

Jan. 4, 1927.

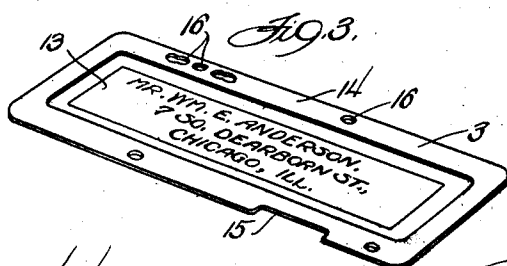
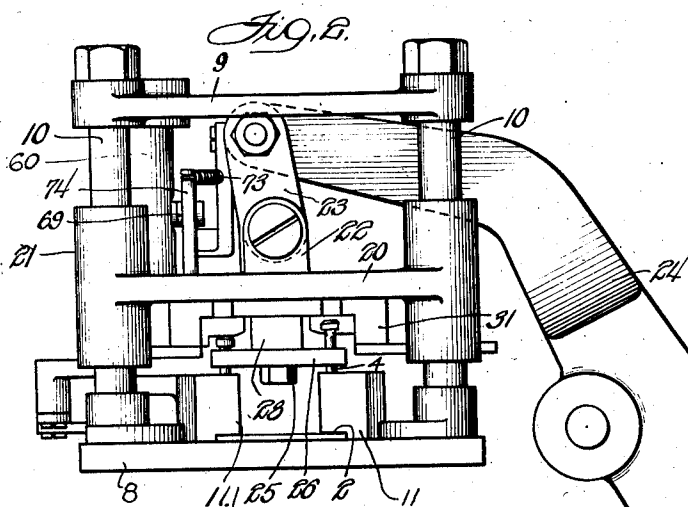
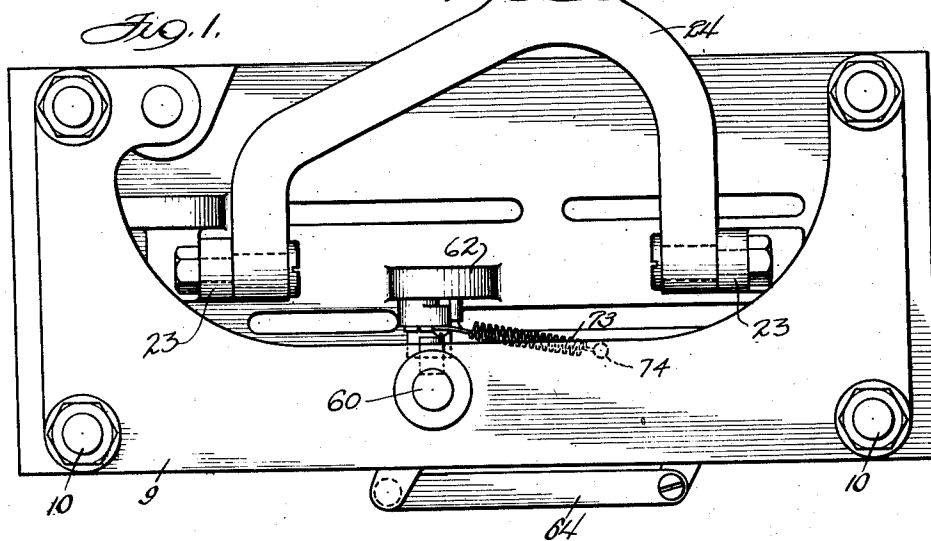
1,613,271

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PUNCHING MACHINE FOR CARDS AND STENCILS

Filed April 18 1925

3 Sheets-Sheet 1



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PUNCHING MACHINE FOR CARDS AND STENCILS

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Fig. 4.

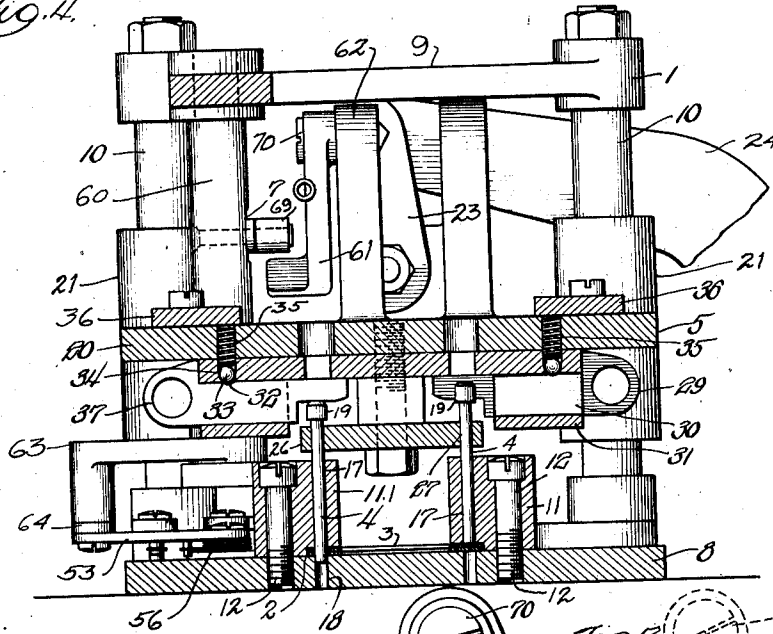


Fig. 5.

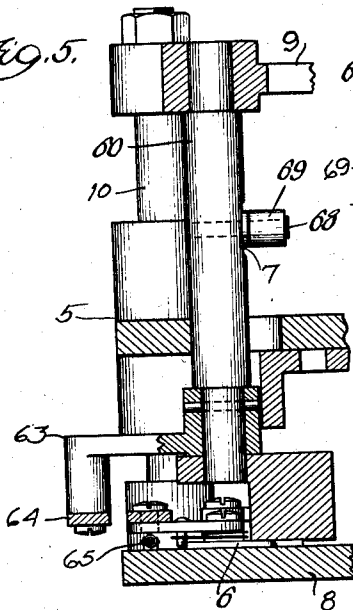


Fig. 6.

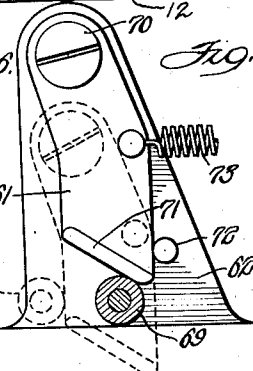


Fig. 7.

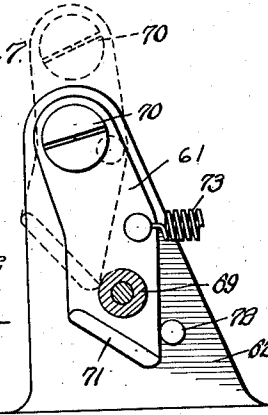
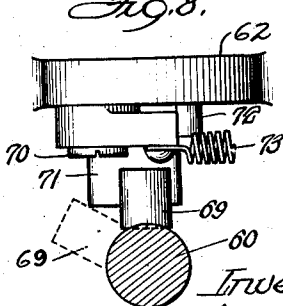


Fig. 8.



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Fig. 9.

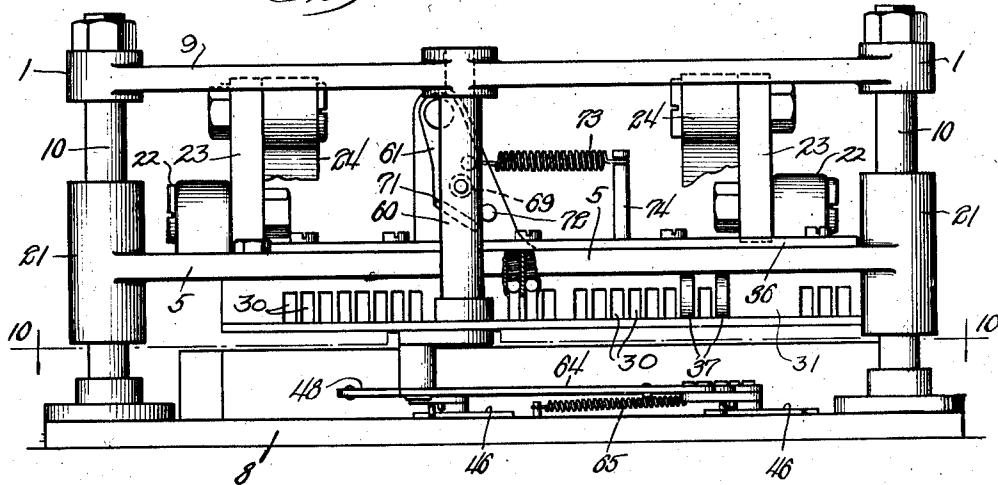


Fig. 10.

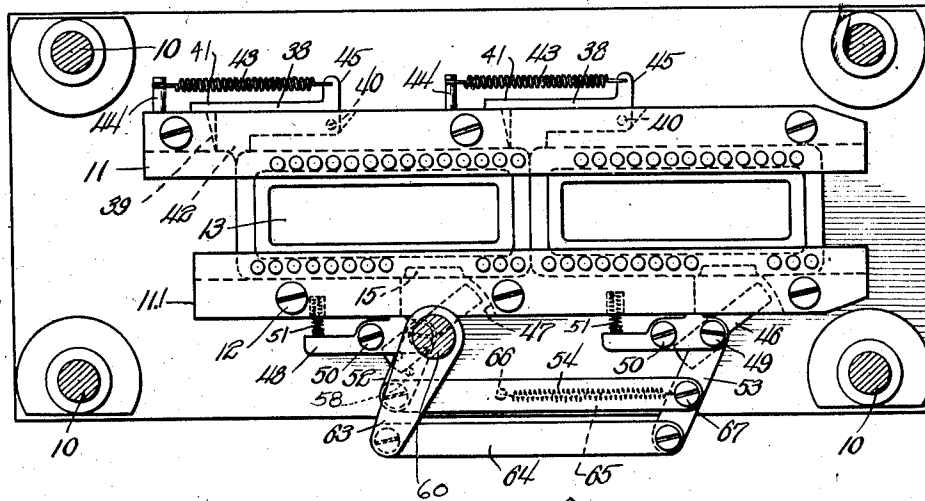
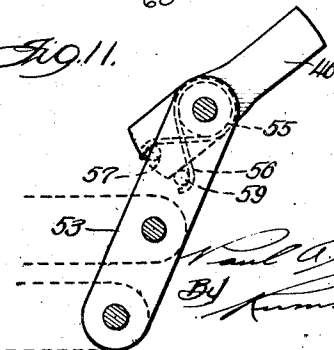


Fig. 11.



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Patented Jan. 4, 1927.

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UNITED STATES PATENT OFFICE.

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PUNCHING MACHINE FOR CARDS AND STENCILS.

Application filed April 18, 1925. Serial No. 24,170.

This invention relates to machines for punching holes in cards and stencils, and is particularly adapted for making code punchings in cards and stencils used in controlling selector mechanisms, such as addressing machines, tabulating machines, weaving machines, and the like.

The main objects of this invention are to provide an improved form and arrangement of punches; to provide improved mechanism for selectively operating said punches; to provide improved means for accurately guiding a series of cards past a fixed point along a definite path and for momentarily holding a card at said point while it is being operated upon; to provide improved operating mechanism for intermittently actuating said holding means; to provide operating mechanism of this kind controlled by the movement of the punching mechanism so as to insure precise positioning of the card at the critical moment; and to provide improved mechanisms and means of this kind whereby two adjacent cards may be operated on simultaneously.

An illustrative embodiment of this invention is shown in the accompanying drawings, wherein—

Figure 1 is a plan of a machine to which this invention is applied, part of the driving mechanism being broken away.

Fig. 2 is an end view of the same.

Fig. 3 is a perspective view of one type of stencil adapted to be operated upon by the improved machine.

Fig. 4 is a transverse vertical section taken on the line 4—4 of Fig. 1.

Fig. 5 is a detail, partly in section, and partly in elevation, of the card positioning mechanism and its actuating means.

Fig. 6 is a detail of the cam which actuates the rock shaft of the positioning mechanism, the full lines representing the parts near the beginning of the downward stroke of the head, and the dotted lines representing the positions of the parts near the completion of the downstroke of the head.

Fig. 7 is another detail of the same, the full lines representing the positions of the parts at the end of the downward stroke of the cam, and the dotted lines showing the cam in a retracted position on its upward stroke.

Fig. 8 is a detail of the same, showing a

plan of the cam and a section of the rock shaft.

Fig. 9 is a front elevation of the machine. Fig. 10 is a horizontal section taken on the line 10—10 of Fig. 9.

Fig. 11 is an enlarged detail of the card positioning mechanism.

Heretofore, stencils and cards used in controlling selector mechanisms usually have been punched by hand, while being held in a suitable master plate or templet. The machines, sometimes used for making the code punchings, heretofore have consisted of a single punch which in some cases was laterally shiftable across the templet, while, in other cases, the templet or master plate and the card to be punched were laterally shiftable relative to the punch. Such prior forms of punches have been very slow in operation and otherwise generally unsatisfactory.

In the specific construction herein shown, the present invention is applied to a punching machine having improved mechanism for selectively operating a battery of punches so that a series of cards or stencils may be fed through the machine in continuous, rapid succession. The cards are fed from a magazine or hopper (not shown) along a guideway in a step-by-step movement to the punching position where they engage improved means arranged to momentarily hold them stationary during the punching operation. The holding means is intermittently actuated by improved mechanism which is controlled by the operation of the punches so that, upon each down stroke of the punches, the holding means is actuated to effectively hold the card or cards operated upon.

In the specific construction herein shown, the improved punching machines comprises a frame 1, having a horizontal guideway 2, along which a series of cards or stencils 3 are adapted to be fed in rapid succession past a certain point where they are operated upon by one or more of a battery of punches 4 which are arranged for selective operation through the movement of a vertically reciprocating head 5, which is mounted in the frame 1. Arranged adjacent the guideway 2, is improved holding and positioning means 6 adapted to momentarily hold two adjacent cards 3 stationary during the punching operation. The holding means 6

is intermittently actuated by improved mechanism 7 controlled in its operation by the movement of the head 5.

As herein illustrated, the frame 1 comprises a base plate 8 and a top plate 9 connected together by upright posts 10 which slidably support the head 5.

The guideway 2 is formed in a pair of spaced guide blocks 11 and 11.1 which are rigidly mounted on the base 8 and secured thereto by bolts 12 or other suitable fastening means.

One form of stencil adapted to be punched by this machine, and which is in common use in addressing machines, is shown in Figure 3. This stencil comprises a thin membrane 13 mounted in a cardboard frame 14 having a recess 15 in one edge thereof which forms a sight opening through which the index cards may be visualized when the cards and stencils are stacked vertically, as is well understood. Formed in the frame 14, are apertures 16, or code punchings, the positions of which determine the selection, as is also well understood in the art, and which may be arranged so close together as to overlap one another to provide for a large number of classifications or selections.

The punches 4 are arranged in two rows, adjacent each side of the guideway 2, and extend through openings 17 in the guide-blocks 11 and 11.1. Formed in the base plate 8, in register with the openings 17, are apertures 18 to receive the lower ends of the punches 4. The upper ends of the punches 4 are provided with heads 19 for retaining them on the head. The space between adjacent punches is equal to the distance between alternate apertures 16 in the card or stencil to be operated upon, and for this reason the punches are arranged in two groups, as shown in Fig. 10, so as to be adapted to operate on two stencils simultaneously. One group of the punches 4 is located adjacent one end of the guideway 2 for punching alternate apertures 16 in the cards 3, while the other group of punches is located adjacent the other end of the guideway for punching the other set of alternate apertures. For instance, apertures located in positions 1, 3, 5, 7, 9, etc. on the card are punched while the card is held at one end of the guideway 2, while the intermediate apertures located in positions 2, 4, 6, 8, 10, etc. are punched while the card is held at the opposite end of the guideway. With this improved arrangement of punches it is possible to punch apertures which overlap one another which would not be possible with a single set of punches without providing for a relative adjustment between the card and punches.

In the specific construction herein shown, the head 5 is in the form of a reciprocating

carriage comprising a horizontal plate 20 having bosses or bearing parts 21 which slidably engage the upright posts 10 of the frame 1. Projecting upwardly from the plate 20, is a pair of lugs 22 connected by links 23 to the ends of a fork-shaped rocker arm 24, which is oscillated by any suitable means, not shown, for continuously reciprocating the head 5.

Suspended from the plate 20, by bolts 25 or other suitable fastening means, is a supporting plate 26, having two rows of apertures 27 forming seats or loosely supporting the punches 4. The supporting plate 26 is spaced from the plate 20 by suitable washers 28 so as to permit the punches 4 to move axially relative to the head. This relative movement of the punches and head, permits those punches which are not in the particular selection, to rest on top of the stencil frame 14, while the head 5 continues its downward movement and while the selected punches are being forced downwardly through the stencil frame 14. To selectively operate the punches 4, they are substantially locked against axial movement, relative to the head 5, by means of keys or wedges 29 which are individually insertable between the heads 19 of the punches 4 and opposed parts of the head 5. The keys 29 are seated in horizontal seats or openings 30 formed in a pair of spaced blocks 31 mounted on the lower face of the plate 20. To secure the keys 29 against accidental displacement from the seats 30, they are provided with notches 32 in their upper edges, which engage spring pressed balls 33 seated in openings 34 of the blocks 31. The balls 33 are urged outwardly by spring 35 seated in the plate 20, and bearing between the balls 33 and plates 36 detachably secured to the plate 20. Formed on the outer ends of the keys 29, are finger grips 37 to facilitate their handling. The inner ends of the keys 29 are adapted to engage the heads 19 of the punches 4 to hold the selected punches in their downwardly extended positions relative to the head 5. If desired, the keys 29 may be operated by a key board control mechanism, not shown, which will enable the operator to change the keys and corresponding punches more rapidly.

The cards and stencils are fed along the guideway 2 in a step-by-step movement, by any suitable means, not shown, and when they reach the punching position, the two adjacent cards located directly beneath the punches engage a pair of stops 38 against which they are urged by the improved positioning means 6.

The stops 38 are substantially like those shown in our copending application, Serial No. 746,808, filed October 30, 1924. These stops are in the form of bell crank levers lo-

cated in recesses 39 of the rear guide block 11 and pivotally secured to the block by pins 40. One arm 41 of each of the levers 38 is provided with a shoulder 42 which projects into the path of the stencils for successively halting them as they reach the critical point where they are to be acted upon by the punches. The shoulders 42 are yieldingly held in operative position by tension springs 43 which are connected to pins 44 mounted on the block 11 and the outer arms 45 of the bell crank levers 38. When the cards are forced forward from one position to the next, the levers 38 are forced back against the action of the springs 43 so that the tips of the shoulders 42 ride on the edges of the cards until they drop into the next corners.

In the specific construction herein shown, the improved positioning means 6 includes a pair of fingers 46, the ends of which are shiftable in recesses 47 formed in the guideblock 11.1, for engagement with the stencils 3 to urge the stencils transversely into firm engagement with the guideblocks 11 and forwardly into engagement with the shoulders 42 of the stops 38. The recesses 47 are spaced apart substantially the length of a stencil. In order to prevent possible injury to the cards by a positive action of the fingers 46, these fingers are pivotally secured to one end of a pair of levers 48 by pins 49. The levers 48 are pivotally secured to the base plate 8 by pins 50. Bearing between the other ends of the levers 48, and the guideblock 11.1, are compression springs 51 which normally urge the pivot pins 49 of the fingers 46 toward the guideway. In order to operate both of the fingers 46 simultaneously, they are connected by a link coupling including arms 52 and 53 pivotally connected to the pins 49 of the fingers 46, and connected together by a link 54. The arms 52 and 53 are spaced above the fingers 46 by suitable washers 55 embracing the pins 49. Embracing the washers 55, are springs 56 which bear against studs 57, 58 and 59 respectively mounted on the fingers 46 and arms 52 and 53. The springs 56 form a yielding connection between the fingers 46 and arms 52 and 53.

In the specific form shown, the operating mechanism 7, for intermittently actuating the positioning means 6, includes a vertically disposed rock shaft 60 journaled in the frame 1, and a vertically reciprocating cam 61 pivotally mounted on a bracket 62 which projects upwardly from the head 5. Fixed on the lower end of the rock shaft 60, is an arm 63 which is connected to the arm 53 by a link 64, so that the rocking of the shaft 60 causes a rocking of the arms 52 and 53 around the pivots 49, and a rocking of the fingers 46 through the spring connections 56. The rock shaft 60 and fingers 46 and the intermediate link coupling are normally urged

into the retracted position, shown in Figure 10, by a spring 65 which is connected at one end to a stud 66 mounted on the base plate 8 and at its other end to a pivot pin 67 which connects the link 54 to the arm 53. Mounted on the shaft 60, is a pin 68 carrying a roller 69 arranged to engage the cam 61 upon each down stroke of the head 5, for rocking the shaft 60 against the action of the spring 65 to actuate the fingers 46.

In the construction herein shown, the cam 61 is pivotally secured at its upper end to the bracket 62 by a pin 70. The lower end of the cam 61 is formed to provide an inclined cam surface 71 which is arranged to engage the roller 69 upon the down stroke of the head 5 for rocking the shaft in a counter clockwise direction. The cam 61 is held in its effective position on its down stroke by a stop pin 72 mounted on the bracket 62, and against which the cam is resiliently urged by a spring 73. One end of the spring 73 is connected to the cam 61, and the other end thereof is connected to a pin 74 mounted on the head 5. On the down stroke of the head 5, when the cam surface 71 passes the roller 69, the roller returns to its normal position (shown in Figure 7) under the action of the spring 65, and then, upon the up stroke of the head 5, the upper face of the cam part 71 rides on the roller 69 so as to force the cam 61 outwardly away from the stop 72, as shown in dotted outline in Figure 7. On the up stroke of the head 5, after the cam 61 has passed above the roller 69, the cam is returned to the stop pin 72 by the action of the spring 73.

In operation, the selected punch 4 is locked to the head 5 by the insertion of the respective key 29. The punches or the key seats are numbered to facilitate the selection. While the cards are being fed in a step-by-step movement along the guideway, the head 5 is continuously reciprocated by the rocker arm 24 so as to move the lower ends of the punches 4 into and out of engagement with the stencil frames 14. On the down stroke of the head 5, those punches which are not in the selection will merely rest upon the stencil frames 14 without making any impression, while the selected punches will continue to move downwardly to pierce the stencils under the action of the head 5. Upon the down stroke of the head 5, the cam 61 moves downwardly into engagement with the roller 69 and rocks the shaft 60 in a counter clockwise direction so as to actuate the fingers 46. The fingers 46 thereby move into engagement with two adjacent stencils so as to urge said stencils transversely against the guideblock 11 and forwardly against the stop shoulders 42, where they are momentarily held in a precise position on the guideway 2 for engagement by the punches.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

We claim:

1. A device of the class described comprising a guide for cards, a head movable toward and away from said guide, a plurality of punches carried by said head and adapted for axial movement relative thereto, said head having seats therein, a plurality of keys adapted for insertion into said seats to bear between opposed parts of said punches and head for securing said punches against axial movement relative to said head, and resilient means in said seats engaging said keys for securing them against accidental displacement.

2. A device of the class described comprising a guideway along which a series of cards is caused to move intermittently in continuous succession past a certain point, mechanism for punching the cards, and means adjacent one edge of said guideway adapted to intermittently urge said cards into engagement with the opposite edge of said guideway for momentarily holding them at said certain point.

3. A device of the class described comprising a guideway along which a series of cards is caused to move intermittently in continuous succession past a certain point, mechanism for punching the cards, and means adjacent one edge of said guideway adapted to intermittently urge said cards into engagement with the opposite edge of said guideway for momentarily holding them at said certain point, said means being controlled by the movement of said mechanism so as to become effective during each punching operation.

4. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, and means controlled by the movement of said mechanism for simultaneously holding a pair of adjacent cards stationary during a brief interval at a certain point along said guideway.

5. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a finger pivotally mounted adjacent one edge of said guideway and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, and means controlled by the movement of said punching mechanism for actuating said finger.

6. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a lever

pivotally mounted adjacent one edge of said guideway, a finger pivotally mounted on one end of said lever and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, and means for actuating said finger.

7. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a lever pivotally mounted adjacent one edge of said guideway, a finger pivotally mounted on one end of said lever and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, and means for actuating said finger, said means being controlled by the movement of said punching mechanism so as to become effective during each punching operation.

8. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a finger pivotally mounted adjacent one edge of said guideway and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, means for actuating said finger, and a yielding connection between said finger and means.

9. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a finger pivotally mounted adjacent one edge of said guideway and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, means controlled by the movement of said punching mechanism for actuating said finger, and a resilient connection between said finger and means.

10. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a lever pivotally mounted adjacent one edge of said guideway, a finger pivotally mounted on one end of said lever and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, resilient means normally urging said one end of said lever toward said guideway, and means for actuating said finger.

11. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a lever pivotally mounted adjacent one edge of said guideway, a finger pivotally mounted on one end of said lever and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, means for actuating said finger, and a resilient connection between said finger and means.

12. A device of the class described com-

prising a guideway for receiving cards, mechanism for punching the cards, a lever pivotally mounted adjacent one edge of said guideway, a finger pivotally mounted on one end of said lever and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, a spring normally urging said one end of said lever toward said guideway, means for actuating said finger, and a resilient connection between said finger and means.

13. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a lever pivotally mounted adjacent one edge of said guideway, a finger pivotally mounted on one end of said lever and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, a rock shaft controlled by the movement of said punching mechanism for intermittently actuating said finger, and a resilient connection between said rock shaft and finger.

14. A device of the class described comprising a guideway for receiving cards, mechanism for punching the cards, a lever pivotally mounted adjacent one edge of said guideway, a finger pivotally mounted on one end of said lever and intermittently shiftable into engagement with said cards for urging them against the opposite edge of said guideway, means for yieldingly urging said one end of said lever toward said guideway, a rock shaft controlled by the movement of said punching mechanism, a link coupling between said rock shaft and said one end of said lever, and a resilient connection between said link coupling and finger.

15. A device of the class described comprising a guideway along which a series of cards having recesses in one edge thereof is caused to move intermittently in continuous succession past a certain point, mechanism for punching the cards, a pair of levers spaced apart along one edge of said guideway, springs normally urging one end of said levers toward said guideway, fingers pivotally mounted on said one end of the levers and adapted to be shifted in unison into engagement with the recesses of two adjacent cards for urging said two cards simultaneously against the opposite edge of said guideway, a rock shaft, a link coupling between said rock shaft and levers, and resilient connections between said link coupling and fingers.

16. A device of the class described comprising a guide for cards, a head movable toward and away from said guide, means for holding a card stationary during a brief interval at a certain point on said guide, a rock shaft arranged to intermittently operate said means, and a cam on said head arranged to actuate said rock shaft.

17. A device of the class described comprising a guide for cards, a head movable toward and away from said guide, means for holding a card stationary during a brief interval at a certain point on said guide, a rock shaft arranged to intermittently operate said means, a bracket on said head, and a cam pivotally mounted on said bracket and arranged to actuate said rock shaft.

18. A device of the class described comprising a frame, a guide for cards, a vertically reciprocating head on said frame, punches operable through the movement of said head, means for momentarily holding a card stationary at a certain point on said guide, a vertically disposed rock shaft journaled on said frame and adapted to intermittently operate said holding means, a cam pivotally mounted on said head and arranged to partially rotate said shaft in one direction on the down stroke of said head, and resilient means normally urging said shaft in the opposite direction.

19. A device of the class described comprising a guideway along which a series of cards is caused to move intermittently in continuous succession past a certain point, a punch arranged to punch the cards when they are positioned at said certain point, and another punch arranged to punch said cards when they are positioned at another point, said punches being relatively arranged so as to punch overlapping apertures in said cards.

20. A device of the class described comprising a guideway along which a series of cards is caused to move intermittently in continuous succession past a certain point, a punch arranged to punch the cards when they are positioned at said certain point, another punch arranged to punch said cards when they are positioned at another point, said punches being relatively arranged so as to punch overlapping apertures in said cards, and mechanism for simultaneously actuating said punches.

Signed at Chicago this 13th day of April, 1925.

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