

July 29, 1924.

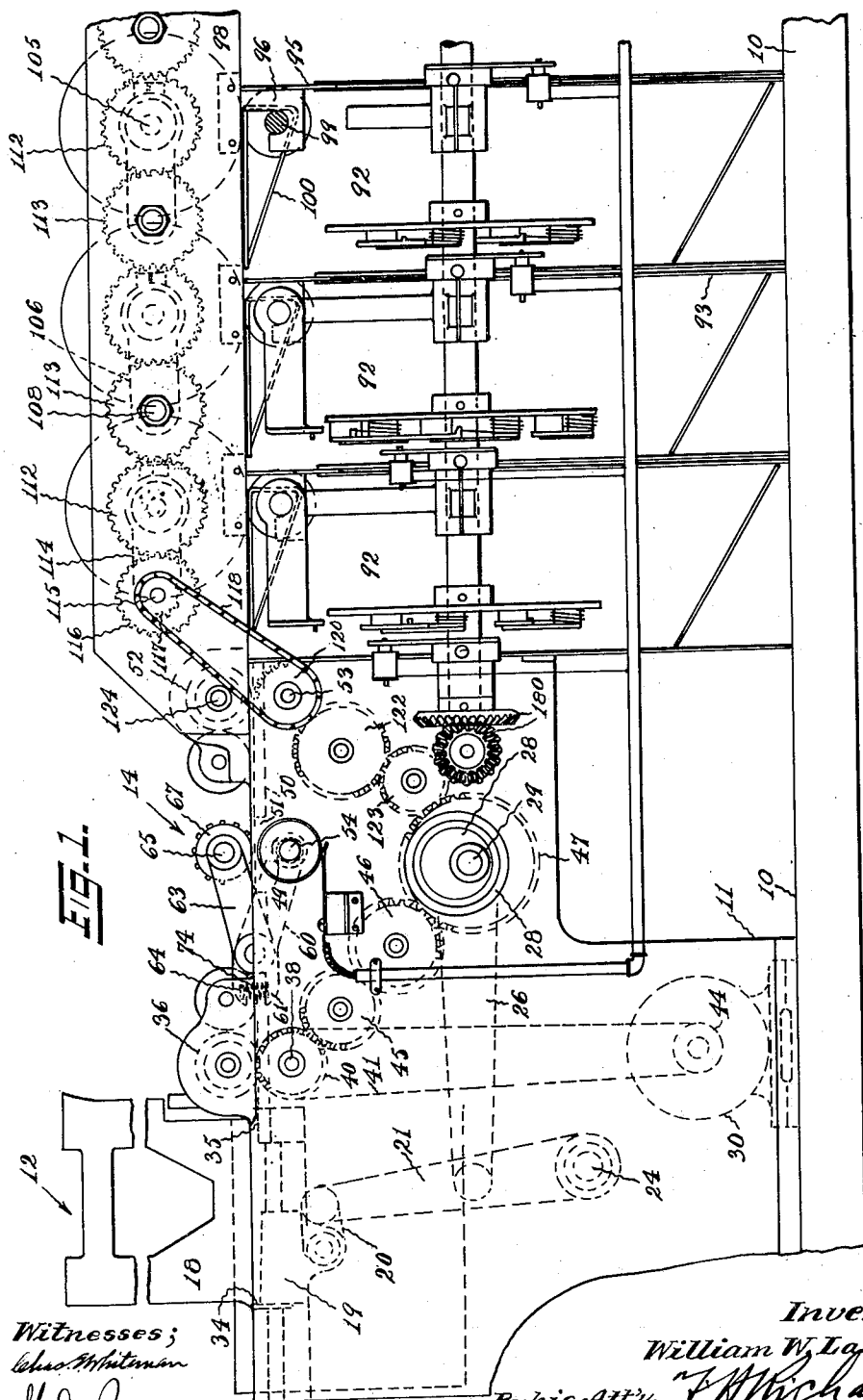
1,502,993

W. W. LASKER

ROTARY SWITCH ELECTRICAL TIMED SORTER

Filed Dec. 19, 1919

2 Sheets-Sheet 1



Witnesses;
Chas. Whitman
H. D. Penney

Inventor:
William W. Lasker,
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2 Sheets-Sheet 2

FIG. 2.

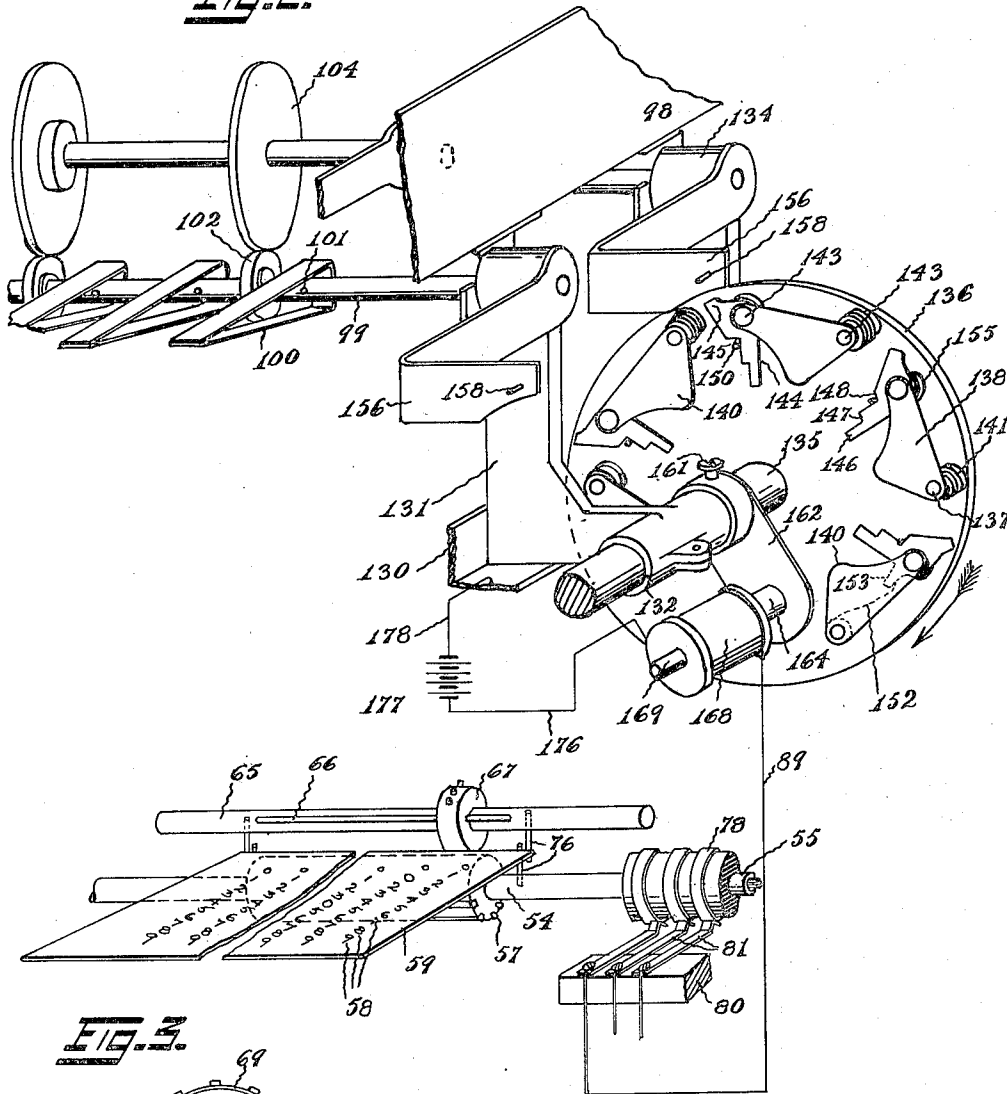


FIG. 3.

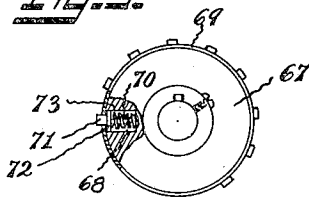
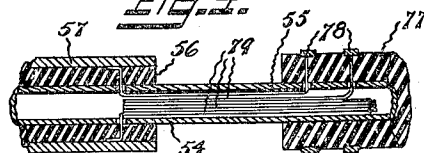


FIG. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM W. LASKER, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO POWERS ACCOUNTING MACHINE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

ROTARY SWITCH ELECTRICAL TIMED SORTER.

Application filed December 19, 1919. Serial No. 346,121.

To all whom it may concern:

Be it known that I, WILLIAM W. LASKER, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Rotary Switch Electrical Timed Sorters, of which the following is a specification.

This invention relates to analyzers for machines for sorting perforated cards of the kind used in automatic accounting and calculating machines, in which cards are passed from the card analyzer and deflected into the appropriate compartments by deflectors which are not operated until the card reaches the deflector.

The invention relates more particularly to an analyzer suitable for the sorting machine described in my U. S. application Serial No. 303,155, filed June 10, 1919, for sorting machines.

One object of the invention is to provide an efficient electric means associated with each compartment to the exclusion of the others for controlling each deflector by the card in the analyzer destined to be deflected by such deflector into the associated compartment.

A particular object of the invention is to provide an analyzer, having no reciprocating parts, for use with my above mentioned machine, or for general application. Other objects will appear as the description proceeds; and while herein I describe minute details of the invention, the invention is not limited to these, since the features of construction and combination may be greatly varied without departing from the scope of the invention as claimed.

In the accompanying drawing by way of example, one of many possible embodiments of the invention—

Figure 1 is a side elevation of the sorting machine with the analyzer attached thereto;

Fig. 2 is an enlarged fragmental perspective view showing the analyzer and the timing arrangement;

Fig. 3 is an end view partly in section of an analyzer-contact member; and

Fig. 4 is a central longitudinal sectional

view taken through another contact member.

As shown in Fig. 1, the machine comprises a base 10 on which are mounted a pair of side plates 11 on which are mounted the card feeding means 12, the analyzer 14 and other parts of the mechanism to be mentioned. The card feeding means 12 of the analyzer 14 are similar in construction to that described in the U. S. patent to James Powers, No. 1,282,626 issued October 22, 1918. The U. S. patent to W. W. Lasker, No. 1,298,971, issued April 1, 1919; hence they need not now be shown or described in all their details.

The upper part of the feeding means comprises a magazine hopper 18 adapted to receive a pack of cards to be sorted; and at the lower part of the feeding means there is provided a reciprocating block 19 guided in the lower part of the feeding means and connected by means of a link 20 to a lever arm 21 mounted on the shaft 24 carried between the side plates 11, and connected to the link 26 having its end 27 eccentrically mounted on the eccentric 28 carried on the eccentric shaft 29 suitably driven, as will be hereinafter described, from the motor 30, whereby the block 19 is reciprocated in the lower part of the magazine 18. The block 19 is provided with a picker knife 34 whereby when the block is reciprocated the lowermost card in the magazine is fed forward through a micrometer slot 35 at the outlet side of the feeding means.

From the micrometer slot 35 the card is received between the roller 36 and a roller mounted on a shaft 38 suitably driven by the sprocket 40 and chain 41 or the like from the drive wheel 44 of the motor 30.

From the shaft 38 suitably gears 45, 46 and 47 convey power to the eccentric shaft 29.

Now will be described the analyzer, forming the principal feature of the present invention. The side plates 11 are provided with shaft bearings 49; and an analyzer plate 50 is disposed between the upper edges of said side plates 11 and provided with a switch receiving opening 51. The superposed feed rolls 36 mounted at the rear of said plate 50 receive cards from the

analyzer and convey them along the plate over said switch opening whereupon they are seized by superposed discharge roll 52 and the roll on the shaft 33 at the discharge end of the plate 50 and passed to the rolls presently to be described.

A hollow switch shaft 54 (Figs. 2 and 4) is disposed in said shaft bearings 49 of the side plates 11 and has a projecting end 55 at one side of the machine and carries an insulating sleeve 56 on the shaft between said plates. A plurality of contact bars 57 are longitudinally disposed on said sleeve 56 embedded in the surface thereof and spaced distances apart equal to the distance between index points 58 on the card 59.

A bracket piece 60 (Fig. 1) disposed against the inner face of each of said side plates 11 has its forward end receiving said hollow shaft is provided with a rearwardly projecting extension 51. A fulcrum lever 63 having a bearing bore at its forward end is fulcrumed at its rear part to said bracket piece 60 and is provided with a rear extension 64 spaced below said first named extension 61. A pressure shaft 65 is disposed in said bearing bores of the lever 63 parallel to and above said hollow switch shaft 54 (Fig. 2) and is provided with a spline 66 fixed longitudinally thereof on which is adjustably slidable a contact roll 67 provided with radial bores 68 (Fig. 3), one for each index point location of the card. A ring 69 around said contact roll is provided with perforations smaller than said radial bores 68 and registering therewith, thereby to form annular shoulders at the outer end of the radial bores respectively. Analyzing contact pins 70 in said bores have contact heads 71 slidable in said registering perforations; and a collar 72 is provided on each pin against said head and shoulder. A spring 73 on the pin and compressed between said collar and the inner end of the radial bore is adapted to press the contact head against the index point locations of the card and if a perforation be present in the card to press the head against the corresponding contact bar 57. A spring 74 (Fig. 1) is compressed between said extensions 61 and 64 for pressing the contact roll 67 against the card thereby to press the card against said bars 57.

Radial stop pins 76 (Fig. 2) mounted on said shafts at each edge portion of said analyzer plate are each adapted to engage the advance edge of the card approaching the contact roll and the switch sleeve thereby to so position said card relative to the contact bars 57 and the pin heads 71 that each contact bar and pin head will be disposed against the corresponding index point location of the card as the card is forced between the rollers to frictionally engage and rotate the rolls.

An insulating bushing 77 (Fig. 4) is provided on the projecting end 55 of the switch shaft and carries a plurality of contact rings 78, one for each contact bar. Separately insulated conductors 79 passing through said hollow shaft 54 connect each contact ring 78 with its corresponding respective contact bar 57. A brush support 80 is mounted on one of the side plates 11; and a plurality of spring contact brushes 81 (Fig. 2) are mounted on said support and each contacts one only of said rings 78. The brushes are each connected to the insulated electric wires 89 for operating the selecting mechanism of the card conveyor as will be explained.

It is, of course, necessary that the pin heads 71 always be adjusted so that the pins register with the row of perforations which are to be analyzed. This can be done merely by sliding the roll 67 on the pressure shaft 65 until the heads register with the desired column.

The cards are received from the roller 52 (Fig. 1) and are finally conveyed to the compartments 92 formed by transverse partitions 93 mounted at their lower ends upon the base 10 and having their upper ends secured to retaining pieces 95 carried upon the bearing supports 96 mounted upon the lower edges of the extension plates 98 secured to the side plates 11. Rotatably mounted in said bearing supports 96 are a plurality of deflector shafts 99, one for each compartment, on which are secured deflectors 100 (Fig. 2) formed of strips of material bent upon themselves and secured by means of rivets 101 to the deflector shaft. Upon each deflector shaft 99 there are rotatably mounted a pair of lower guide rollers 102 against which are yieldably pressed the upper guide rollers 104 rotatably mounted in brackets 106 (Fig. 1) loosely mounted on pivot bolts 108 secured to the extension plates 98.

On each upper shaft 105 there is fixed a pinion 112 meshing with an idler 113 rotatably mounted on one of the bolts 108.

The end bracket 114 is loosely mounted on a short bearing shaft 115 on which is fixed a drive pinion 116 and a driven sprocket 117, the latter being driven by means of a sprocket chain 118, on the sprocket wheel 120 carried on the shaft 53 operatively connected to a gear wheel 122 driven by the gear 123 in turn driven from the gear 47. On the shafts 53 and 124 are mounted rollers 53 and a lower roller which receive the cards from the analyzer 14 and convey them to the rollers 102 and 104 which latter convey the cards in a horizontal path above the deflectors 100, when the deflectors are in their normal horizontal position as shown in Fig. 2. When the deflectors 100 are deflected upwardly so that a card passing from the analyzing plate passes to the

underside of the deflector, such card is deflected into one of the compartments 92 on to the receiving plate 127.

Means for operating the deflector will now be described.

Mounted upon one of the side plates 11 (Fig. 3) is a bracket support 130 upon which are mounted elbow brackets 131 provided with timing shaft bearings 132 and deflector shaft bearings 134, the latter receiving the ends of the deflector shafts 99. In the bearings 132 there is disposed a timing shaft 135 on which are fixed, one for each compartment, a plurality of timing disks 136. Disposed around each timing disk equal angles apart, are a plurality of tripping supports or pivots 137 on which are pivotally mounted setttable tripping cams 138 provided at their inner edges with a cam projection 140. Said cams are held spaced from the disk by means of spacing collars 141. At the free end of each setttable cam there is secured a pivot pin 143 on which is pivotally mounted a detent 144 provided with an upwardly pointing releasing finger 145 and an inwardly pointing detent finger 146 provided with an active detent shoulder 147 and an inactive detent shoulder 148 either one of which is adapted to rest upon the detent pin 150 mounted upon the disk. Said finger 144 is held pressed against the detent pin by means of a coil spring 152 wrapped around the collar 141 and pressing against a projection 153 carried upon the detent 144.

Upon each pivot pin 143 there is also carried a tripping roller 155, adapted, when the active shoulder 147 engages the detent pin, to engage the operating arm 156 fixed upon the deflector shaft 99, whereby as said disk rotates and brings said roller into contact with said arm 156, the deflectors 100 are raised and deflect the cards into the compartments. After the operating arm 156 has been thus operated, the releasing finger 145 engages the releasing pin 158 carried upon the outer end of the operating arm 156, whereby said active shoulder 147 is forced away from the detent pin 150 and the spring 152 causes the tripping cam and detent to move inwardly until the detent pin 150 is engaged by the inactive shoulder 148. The deflector operating means as thus far described is shown in said first named application.

Each timing shaft bearing box 132 is provided with a reduced extension on which is fixed by means of a set screw 161, a plunger bracket 162 provided with an opening in which is received a thimble 164 on which is mounted a solenoid 168 having therein a slidable armature core 169 provided with means, as shown in my said patent for holding the core retracted. One end of the solenoid wire connected to the

insulated electric wire 89. The other end of the solenoid wire is connected by the conductor 176 to one terminal of a suitable source of current 177, the other terminal thereof being, by means of the conductor 178, grounded on the frame of the machine. There is one solenoid 168 electrically connected by the wires 89 to each brush 81. As the pins 70 and the pressure shaft 65 are grounded on the frame of the machine, it will be seen that whenever a pin head is depressed through a perforation to contact with a bar 57, a circuit is formed comprising said pin 70, the bar 56, the conductor 79 the ring 78, the brush 57, the solenoid 168, the conductor 176, the source of current 177, the conductor 178, and the frame of the machine. When the circuit is thus formed by the contact of a pin 70 the corresponding solenoid is energized and the corresponding tripping or plunger core 169 is projected.

The timing shaft 135 is rotated by means of bevel gears 180 (Fig. 1) driven from the gear 123; and these gears are so proportioned that each time a card is analyzed in the analyzer, one of the tripping cams 138 is just coming into operative relation with one of the plungers 171.

When a card is in the analyzer and the analyzing pin 70 finds a perforation and presses upon the bar 57 the solenoid projects the tripping plunger 169, whereupon, the tripping plunger engages the tripping cam 138 at that time coming into operative relation therewith.

As the various compartments 92 are placed progressively greater distances from the analyzer, it requires a greater length of time for the card passing from the analyzer to reach the compartments more remote therefrom; and provision is made for operating the deflector just at the instant that the card reaches it so that each card may be deflected into its appropriate compartment without having to wait until sufficient time has elapsed for a card to be deflected into the most remote compartment. In order to accomplish this it is merely necessary to place the plunger 169 associated with each compartment and timing disk such a distance from the associated operating arm 156 that the tripping cam which comes into operative relation with such plunger at the time that the card is in the analyzer will have just time to pass from such tripping plunger to said operating arm as the card which operated such plunger 169 requires to pass from the analyzer to the deflector. In order to fulfill these conditions the plungers 171 must be placed spirally around the timing shaft, the plungers associated with the most remote compartments being placed the greatest distances from the operating arm 156, such distances being measured forward from the plunger in direction of rotation of the

disks indicated by the arrow at the right of Fig. 2. As the embodiment herein described is provided with 12 compartments, and the timing disks are provided with only six tripping cams, it is necessary that the tripping cams of one disk be placed in staggered relation with the tripping cams of the adjacent disk so that the tripping cam on every disk will be coming into operative relation with the associated tripping plunger just at the instant that the card is being analyzed. Otherwise some of the tripping plungers would be operated at an instant when the point of the disk midway between adjacent cams would be opposite the plunger, and no setting of the tripping cam would take place. The number of tripping cams could be either greater or less than shown, if desired.

From the foregoing the operation of the entire machine will be readily understood and need now be only very briefly summarized as follows:

By means of the reciprocating picker blades 34, each card is fed from the lower part of the magazine hopper 18 to the roller 38 whence it is carried above the analyzer, and against the radial pins 76, thereby positioning the card relative to the rollers, so that each contact bar 57 will be disposed under its corresponding number on the card. The card is then forced by its feed rollers until a pin 70 find a perforation and the associated tripping plunger 169 associated with the compartment to which said card is destined, is operated, thereby bringing about the setting of the tripping cam 140 associated with said compartment just as it comes into operative relation with such tripping plunger. When this takes place the card which caused its setting is seized by the roller 52 and this card and the tripping cam set thereby both travel toward the deflectors 100 and the operating arm 156 associated with such compartment; and because of the relation between the location of the setting plunger, the remoteness of the compartment from the analyzer, and the speeds of travel of the set tripping cam and the card, said tripping cam comes into operative relation with the operating lever 156 just before the card comes into operative relation with the deflectors 100, whereupon the set tripping cam operates the operating lever and consequently the associated deflectors and deflects the card into the appropriate compartment. The operating cam immediately passes on and permits the deflectors to fall, so that a card immediately following the card thus deflected may pass over said deflectors for a more remote compartment. If such card was destined for the same compartment, the deflectors will be immediately deflected again in the same manner just described.

As soon as the operating arm 156 has been

operated, the tripping finger 145 engages the tripping pin 158 thus releasing the shoulder 147 from the detent pin 150 whereupon the tripping cam resumes its normal position. This operation is repeated until all of the cards are analyzed and deposited in their appropriate compartments.

I claim:

1. In combination, a rotary card analyzing member comprising insulated contact members adapted to register with the index point locations of a card; a pressure member adapted to press against and contact said contact members; sorting stations adapted to receive cards from said members; an electrically operated means electrically connected with the contact member corresponding to the perforation of the card destined for such compartment, for causing the cards to enter the stations.

2. In combination, a rotary analyzing member comprising an insulating member and contact bars thereon spaced equal distances apart; a pressure member adapted to press against and contact said bars; card compartments past which cards are conveyed from between said members; a deflector for each compartment; an electrically operated means for each deflector and electrically connected with the bar corresponding to the perforation of the card destined for such compartment.

3. In combination, a rotary analyzing roll comprising an insulating sleeve and longitudinal contact bars spaced equal distances apart thereon; a pressure roll axially parallel to said analyzing roll; outwardly pressed radial analyzer disposed around said analyzer roll and adapted to contact said bars respectively; feed means for forcing cards between said rolls; discharge means for extracting cards thus forced; insulated contact rings connected with the contact bars respectively; card compartments past which cards are conveyed from the discharge means; a deflector for each compartment for deflecting the cards therein; and an electrically operated means for each deflector and electrically connected with the ring corresponding to the perforation of the card destined for such compartment.

4. In combination, a switch shaft; an analyzing roll on said shaft and comprising an insulating sleeve and longitudinal contact bars spaced distances apart equal to the distance between index points on the card to be analyzed; a pressure shaft parallel to and above said switch shaft; a pressure roll longitudinally adjustable on said pressure shaft and provided with radial bores therein, one for each index point; outwardly spring pressed analyzer pins in said bores; feed means for forcing cards between said rolls; discharge means for extracting cards thus forced; insulated contact

rings on said switch shaft and connected with the contact bars respectively; brushes contacting said rings respectively; card compartments past which cards are conveyed from the discharge means; a deflector for each compartment; and an electrically operated means for each deflector and electrically connected with the brush corresponding to the perforation of the card destined for such compartment.

5. In combination, a hollow switch shaft; an analyzing roll on said shaft and comprising an insulating sleeve and longitudinal contact bars spaced distances apart equal to the distance between index points on the card to be analyzed; a pressure shaft parallel to and above said switch shaft; a pressure roll longitudinally adjustable on said pressure shaft and provided with radial bores therein, one for each index point; outwardly spring pressed analyzer pins in said bores; feed means for forcing cards between said rolls; discharge means for extracting cards thus forced; insulated contact rings on said switch shaft; conductors passing through said hollow shaft and connecting the rings to the contact bar respectively; brushes contacting said rings respectively; card compartments past which cards are conveyed from the discharge means; a deflector for each compartment; an electrically operated means for each deflector and electrically connected with the brush corresponding to the perforation of the card destined for such compartment.

6. In combination, a hollow switch shaft having a projecting end; an analyzing roll on said shaft and comprising an insulating sleeve on the mid-part of said shaft; and a plurality of contact bars longitudinally disposed on said sleeve thereof and spaced distances apart equal to the distance between index points on the card to be analyzed; a pressure shaft disposed parallel to and above said switch shaft; a pressure roll longitudinally adjustable on said pressure shaft and provided with radial bores therein; outwardly spring pressed analyzer pins in said bores; feed rollers for forcing cards between said pressure and analyzing rolls; discharge rollers for seizing cards forced by the feed rollers as they emerge from the analyzer roll; an insulating bushing on the projecting end of the switch shaft; a plurality of contact rings on said bushing; conductors passing through said hollow shaft and connecting each ring with its corresponding contact bars; brushes contacting said rings respectively; and electrically operated means connected with the brushes respectively.

7. In combination, a switch shaft; a rotary analyzing member thereon comprising an insulating member and spaced contact members thereon; a pressure shaft parallel

to the switch shaft; a pressure member thereon adapted to contact said contact members; an electric conductor connected with the contact members respectively; and radial stop pins mounted on said shafts and each adapted to engage the advance edge of a card approaching the analyzing and pressure members thereby to position said card relative to the contact members.

8. In combination, a switch shaft; a rotary analyzing member thereon comprising an insulating member and contact bars thereon spaced equal distances apart; a pressure shaft parallel to the switch shaft; a pressure member thereon adapted to press against the said contact bars; card compartments past which cards are conveyed from between said members; a deflector for each compartment; an electrically operated means for each deflector and electrically connected with the bar corresponding to the perforation of the card destined for such compartment; and radial stop pins mounted on said shafts and each adapted to engage the advance edge of a card approaching the analyzing and pressure members thereby to so position said card relative to the contact bars that each contact bar will be disposed against the corresponding index point location of the card as the card is forced between the members to frictionally engage and rotate the members.

9. In combination, a rotary analyzing member comprising insulated contact bars; spaced equal distances apart; conductors electrically connected with the respective contact bars; a pressure shaft provided with a spline fixed longitudinally thereof; a contact roll adjustably slidable on said pressure shaft and provided with radial bores therein; a ring around said contact roll and provided with perforations smaller than said radial bores and registering therewith thereby to form annular shoulders at the outer end of said radial bores respectively; contact pins in said bores and having contact heads slidable in said registering perforations; a collar on each pin against said head and shoulder; a spring on the pin and compressed between said collar and the inner end of the radial bore and adapted to press the contact head against the corresponding contact box.

10. In combination, a rotary analyzing member comprising insulated contact devices movable in series in the same path; a member thereon adapted to engage the contact devices through perforations of cards; and conductors electrically connected with the respective contact devices.

11. In combination, a card conveying means; and a movable analyzing member movable with the card in transit and comprising separate analyzing devices associating themselves individually with respec-

tive individual index points of the cards; sorting stations adapted to receive the cards from said analyzing member; and a guide means connected with the devices for causing the cards to enter the stations.

12. In combination, a conveying means for conveying cards having rows of index points so that said points move in series in the same path; and a movable analyzing member comprising separately insulated analyzing devices associating themselves individually with the respective individual index points; sorting stations adapted to receive the cards from said analyzing member; and a guide means electrically connected with the devices for causing the cards to enter the stations.

13. In combination, a card conveying means for conveying cards having rows of index points so that said points of each row move in series in the same path; a movable analyzing member comprising separate analyzing bars transverse to their path of movement and associating themselves individually with the respective individual index points; and operating means connected with the respective bars.

14. In combination, a card conveying means for conveying cards having rows of index points arranged side by side so that said points of each series move in a simple path; a pair of rotary analyzing members between which the cards are fed and movable to co-operation with any of said rows, for analyzing a card during transit; sorting stations adapted to receive the cards from said analyzing member; and a mechanically operated means electrically connected with the analyzer means for causing the cards to enter the stations.

15. In combination, a rotary analyzing member comprising separate insulated analyzing devices movable in series in said same path; and conductors electrically connected with the respective devices.

16. In combination, a card conveying means for conveying cards having a row of index points so that said points of said row move in series in the same path; a movable analyzing member comprising separate analyzing devices movable in series in said path and associating themselves individually with the respective individual index points; and operating

means connected with the respective contact devices.

17. In combination, a card conveying means for conveying cards having rows of index points so that said points move in series in the same path; and a movable analyzing member comprising separate analyzing devices movable in series in said same path and associating themselves individually with the respective individual index points; conductors electrically connected with the respective devices; sorting stations adapted to receive the cards from said analyzing member; and a mechanically operated means electrically connected with the conductor means for causing the cards to enter the stations.

18. In combination, a movable analyzing means adapted to analyze a card during transitory movement of the card; sorting stations adapted to receive cards from said means; and means individual to each station electrically connected with the analyzing means for causing cards to enter the appropriate stations.

19. In combination, a rotary analyzing means adapted to analyze a card during transitory movement of the cards; sorting stations adapted to receive cards from said means; guide means for causing cards to enter the stations; and means individual to each guide means for operatively connecting the guide means to the analyzer.

20. In combination, a number of compartments for receiving cards used in calculating machines; means associated with each compartment to cause the appropriate card to enter the compartment when the card reaches it and which means require a period of time to elapse after being put into operation and when it is to receive the card; an electromagnetic device for starting the operation of said means; an analyzer for controlling the operation of each of said electro-magnetic means; a series of cards each having an index point to cause the analyzer to energize the electro-magnetic device of its appropriate compartment; and means for feeding the cards to the compartments from the analyzer.

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