

April 4, 1944.

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2,345,858

APPARATUS FOR VERIFYING PUNCHINGS OR NOTCHINGS IN SHEETS

Original Filed Sept. 12, 1940 3 Sheets-Sheet 1

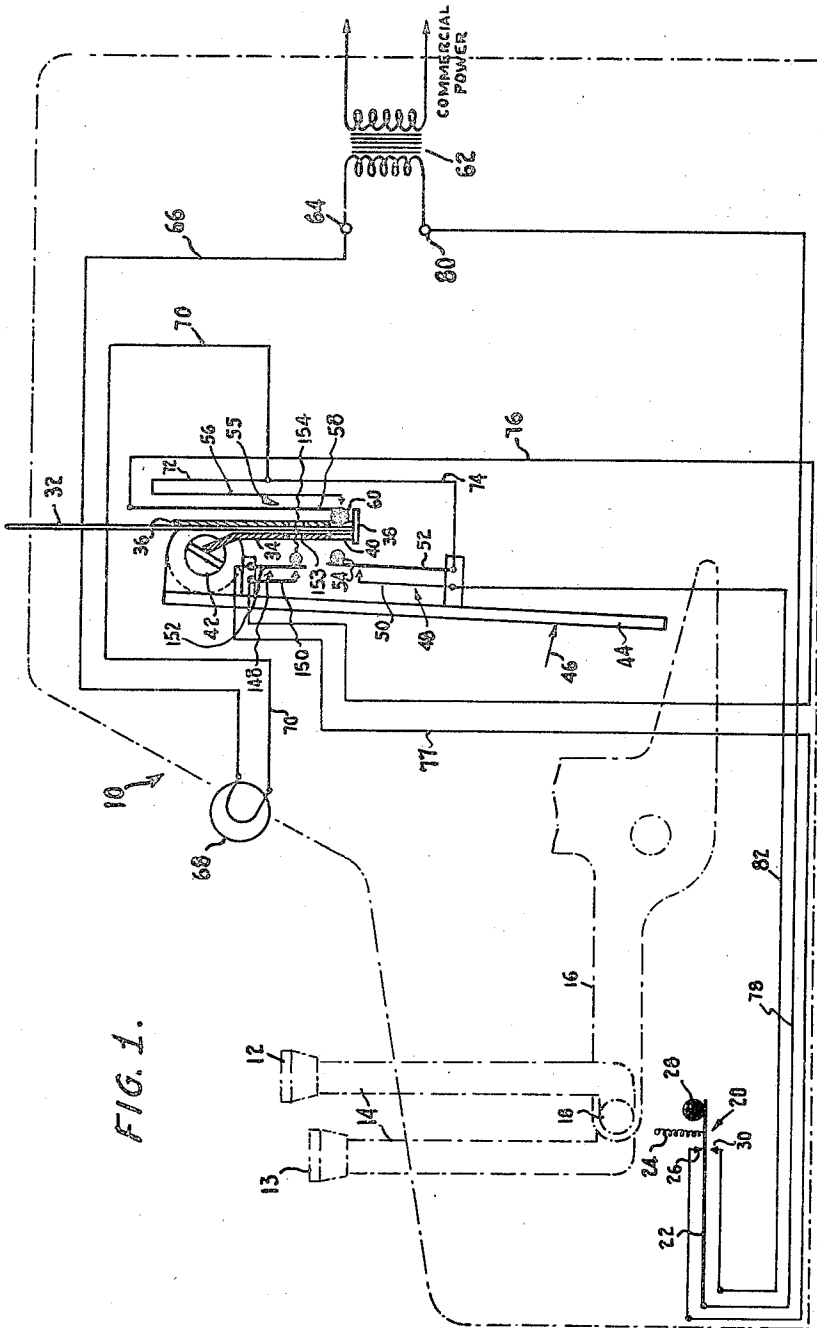


FIG. 1.

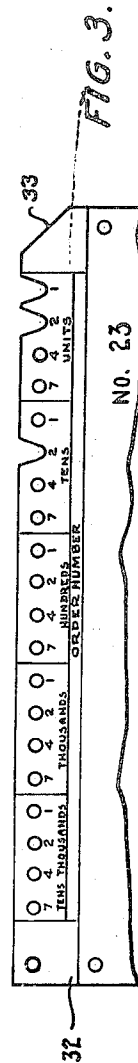


FIG. 3.

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3 Sheets-Sheet 2

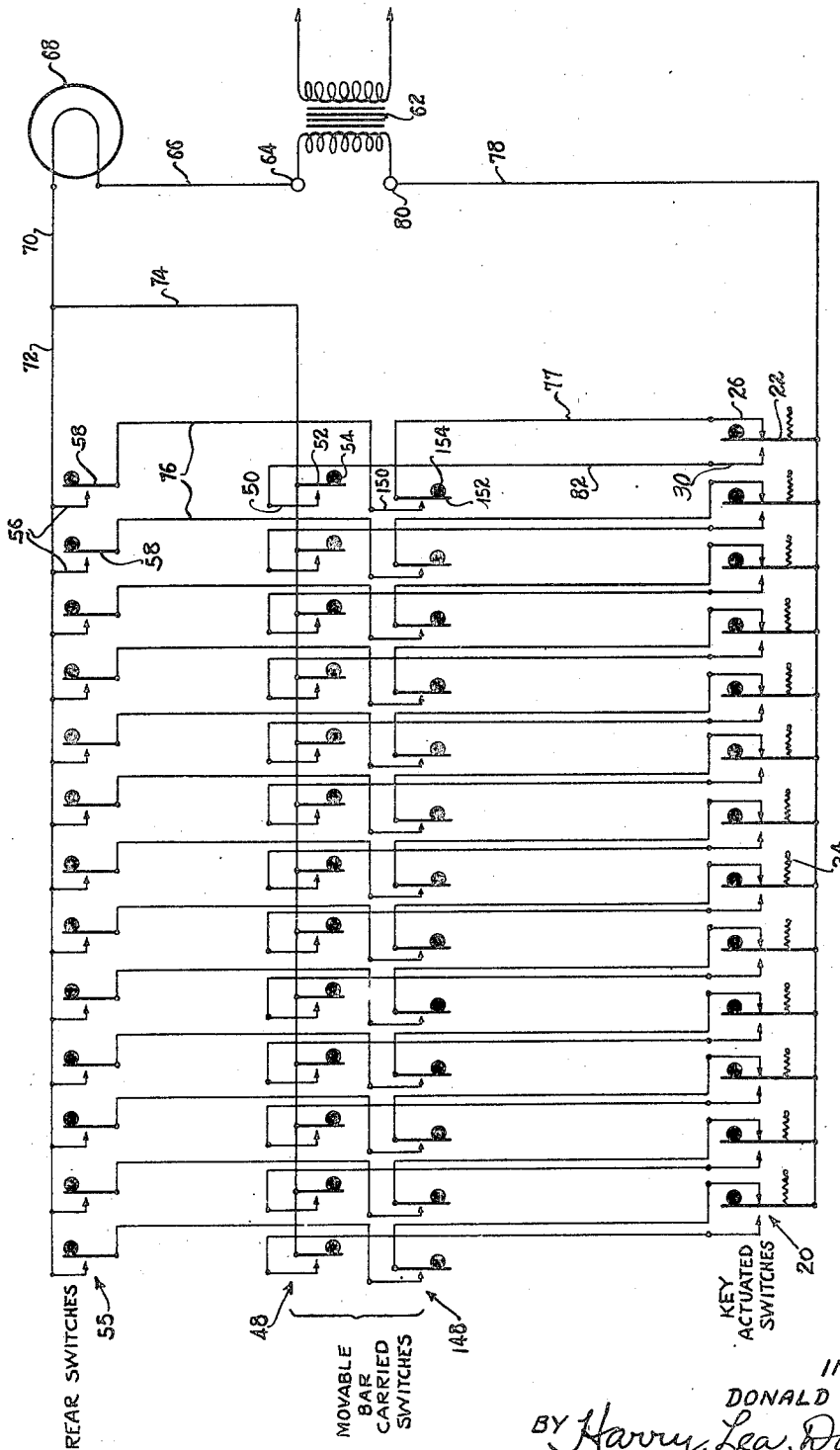


FIG. 2.

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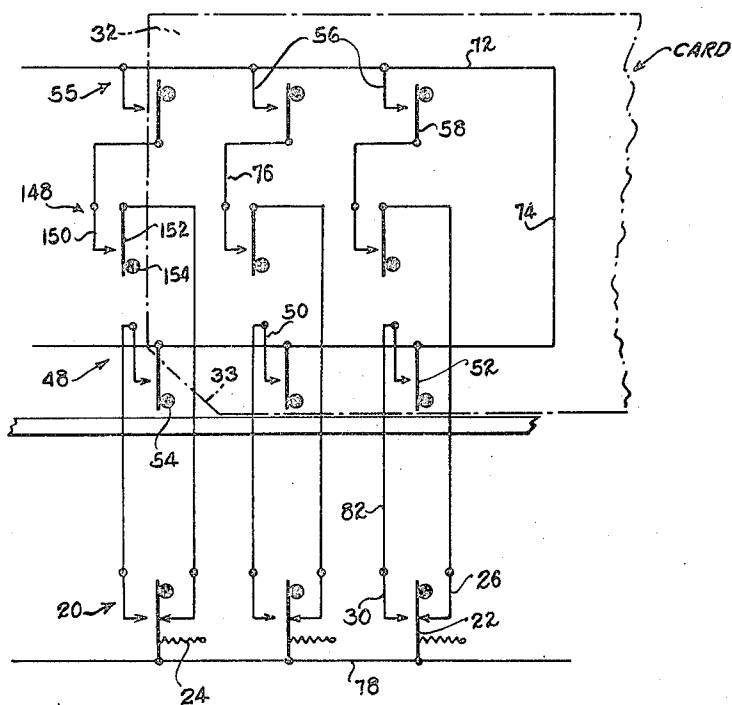
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FIG. 4.



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APPARATUS FOR VERIFYING PUNCHINGS
OR NOTCHINGS IN SHEETS

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Original application September 12, 1940, Serial
No. 356,556. Divided and this application April
3, 1941, Serial No. 386,674

8 Claims. (Cl. 73—54)

My invention relates to an apparatus for verifying notched, punched or slotted sheets or cards, such as is described in my copending application, Serial No. 356,556, filed September 12, 1940, of which this is a division.

After cards or other sheet material have been slotted, punched or notched for purposes of classification, it becomes important to verify such punching, slotting or notching by a separate operation, especially where the information to be verified relates to financial accounts. In order to expedite such verification, it is convenient to utilize a verifier similar in construction to the punching machine and having a keyboard similar thereto. In this manner, the operator will not be required to learn an entirely new mode of manipulation.

The apparatus contemplated by the present application are particularly adapted for use in conjunction with the notched cards of the type disclosed in the patent to Alfred Perkins, No. 1,544,172. The framework of the device utilized in describing the present invention is similar to that disclosed in the patent to Nelson S. Welk, No. 2,035,777, and provides a keyboard which may be identical with that of the Welk patent.

After a card or sheet has been punched, slotted or notched to denote certain designated classification or values, it is passed on to a machine of the type to be disclosed herein, inserted with its perforations or notches between electrical switching devices, one or more of the switching devices being moved relatively with respect to the card or sheet and indicating by the operation of suitable electrical circuits if any error has been made by either omitting any designation or including any which should not have been present. The presence of error may be indicated by visual and/or audible means included in the electrical system.

The principal object of the present invention is to provide an apparatus which may be employed to expedite the verification of such cards or sheets and thereby effect a material saving of the time and expense involved in the operations as carried out in accordance with present day practice.

And it is also proposed to create a machine which will where needed provide for automatic compensation where cards or sheets of different dimensions are to be served by the machine.

My means of accomplishing the foregoing objects may be more readily understood by having reference to the accompanying drawings which are hereunto annexed and made a part of the specification in which I have shown one form of

apparatus to carry out the steps of the method, in which:

Fig. 1 is a more or less diagrammatic view in elevation of the apparatus;

Fig. 2 is a wiring diagram showing electrical circuits utilized in the apparatus;

Fig. 3 is a fragmentary showing of a card in conjunction with which use of the apparatus of Fig. 2 is suitable; and

Fig. 4 is a diagrammatic showing of a portion of the electrical circuit arrangement as utilized in conjunction with cards having one of their corners cut away.

Similar reference numerals refer to similar parts throughout the entire specification.

The apparatus shown in Fig. 1 has been generally designated by reference character 10, and is provided with a plurality of keys 12 and 13, arranged in a manner similar to that disclosed in the patent to Welk, No. 2,035,777, already referred to. These keys are provided with shanks 14, each of which is connected with a rocker arm 16, by means of a pivot 18. Below each key shank and in the path of its travel, there is provided a single-throw double-pole switch 20, having a movable switch arm 22, normally retained by means of a spring 24, in its uppermost position in contact with its upper terminal 26. The switch arm is moved downwardly when its corresponding key is depressed, by the action of the respective shank 14, bearing upon an insulating button 28. When the switch arm 22 is thus depressed, its contact with the upper terminal 26 is broken and it is brought into contact with the lower terminal 30, to establish a new circuit which will be described subsequently.

The sheet or card 32, intended to have its punching, slotting or notching verified is received in the device between a front guide plate 34, and a rear guide plate 36, until the leading edge of the card rests upon a supporting plate 38. In Fig. 1 of the drawings, the card 32 is shown in position to be verified. The guide plates 34 and 36 are cut away at their lower ends 40 so as to expose the entire edge of the card intended to be notched or otherwise mutilated and thereby permit access to the card by the circuit closers to be described hereinafter. It will be understood that the supporting plate 38, could assume a lower position in the device and/or the guiding plates 34 and 36 could be cut away to expose other portions of the card or sheet in the event that closed perforations, slots or punched-out portions are preferred for classification purposes to the

notches employed in a card of the type depicted in Fig. 3 of the drawings.

Pivotally mounted on a shaft 42, there is provided a bar 44, which is moved from its normal position depicted in Fig. 1 of the drawings, in a counter-clockwise direction by a suitable actuating mechanism diagrammatically indicated by the arrow 46, upon closing the circuit of a motor which has not been shown. Bar 44 at the bottom of its stroke is adapted to come in contact with the inner end of pivotally mounted rocker arm 16, which is raised sufficiently for that purpose only when the keys 12 or 13 have been depressed, and in this way restore the keys to their normal position. It will be readily seen that when rocker arm 16 is in its normal position, shown in Fig. 1, its inner end is not raised sufficiently to come in contact with bar 44 and it will be unaffected by movement of the bar. After the counterclockwise movement has been completed to effect the verifying operation, the bar is withdrawn by continued operation of the motor to its initial normal position in preparation for a subsequent operation. Further reference to the description and operation of bar 44 is omitted since this mechanism is similar to that shown and described in the above referred to Welk Patent No. 2,035,777. Mounted upon the bar 44, there are a plurality of front circuit closers 48, there being one of such circuit closers for each of the keys 12. Each of these circuit closers is provided with a relatively fixed contact element 50 and a relatively movable switch arm 52, having an insulating button 54 adapted to enter a slot formed in the card 32, should there be one corresponding to the position of the particular circuit closer when the bar 44 is moved through its counter-clockwise path. As will be observed from the drawings, the circuit closer 48 is normally open, the switch arm being brought into contact with the terminal only when the insulating button 54 engages an unnotched or unpunched portion of the sheet or card being verified.

The upper portion of the bar 44 supports another row of circuit closers 148, there being in this case as well, one of such circuit closers for each of the keys 12. Each one of the circuit closers 148 is provided with a relatively fixed contact element 150 and a relatively movable switch arm 152, carrying an insulating button 154 which is adapted to enter a hole 153 formed in the guide plate 34, whereby the button 154 will contact the body of the card when its supporting bar 44 partakes of its counter-clockwise movement.

Disposed on the opposite side of the sheet or card from the circuit closers 48, there is provided a group of rear circuit closers 55, again corresponding in number to the keys provided on the device and consequently to the number of circuit closers 48 arranged in front of the card or sheet. The circuit closers 55 are provided with relatively fixed terminals 56 and relatively movable switch arms 58 provided at their ends with insulating buttons 60. As indicated in the drawings, circuit closers 55 are normally open, being closed by cooperation with any of the insulating buttons 54 of the circuit closers 48 which pass through openings formed in the card 32.

Current may be supplied to the electrical system from any suitable source, the transformer 62 having been indicated for purposes of this description. From the upper terminal 64 of the transformer, a lead 66 connects with one ter-

minal of a signal device which has been depicted as an incandescent lamp 68, the opposite terminal of the lamp being connected by means of a lead 70 to a lead 72, connected with the relatively fixed contact of the circuit closer 55, and by a lead 74, with the relatively movable switch arm 52 of the circuit closer 48. The relatively movable switch arm 58 of the circuit closer 55 is connected by means of a lead 76 with the relatively fixed contact 150 of the upper circuit closer 148. The relatively movable switch arm 152 of the upper closer is connected with the upper terminal 26 of the switch 20 by a lead 77. The lower terminal 30 of the switch 20 is connected by means of a lead 82, with the relatively stationary contact 50 of the switch or circuit closer 48. The switch arm 22 of the switch 20 is connected by means of a lead 78, with the pole 80 of the transformer 62.

It is sometimes necessary or desirable to verify the punching or notching of a card having smaller dimensions than those for which the machine is primarily designed. Or, a similar problem arises when it is desired to verify the punching or notching along a shorter edge of a card of the size for which the machine is designed. Since from the foregoing description, it will be understood that only the precise number of circuit closers should be used as will correspond with the length of the edge of a card being verified, automatic means has been provided to render operative the correct number of circuit closers required for verifying the punched portions of cards or edges of varying lengths for which the machine is adapted. The single circuit arrangements thus far described is representative of a plurality of similar circuits arranged in parallel and depicted by corresponding characters in Fig. 2 of the drawings.

The card 32 notched as depicted in Fig. 3 of the drawings will be inserted with its notched end to be verified directed downwardly between the guide plates 34 and 36. The operator, knowing the data that was supposed to have been represented when the card was notched, will depress the proper key or combination of keys 12, which in the case of the particular card shown in Fig. 3 of the drawings would represent the value "23". The key 12 shown in Fig. 1 of the drawings is assumed to be one of those depressed to represent the value in question. As the shank of the key moves downwardly, it abuts the insulating button 28, breaking the circuit between the switch arm 22 and the upper contact 26, and making the circuit between the switch arm 22 and the lower contact 30. The motor circuit will then be completed by operating a suitable switch (not shown), whereupon the bar 44 will be moved in a counter-clockwise direction, the insulating button 54 of the circuit closer 48 passing through the cut-out portion of the guide plate 34 towards the card 32. In the event that the card has not been punched at this point, the material of the card will resist the insulating button 54, so that upon continued advance of the bar 44, contact will be made between the switch arm 52 and the relatively fixed terminal 50, and a circuit established through the signal device 68, notifying the operator that the card has not been properly punched.

The circuit may be traced as follows: from the lower terminal 80 of the transformer 62, through the lead 78 to the switch arm 22, thence through lower contact 30, lead 82 fixed contact 50, switch arm 52, lead 74; lead 70, through the filament

of the lamp 68, and from the opposite terminal of the lamp through the lead 66 to the upper terminal 64 of the transformer.

Again assuming that the key 12 has been depressed and the switch arm 22 moved into contact with the lower terminal 30, and the motor circuit closed to move the arm 44 counter-clockwise, this time further assuming that a notch at the lower edge of the card 32 registers with the insulating button 54; under these circumstances, insulating button 54 will pass through the notched portion of the card and abut the oppositely disposed insulating button 60 of the circuit closer 55, closing the circuit between the relatively movable switch arm 58 and the relatively fixed terminal 56. When this situation occurs, the circuit closer 48 will not have its own circuit closed, the relative resistance to flexing of the switch arms 52 and 58 being designed for this result. Accordingly, since the circuit closer 48 fails to complete the circuit established through the switch arm 22 and lower contact 30 of the circuit closer 20, there will be no signal given by the lamp 68. In a similar manner, although the circuit closer 55 is actuated to close the gap between its switch arm 58 and terminal 56, and although the gap between the arm 152 and terminal 150 of closer 148 has been bridged, this circuit through the signal lamp is incomplete because the switch arm 22 of the switch 20 has been depressed from engagement with its upper contact 26.

In the event that the classification value called for by the particular card being verified does not require that key 12 be depressed, then the corresponding switch arm 22 will be retained in its upper position by means of a spring 24 or by its own resilience. When the motor circuit is closed and the arm 44 moved through its counter-clockwise path, if the insulating button 54 should pass through a punched-out portion of the card which was unintentionally formed, the signal circuit would then be closed by completion of the circuit through the corresponding rear closer 55 and front closer 148.

Tracing this circuit from the transformer, current would flow from the lower terminal 80 through the lead 78 to the switch arm 22, thence through the upper contact 26 and lead 77 through the switch arm 152 and terminal 150, through lead 76 to the relatively movable switch arm 58 of the circuit closer 55, then through the terminal 56, and lead 72, by way of lead 70 and lamp 68, through the lead 66 and to the upper terminal 64 of the transformer 62.

It will be understood that after the motor circuit has been closed, continued operation of the motor will return the bar 44, together with its circuit closers 48, to the initial position shown in Fig. 1 of the drawings preparatory for a new operation upon the insertion of the next card or edge to be verified.

Normally, with the bar 44 in its initial position as shown in Fig. 1 of the drawings, all of the circuit closers 148 are open, thus preventing the passage of current from the switch arm 58 of the rear closer 55 to the arm 22 of the key actuated switch 20. However, with a card positioned between the guide plates, when the bar 44 moves towards the card, the buttons 154 enter the holes 153 formed in the guide plate 34 and the movement of each such button is restrained in the event that it encounters the face of the inserted card. All of the closers 148 whose buttons so engage the card will close, upon continued advance

of bar 44 in a counter-clockwise direction. Accordingly, with a card wide enough to engage all of the buttons 154, all of the switches 148 will be closed.

Of course, when a card is inserted, one of its edges is located against a stop corresponding to one employed when the card was slotted. Therefore, if the inserted card is of insufficient width to be engaged by all of the buttons 154, those not encountered will not depress their respective switch arms and their circuit closers will remain in their open positions. Thus all of the closers 148 positioned beyond the width of an inserted card remain inoperative, thereby automatically providing for verifying card edges or unequal lengths without making any manual adjustments of the device.

Cards of the type shown in Fig. 3 of the drawings are manufactured with a corner 33 removed for purposes of "needling" or sorting, and when inserted in a certain position in the verifying device, the absence of this corner will permit one of the circuit closer buttons 54 to avoid the card just as though the card were slotted at this point. This relationship is clearly shown in Fig. 4 of the drawings where one of the buttons 54 registering with the removed corner would ordinarily indicate that the card had been improperly punched by operating its corresponding closer 55. To prevent this, I have arranged the circuit closers 148 in an offset position with respect to the corresponding circuit closers 48 and 55. With such an offset arrangement the contact button 54, passing through the cut-away corner of the card will not complete the electrical circuit controlled by the closer 55 because the same circuit is broken at the switch 148 which remains open, due to the fact that it is offset beyond the edge of the card, in view of which its operating button 154 fails to encounter the card and therefore enters its opening 153 and fails to depress its switch arm.

While for illustrative purposes, I have shown a specific arrangement of apparatus to carry out my invention, it is to be understood that it is only to show a preferred form and in no sense as a limitation because obviously many forms or arrangements of the apparatus may be employed without departing from the spirit of the invention.

Having described my invention what I regard as new and desire to secure by Letters Patent is:

1. A verifier for a notched card comprising a support for the card, a pair of circuit closers arranged on opposite sides of the card for cooperation when a notch in the card is presented between them, a signal device in circuit with said circuit closers, a selecting switch cooperating with each of the pair of circuit closers, an operating key for actuating the selecting switch, said selecting switch normally connecting one of said circuit closers to a source of current, operation of said key serving to actuate said selecting switch to disconnect the normally connected circuit closer from the current source and connect the other of said circuit closers to the source of current, one of said circuit closers being relatively movable towards said card whereby contact with the material of the card will close the relatively movable closer and registration with an opening in the card will close the opposed circuit closer.

2. A verifier for punched cards comprising sets of opposed switches normally open having circuits including an alarm and a source of current, means for supporting a card with its punched portion interposed between said sets of switches,

means for imparting relative movement to certain of said sets of switches towards said card, engagement of one of said movable sets of switches with said card at a point that should be punched closing the same and thereby completing a circuit to actuate said alarm, and failure of one of said movable sets of switches to engage said card at a point that should be closed closing the opposed set of switches and thereby completing a circuit to actuate said alarm.

3. A verifier for punched cards comprising sets of opposed switches having circuits including an alarm and a source of current, means for supporting a card with its punched portion interposed between said sets of switches, means for imparting relative movement to the sets of switches on one side of said card towards said card, engagement of one set of said movable sets of switches with said card at a point that should be punched being adapted to close a circuit and actuate said alarm, failure of this same set of movable switches to engage said card at a point that should be closed being adapted to close the opposed set of switches and complete a circuit to actuate said alarm and one set of said movable sets of switches being laterally displaced with relation to the others so as to remain open unless engaged by said card thereby permitting cards of unequal lengths to be verified.

4. In a verifier, the combination with means for holding stationary a perforated card, of a fixed switch with a fixed and a movable contact arranged at one side of the card, two switches movably mounted at the other side of said card each with a fixed and a movable contact, means to move each of said latter switches to yieldably bear upon the card, one of said movable switches engaging with said fixed switch to close it when a perforation in the card is presented between them and the other of said movable switches being constructed to close when moved against an unperforated portion of the card, circuits controlled by said several switches, and an electric signal means adapted for energization through said circuits.

5. A verifier for a notched, punched or slotted card or sheet comprising a stationary support for the card to be verified; circuit closers arranged in two groups on one side of said support and movable towards said card; one group of said movable circuit closers being controlled by the

presence of said card and the second group thereof having switching means for selectively connecting it to a source of current; a third group of circuit closers arranged on the opposite side of said support cooperating with the second group of movable circuit closers when an opening in said card is presented between them; and signal means connected in circuit with all of the said circuit closers.

6. In a verifier, the combination with means for holding stationary a perforated card, of a contact switch fixed at one side of the card, upper and lower contact switches movably mounted at the other side of said card adapted to yieldably bear thereon, circuits controlled by said upper and lower and fixed switches, means for selectively energizing the circuits controlled by said upper and lower switches, and electric signal means adapted for energization through said circuits responsive to an error as regards the location of perforations in said card.

7. In a verifier, the combination with means for holding stationary a perforated card, of a contact switch mounted at one side of the card, upper and lower contact switches movably mounted at the other side of said card adapted to yieldably bear thereon, said upper switch being laterally displaced with relation to said lower switch and governed by a dimension of said card, circuits controlled by said upper and lower and fixed switches, means for selectively energizing the circuits controlled by said upper and lower switches, and electric signal means energized through said circuits responsive to an error as regards the location of perforations in said card.

8. A verifier for perforated cards having a certain corner removed therefrom comprising stationary means for supporting a perforated card; a contact switch mounted at one side of said card; upper and lower contact switches movably mounted at the other side of said card adapted to yieldably bear thereon, said upper switch being laterally displaced with relation to said lower switch; circuits controlled by each of the said switches; means for selectively energizing the circuits; and electric signal means energized through said circuits responsive to an error as regards the location of perforations in said card and failing to respond in regard to the removed corner of said card.

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