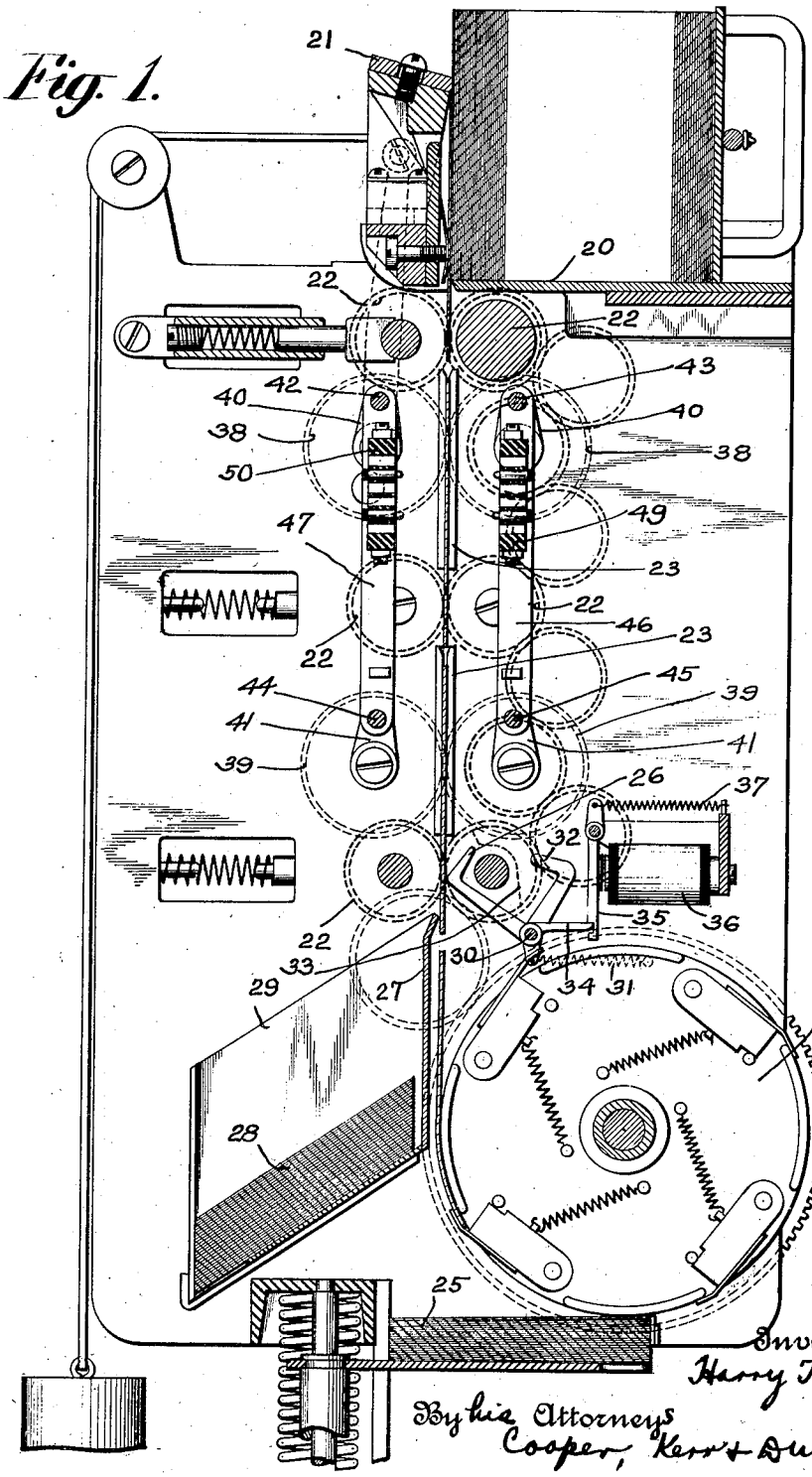
May 8, 1928. 1,669,238

H. T. GOSS

ALPHABETICAL SORTER

Filed Dec. 3, 1924 5 Sheets-Sheet 1

Fig. 1.



Inventor
Harry T. Goss

By his Attorneys
Cooper, Kerr & Dunham

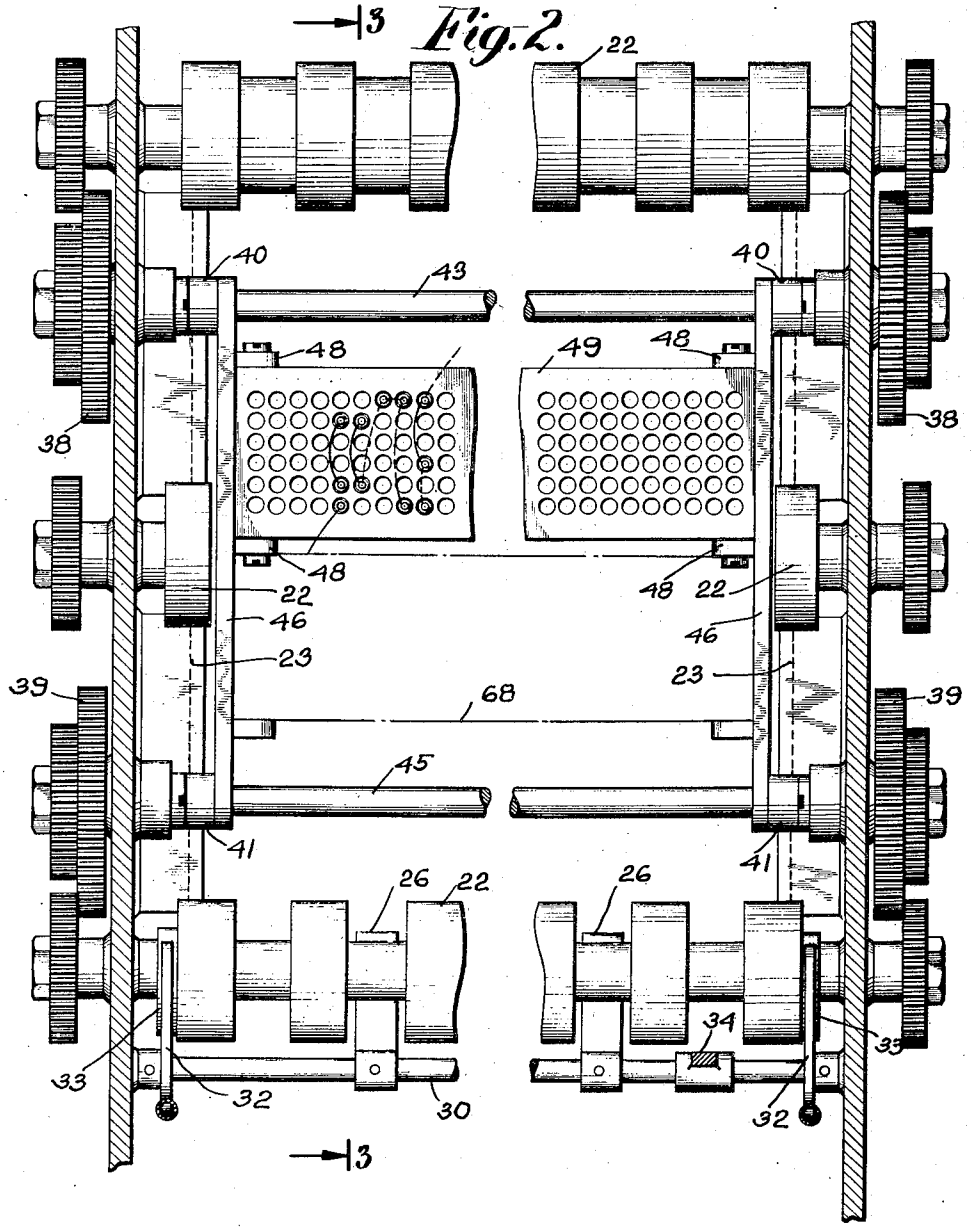
May 8, 1928. 1,669,238

H. T. GOSS

ALPHABETICAL SORTER

Filed Dec. 3, 1924 5 Sheets-Sheet 2

Fig. 2.



Inventor
Harry T. Goss

By his Attorneys
Cooper, Kerr & Dunham

May 8, 1928. 1,669,238

H. T. GOSS

ALPHABETICAL SORTER

Filed Dec. 3, 1924 5 Sheets-Sheet 3

Fig. 3.

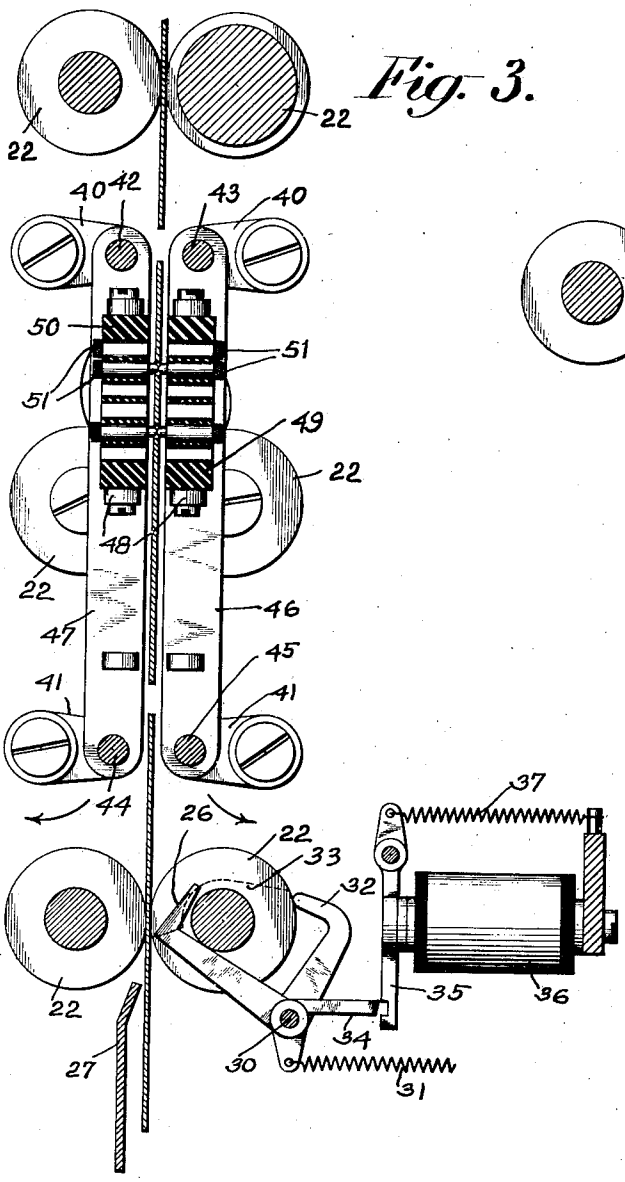


Fig. 4.

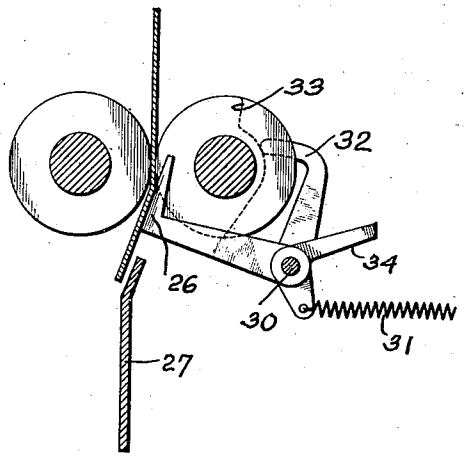
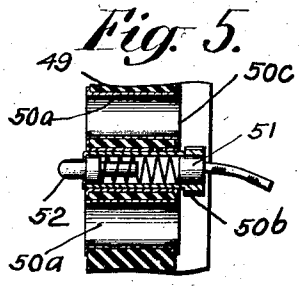


Fig. 5.



Inventor
Harry T. Goss

By his Attorneys
Cooper, Kerr & Dunham

May 8, 1928. 1,669,238

H. T. GOSS

ALPHABETICAL SORTER

Filed Dec. 3, 1924 5 Sheets-Sheet 4

Fig. 6.

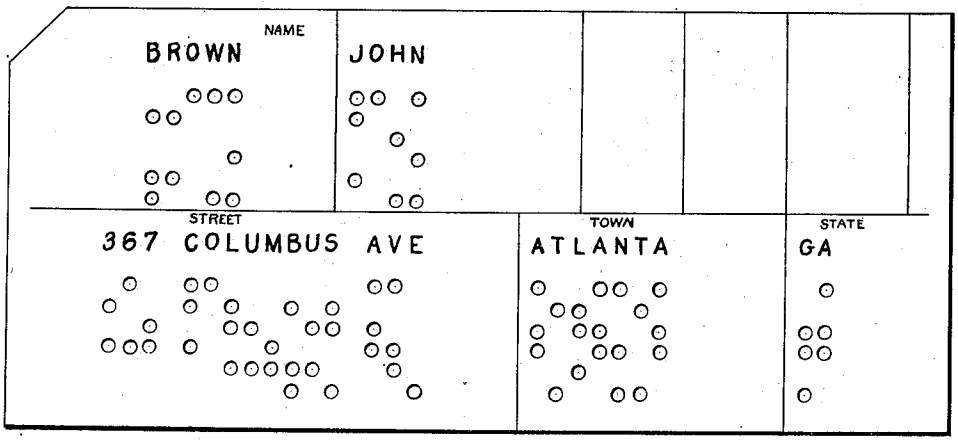
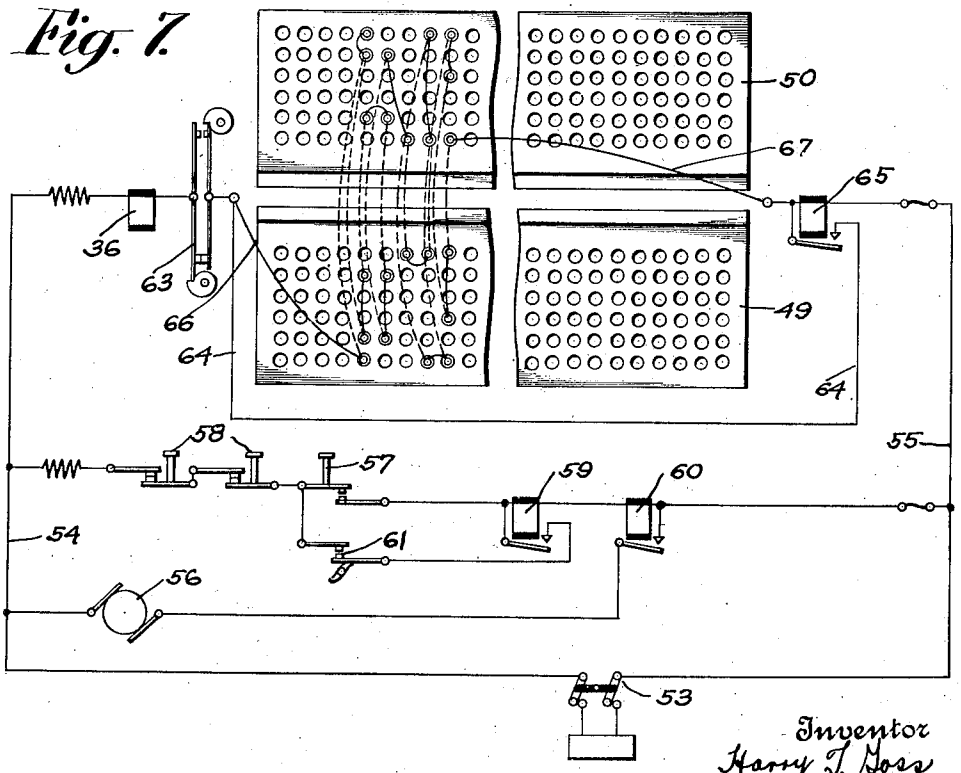


Fig. 7.



Inventor
Harry T. Goss

By his Attorneys
Cooper, Kerr & Dunham

May 8, 1928. 1,669,238

H. T. GOSS

ALPHABETICAL SORTER

Filed Dec. 3, 1924 5 Sheets-Sheet 5

Fig. 8.

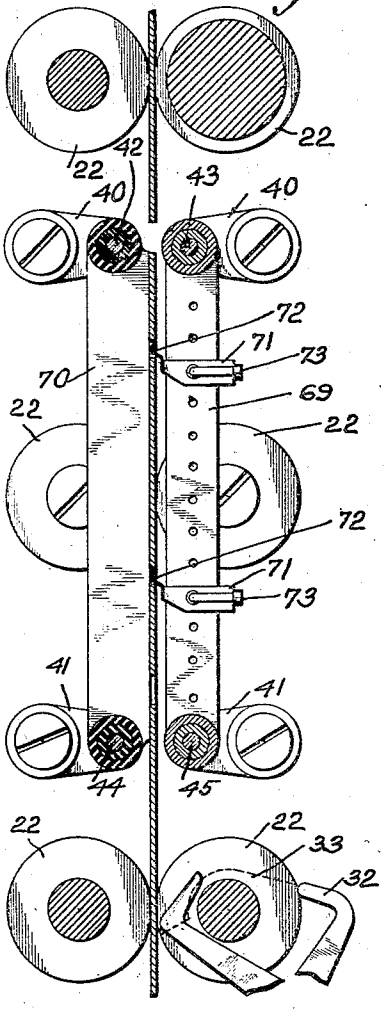
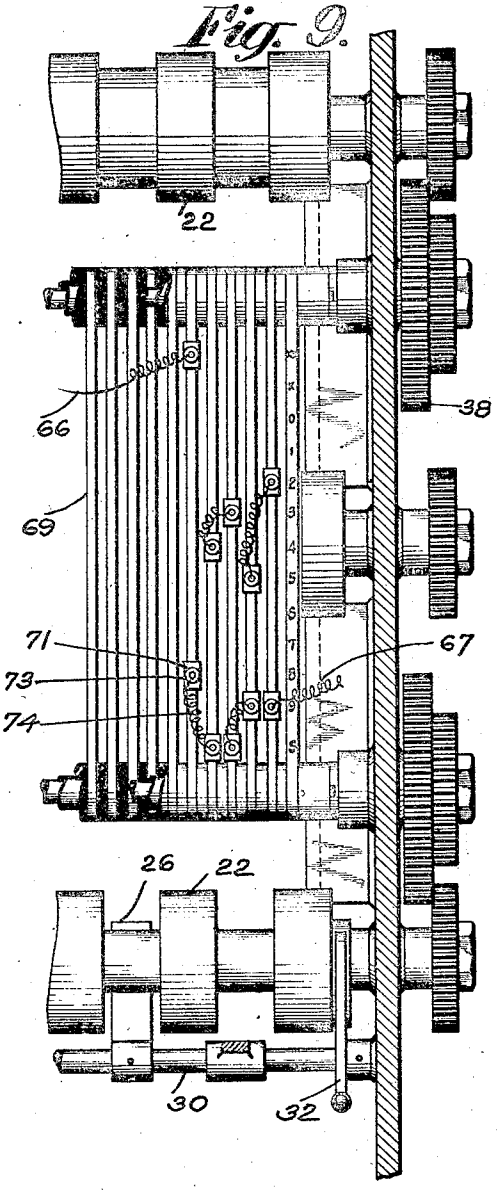


Fig. 9.



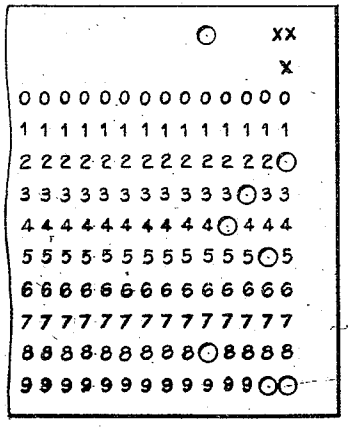


Fig. 10.

Inventor
Harry T. Goss
By his Attorneys
Cooper, Kerr & Dunham

Patented May 8, 1928. 1,669,238

UNITED STATES PATENT OFFICE.

HARRY T. GOSS, OF RUTHERFORD, NEW JERSEY, ASSIGNOR TO THE TABULATING MACHINE COMPANY, OF ENDICOTT, NEW YORK, A CORPORATION OF NEW JERSEY.

ALPHABETICAL SORTER.

Application filed December 3, 1924. Serial No. 753,561.

This invention relates to improvements in machines for sorting perforated record cards such as are used in tabulating machines, especially cards punched according to the Peirce alphabetical code.

In the Peirce system the reading position is a particular zone on a card, and the perforations are variously arranged in that zone instead of being positioned anywhere in a card column extending from top to bottom of the card, as in the Hollerith system.

My present invention is an improvement on the machine described in detail in copending application Serial 695,000, filed February 25, 1924 on behalf of E. A. Ford which discloses a sorting machine designed to segregate in one run cards of the Hollerith type having certain combinations of holes in a plurality of columns.

My invention covers a sorting machine designed to segregate in one run cards having a certain individuality as represented by a particular combination of perforations on the card. For instance, it may be desired to separate from a promiscuous stack of cards all those bearing the name "Brown", or all those bearing the name of a certain town, such as "Atlanta", and that is the kind of work this present invention will do. It sorts cards electrically while the cards are in motion, depositing the segregated cards in one stack and the rejected cards in another stack. My machine works rapidly, is easy to change from one set-up to another, is simple in construction, and inexpensive to manufacture. Further and other advantages will hereafter appear in the accompanying specifications and claims and in the drawings, which by way of illustration show what I now consider to be a preferred embodiment of my invention.

In the drawings,

Fig. 1 is a sectional view of the machine.

Fig. 2 is a front view.

Fig. 3 is a sectional view on line 3—3 of Fig. 2.

Fig. 4 is a view of the card deflecting mechanism in deflecting position.

Fig. 5 is an enlarged view of a plugboard detail.

Fig. 6 shows a typical perforated Peirce record card.

Fig. 7 shows the electric circuits of my machine.

Fig. 8 shows a side view of a modification of my invention designed to sort cards punched according to the Hollerith alphabetical code.

Fig. 9 is a front view of the modification in Fig. 8.

Fig. 10 shows a portion of a Hollerith card punched according to the Hollerith alphabetical code.

In the drawings, 20 is the magazine containing a stack of record cards from which the cards are fed one by one, at regular intervals, by the picker mechanism 21, into control of the positively driven conveyor rolls 22. In their passage downwardly through the conveyor and analyzing device the cards are guided by slots in the edges of fixed plates 23.

After a card leaves the bottom rolls of the conveyor it passes normally into control of a stacking device shown conventionally at 24 and is deposited thereby on the stack of reject cards 25. If, however, the card has the predetermined combination of perforations for which the analyzing device has been adjusted by the operator, the card, as it emerges from the last pair of rolls, is acted upon by the blades 26 and is deflected thereby to the left of partition 27 and deposited on stack 28 in receiving pocket 29.

Deflecting blades 26 are fixed to shaft 30 and are adapted to be rocked anti-clockwise into deflecting position by spring 31, when permitted by cam 33. Fingers 32, also fast on shaft 30, bear on cam 33 which is fast on one of the conveyor roll shafts.

Also fixed to shaft 30 is an arm 34 which engages a notch in armature 35 of magnet 36. These parts are normally held in latched position by spring 37, as in Fig. 1. While the deflector is in this position all cards will pass to the reject pile.

When sorting magnet 36 is energized, armature 35 is drawn to the right, arm 34 is unlatched, and fingers 32 rest on cams 33, as in Fig. 3, and deflector plates 26 are rocked by spring 31 at the proper time in the machine cycle to direct the card into pocket 29.

The foregoing devices are commonly used

in card sorting machines and require no further description.

Analyzing device.

The gear trains which drive the feed rolls include upper and lower pairs of gears 38 and 39 respectively. A crank 40 is fast to each stud on which upper gears 38 are mounted, and a similar crank 41 on each stud of lower gears 39. Cranks 40 carry cross shafts 42 and 43, while cranks 41 carry cross shafts 44 and 45. Mounted on cross shafts 43 and 45 is a pair of side bars 46, and on shafts 42 and 44 a pair of similar side bars 47.

Supported by lugs 48 on bars 46 is a plug-board 49, and in a similar manner, plug-board 50 is carried by parallel bars 47. These plug-boards are made of non-conducting material such as bakelite and are perforated so that each hole corresponds to an index position on the card. Each hole in the plug-board is provided with a shell portion 50^a adapted to receive a plug assembly 50^b (see Fig. 5). The plug assembly is preferably removably secured in the plug-board shell by means of a bayonet joint 50^c. Each plug assembly comprises an outwardly spring-pressed contact plug 52 and a tap portion 51. It will be understood that the plug assemblies can be changed in their locations as desired and in accordance with the index perforations which are to be sensed. To facilitate removal and insertion of the plug assemblies they may be provided with suitable knurled heads as shown in Fig. 3.

When the machine is in operation the cranks 40 and 41 revolve in the direction indicated by the arrows in Fig. 3, bringing the two plug-boards into close proximity with each other once during every card cycle. Their movement is so synchronized with the balance of the mechanism and the card travel, that, during the time they are together and moving practically parallel with each other and with the card, every hole in both plug-boards registers with its corresponding card index position, and if any taps 51 are in position in the plug-boards their spring plugs 52 will contact with their corresponding index positions on the card. If there is a perforation in the card at any such index position the plug 52 will pass through that perforation.

The card.

Fig. 6 shows a typical record card bearing information punched therein according to the Peirce alphabetical code. For purposes of explanation the translation of the perforations in each zone is printed above the perforations. It will be noticed that holes are punched in six horizontal rows, and that there are either one, two, or three holes, in various positions, in each column. It is evident that holes in index positions 3, 4, and 6 always mean "A"; holes at positions 1, 2 and 5 mean "B"; a single hole at position 6 means "0", while holes at 3 and 5 mean "3", and so on.

The electric circuit.

Referring to the circuit diagram (Fig. 7), 53 is a switch admitting current from an outside source to the lines 54 and 55. 56 is the motor, controlled in the manner customary in machines of this character. Depression of start key 57 closes a circuit from line 54 through the two stop keys 58, through relays 59 and 60 to line 55. Energization of relay 60 closes the motor circuit, which, after start key 57 is released, is maintained by card lever contact 61 as long as cards are passing. Relay 59 closes this circuit when its magnet is energized. The motor will be stopped automatically by the opening of contacts 61 when the supply of cards is exhausted, or it may be stopped at the will of the operator by depressing either stop key 58.

The sorting circuit includes sorting magnet 36 and cam contact devices 63 which are those generally used in machines of this class to make the circuit during the passage of a card and break it again at a fixed point in the cycle. From the right side of the contact combination 63 one wire 64 leads to the contact point of a relay 65 connected to line 55, while another wire 66 leads to the analyzing device. If contact is established through the analyzing device current will flow through inlet wire 66 and outlet wire 67 to relay 65 which will be energized and will maintain a stick circuit in magnet 36 through wire 64 after the contacts through the cards are separated, thereby preventing arcing at the cards. This circuit is finally broken at a set time in the machine cycle by contact device 63.

Operation.

By way of illustration, I have assumed that the operator has a promiscuous stack of cards and wishes to segregate all those bearing the name "Brown". To accomplish this he wires the plug-boards 49 and 50 by means of taps 51 and their connecting wires so when a card bearing the combination of perforations meaning "Brown" is in the analyzing device every plug 52 in plugboard 49 will be in contact with its corresponding plug 52 in plugboard 50 through a hole in the card, and a series circuit will therefore be established through inlet wire 66, the plug-board wiring, and outlet wire 67, so that sorting magnet 36 will be energized and that card will be sorted. This circuit may be readily traced in Fig. 7, in which plug-board 50, although normally straight behind board 49, has been, for descriptive

purposes, swung up to a position above 49. Current passes from wire 66 through front tap No. 1 in the B column, comes out through the corresponding rear tap, and passes by the tap wire in the rear to rear tap No. 2 in the B column, from which it emerges through the corresponding front tap No. 2, then passes by front tap wire to front tap No. 5 in B column, and after coming out through the rear No. 5 tap it passes to the No. 5 tap in the next column, and so on, passing through all taps in series, spelling out the letters of "Brown" and finally emerging from rear tap No. 6 in the N column and passing by wire 67 to relay 65.

Now if the cards to be sorted are placed in magazine 20 and the machine started by pressing motor start key 57 the cards will be fed at regular intervals to conveyor rolls 22 and while passing downwardly through the conveyor each card will be examined by the analyzing device above described. If the name "Brown" does not appear, the sorting magnet will not be energized, and the card will pass straight ahead into control of the stacking device and will be deposited thereby on the "reject" pile. If, however, the name "Brown" does appear, in the proper location on the card, the circuit will be completed as above described, sorter magnet 36 will act, and deflector blades 26 will direct that card to the left of partition 27 so it will finally rest on pile 28 in pocket 29.

If it be desired to sort under control of some combination of perforations in the bottom half of the card, another set of plug-boards is installed in the position indicated by the broken lines in Fig. 2, and are wired for the desired combination of perforations.

Modification.

Figs. 8, 9, and 10 show a modification of my present invention. For purposes of illustration this modification is shown as adapted for sorting cards according to the Hollerith alphabetical code. Plug-boards 49 and 50 are replaced by sets of parallel bars 69 and 70 respectively, there being one bar for each column of index positions on the Hollerith card. Bars 69 are of nonconducting material, while bars 70 are of metal, insulated from each other and from their supporting shafts 42 and 44. Each bar 69 carries two settable clips 71, each provided with a contact spring 72 and with a screw 73 for attaching a wire 74, also a locking device as indicated at 75 to secure the clip to its bar. Each bar 69 has a marked position for each row of index positions on the card, also an extra position S below the 9 row, all as indicated on the bar 69 furthest to the right in Fig. 9.

In the Hollerith alphabetical code the letters are each represented by one or two perforations at particular index positions in the card column. The perforations in Fig. 10 spell the name "Brown", "B" being represented by holes in XX and 8 positions, "R" by a single hole in row 4, "O" by a single hole in row 3, "W" by holes at 5 and 9, and "N" by holes in rows 2 and 9.

To separate from a promiscuous stack of cards those having the above perforations, the operator sets his clips 71 and connects them with wires 74, all as shown in Fig. 9. The path of the sorting current is through wire 66 to clip at XX position then down the 69 bar to clip at 8 position, thence by wire 74 to clip at S position on the next bar, thence through the bar to clip at position 4, thence through a wire 74 to clip on the next bar, and so on, until it finally emerges on wire 67.

It is evident that only the combination of holes representing "Brown" will allow completion of the sorting circuit, consequently, as promiscuous cards are passed through the device only those punched "Brown" in the last five columns of the Hollerith card will be sorted, all others being rejected.

In accordance with the provisions of the patent statutes, I have herein described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiments thereof, but I desire to have it understood that the apparatus disclosed is only illustrative and that the invention can be carried out by other means. Also, while it is designed to use the various features and elements in the combinations and relations described, some of these may be altered and others omitted and some of the features of each modification may be embodied in the others without interfering with the more general results outlined, and the invention extends to such use.

I claim—

1. In a machine of the character described, in combination with means for feeding record cards, means to analyze the cards by causing electric current to flow through holes in the cards while the cards are in motion, and means to control the operation of the machine on the passage of a card having any desired combination of holes in a plurality of columns, any of which columns may have more than one hole; said analyzing means comprising electric contact devices normally out of contact with the card but movable into contact therewith.

2. In a machine of the character described, in combination with means for feeding record cards, means to analyze cards by causing electric current to flow through holes in the cards while the cards are in motion, and means to control the operation of the machine on the passage of a card having any desired combination of holes in a plurality

of columns; said analyzing means comprising electric contact devices carried on plug-boards, at least one of said plug-boards being movable to bring the contact devices into contact with the card.

3. In a machine of the character described, in combination with means for feeding record cards to a card conveyor, means to analyze the cards while they are in motion, and means to control the operation of the machine on the passage of a card having any desired combination of holes in a plurality of columns, any of which columns may have more than one hole; said analyzing means comprising electric contact devices normally out of contact with the card but movable in synchronism with said conveyor to contact with the card while it is passing through the conveyor.

4. In a machine of the character described, in combination with means for feeding record cards, a control circuit normally open, means to analyze cards by causing electric current to flow through hole in the cards while the cards are in motion, and magnetic means controlled by said analyzing means to control the operation of the machine on the passage of a card having any desired combination of holes in a plurality of columns, any of which columns may have more than one hole; said analyzing means comprising contact devices normally out of contact with the card but movable into contact therewith to close said control circuit whenever the card has the proper combination of holes.

5. In a machine of the character described, in combination with means for feeding record cards, a control circuit normally open, means to analyze cards by causing electric current to flow through holes in the cards while the cards are in motion, and magnetic means to segregate in one run cards having any desired combination of holes in a plurality of columns, any of which columns may have more than one hole; said analyzing means comprising a plurality of contact devices normally out of contact with the card but movable simultaneously from both sides of the card into contact therewith to close said control circuit through the contact devices when, and only when, the desired combination of holes is in the card.

6. In a machine of the character described, in combination with means for feeding record cards, a control circuit normally open, means to analyze cards by causing electric current to flow through holes in the cards while the cards are in motion, and magnetic means to segregate in one run cards having any desired combination of holes in a plurality of columns, any of which columns may have more than one hole; said analyzing means comprising a plurality of contact devices normally out of contact with the card but movable into contact therewith to close said control circuit through the contact devices when, and only when, the desired combination of holes is in the card, and said segregating means comprising a magnetically controlled card deflector operable whenever said control circuit is closed.

7. In a machine of the character described, in combination with means for feeding record cards, a control circuit normally open, means to analyze cards by causing electric current to flow through holes in the cards while the cards are in motion, and magnetic means controlled by said analyzing means to control the operation of the machine on the passage of a card having any desired combination of holes in a plurality of columns, any of which columns may have more than one hole; said analyzing means comprising a pair of plug-boards between which the card passes, said plug-boards carrying contact devices normally out of contact with the card, the plug-boards being movable in synchronism with the card travel to bring said contact devices against both sides of the card once during every card cycle and thereby complete the control circuit through the card whenever the desired combination of holes is in the card.

8. In a machine of the character described, in combination with means for feeding record cards to a card conveyor, means to analyze the cards while they are in motion, and means to control the operation of the machine on the passage of a card having any desired combination of holes in a plurality of columns; said analyzing means comprising a rear set of parallel metallic insulated bars, one for each card column of index positions, a front set of parallel nonconducting bars, one for each card column, the front set of bars each carrying a plurality of settable contact devices, suitably wired together, said front and rear sets of bars being movable in synchronism with said card conveyor to bring the contact devices against the card once during every card cycle and thereby complete the control circuit by contacting with the rear bars through the card perforations whenever the proper combination of holes is in the card.

9. In a machine of the character described, in combination with means for feeding record cards, a control circuit normally open, means to analyze cards while they are in motion, and means to control the operation of the machine on the passage of a card having any desired combination of holes in a plurality of columns; said analyzing means comprising a plurality of electric contact devices carried on plug-boards and located thereon to register with index positions on the cards, said plug-boards being movable to bring the contact devices into contact with the corresponding index positions on the

card and thereby close said control circuit by forming a series circuit through said contact devices whenever the proper combination of holes is found in the card.

10. A sorting machine for cards perforated with alphabet designating combinational perforations, comprising means operable while the cards are in motion for sensing the alphabet designating combinational perforations which designate a complete word or complete words, and means controlled by said sensing means for sorting out of a group of cards in a single run of the same through the machine all cards which designate the same like word or words.

11. The invention set forth in claim 10 in which means is provided for changing the sensing means to permit any desired sets of perforations designating multiple combinations of alphabetical characters to be sensed thereby.

12. In a sorting machine, in combination with means for feeding record cards having sets of combinational holes therein designating the various letters of the alphabet, and means operable while the cards are in motion for sorting out from a group of cards all cards which have like sets of combinational holes therein designating a plurality of separate alphabetical characters forming a word or words.

13. In a sorting machine in combination with means for feeding record cards through the machine having a plurality of sets of combinational hole records therein, each set of the combinational holes in said records designating a letter of the alphabet, means operable while the cards are in motion for concurrently sensing the combinational holes of a plurality of columns designating a plurality of separate letters forming a word or words, and means for sorting out at one run of the cards through the machine all cards designating the same word or words.

14. A sorting machine for combinational hole records having one or more perforations in each of a plurality of columns in combination, means operable while the cards are in motion for sensing alphabet designating perforations in said records, said sensing means having provisions for sensing concurrently a plurality of sets of combinational perforations designating a complete word or words and means controlled by said sensing means for sorting out in one run of the cards through the machine all cards perforated to designate the same complete word or words.

15. The invention set forth in claim 14 in which means is provided operable at the will of the operator for setting up said sensing means to sense any desired combination of letters forming a complete word or words.

In testimony whereof I hereto affix my signature.

HARRY T. GOSS.