, for the time being, nothing else happens. When the card under the brushes 42 reaches the "12" position the gap 82 breaks the shunt circuit and transfers the holding circuit of relay 57 to the sorting magnet 56 thereby energizing said magnet and causing the card to go to the "12" pocket.

It may happen that none of the perforations in a card analyzed by the brushes 42 correspond to the perforations representing the identifying number of the desired cards. When such is the case, the first perforation encountered by one of the brushes 42 will set up the relay 57 and the perforations subsequently encountered will have no effect although the bars 87 therefor will be connected to the adjacent ring 84.

For the purpose of preventing excessive sparking at the brush 83 when the circuit is broken at the "12" position there is provided a condenser 113 connected in parallel with the sorting magnet and contained within the casing 66 and a glass insert 114, which is set flush with the ring 80 at the point where the brush 83 breaks the circuit through the ring 80. The glass insert prevents the spark created by the break in the circuit from burning the insulation comprising the drum 79.

This invention has been so devised as to form a compact and self contained device which may be readily mounted upon an existing sorting machine without requiring any changes other than a slight reconnection and rearrangement of the circuits and the attachment of suitable supporting brackets to the frame of the machine. It may be readily connected and disconnected at the will of the operator and imposes no appreciable additional load on the driving motor.

The present invention is not limited to selecting cards according to a single identifying number but is capable of selecting all of the cards of a complete series, for instance, all cards bearing identifying numbers ranging from 9831 to 9839, inclusive. This result is obtained by turning the selector switches in the fourth column of the right (Fig. 3) until the numbers "9", "8", "7", "6", "5", "4", "3", and "2", respectively, appear upright, the number "9831" having been previously set up in the manner already described. When the batch of cards is passed through the machine no circuit can be set up by the presence of perforations representing the number "9" in the thousands place, the number "8" in the hundreds place, the number "3" in the tens place, or the numbers "1" to "9", inclusive, in the units place, since the bars 87 will be disconnected in all of the positions in the fourth column except the "0", "11", and "12" positions, consequently all of the cards of the series 9831 to 9839 will be rejected and all others will be conveyed to the "12" pocket.

The present invention may be used to select record cards having identifying numbers up to six digits, however, it is not limited in scope to numbers of six digits as, by providing additional brushes 42 and additional rows of bars 87 with the necessary rings 84, the device may be used to select numbers having any desired number of digits. Theoretically the device might be provided with as many analyzing brushes as there are columns on the record card, each brush having its corresponding row of bars 87. Under

ordinary conditions found in practice numbers will seldom have more than six digits so that six brushes and six rows of selector switches are more than ample for most purposes.

Nor is the invention limited to use in connection with a sorting machine alone, since it may be built in the form of an attachment to a tabulating machine to select the card to be operated upon by said machine. This may be readily accomplished by delivering the desired cards directly to either the card magazine or the feeding rollers of the tabulating machine instead of accumulating the cards in the "reject" sorting pocket.

We claim:

1. In a sorting machine, the combination with the main drive shaft of the sorting machine, of a drum driven by said shaft, a plurality of conductor rings mounted upon and insulated from said drum, a plurality of rows of segments carried by and insulated from said drum, each row being arranged adjacent a conductor ring and insulated therefrom, each row of segments being associated with a column in the record card and each segment corresponding to an index-point position in the associated card column, manually settable means for establishing a connection between each segment and the adjacent ring whereby to connect all segments in a given row to the adjacent ring except the one associated with a predetermined index-point in the card column associated with said row, and a series of brushes cooperating with said rings and said rows of segments for connecting the latter to the circuits of the sorting machine to control sorting operations of the latter.

2. In a device of the character described, sorting mechanism, a plurality of circuits for controlling said sorting mechanism, a plurality of commutator devices, one for each circuit, each of said commutator devices having a common contact ring and a plurality of individual segments one for each index-point, and normally electrically connected to said common contact, and means individual to each segment for disconnecting said segment from the common contact ring, comprising a support carried by a lug formed in each segment, a switch element mounted upon said support and having a projection adapted to normally rest on said common contact ring to establish contact between said ring and said segment, said projection being disengageable from said ring by a slidable and rotatable movement on said support and thereafter settable to rest on said segment.

3. The invention set forth in claim 2 characterized by the provision of means for preventing said switch element from being accidentally displaced relative to the lug.

4. The invention set forth in claim 2 in which said switch element is provided with a transverse groove cooperating with said lug to prevent said switch element from being accidentally displaced from either of its set positions.

5. In a sorting machine, card analyzing mechanism, sorting mechanism controlled thereby and means for disabling the analyzing device on the occurrence of cards bearing certain data comprising a common contact member, a plurality of contact members arranged adjacent said common contact member, each individual to an index-point position in a column of the record card, all of said contact numbers being insulated from each other, and means for connecting any contact member associated with a given index-point to said common contact member, including a relatively fixed element carried by each individual member, and a switch element slidably and rotatably mounted upon said fixed element, said switch element having a projection formed therein normally resting on the common contact member and adapted to be positioned to rest on the individual contact member by a slidable and rotary movement of the switch element.

6. The invention set forth in claim 2 characterized by means for locking said switch element in either of its set positions.

7. In a sorting machine, an analyzing device, sorting mechanism controlled by the analyzing device, a multiple column selector adapted to be set to disable the sorting mechanism on the presentation to the analyzing device of records bearing certain data, a main drive shaft for said machine, means for manually connecting the multiple column selector to the drive shaft for forward drive by the latter, and means operated by the last named means for preventing reverse motion of the multiple column selector when the latter is disconnected from the drive shaft.

8. In a device of the character described, sorting mechanism, a plurality of circuits for controlling said sorting mechanism, a plurality of commutator devices, one for each circuit, each of said commutator devices having a common contact ring and a plurality of individual segments one for each index point and normally electrically connected to said common contact, and means individual to each segment for disconnecting said segment from the common contact ring.

9. In combination with a sorting machine provided with analyzing means, sorting mechanism, and a drive for said mechanism; a selector device adapted to be set to control the sorting mechanism conjointly with the analyzing mechanism to sort out together all records having one or more predetermined designations, manually disconnectible means for connecting the selector device to the drive, and means associated with the last named means for preventing backward rotation of the selector device when the latter is disconnected from the drive.

10. In a machine for sorting records having index-point perforations disposed in a control field comprising several columns, each column having a plurality of index-point positions; sorting mechanism, and a plurality of control circuits therefor corresponding to the several columns of the control field in the record; each control circuit including a settable selector device having a common connection to the sorting mechanism and a plurality of switching devices, one for each index-point position in the corresponding column of the control field, and settable to limit the control of the sorting mechanism to one or more index point positions in each column.

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