July 23, 1957 R. TAYNTON ET AL 2,800,181

CARD PUNCH

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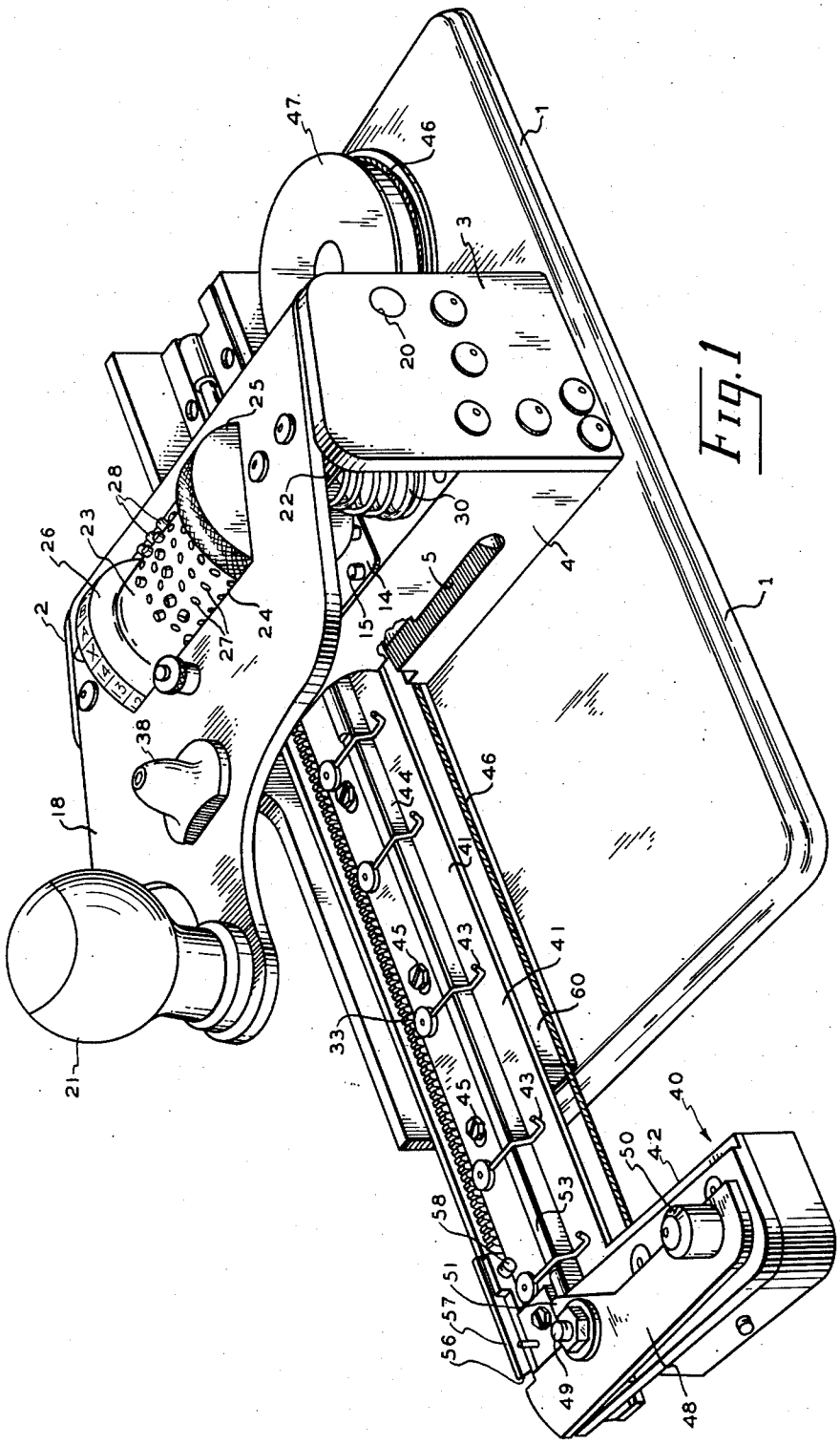


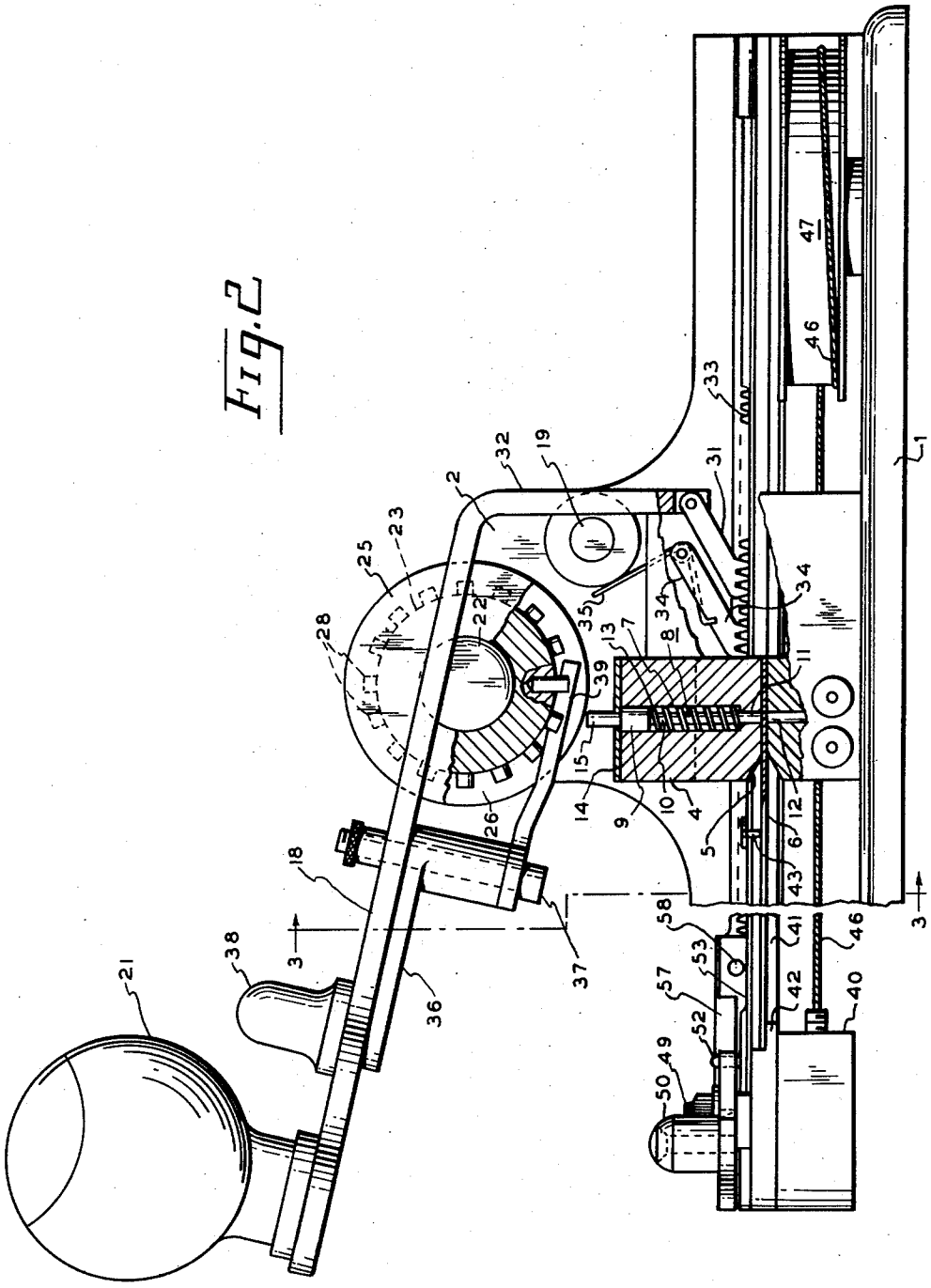
FIG. 1

July 23, 1957 R. TAYNTON ET AL 2,800,181

CARD PUNCH

Filed Feb. 27, 1956 3 Sheets-Sheet 2

Fig. 2



July 23, 1957 R. TAYNTON ET AL 2,800,181

CARD PUNCH

Filed Feb. 27, 1956 3 Sheets-Sheet 3

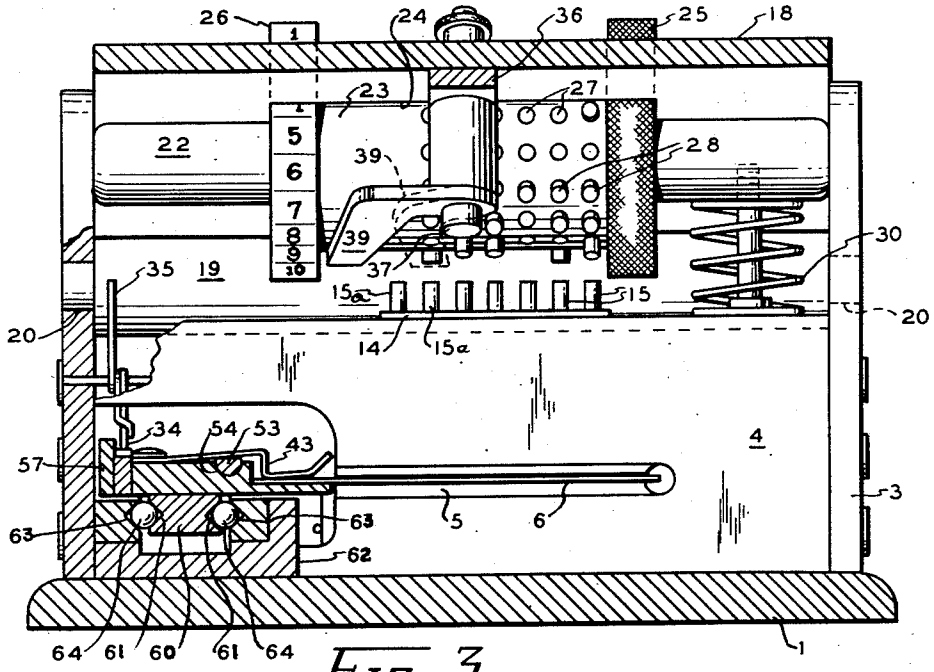


Fig. 3

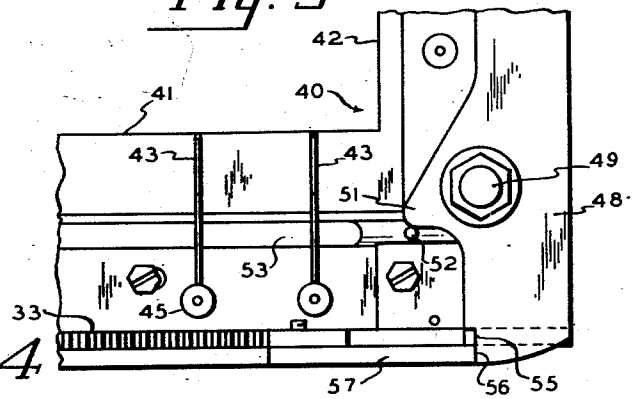


Fig. 4

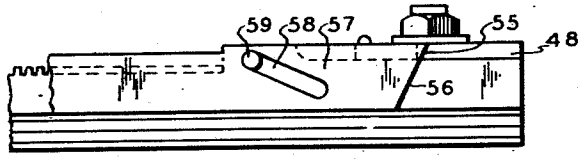


Fig. 5

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2,800,181

CARD PUNCH

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11 Claims. (Cl. 164—111)

The present invention relates generally to card punch and feed devices, and more particularly to devices for punching selectively position-coded arrays of holes in a card, and for feeding the card step-wise in response to each punching operation, preparatory to a further punching operation.

Briefly describing a preferred embodiment of the present invention, a card carriage is provided, which is step-wise actuatable longitudinally by means of a pawl and ratchet. The card carriage is normally spring biased toward a rearward position, and is movable forwardly in steps against the bias force by means of the pawl and ratchet. A manually actuatable pivotable lever is provided at a convenient position of the device, which when actuated in one sense releases the card from the carriage, and when actuated in reverse sense cams a pawl lifting bar, which disengages the carriage actuating pawl from its ratchet, to permit free motion of the carriage by the bias spring. The card clamping device and the pawl lifting bar may be actuated in any longitudinal position of the card carriage.

The pawl is actuated once in response to each actuation of a card punch lever, on the return stroke of the latter. A cylindrical punch selector is mounted in an opening in the card punch lever, for rotation with respect thereto. The punch selector includes a series of apertures, distributed both axially and circumferentially, in selecting ones of which may be inserted punch actuating pins. Any axially distributed set of punch actuating pins may then be selected at will by manual rotation of the cylinder. The selected set of pins is that which extends approximately vertically downwardly, in superposition of a set of upwardly spring biassed hole punching pins. Those punching pins are actuatable by depression of the card punch lever which are in alignment with punch actuating pins. In addition, an interposer bar is secured pivotally to the card punch lever for depression therewith, and is positionable selectively in a non-interposed position or in an interposed position. When positioned in interposed position the interposer bar is superposed over one punching pin position, in which case actuaton of the punch lever causes a hole to be punched for that one pin position, regardless of the rotary position of the cylinder.

It is, accordingly, a broad object of the present invention to provide a system for punching arrays of holes in cards.

It is another object of the invention to provide a system for selectively releasing a card with respect to a movable carriage, and releasing the carriage from control of a carriage actuating mechanism, in response to differently directed motions of a single lever.

It is a further object of the invention to provide a system for effecting a card punching operation, and thereafter automatically feeding the card step-wise with respect to a punching station.

A further object of the invention resides in the provision of a card punching machine having provision for punching coded sets of holes at any longitudinal position

of the card, the card being normally fed sequentially from position to position step-wise in response to the punching operation, in which card release and carriage return to an initial position are controlled by a single lever, and in which a predetermined code change may be introduced at will in any coded set of holes by means of a selectively positionable interposer device.

The above and still further objects, features and advantages of the present invention will become apparent upon consideration of the following detailed description of one specific embodiment thereof, especially when taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a view in perspective of a card punch and feed device in accordance with the present invention;

Figure 2 is a view in side elevation of the device of Figure 1;

Figure 3 is a view taken on the line 3—3 of Figure 2;

Figure 4 is a partial view in plan, of a card and carriage release mechanism included in the machine of Figure 1–3; and

Figure 5 is a view in elevation corresponding with Figure 4.

Referring now more particularly to the accompanying drawings, the reference numeral **1** denotes a rectangular base, on which is secured a pair of upright end plates **2**, **3**, separated by a transversely extending punching block **4**. The latter includes a transversely extending horizontal slot **5**, through which a rectangular card **6** may extend. The card may be fabricated of paper, card-board, or the like.

A plurality of laterally spaced vertical apertures **7** is provided in the punching block **4**. Within each aperture **7** extends a punching pin **8**, having an upper portion **9** which rides snugly within the aperture **7**, and a lower portion **10** of smaller diameter. The lower end **11** of the pin **8** constitutes a punch for the card **6**, and to this end the pin **8** may move downwardly through the slot **5**, through the card **6**, and into an aperture **12**. The latter acts as a die and also provides a passage which permits disposal of punch waste. A compression spring **13** surrounds the portion **10** of smaller diameter, and biasses the upper portion **9** toward an apertured cover plate **14**, which limits upward motion of punching pins **8**. An upward extension **15** of each pin **8**, of reduced diameter, extends through a mating aperture in the plate **14**, and projects vertically upwardly therefrom.

A card punch lever **18** is mounted on a cross shaft **19**, which pivots in bearing apertures **20** in the upright end plates **2**, **3**. The card punch lever **18** extends longitudinally forwardly of the cross shaft **19** at a slight angle to the horizontal, and is provided with a vertical knob **21**, adjacent its forward termination.

Secured immovably directly to the underside of card punch lever **18**, in superposition of punching block **4**, is a stationary shaft **22**. A punch actuator cylinder **23** rotates on the stationary shaft **22**, and extends through a rectangular opening **24** provided in the lever **18**, to permit ready manual access to cylinder **23**. Flanges **25**, **26** are integral with the punch actuator cylinder **23**, one at each end thereof. Flange **25** may be knurled to facilitate manual positioning of the cylinder **23**, and flange **26** may contain numerals, or other character designations, arranged circumferentially thereof to assist in positioning the cylinder **23**. The clearance between punch actuator pins **28** and the upward extensions **15** of pins **8** is such that depression of knob **21** may cause actuation of pins **8**, in a direction generally downwardly, for a sufficient distance to accomplish a card punch operation. By selectively placing punch actuator pins **28** in the several axial rows of apertures **27**, any desired combination of holes may be punched at spaced lateral positions of the card **6**.

The card punch lever **18** is biased upwardly by means of a helical compression spring **30**, whereby the knob **21** and the punch lever **18** are returned to unactuated position following a card punch operation.

A pawl **31** is secured to a skirt **32**, which extends downwardly from the rearward end of lever **18**. Depression of knob **21** raises the skirt **32**, and thus disengages the pawl **31** from ratchet **33**. On return of knob **21** to unactuated position the pawl **31** engages the ratchet **33**, advancing same forwardly by one step. The pawl **34** is a holding pawl, spring biased by a spring **35** into engagement with ratchet **33**. The pawl **34** holds the ratchet **33** in its last position, while pawl **31** is disengaged, but permits forward motion of ratchet **33** when the latter is actuated by pawl **31**. Accordingly, each card punch operation is followed by a stepped card feed, on release of knob **21**.

In addition to selection of card punch pins **8** by the actuator pins **28**, provision is made for manual selection at will of one additional hole position of card **6**. To this end a lever **36** is secured for horizontal motion about a pin **37**, extending perpendicularly of card punch lever **18**. The forward end of lever **36** is provided with a small upwardly extending knob **38**, suited and positioned for convenient digital actuation of knob **38**. The rearward end of lever **36** constitutes an interposer bar **39**. In the unactuated position of knob **38** the interposer bar **39** extends free of the punch pin extensions **15**. In the actuated position of knob **38** the interposer bar **39** is positioned over one of the punch pin extensions **15***a*, so that actuation of lever **18** effects a punching operation of the corresponding one of pins **8**.

The card **6** is secured on a carriage **40**, being supported on the carriage **40** adjacent one of the longitudinal edges of the card **6**, and adjacent the forward one of its laterally extending edges. Support of the recited portions of card **6** is provided by longitudinal and lateral shelves **41** and **42**, respectively, of the carriage **40**. Support of the card **6** adjacent two of its edges only permits the card to extend into slot **5** and under the punch pins **8**.

A plurality of spring clips **43** is secured at intervals, adjacent the longitudinal shelf **41**, being secured to the adjacent portion **44** of the carriage **40** by small bolts **45**, and extending over the card **6**.

The carriage **40** is normally spring biased to its rearwardmost position by the pull of a cable **46**, which extends about a rotary drum **47**. The latter is spring biased for rotation in a sense by a spiral spring (not illustrated) contained internally of drum **47**.

The forward element of carriage **40** supports a camming lever **48**, pivoted intermediate its ends on a pin **49**, and actuatable by means of a knob **50** secured to one end thereof. The camming lever **48** serves a double function. When the knob **50** is pushed forwardly, a camming projection **51** on a rearward edge of lever **48** actuates a vertical pin **52**. The pin **52** is secured to and extends upwardly from a flat topped longitudinally extending rod **53**, which extends immediately under all the spring clips **43**. The under surface of rod **53** is of generally arcuate form, when viewed in cross-section, and nests in a correspondingly shaped channel **54** in carriage **40**. Actuation of pin **52** by camming surface **51** of lever **48** causes rotation of rod **53** about its longitudinal axis. The flat top of rod **53** then raises all the spring clips **43** simultaneously, releasing the card **6**.

On rearward actuation of knob **50** a camming surface **55** on the rearward edge of lever **48** impinges against one end **56** of a flat plate **57**. The plate **57** lies in a vertical plane, and extends longitudinally of and in immediate proximity to the carriage **40**, adjacent the ratchet **33**. The end **56** of plate **57** slopes downwardly and rearwardly, and the plate **57** contains a pair of similar longitudinally displaced slots **58**, which ride on pins **59**. The pins **59** extend laterally of the carriage **40**, while the slots **58** slope forwardly and downwardly. Accordingly, rearward camming of the plate **57** by the camming surface **55** causes the slots **58**, and hence the plate **57**, to ride up with respect to the pins **59**. The plate **57** raises the pawls **31** and **34** out of engagement with the ratchet **33**, permitting rearward motion of carriage **40** in response to the pull of the cable **46**.

The carriage **40** includes a longitudinally extending under-carriage **60**, of rectangular cross-section, having opposed V-shaped longitudinally extending parallel notches **61** in its vertical walls. The base supports a U-shaped longitudinally extending support **62**, within which the vertical arms of which the under-carriage **60** extends. The inner vertical walls of the U-shaped support **62** contain opposed V-shaped longitudinal notches **63**. The opening of each of notches **61** mates with one of the openings of notches **63**, to provide a pair of bearing races, within which are located bearings **64**.

Description of operation

Describing now the operation of the device illustrated as embodying the present invention, with the carriage **40** initially pulled forwardly a card **6** is inserted on the carriage **40** under the spring clips **43**, and resting on the shelves **41**, **42**. The knob **50** is actuated rearwardly in order to raise the spring clips, in order to permit easy card insertion, and then moved to neutral position to release the spring clips to card locking position. The knob **50** is then actuated forwardly, camming the plate **57** upwardly, and releasing the pawls **31** and **34**. The carriage **40** is then free to be pulled to its extreme rearward position by the cable **46**, in preparation for successive punching operations.

It is assumed that punch actuating pins **28** have been inserted in selected ones of apertures **27**, each laterally extending combination of pin positions representing a coded set of card holes. The coding may be correlated with the indicia on flange **26**, for ready reference. The cylinder **23** may be placed in any desired orientation, and the knob **38** operated digitally to one of its possible positions (from which it is spring returned), so that interposer bar **39** is, or is not, an interposed position, as the case may be.

The knob **21** is then depressed, actuating lever **18**. The punch actuating pins **28** (and the interposer bar if in interposed position) depress selected punching pins **8**, to effect a punching operation. The pawl **31** is withdrawn generally rearwardly when knob **21** is depressed, the ratchet **33** being then held by the holding pawl **34**. On release of knob **21** the knob moves upwardly, in response to the force exerted by helical compression spring **30**, and the pawl **31** actuates both the ratchet **33** and the carriage **40** to which the ratchet is secured, forwardly by a predetermined distance.

This action may be repeated, with intermediate repositioning of cylinder **23**, as desired. When a card has been completed the carriage may be pulled forwardly, the knob **50** pressed rearwardly to raise the spring clips **43** for card release, and the completed card removed.

While we have described and illustrated one specific embodiment of the present invention, it will become apparent that variations of the specific details of construction may be resorted to without departing from the true spirit and scope of the invention as defined in the appended claims.

What we claim is:

1. A card punching machine comprising a card carriage movable between two extreme positions, said card carriage including a plurality of card holding fingers normally resiliently pressing said card against said card carriage, means for spring biasing said card carriage toward one of said extreme positions, a ratchet extending along the length of said card carriage and secured to said card carriage, a holding pawl normally engaged with said ratchet for holding said ratchet fixed, a member manually actuatable to either of two positions, means responsive to said member in one of said two positions for raising

said fingers from pressing engagement with said card, and means responsive to said member when actuated to the other of said positions for disengaging said pawl from said ratchet.

2. The combination in accordance with claim 1 wherein said card carriage is movable relative to said pawl, and wherein said means for raising said pawl is operative in any position of said card carriage.

3. The combination in accordance with claim 1 wherein said means for raising said fingers includes an elongated bar having a flat proximately parallel with and under said fingers, and means for rotating said bar about its longitudinal axis.

4. A card punch, comprising a cylinder positionable about its axis and pivotable on a further axis, a plurality of card punch actuator pins secured predetermined in axially distributed arrays about the periphery of said cylinder, a card punch block having a guide slot for said card, a plurality of depressible card punch pins within said card punch block and extending toward said guide slot in alignment with one array of said actuator pins, means spring biasing said card punch pins out of punching position, and means for pivoting said cylinder about said further axis sufficiently to cause said actuator pins to depress said card punch pins into punching position.

5. In a card punch machine, means for securing a card in fixed position, a rotary cylinder, a plurality of punch actuator pins secured about the periphery of said rotary cylinder in axial arrays, a plurality of in-line punching pins individually actuatable to punching position by individual ones of said punch actuator pins, an interposer bar movable at will to either of two positions, said interposer bar superposed over one of said punching pins only in one of the two positions of said interposer bar only, and means for simultaneously actuating said interposer bar and said punch actuator pins toward and into actuating relation with said punching pins.

6. In a machine for punching holes in a card, a stationary base, a card carriage movable over said base in a predetermined line between two extreme positions, the distance between said extreme positions comprehending a plurality of discrete card positions separated longitudinally of said card, manual means for punching transversely position coded holes in said card at each discrete card position, means responsive to said manuel means for feeding said card carriage from one to another of said discrete card positions in response to and following each punching operation of said manual means for punching, said means for punching including means for at will manually selecting the coding of said holes, wherein said manual means for punching transversely position coded holes in said card and for selecting the coding at will comprises a pivotable punch lever, a cylinder mounted for rotation with respect to said cylinder and pivotable with said punch lever, said cylinder including transversely coded punch actuator pins in pre-selected codings at different angular positions about the periphery of said cylinder.

7. The combination in accordance with claim 6 wherein is provided further means for at will modifying any of said codings, comprising a bar movable at will between a punch actuating position and a non-punch-actuating position.

8. The combination in accordance with claim 7 wherein said further means is mounted on said pivotable punch lever for actuation therewith.

9. The combination in accordance with claim 8 wherein is further provided means for at will releasing said card carriage for free movement with respect to said base and in said predetermined line, said last means operative at any position of said carriage, and means for automatically drawing said card carriage to one of its extreme positions on said releasing of said card carriage.

10. The combination in accordance with claim 9 wherein is further provided a manually pivotable lever having two operative positions, means normally securing said card to said carriage, means responsive to said manually pivotable lever in one of said two operative positions for releasing said means for securing said card and in the other of said two operative positions for actuating said means for releasing said card carriage.

11. A card punch machine, comprising a base, a card carriage movable between two extreme positions with respect to said base, means biasing said carriage toward one of said positions, comprising a rotary cylinder pivotally secured to said base, spring means biasing said rotary member in one direction of rotation, a cable secured at one end to said rotary member for translatory actuation thereby and secured at the other end to said carriage, means for effecting motion of said carriage toward the other of said extreme positions in opposition to said means for biasing, and means for releasing said carriage toward the one of said extreme positions in response to said means for biasing of said carriage, wherein is provided manually actuatable means for selectively punching predetermined arrays of holes in said card, said manually actuatable means having a punch position and a return position, means maintaining said carriage stationary during motion of said manually actuatable means to punch position and means for actuating said carriage a predetermined distance against the force exerted by said means for biasing during motion of said manually actuatable means to said return position.

References Cited in the file of this patent

UNITED STATES PATENTS

579,433	Hertzberg	Mar. 23, 1897
1,745,910	Peirce	Feb. 4, 1930
1,750,216	Ewald	Mar. 11, 1930
2,041,085	Nevin	May 19, 1936
2,421,069	Kelley	May 27, 1947