

May 27, 1947.

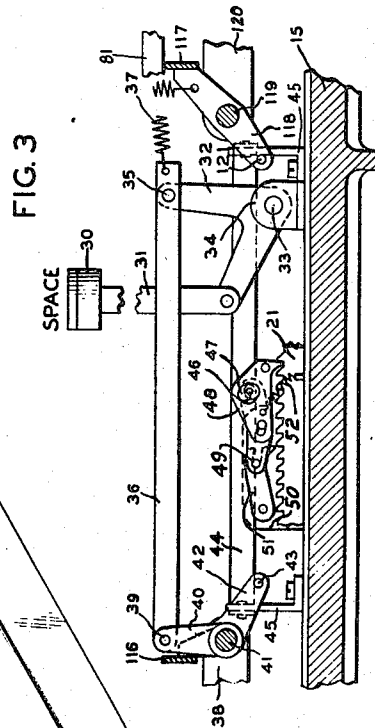
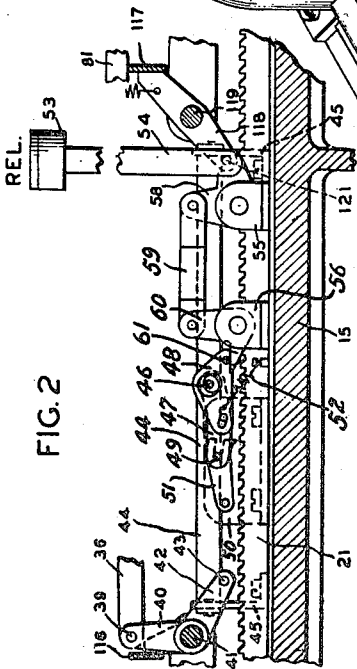
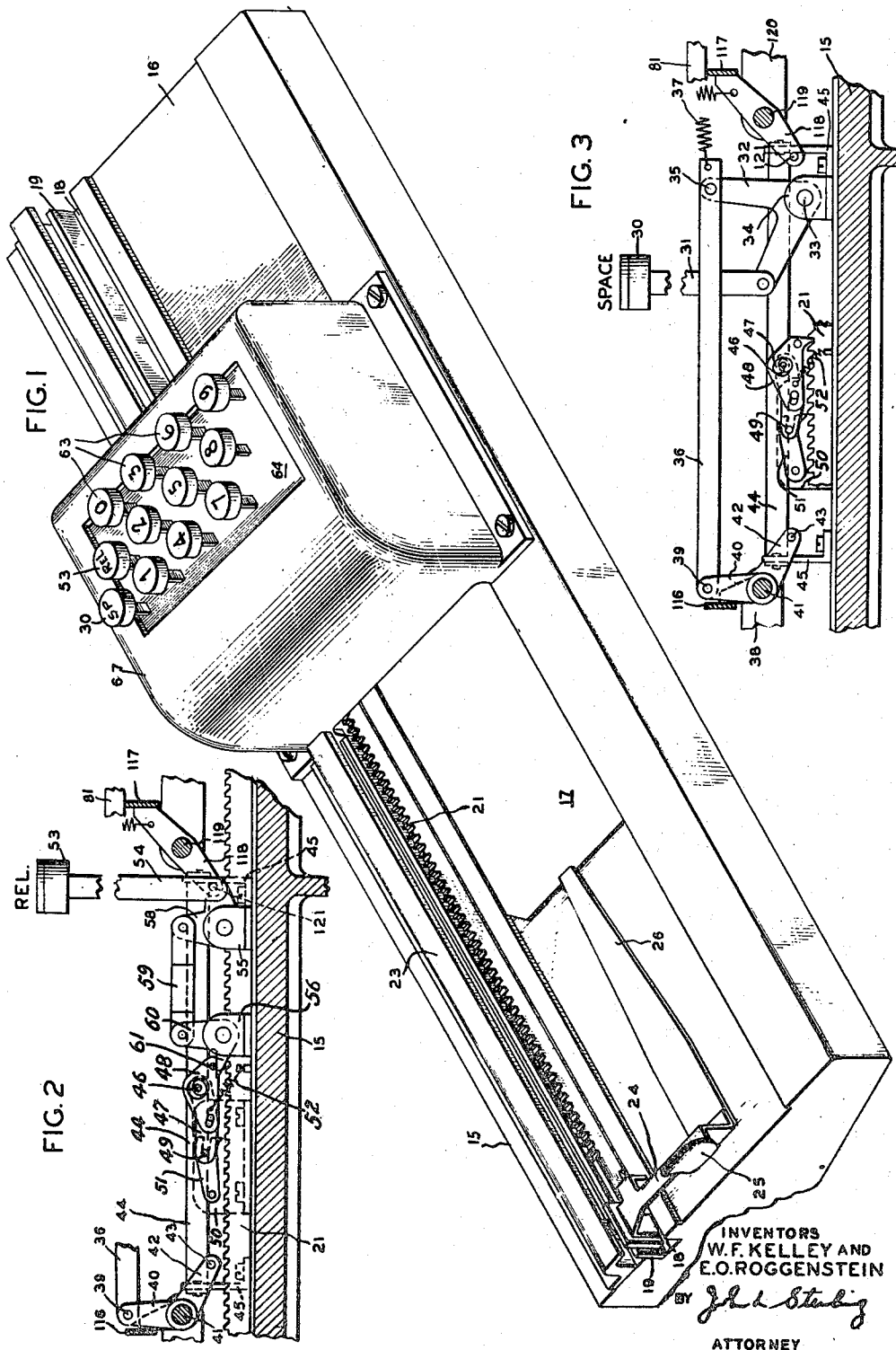
W. F. KELLEY ET AL

2,421,069

PUNCH

Filed Aug. 2, 1945

5 Sheets-Sheet 1



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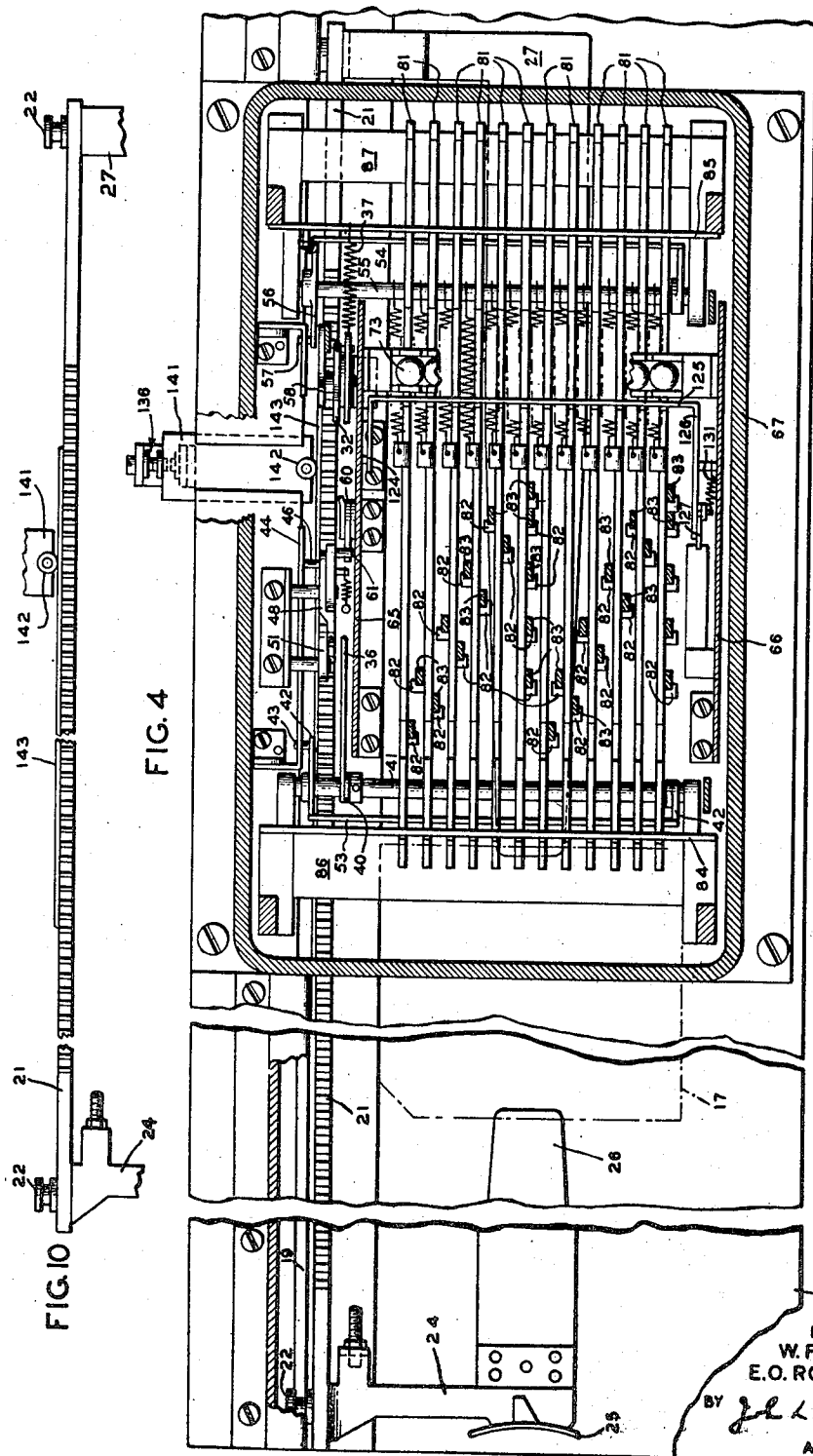
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5 Sheets-Sheet 2



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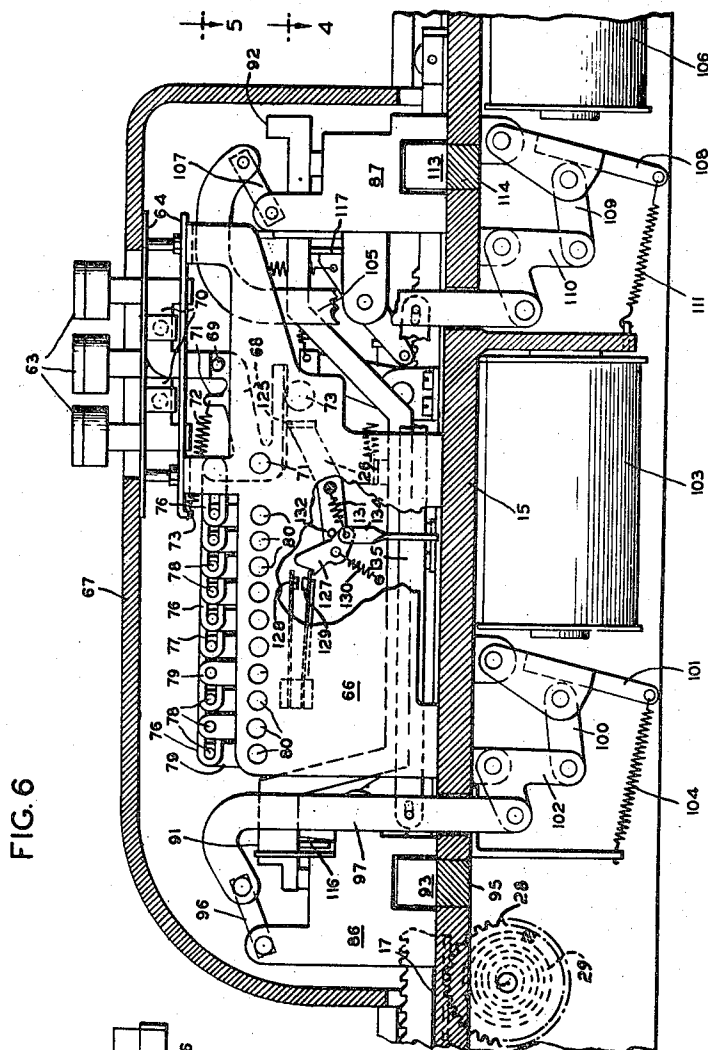


FIG. 6

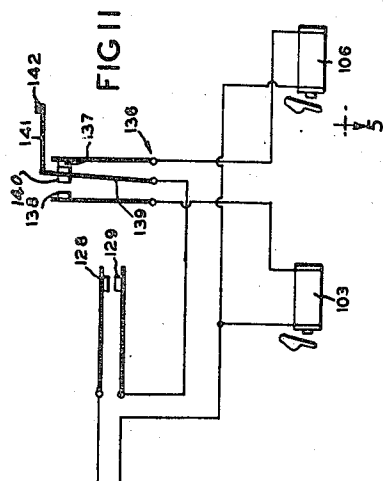
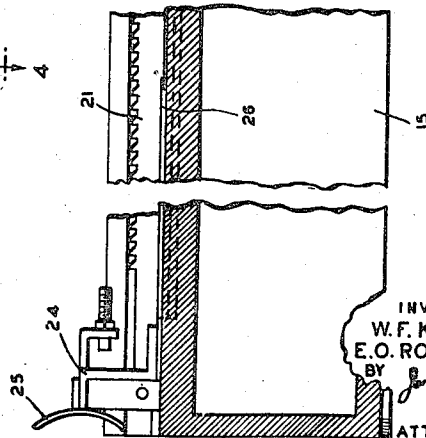


FIG. 11



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2,421,069

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UNITED STATES PATENT OFFICE

2,421,069

PUNCH

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Application August 2, 1945, Serial No. 608,534

14 Claims. (Cl. 164—113)

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This invention relates generally to machines used in perforating cards for use in statistical machines, and more particularly to an electro-mechanically operated punch mechanism adapted to perforate a card in accordance with a predetermined code, the invention being more specifically applied to portable machines which perforate a carriage propelled card in a column by column manner.

As is now well known to the art, one type of statistical card in common use is the Powers card which is produced in two widely used forms, namely, the forty-five column card and the ninety column card. In the forty-five column card each column contains twelve index positions, thereby permitting each of the ten digits to be indicated by a single perforation, and the alphabet letters by a combination of one or more perforations in a column. The ninety column Powers card is divided horizontally into two zones, an upper and lower zone, each zone containing forty-five columns of six index positions each, thereby requiring each of the ten digits and the alphabet letters to be indicated in each card column by one or more perforations therein, in accordance with a pre-determined code. In the code commonly known as the ninety column code and used with this type of Powers card, the "0" and all odd digits are consecutively represented by a perforation in single successive index positions from the top of a column, and all even digits are represented by a multiple perforation comprising perforations in the next lower odd digit-index position in combination with the "nine" digit index position. This latter type of card, together with the code adapted for use therewith, is disclosed and more fully described in patent to W. W. Lasker 1,780,621, issued November 4, 1930. It is to a machine for punching such type of card that the present invention relates, and in the embodiment herein disclosed the code for indicating numerical data in six position card columns as therein described is herein adopted.

Heretofore, it has been the practice to provide all card perforating machines of the type described with a traveling card carriage and associated escapement mechanism capable of positioning the card in a number of separate positions equal to the number of columns across the entire width of the card. Accordingly, such machines for use with Powers type cards were provided with carriages and carriage escapement racks of forty-five column capacity. This practice has been continued in adapting such ma-

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chines for use with plural zoned cards, with the result that in all machines so adapted a return of the card carriage has been required between punching of the separate zones of the card, and for this reason necessitating more than one cycle of carriage operation for a complete punching of one plural zoned or ninety column card. This practice necessarily likewise required provision of means for selectively activating one of two groups of punches in a plurality of punch combinations for each digit in every carriage position, depending upon the card zone in which a perforation was desired.

The present invention may be embodied in a machine provided with the usual base with a card carriage and keyboard mounted thereon. However, instead of the usual single row of twelve reciprocable punches, the present machine is provided with two separate and independently driven rows of punches, or, accordingly a separate row operable in each separate zone of the card. The two rows of punches are set in separate punch supporting blocks extending over the path of the card carriage, near opposite ends of the key actuated mechanism, and both rows are simultaneously conditioned upon depression of the same digit key. The linear distance between said separate punch supporting blocks is such that, as a card is drawn by the card carriage from right to left below both rows of punches, the first column of the lower zone is in position for perforation by punches in one of said rows of punches upon completion of the punching of the last column of the upper zone by the other of said rows of punches. Spacing mechanism is provided for advancing the card column by column through the respective punching chambers, with means responsive to the relative position of the card in the machine for disabling that row of punches operable on that zone of the card in which a perforation of the card in such position is not desired. A key actuated carriage release mechanism is provided for disabling the carriage escapement mechanism so as to permit return of the carriage to its extreme left hand position wherein the card may be either inserted or withdrawn from the machine.

The present machine is provided with a card carriage capable of being positioned by the escapement mechanism in a number of positions equal to the total number of columns in a plural zoned card, in the present disclosure the carriage mechanism being of a ninety column capacity. Accordingly, such carriage mechanism, in co-operation with the unique arrangement of the

plural rows of punches, permits a complete punching of all columns of a plural zoned card within one continuous and uninterrupted series of punching operations, and the additional operation, previously required, of returning the carriage to normal starting position upon completion of punching in one zone, is thereby eliminated. The entire card may be punched within one operational cycle of the card carriage, upon completion of which the card is in position for removal from the machine. It follows that such a feature avoids the necessity of providing a machine of this type with means for selectively activating one of a plurality of punch combinations in each card carriage position, and the possibility of inadvertent operational error in failure to so select correctly resulting in the perforation of the wrong card zone is thereby eliminated.

It is, therefore, the principal object of this invention to improve the construction and design of card punches to permit the perforating of all columns of a plural zone statistical card within one cycle of its carriage operation.

It is a further object of this invention to simplify the art of card punch operation by eliminating the carriage return upon the completion of punching in one zone of a plural zone data card.

It is a further object of this invention to avoid, in card punch operation, the possibility of operational error of causing the machine to perforate in the unintended zone of a plural zone data card.

A clearer concept of the invention, with additional objects and features therein apparent, may be derived from the following description of the drawings, in which

Fig. 1 is a view of the machine in isometric perspective;

Fig. 2 is a detail front view partly in section, showing the carriage release key and associated mechanism;

Fig. 3 is a detail front view partly in section showing the carriage space key and associated escapement mechanism;

Fig. 4 is a plan view of the key actuated punch gag mechanism taken along line 4—4 of Fig. 6;

Fig. 5 is another plan view of the key actuated punch gag mechanism along line 5—5 of Fig. 6;

Fig. 6 is a longitudinal cross section through the machine;

Fig. 7 is a cross section taken along line 7—7 of Fig. 5;

Fig. 8 is a cross section taken along line 8—8 of Fig. 5;

Fig. 9 is a fragmentary view in isometric perspective showing a digit key and associated mechanism;

Fig. 10 is a fragmentary plan view of the carriage escapement rack and transfer switch control;

Fig. 11 is a wiring diagram of the machine operating circuit; and

Fig. 12 is a detail side view partly in cross section of the key actuated contact switch.

The machine embodying the present invention is similar in construction and operation to that disclosed in the patent to E. O. Roggenstein, 2,151,232, issued March 21, 1939. The mechanism is mounted on a base 15, which is over double the length of the usual statistical punch card. The base is formed with a shallow recess 16 which extends the full length of the base, and is the same width as a statistical card 17, thus forming a guide therefor. The base 15 is further provided

with a groove 18 extending its entire length in which is mounted a carriage rail 19 on which is mounted for longitudinal travel a carriage escapement rack 21. The carriage escapement rack 21 is provided near each end thereof with double flange rollers 22, as best seen in Fig. 10, which rollers ride on said carriage rail, and are held against vertical displacement therefrom by the overhanging arm of a guide bar 23 affixed to base 15. Secured to the left end of carriage escapement rack 21 is an arm 24 projecting at right angles thereto carrying a concavely curved finger piece 25 and a horizontally projecting tongue 26, the bottom surface of which tongue rides on the floor of recess 16 in base 15. The forward free end of said tongue is notched to engage therein the edge of a card 17 and thus prevent longitudinal or vertical displacement of the card in relation thereto. A similar arm 27 (Fig. 4) is secured to the right hand end of the carriage escapement rack 21 and acts as a card stop by similarly engaging the opposite edge of the card, the two arms thereby comprising a carriage for holding the card in fixed relation to the carriage escapement rack while being drawn thereby beneath the punching mechanism. The card is inserted in the machine when the carriage is in its extreme left hand position, at which time the card carriage is manually urged to its extreme right hand position preparatory to punching. The carriage escapement rack is then urged to the left, step by step, by a pinion 28 (Fig. 6) driven by a spring 29 and engaging with the rack 21, upon release of key controlled escapement mechanism as hereinafter described.

The card carriage may be spaced, either in conjunction with the operation of any digit key, as will be hereinafter described, or by depression of the space key 30, the stem 31 of which, as shown in Fig. 3, is pivoted to one arm of a bell-crank 32 pivotally mounted at 33 to a bracket 34 secured to base 15. The other arm of bell-crank 32 is pivotally connected at 35 to one end of a link 36 pivoted at its opposite end at 39 to a lever 40 secured to a rock shaft 41. Rock shaft 41 is suitably journaled in arms 38 formed on a punch supporting block hereinafter described, and has also secured thereto a pair of rock arms 42 one of which extends below its pivot point and carries a lug 43 projecting beneath an escapement bail 44 which is pivoted through its bent ends to brackets 45 affixed to base 15. A pin 46 on the escapement bail 44 extends through holes cut in an escapement pawl 48 and an arm of a bell-crank 47 jointly pivoted to a bracket 50 mounted on base 15. Also pivoted on bracket 50 is a holding pawl 51. The escapement pawl is normally pulled into engagement with a tooth of the carriage escapement rack 21 by spring 52. The manual depression of the space key 30 results in the counter-clockwise rocking of bell crank 32 moving link 36 to the left against tension of spring 37 to rock shaft 41, thereby rocking escapement bail 44 through lug 43 on the extended rock arm 42. The rocking of bail 44 raises pin 46 which disengages the escapement pawl from the rack, and at the same time rocks the bell-crank 47, the other arm of which is bent and provided with a pin 49 engaging a slot in the holding pawl 51. The rocking of bell-crank 47 rocks the holding pawl 51 simultaneously into engagement with another tooth of the carriage escapement rack. The pivotal connection of escapement pawl 48 with bracket 50 is of the pin and slot type, so that this pawl, upon disengagement with the car-

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riage escapement rack, is urged by spring 52 to the right a slight distance as limited by said slot, which distance is sufficient to prevent the return of the pawl 48 to engagement with the same tooth of the rack. Release of the space key allows spring 52 to pull the escapement pawl 48 back into engagement with the next succeeding tooth of the carriage escapement rack, at the same time rocking the holding pawl 51 out of engagement with the rack through the action of pin 46, bell-crank 47, and pin 49. The carriage is thus restrained by the escapement pawl from moving to the left a distance greater than that between two adjacent teeth, which distance is equal to the columnar spacing of a punch card, and in this manner a single column carriage spacing is effected.

The card carriage may be released for return to its extreme left hand position by manual depression of the release key 53, the stem 54 of which is pivoted, as shown in Fig. 2, to one arm of bell-crank 58 mounted on a bracket 55 secured to the base 15. The other arm of bell-crank 58 is connected to one end of a link 59, the other end of which is pivoted to an arm of a bell-crank 60 mounted on a bracket 56, likewise secured to base 15. The free arm of bell-crank 60 projects beneath a lug 61 on escapement pawl 48. Depression of the release key rocks bell-cranks 58 and 60 clockwise, causing the free arm of said bell-crank 60 to engage the lug 61, thereby rocking the escapement pawl counter-clockwise to disengage it from the teeth of the carriage escapement rack. The lost motion between the hole in escapement pawl 48 and the escapement bail pin 46 permits the pawl to be rocked out of engagement without the concurrent rocking of bell-crank 47. Due to the bell-crank 47 not being rocked, holding pawl 51 remains ineffective. Accordingly, in this operation both the escapement pawl and holding pawl are simultaneously free from the escapement rack, permitting release of the carriage to its extreme left hand position.

The ten digit keys 63, Release key 53, and Space key 30 are arranged in three rows as shown in Figs. 1, 6, and 7. Each digit key comprises the button 63 mounted on a rectangular stem 62 extending through rectangular perforations in each of two guide plates 64, securely mounted on two frame plates 65, 66, and which are in turn secured to base 15 to form a supporting structure suitably enclosed by a cover plate 67. The key stem for each of the center row of keys extends vertically downward through said guide plates to rest on a stud 69 on one arm of a bell-crank 68, while the key stem of each of the outer row keys is cut off below the lower guide plate and carries, instead, an inwardly projecting arm 70, bent downward through a perforation in lower guide plate 64 to similarly rest on a stud on the supporting arm of its corresponding bell-crank 68. Said bell-cranks are loosely mounted on a fixed cross shaft 71 suitably supported by the two frame plates 65 and 66, and are normally urged counter-clockwise by action of a spring 72. Each of said bell-cranks 68 is formed with a horizontal arm projecting to the right directly above a row of steel balls 73 in a slotted housing extending between the said two side frame plates in such a manner as to constitute a ball lock mechanism, the operation of which is well known to the art, the purpose of which is to allow no more than one bell-crank 68 and corresponding actuating digit key to be depressed at one time. The vertical arm of each bell-crank 68 has pivoted there-

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to at 75 a link 76 having a slot 77 to engage a pin 78 on a lever 79 which is secured by a collar to a rock shaft 80 suitably journaled in the two side frame plates 65 and 66. Likewise secured by a collar to each rock shaft 80 are two or more fingers 83 extending downwardly to engage studs 82 on individual punch conditioning slides 81. Said punch conditioning slides, as seen in Figs. 4 and 7, are guided through comb plates 84 and 85 secured to punch supporting blocks 86 and 87, respectively, to rest loosely near each end thereof, on the heads of punches 88 and 89, and are normally urged to the right, as shown in Fig. 7, by action of springs 90. Motion imparted by depression of a digit key 63 is carried through bell-crank 68, link 76, lever 79, rock shaft 80, fingers 83, to shift the punch conditioning slides engaged thereby to the left wherein shoulders 91 and 92 at each end thereof will act as punch gags for the punches 88 and 89, respectively, as hereinafter described. The punches 88 (Fig. 7), for perforating the lower zone of a Powers ninety column punch card, are supported as aforementioned in the block 86 and a guide block 93, both of which are secured to base 15 and extend over the card bed at the left hand end of the key actuated mechanism. The punches 88 are aligned in a row of twelve to correspond with the twelve index positions from top to bottom in a Powers type statistical card, and, likewise, to support one end of the twelve punch conditioning slides 81. However, only the front six of said punches 88 are effective for perforating a card, they being positioned over the six index positions comprising a column in the lower zone of a card. The rearmost six punches 88, positioned over the six index positions of the card's upper zone, are dummy punches with the cutting edge eliminated, their purpose being to support the six rearmost punch conditioning slides 81, and their incidental depression during actuation of the punches 88 is ineffective to cause a card perforation. All of said punches 88 are normally urged upward by compression springs 94 resting on guide block 93 and pressing against the punch heads thereby allowing free passage of a punched card therebelow. Punch dies 95 are secured in the base 15 in any well known manner. A hammer bail 96 is pivoted to shoulders on the block 86 and is rocked by a hammer bail arm 97 pivotally connected thereto and extending downward through an opening in base 15, where it is pivoted to a bell-crank 102 mounted on the under side of the base. Said bell-crank is connected by link 100 to an armature 101 cooperating with electromagnet 103, both armature and magnet being suitably secured to the underside of the base. The energization of the magnet rocks its armature 101 counter-clockwise (Fig. 6) against the tension of spring 104 to rock hammer bail 96 clockwise through link 100, bell-crank 102 and hammer bail arm 97, thereby depressing whichever shoulders 91 of slides 81 have been laterally shifted into its path, and in so doing driving the associated punch or punches through the card 17. Deenergization of magnet 103 permits return of the parts to normal or inactive position by spring 104. The construction and operation of the upper zone punch mechanism is similar to that of the lower zone just described, except that the six effective punches are the rearmost six in the row of punches 109, being aligned with the six column positions in the upper zone of a card, while the front most six are the dummy or ineffective punches in said row. Accordingly,

a description thereof need be only briefly noted here wherein energization of magnet 106 rocks armature 108 against the tension of spring 111, and rocks hammer bail 107 through link 109, bell-crank 110 and hammer bail arm 105 to depress whichever shoulders 92 of punch conditioning slides 81 have been laterally shifted into its path, thereby driving the corresponding punches 89 yieldably supported by springs 112 in block 87 and guide block 113 through the upper zone of the card 17 and into punch dies 114.

The card carriage is automatically spaced, upon the actuation of any punch, by means of spacing bails 116 or 117 which underlie the punch conditioning slides of each end thereof. Spacing bail 116 (Figs. 3, 7, and 8) is carried by arms 42 integral therewith secured to the rock shaft 41 as heretofore described, and spacing bail 117 is carried by a pair of arms 118 secured to a rock shaft 119 journaled to arms 120 formed on the punch supporting block 87. The rearmost arm 118 of bail 117 extends downward and carries a lug 121 (Fig. 3) projecting directly beneath the escapement bail 44. Thus the depression of a punch conditioning slide 81 (Fig. 3) by hammer bail 107 rocks spacing bail 117 clockwise to raise escapement bail 44 through lug 121 and, similarly, the depression of a punch conditioning slide by hammer bail 96 rocks spacing bail 116 counter-clockwise, likewise raising escapement bail 44 through the lug 43. The effect of raising the escapement bail 44 causes carriage spacing, as has been previously described in connection with the operation of the space key. In this manner the depression of any punch slide by either hammer bail simultaneously actuates one or the other spacing bails, resulting in the spacing of the carriage to position the card 17 in preparation for perforating the next succeeding column.

The use of rock shafts 80 (Figs. 5 and 8) in a machine of this type provides a simple and expedient means for conditioning a plurality of punches as is required in code punching, by the depression of only one digit key. As hereinbefore mentioned, the punch code used in the present disclosure is one in which the "zero" and all odd digits are consecutively represented by a perforation in a single index position, and the even digits are represented by perforations in the next lower odd digit index position in combination with the "nine" digit index position. Accordingly, those rock shafts 80 linked to the zero and odd digit keys each carry two fingers 83 for shifting one punch conditioning slide 81 effective on punches operable in each of the two card zones, while those rock shafts linked to the even digit keys each carry four fingers 83 for shifting two punch conditioning slides in accordance with the code to effective position over punches operable in each of the two card zones. Fig. 9 is a fragmentary view showing mechanism actuated by the "six" digit key wherein it can be seen that the rock shaft 80 carries four fingers 83 for shifting four punch conditioning slides 81, two for the upper zone and two for the lower. Number "six" being an even digit and represented in the six position code by perforations in the fourth and sixth positions from the top of a column, the slides shifted by depression on the "six" digit key are, accordingly, those conditioning two of the punches 89 aligned with the fourth and sixth position in the punch card's upper zone, and those conditioning two of the punches 88 aligned with the fourth and sixth columnar position of the card's lower zone. Thus it is apparent that upon

depression of a digit key, the resultant perforation can be effected in either the upper or lower zone of a ninety column card, depending on which of the two hammer bails 96 or 107 is caused to rock in cooperation therewith. As can be seen by reference to Figs. 4 and 5, it is obvious that any code combination can be obtained by grouping the fingers 83 on the cross shafts 80 in such a manner that the rocking of any shaft 80 by an individual key will result in the positioning of one or more punch slides 81 in accordance with the desired code.

An electrical circuit to either magnet 103 or 106 is closed upon depression of any digit key through the medium of a contact bail 125 (Figs. 4 and 6) extending beneath the horizontal arms of key operated bell-cranks 68 which bail is carried by arms 124 and 126 mounted on stud shafts in side assembly frame plates 65 and 66. Bail arm 126 extends beyond the pivot point and has pivoted on its free end a contact pawl 127 (Figs. 6 and 12) pulled by spring 131 in a counter-clockwise direction against a stud 132. A lip on the contact pawl 127 normally engages the lower spring contact 129 of a pair of contacts 129 and 128 suitably insulated and secured to side frame plate 66. A link 134, formed as shown and pivoted to the contact pawl 127 has a slot near its lower end through which passes a tie link 135 pivoted to hammer ball arms 97 and 105. Depression of a digit key rocks the contact bail 125 clockwise, raising contact pawl 127, closing contacts 129, 128 to complete an electrical circuit (Fig. 11) through a transfer switch hereinafter described, to either magnet 103 or 106. Upon energization of either magnet its associated hammer bail arm 97 or 105 is pulled downward to rock its corresponding hammer bail, at the same time lowering tie link 135 to a point where it engages the lower edge of the slot in link 134, thereby rocking contact pawl 127 clockwise. The rocking of the pawl disengages it from spring contact 129 permitting the contacts 129 and 128 to open the circuit. The circuit remains open and cannot be again closed until release of the digit key permitting return of contact bail 125 to normal by spring 130, and the concurrent lowering of the pawl 127 to again engage its lip under spring contact 129 in preparation for a succeeding punching operation.

The circuit completed by the closing of contacts 128, 129, above described, passes through a two way transfer switch 136 mounted on the rear of base 15 as can be seen in Figs. 4, 5, and 8. The transfer switch comprises two contacts 137 and 138 having a common contact 140 mounted on a center spring 139. One or the other of contacts 137 and 138 is always closed, and they are controlled by a contact slide 141 abutting the common center spring and extending through a slot in the base 15. A roller 142 mounted on the slide engages the side surface of the carriage escapement rack 21. As best seen in Fig. 10, the side of the carriage escapement rack is formed with a cam 143 extending over a portion of its surface, which cam, in cooperating with roller 142, acts to shift the contact slide rearward away from the carriage escapement rack, thereby breaking contact 137 and making the contact 138. Electromagnets 103 and 106 are wired to the alternate contacts of the transfer switch as shown in the wiring diagram Fig. 11. Thus, when the card carriage is moved to its extreme right hand position preparatory to the punching of a card, contact slide roller 142 engages the side surface of the carriage escapement rack, per-

mitting the spring action of the center contact spring of switch 136 to close contact 137 completing the circuit to magnet 106, it being the actuating means for driving punches 89 which, as aforementioned, are used for punching only in the upper zone of a ninety column card. This circuit to magnet 106 is thus maintained during the forty-five columnar space positions of the card carriage to permit complete punching of the upper zone upon the completion of which, as the carriage proceeds leftward to the forty-sixth space position, cam 143 engages roller 142 to shift contact slide 141 rearward. Said shifting of the slide opens the contact 137 and closes contact 138 opening the circuit to magnet 106 and closing the circuit to magnet 103, maintaining said circuit for the remaining forty-five columnar space positions of the card carriage. The linear distance between rows of punches 88 and 89, being the equivalent of forty-five carriage spaces, the spacing of the carriage upon the perforation of the last upper zone or forty-fifth card column by punches 89 will carry the card to a position where the first lower zone or forty sixth card column can be perforated by punches 88. In this manner the entire ninety columns of the card may be punched in one continuous and uninterrupted series of punching operations, the transfer from upper to lower zone being effected automatically through the unique arrangement of the punches, transfer switch, and associated mechanism.

Suitable means for conducting a source of electrical energy to the circuit herein disclosed may comprise any such means known and familiar to the art. In the preferred embodiment such means comprises a dry disk rectifier in a combination circuit permitting use of either an A. C. or D. C. potential in the manner disclosed and fully described in the aforesaid Patent 2,151,232, issued to Roggenstein March 21, 1939.

While I have described what I consider to be a highly desirable embodiment of my invention, it is obvious that many changes in form could be made without departing from the spirit of my invention, and I, therefore, do not limit myself to the exact form herein shown and described, nor to anything less than the whole of my invention as hereinbefore set forth, and as hereinafter claimed.

What we claim as new, and desire to secure by Letters Patent, is:

1. In a machine for perforating a plural zoned statistical card, means for spacing said card in successive positions corresponding to successive columns of said card, and key controlled perforating means separately grouped in successively offset rows aligned with the columnar index positions of each separate zone and successively operable in each of said separate zones of said card.

2. In a machine for perforating a statistical card having separate parallel zones of successive data registering columns, means for rectilinearly advancing said card to successive positions to correspond to each successive columns in each separate zone of said card, and key controlled perforating means grouped in separate rows successively offset relative to the rectilinear advance of said card so as to align with successive columns of said card in each successive card position.

3. In a machine for perforating a plural zoned statistical card, a row of key controlled punches aligned to perforate one zone of said card in separate successive spaced positions of the card,

an additional row of key controlled punches aligned to perforate another zone of said card in additional separate spaced positions of the card, and means for advancing each zone of said card successively into said spaced positions relative to the row of punches aligned with each respective zone of the card.

4. A machine for perforating a plural zoned statistical card comprising spacing means for advancing said card step by step into punching positions corresponding to the separate columns of said card, punches separately grouped in successive rows aligned with the individual zones of said card, key actuated means for conditioning related punches in each of said separate groups of punches, and means for operating the punches so conditioned by said key actuated means.

5. A machine for perforating a plural zoned statistical card comprising spacing means for advancing said card into separate positions for each separate column of said card, punches separately grouped in successive rows aligned with the individual zones of said card, key actuated means for simultaneously conditioning related punches in each of said separate group of punches, and means selectively enabled according to the relative position of said card for operating the conditioned punches in one of said separate group of punches.

6. A machine for perforating a plural zoned statistical card comprising spacing means for advancing said card into separate positions for each separate column of said card, punches separately grouped in successive rows aligned with the individual zones of said card, key actuated means for simultaneously conditioning related punches in each of said separate rows of punches, punch operating means for each of said separate groups of punches, and transfer means responsive to the movement of said spacing means for selectively enabling one of said punch operating means.

7. In a machine for perforating a plural zoned statistical card, a card carriage, escapement means for spacing said carriage in successive positions corresponding to successive columns of the card, and key controlled punches separately grouped in offset rows to successively align with the columnar index positions of each separate zone in predetermined carriage positions.

8. In a machine for perforating a plural zoned statistical card, the combination with a row of punches aligned to perforate one zone of said card in separate successively spaced positions of the card, operating means for said row of punches, of an additional row of punches aligned to perforate another zone of said card in additional successively spaced positions of the card, operating means for said additional row of punches, punch conditioning means for simultaneously gagging related punches in each of said rows of punches, and transfer means responsive to the advance of said card through predetermined positions for selectively enabling the corresponding punch operating means.

9. In a key operated machine for perforating a statistical card in accordance with a multiple hole code, the combination with punches aligned with the index positions of successively spaced card columns, interponent slides movable into gagging position relative to each of said punches, and means for operating the punches gagged by said slides, of a rock shaft for and actuated by each operating key and common to said slides, and means mounted on each shaft and selectively

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engaging said slides for moving the slides selected in accordance with said code into gagging position relative to said punches.

10. In a key operated machine for perforating a plural zoned statistical card in accordance with a multiple hole code the combination with punches separately aligned with the index positions of successively spaced card columns of each separate zone, interponent slides movable into gagging position relative to punches aligned with each of said separate zones, and selectively enabled means for separately operating the gagged punches aligned with each separate zone, of a rock shaft for and actuated by each operating key and common to said slides, and means mounted on each shaft and selectively engaging slides effective in each of said separate zones for simultaneously moving the slides selected in accordance with said code into gagging position relative to the punches aligned with each of said separate zones.

11. A machine for perforating a plural zoned statistical card comprising a base, a card carriage, escapement means for successively spacing said carriage relative to said base, a row of punches aligned to perforate separate columns in one zone of said card in one group of carriage positions, an additional row of punches aligned to perforate separate columns in another zone of said card in another group of carriage positions, key actuated punch conditioning means for simultaneously gagging related punches in each of said separate rows of punches, individual punch operating means for each of said separate rows of punches, and transfer means responsive to the movement of said carriage for selectively enabling one of said punch operating means depending upon the position of said carriage.

12. A machine for perforating a plural zoned statistical card comprising a base, a card carriage, escapement means for successively spacing said carriage relative to said base, a row of punches aligned to perforate separate columns in one zone of said card in one group of carriage positions, an additional row of punches aligned to perforate separate columns in another zone of said card in an additional group of carriage positions, key actuated punch conditioning means for simultaneously gagging related punches in each

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of said separate rows of punches, individual electromechanical punch operating means for each of said separate rows of punches, a separate circuit for each of said operating means, and a transfer switch common to each of said circuits and controlled by the movement of said carriage for selectively conditioning one of said circuits depending upon the position of said carriage.

13. In a punch for perforating a plural zoned statistical card, a plurality of groups of punches each group individual to a zone of said card, a card carriage for carrying said card step by step past said groups of punches, operating means individual to each group of punches and means controlled by the position of said carriage for selectively enabling said operating means.

14. In a punch for perforating a plural zoned statistical card in accordance with a multiple hole code, a base, a plurality of groups of punches each aligned to perforate in one zone of said card and positioned apart along said base, a card carriage, escapement means for successively spacing said carriage relative to said groups of punches, an actuating bail for each group of punches, interponents adapted to be shifted to an effective position between said bails and punches, a plurality of cross shafts one for each character to be perforated, shifting members secured to each shaft one of said members for each of said interponents which corresponds in each card zone to an index position of the character associated with each shaft, a key actuated member connected to each of said shafts, said actuating member rocking said shaft to position said interponents in effective position, and means under control of said carriage for selectively operating one of said bails.

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