Nov. 16, 1954 R. S. RUFFIN 2,694,449

CARD PUNCHING MECHANISM

Filed June 26, 1953 3 Sheets-Sheet 1

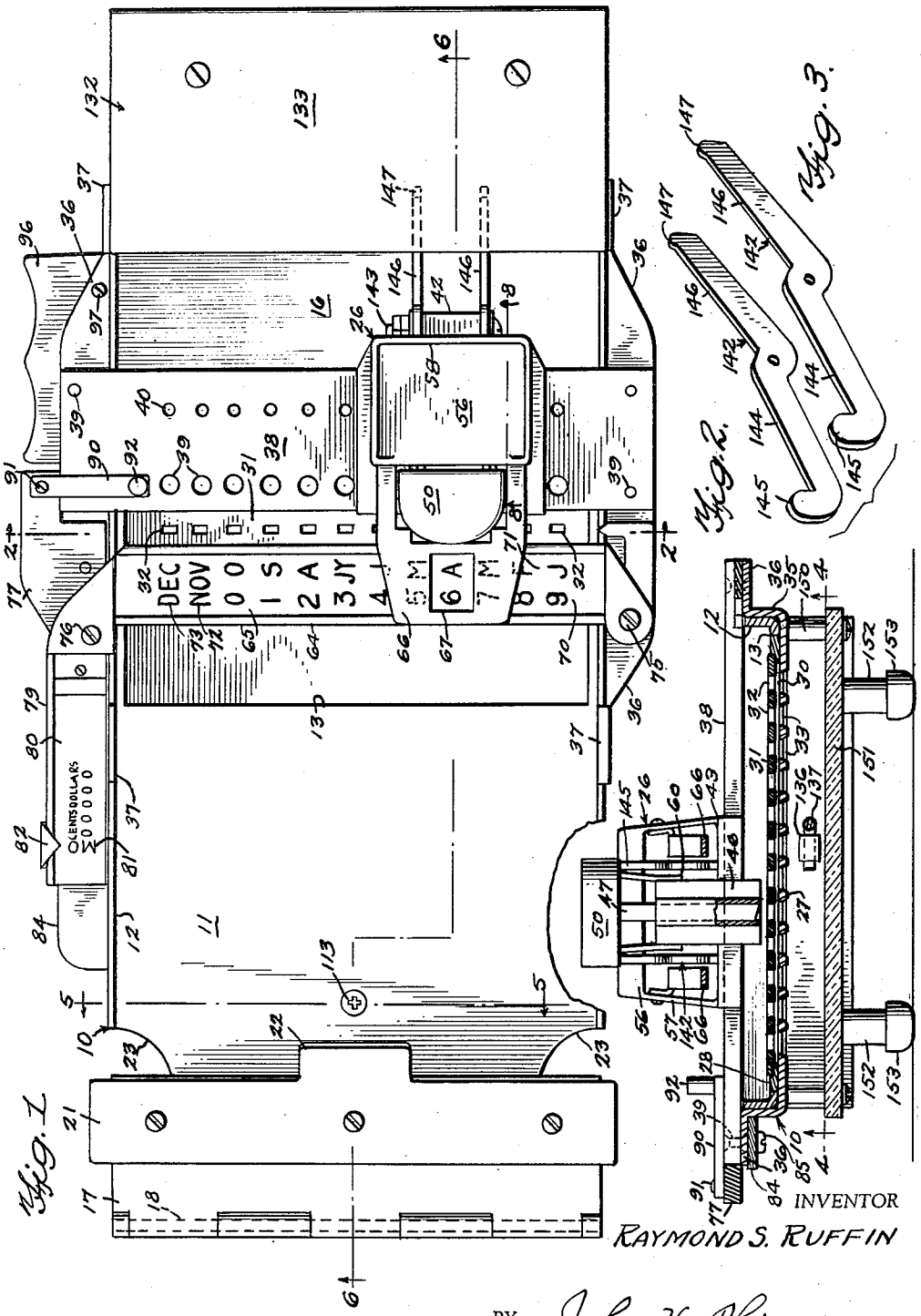


Fig. 1.

Fig. 2.

Fig. 3.

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CARD PUNCHING MECHANISM

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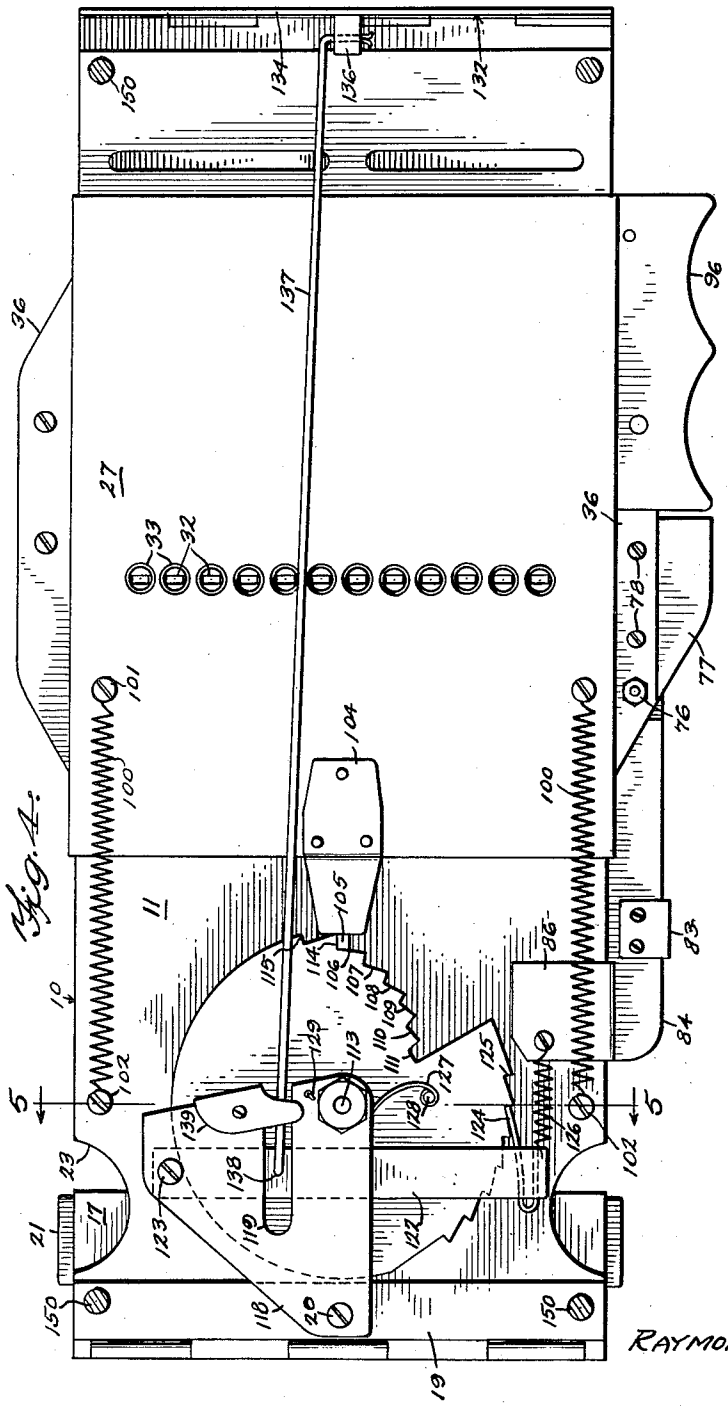


Fig. 4.

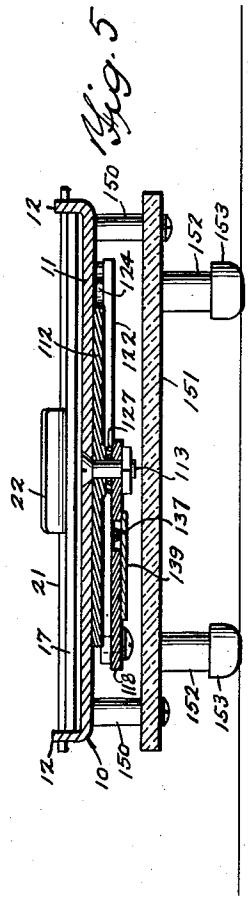


Fig. 5

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CARD PUNCHING MECHANISM

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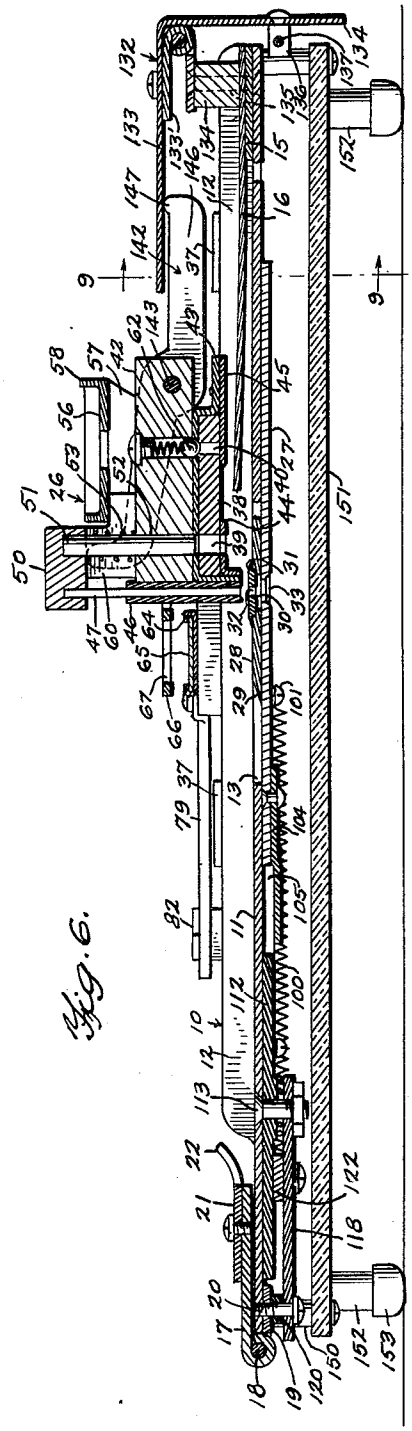


Fig. 6.

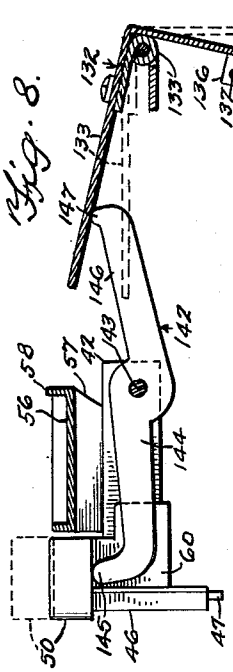


Fig. 8.

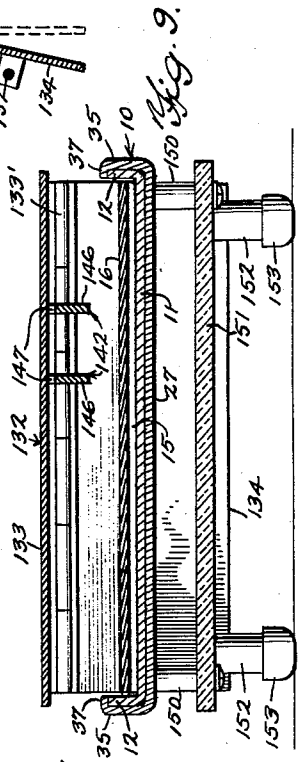


Fig. 9.

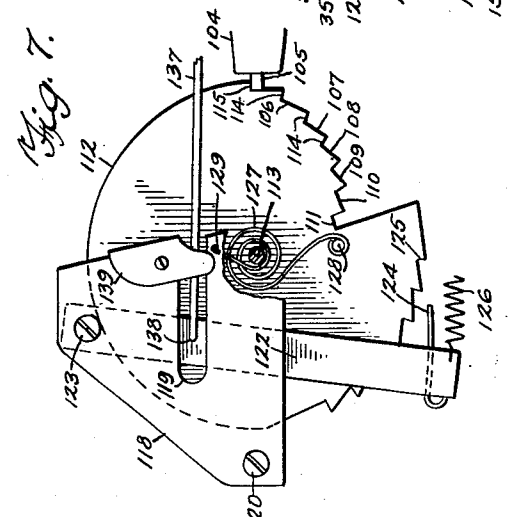


Fig. 7.

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CARD PUNCHING MECHANISM

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Application June 26, 1953, Serial No. 364,359

16 Claims. (Cl. 164—86)

This invention relates to a card punching device and is an improvement over the structure shown in the copending application of Montgomery Osborne Jones and Raymond S. Ruffin, Serial No. 275,722, filed March 10, 1952.

In the copending application referred to, there is disclosed a novel type of card punching device, particularly intended for the punching of postal money order cards, whereby these cards may be passed through automatic business machines for the recording thereof. The prior device comprises a main support having a cross head mounted to travel longitudinally thereof and a punching unit movable transversely of the supporting structure and carried by the cross head, and it further comprises means for providing an accurate step-by-step movement of the cross head and punching device to successive columns of indicia on the card. The step-by-step movement is accomplished by first operating the punch with respect to a right-hand column of indicia, releasing the punch, pulling the cross head to the right to its limit of movement, and then releasing it. This movement of the cross head would control positioning means whereby, when the cross head is released, it will advance one step to position the punch over the next column of indicia. This operation is repeated for punching openings at desired points in each column of indicia.

An important object of the present invention is to provide a card punching device for the same general purpose as the device shown in the copending application referred to, but wherein it is unnecessary for the operator to move the carriage in order to effect the positioning of the punch over each successive column of indicia, the punching, and the releasing of the punch effecting such step-by-step operation.

A further object is to provide such a device wherein, after the various columns of indicia have been selectively punched, the positioning means for the punch may be quickly and easily reset to its normal starting position.

A further object is to provide a novel positioning device with means biasing it toward a normal starting position whereby, after the columns of indicia have all been selectively punched, the positioning device may be released and will automatically return to its initial position.

A further object is to provide a device of the character just referred to, wherein the resetting is accomplished with ease and facility by the simultaneous performing of two operations by a single hand of the operator, namely, the releasing of an advancing pawl and the releasing of the positioning device by movement of the carriage back to a starting position, the positioning device under such conditions moving back to its initial position and being stopped in such position ready for the beginning of the punching of the next card.

A further object is to provide common means operative for advancing the positioning device after each punching operation and for releasing the punching device for return movement to its initial position.

A further object is to provide for a mechanical step-by-step advancing of the carriage with its punching device to positions over successive columns of indicia, and wherein such advancing operation takes place after the punch is released from the card, thus preventing any tearing or distortion of the card at a perforation.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings I have shown one embodiment of the invention. In this showing:

Fig. 1 is a plan view of the device;

Fig. 2 is a transverse sectional view on line 2—2 of Fig. 1;

Fig. 3 is a detail perspective view of a pair of lever arms associated with the step-by-step advancing mechanism;

Fig. 4 is a horizontal sectional view on line 4—4 of Fig. 2;

Fig. 5 is a transverse sectional view on line 5—5 of Fig. 4;

Fig. 6 is a vertical longitudinal sectional view taken substantially on line 6—6 of Fig. 1;

Fig. 7 is a bottom plan view of a portion of the step-by-step mechanism shown in Fig. 4, the parts being shown at their limits of movement in the direction of resetting of the positioning device;

Fig. 8 is a detail sectional view on line 8—8 of Fig. 1, parts being omitted; and

Fig. 9 is a transverse vertical sectional view on line 9—9 of Fig. 6.

Referring to the drawings, the numeral 10 designates the body of the device as a whole, comprising a flat plate 11 of generally rectangular shape and of a size determined in accordance with the cards to be punched. The present device is particularly intended for use in punching money order cards, and the body of the device and the elements associated therewith are sized accordingly. At opposite edges, the body is provided with upstanding parallel flanges 12 spaced apart in accordance with the width of the card to be punched. The plate 11 is provided with a rectangular opening 13 of a width slightly less than the distance between the flanges 12 as shown in Fig. 2.

A card is adapted to be supported on the plate 11, as previously stated. This card is inserted from the left-hand end of the device as viewed in Figs. 1 and 6, and to limit movement of the card to its proper position, a stop plate 15 is provided adjacent the right-hand end of the device. This plate is secured to the plate 11, and above the stop plate is arranged a guide plate 16 which curves upwardly and forwardly to the left, as viewed in Fig. 6, to a slight extent to facilitate the insertion of the entering end of the card therebeneath. At the other end of the body is arranged a positioning and holding down plate 17 hinged with respect to the plate by being connected through a pivot pin 18 to a hinge member 19 secured against the bottom of the plate 11 by screws 20 (Fig. 6). A plate 21, having a finger piece 22, is secured to the plate 17 and this plate, when the device is operative occupies the position shown in Figs. 1 and 6. To facilitate the picking up of the card after a punching operation is completed and the plate 17 has been swung upwardly and to the left to an inoperative position, the plate 11 is cut away at opposite edges as at 23.

A carriage indicated as a whole by the numeral 26 is arranged above the body 10. This carriage comprises a bottom plate 27 arranged beneath the plate 11. The plate 27 extends across and substantially beyond the limits of the opening 13 longitudinally of the device in any position of the carriage, as will become apparent. A die-carrying plate 28 is fixed to the plate 27, and its dimension longitudinally of the body 10 is substantially less than the dimension of the opening 13 and is movable longitudinally of the device in such opening, as will become apparent below. The left-hand edge of the plate 28 is tapered as at 29 to facilitate the sliding of a card thereover when the device is to be used. The plate 28 substantially fits against the longitudinal edges of the opening 13 to slide with respect to such edges, as shown in Fig. 2. The plate 28 is provided with an opening 30 extending throughout the greater portion of the dimension thereof transversely of the device, and a die plate 31 is soldered or otherwise secured to the plate 20 and is provided with a plurality of uniformly spaced die openings 32, preferably rectangular and of a size corresponding to the size of openings commonly employed in business machine cards.

The bottom plate 27 is provided with an opening 33 in vertical alignment with each of the die openings 32 so that

pieces of the card punched in a manner to be described will fall freely through the plate **27**. At opposite sides of the device, the plate **27** is provided with upstanding flanges **35** slidably fitting the outer surfaces of the flanges **12**. The plate **27** is provided throughout a portion of the length of the flanges **35** with outstanding horizontal flanges **36**. At the ends thereof, each flange **35** is provided with a relatively long lip **37** bent inwardly over and slidably engaging the upper edge of the associated flange **12** (Figs. 1 and 9).

The carriage further comprises a flat, relatively thick, and rather wide bar **38** extending transversely of the device and fixed as at **39** to the flanges **36**. The plate **38** is provided with a series of equidistantly spaced, preferably circular openings **39** adjacent one edge thereof and with a second series of circular openings **40** adjacent the opposite side thereof for a purpose to be described. It will be apparent that the plate **27** and its flanges **35**, together with the plate **38**, form a structure completely surrounding the body **10** and engaging surfaces thereof for substantial lengths so that the carriage is accurately guided for longitudinal movement relative to the body **10**. The lips **37** assist in guiding the parts in snug sliding engagement.

A punch unit is mounted to slide longitudinally of the plate **38** and to move with the carriage longitudinally of the body **10**. The punch unit comprises a body block **42** (Fig. 6) fixed to an upper guide **43** extending over and around the plate **38** and cooperating with lower guide elements **44** and **45** to be guided for sliding movement longitudinally of the plate **38**. A vertical guide **46** is fixed to the forward or left-hand end of the block **42**, as viewed in Fig. 6, and is also secured to the forward end of the guide **43**. Within the guide **46** is slidably arranged a vertically movable punch element **47** having a sloped lower end (Fig. 2) to facilitate its cutting through a card arranged over the die plate **31**.

The upper end of the punch element **47** is fixed to a push button **50**. To this push button **50** is also connected the upper end of a plunger rod **51** to the lower portion of which is slidable through an opening **52** formed in the block **42** and continuing through the guides **43** and **44** and adapted to align with any opening **39** in the plate **38**. A spring **53** surrounds the plunger rod **51** to urge the push button **50** upwardly to normally position the parts of the punch unit as shown in Fig. 6. Under such conditions, the lower end of the plunger rod **51** is arranged above the plate **38**, and accordingly the punch unit is movable across the device, that is, longitudinally of the plate **38**.

A thumb seat **56** is arranged above the block **42** and is provided at opposite sides with depending flanges **57** secured to such block. The thumb seat **56** is flanged as at **58**, the right-hand flange as viewed in Fig. 6 preferably being higher than the side flanges to provide greater facility in resetting the mechanism, as will become apparent below. As shown in Figs. 2, 6, and 8, the push button **50** is provided at opposite sides with depending flanges **60**, the rear portions of which project beneath the thumb seat **56** and engage such seat, as in Fig. 6, to limit upward movement of the push button **50**.

As previously stated, the punch unit is movable longitudinally of the plate **38**, and accordingly it will be apparent that the punch element is movable into alignment with any die opening **32**. The plunger rod **51** prevents substantial downward movement of the push button unless the plunger **51** is properly aligned with an opening **39** in the plate **38**. To assist in positioning the parts, the block **42** is provided with a spring-pressed detent **62** (Fig. 6) which snaps into a selected opening **40**, according to the die opening **32** through which the card is to be punched.

An index plate **64** is arranged forwardly or to the left of the plate **38** and is spaced therefrom as shown in Fig. 1. This plate has its longitudinal edges turned about an index card **65** carrying suitable indicia for facilitating the use of the device. The index card **65** is utilized in conjunction with a plate **66** carried by the flanges **57** and apertured as at **67** to render visible the desired indicia on the card **65**.

In conjunction with the punching of postal money orders the index card **65** will be provided with indicia as shown in Fig. 1. These indicia are made up of two columns **70** and **71**, the former of which is numbered from top to bottom, as viewed in Fig. 1, from "0" to "9." The column **71** is made up, reading from bottom to top, of the initials or abbreviations of the months from January to October. Above the "0" of column **70** and the initial

"O" for October, the index card carries abbreviations for November and December, as indicated by the numerals **72** and **73** respectively. Each number in column **70** and the adjacent designations for the months from January to October are arranged opposite openings **39**, while the "Nov" and "Dec" designations are arranged respectively opposite the last two openings **39** toward the top of the plate **38**, as viewed in Fig. 1.

The index plate **64** is fixed at one side as at **75** to the adjacent flange **36**, and is secured at its opposite side as at **76** to a plate **77**, secured as at **78** to the adjacent flange **36**. To such plate is connected an auxiliary index plate **79** (Fig. 1) having an index card **80** with indications showing relative positions of the dollars and cents columns with the adjacent initials "M O" **81**, which stands for "money order." Adjacent the index card **80** and operating in conjunction therewith is a pointer **82** extending downwardly of the outer edge of the index plate **79** and provided with a bottom portion **83** (Fig. 4) attached to a plate **84** secured as at **85** to the adjacent flange **36** of the body. The plate **84** accordingly is stationary with respect to the body, and at its left-hand end, it is provided with an integral projection **86** (Fig. 4) for a purpose to be described. The index card **80** provides a visual indication from which the operator may determine at all times over which column of numbers or other indicia on the card the punch element **47** is arranged.

The plate **77** (Fig. 1) carries an arm **90** pivoted as at **91** to the plate **77** and provided at its free end with a small upstanding handle **92**. During the first ten months of the year the arm **90** may remain in the position shown in Fig. 1, and when the carriage **26** is pushed upwardly, as viewed in Fig. 1, the arm **90** acts as a stop engaging the adjacent end of the guide **43** to position the punch over the "O" of the index card **65**, thus facilitating the use of the device. During November and December, when it is necessary to use the eleventh and twelfth die openings **32**, counting from the bottom of the device in Fig. 1, the arm **90** may be swung to one side.

The side flanges of the thumb seat **56** are engaged by the thumb to move the punch unit longitudinally of the plate **38**, and the rear or right-hand flange **58** is utilized when the entire carriage is to be moved rearwardly or to the right in Figs. 1 and 6. Ease in the movement of the thumb seat transversely of the device is facilitated by a finger-engaging plate **96** secured as at **97** to the top flange **36**, as viewed in Fig. 1. For example, the forefinger and middle finger of the right hand may be engaged in the two notches of the plate **96** while the thumb engages the thumb seat **56**. Bearing edgewise against the plate **96** facilitates movement of the thumb seat **56** longitudinally of the plate **38**, by movement of the operator's thumb.

The carriage **26** is urged toward the left in Figs. 1, 4, and 6 by means of a pair of springs **100**, most clearly shown in Fig. 4. These springs are arranged adjacent opposite edges of the device, and each has one end connected as at **101** to the plate **27** and its other end connected as at **102** to the plate **11**.

It will become apparent that, upon the completion of each punching operation, the carriage is advanced toward the left by the springs **100**. The plate **27** is provided with a small plate **104** (Figs. 4 and 6) which extends beyond the advancing edge of the plate **27** and is spaced from the plate **11**. Within this space is arranged a stop finger **105** extending beyond the advancing edge of the plate **100** and adapted successively to engage stop surfaces **106**, **107**, **108**, **109**, **110** and **111** formed in a positioning wheel **112**. The wheel **112** is pivoted to the plate **11** as at **113** and each of the stop surfaces **106**, etc. is tangent to a circle having a center at the axis of rotation of the plate **112**. The surfaces **106** et seq. extend progressively closer to the center of rotation and, as each is brought into alignment with the stop fingers **105**, the springs **100** advance the carriage one step toward the left. Each of the stop surfaces **106** et seq. is provided at the counterclockwise limit thereof with a stop shoulder **114** engageable with the stop finger **105** as further referred to below. Counterclockwise of the stop surface **106**, the wheel **112** is provided with a stop shoulder **115**, the purpose of which also will be referred to below.

Beneath the wheel **112** is arranged a substantially triangular plate **118** slotted longitudinally of the device as at **119**, for a purpose to be described. The plate **118** is fixed with respect to the body plate **11** by one of the screws **20** (Fig. 6), a spacer **120** being arranged between

the hinge element 19 and the plate 118. The pivot screw or bolt 113 for the wheel 112 also extends through and assists in positioning the plate 118.

In the space between the wheel 112 and plate 118 is arranged a lever arm 122 pivoted to the plate 118 as at 123. At its free end, the arm 122 carries a spring pawl 124 successively engageable with teeth 125 formed in the adjacent portion of the wheel 112. A spring 126 is connected between the free end of the arm 122 and the plate 86 to tend to swing the arm 122 in a counterclockwise direction.

A torsion spring 127 (Fig. 7) has one end connected as at 128 to the wheel 112 and its other end connected as at 129 to the plate 118. This spring biases the wheel 112 for rotation in a clockwise direction.

Referring to Figs. 1 and 6, it will be noted that the right-hand end of the device is provided with an operating member 132 extending across the width of the device and bent intermediate its ends to form a horizontal plate 133 and a vertical plate 134 extending downwardly beyond the right-hand end of the machine. The plate 132 is carried by a hinge 133' the lower portion of which is supported or a bar 134, this bar and the adjacent portions of the plates 11, 15, and 16 being connected together by rivets or the like, 135. Beneath the plate 11, the depending plate 134 is provided with a boss 136 (note particularly Fig. 4) to one end of which is pivotally connected an operating rod 137. This rod extends beneath the plate 27 and has its other end extending into the slot 119 and connected as at 138 to the lever arm 122. A keeper plate 139 secured to the plate 118 for bridging the slot 119 prevents the rod end 138 from becoming disconnected from the arm 122.

At opposite sides of the block 42 of the punching unit are arranged levers 142 pivotally connected intermediate their ends to the block 42 by a transverse pivoted pin 143. The forward arms 144 of these levers turn upwardly as at 145 to engage beneath the push button 50. The other arms 146 of the levers 142 have upwardly extending contact ends 147 engaging the bottom of the plate 133, this engagement taking place in any selected position of the punching unit transversely of the device, as will be apparent.

The structure described above constitutes all of the operating mechanism of the device, and such mechanism is mounted on a suitable support. Corner posts 150 are fixed at their upper ends to the body plate 11 and are attached at their lower ends to a bottom plate 151, preferably formed of relatively heavy glass or plastic for the visual examination of the operating parts of the mechanism upon the inversion of the device. Supporting legs 152 are secured at their upper ends to the plate 151 and are provided at their lower ends with rubber or similar feet 153.

Operation

The parts normally occupy the positions shown in Figs. 4 and 6 and also shown in Fig. 1 except that there is no normal position for the punch unit 26, which may be arranged at any desired point transversely of the device. The plate 17 is swung upwardly and the card to be punched, for example a money order card, is inserted into the device, the leading edge passing over the top of the die plate 31 and thence beneath the guide plate 16 until such edge engages squarely against the edge of the stop plate 15 (Fig. 6). The card will now be accurately positioned for punching, and the plate 17 is then swung back to its normal operative position. Under such conditions the punch unit 47 will be arranged over the column on the card representing the month in which the money order is issued. Assuming it to be in the month of April, the punch unit 26 will be positioned transversely of the device as shown in Fig. 1, whereupon the downward force exerted on the push button 50 will effect the perforating of the card at the desired point in the column referred to.

Referring to Figs. 6 and 8, it will be apparent that the punch unit 47 and its push button 50 will have occupied the position shown in Fig. 6 and when the punching operation is performed, the parts will be moved to the position shown in Fig. 8. Downward movement of the push button rocks the levers 142 and the ends 147 of the lever arms 146 will rock the plate 132 to the position shown in Fig. 8. This operation pushes the rod 137 (Fig. 4) to rock the lever arm 122 to the position shown in Fig. 7, although it should be borne in mind that the stop finger 105 occupies the position shown in such figure for a different purpose, as described below. The performance of the first punching operation referred to will have started with the finger 105 in the position shown in Fig. 4. The swinging of the lever arm 122 will release the spring pawl 124 from the tooth 125 with which it is engaged in Fig. 4 and will swing it substantially beyond the next tooth and outwardly of the radial limits of such teeth. When the push button 50 is released to return to the position shown in Fig. 6, the spring 126 (Fig. 4) will return the lever arm 122 to its normal position and in so moving, it will cause the pawl 124 to engage the next adjacent tooth to the left in Fig. 4 to rotate the positioning wheel 112 in counterclockwise direction.

In this connection it should be pointed out that the torsion spring 129 biases the wheel 112 for clockwise rotation, but since the spring 126 is stronger than the spring 127, the pawl 124 will effect rotation of the wheel 112 in the manner described and the stop surface 107 will be brought into alignment with the stop finger 105. This finger will escape over the shoulder at the bottom of the surface 106, and the springs 100 will move the carriage to its second position with the punch element 47 aligned over the cents column on the card.

Assuming that the money order is to be made out in the amount of $28.61, the operator will now move the punch unit 26 upwardly as viewed in Fig. 1 until the numeral "1" appears in the window 67. If the device is not accurately positioned, the pin 53 (Fig. 6) cannot enter the proper opening 39 in the plate 38 and the punch cannot be operated. However, the spring detent 62 will accurately position the punch unit if the latter is moved approximately to the proper place.

The operator will again push the button 50 to perforate the card through the numeral "1" in the cents column and, as before, the punching operation rocks the plate 132, advances the pawl 124 beyond the next tooth 125, and upon the releasing of the push button, the spring 126 will return the arm 122 to normal position and the stop finger will snap over the shoulder at the bottom of the surface 107 into engagement with the surface 108, the carriage again being moved by the springs 100. The operator will now move the punch unit 26 into the position shown in Fig. 1, with the window 67 registering with the numeral "6." The punching operation is again performed in the same manner, the carriage is advanced one step, with the stop finger engaging the surface 109, and the carriage is moved to expose the numeral "8" in the window 67 and the punch is again operated.

The card will now be punched for $8.61 and the punch will be moved to the 10's column over the card, whereupon the unit 26 will be moved to register the window 67 with the numeral "2," whereupon the punching operation will be repeated as before, and the card will be punched for the desired amount of $28.61. The device is capable of advancing to more columns with the illustration shown, and any number of columns may be punched within reasonable limits in accordance with the design of the device.

Each operation of the push button, as described above, rocks the plate 132 to swing the lever arm 122 which not only moves the pawl 124 to the left in Fig. 4 but also swings it radially outwardly to the position shown, somewhat exaggerated, in Fig. 7, the free end of the pawl being arranged radially outwardly of the outermost limits of the teeth 125. This is important in the resetting of the device, as will become apparent. When the punching of the card has been completed, the operator will place the thumb of his right hand in the thumb seat 56 (Fig. 6), and will place one or more fingers of the same hand against the depending plate portion 134 below the pivot 133'. By squeezing the thumb and fingers toward each other in a single operation, the operator will move the carriage toward the right to retract the carriage one step beyond the position in Fig. 4, the finger 105 clearing the shoulder 114. At the same time, the rocking of the plate 132 by the finger of the right hand will move the lever arm 122 to the position shown in Fig. 7. The wheel 112 will now be completely released and turning movement of this wheel will be resisted solely by the negligible friction of the parts. The wheel 112 then will be turned by the torsion spring 127 in a clockwise direction to the position shown in Fig. 7, the stop finger 105 now engaging the shoulder 115 to limit turning

movement of the wheel **112** beyond the position shown in Fig. 7. The parts will now be released, whereupon the spring **126** will return the lever arm **122** to its normal position and in this movement, the spring pawl **124** will rotate the wheel **112** one step to the position shown in Fig. 4 with the finger **105** engaging the surface **106**. The device is now completely reset, ready for the starting of the next punching operation.

From the foregoing it will be apparent that the present construction provides novel means for progressively punching desired positions in successive columns of indicia on a card, the advancing of the punch element to successive columns being an automatic function of the punching operation. Particular attention is invited to the fact that the advancing of the wheel **112** to each successive position occurs upon the return movements of the parts to normal position after a punching operation, and occurs only after the punch element has been completely withdrawn from the card. In other words, it is during the last portion of the return movement of the punch element to normal position that the finger **105** escapes over the shoulder of the next stop surface **107**, et seq.; and accordingly the carriage is prevented from advancing until the punch element is completely withdrawn from the card. This prevents any tearing or other distortion of the card, which would occur upon the advancing of the card before the complete withdrawal of the punch element. It also will be apparent that the high degree of visibility of the indicia on the card **65** reduces to a minimum any chance of error in the punching of a card, this chance of error being reduced substantially below that which has been found to be present in conventional perforating devices for perforating cards, used in ordinary business machines. It further will be apparent that the resetting of the device is extremely simple and requires merely one operation by one hand of the operator to return the carriage and the wheel **112** to their starting points. The carriage will be pulled to its limit of movement to the right in Fig. 6, as determined by engagement of the right-hand edge of the plate **28** with the right-hand limit of the opening **13**. Accordingly, it is impossible to pull the carriage too far to the right.

The portions of the flanges **60** underlying the thumb seat **56** limit upward movement of the push button **50**, and this also defines the limit of turning movement of the levers **142** and plate **132**, thus also defining the limits of movement of the rod **137** (Fig. 4) and the pawl **124**. Thus it is unnecessary to specifically provide means for limiting movement of any of these parts.

The flanges of the thumb seat **56** facilitate movement of the punch unit **26** and this facility is increased by the provision of the finger engaging plate **96** since, by pressing the forefinger and middle finger of the right hand against the edge of this plate, it is much easier to rapidly and accurately move the punch unit **26** in either direction than is true by movement of the entire forearm of the operator if the thumb is engaged with the thumb seat and the operator's hand is otherwise entirely free.

The device accordingly embodies numerous operational advantages and a money order may be quickly punched by the issuing official in a post office. The chance of error is reduced and substantial economies are effected by the elimination of special machines and employees for punching money order cards with the amounts filled in by pen in the blank spaces provided for this purpose at the issuing post offices.

It is to be understood that the form of the invention shown in the drawings is to be taken as illustrative only, the scope of the invention being defined in the appended claims.

I claim:

1. A card punching device comprising a body, a structure slidably connected to said body, said body and said structure constituting a pair of relatively linearly movable units, a punch element carried by said structure and mounted for vertical movement, there being a die plate beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, a movable member carried by one of said units, and means rendered effective by said punch element upon upward movement of the latter after having been moved downwardly to punch the card to present a different portion of said member to engagement with a portion of the other unit to effect and limit said linear movement in one direction with said punch element arranged over a different point on the card.

2. A card punching device comprising a body, a structure slidably connected to said body for linear movement relative thereto, a punch element carried by said structure and mounted for vertical movement, there being a die beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, a movable member carried by said body and provided with a plurality of successive steps, said structure having a normal starting position in which a portion thereof engages one of said steps, and means rendered operable by said punch element upon upward movement thereof after a downward card-punching movement for moving said member to present the next step to engagement with said portion of said structure to limit said linear movement in one direction with said punch element arranged over a point spaced in said direction from the point at which said card-perforating movement of said punch element has perforated the card.

3. A card punching device comprising a relatively flat card-supporting body, a structure slidably connected to said body for linear movement relative thereto, a punch element carried by said structure and mounted for vertical movement, means biasing said punch element upwardly to a limit of movement, there being a die beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, means biasing said structure for linear movement in one direction relative to said body, a pair of positioning devices one carried by said body and the other by said structure, one of said devices comprising an engaging element and the other comprising a stop element having successive steps engageable by said stop element to limit linear movement of said structure in said direction at progressively different points, and means operative upon movement of said punch element upwardly to said limit of movement after a punching operation to position said engaging element for contact with the next successive step of said stop element.

4. A card punching device comprising a body, a structure slidably connected to said body, a punch element carried by said structure and mounted for vertical movement, there being a die beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, a movable member carried by said body and provided with a plurality of successive steps, said structure having a normal starting position in which a portion thereof engages one of said steps, means biasing said punch element upwardly to a normal limit of movement, an actuating device engageable with said movable member to positively advance it one step upon return movement of said punch element approximately to its normal position to present the next of said steps for engagement by said portion of said structure, means biasing said structure for linear movement in one direction to engage said portion thereof with said steps, said structure being movable in the opposite direction beyond its normal position to release said portion thereof from said movable member, and means operative when said carriage is in its last-named position for reversing movement of said movable member.

5. A device constructed in accordance with claim 4 wherein the means for reversing the movement of said movable member comprises a return spring constantly biasing said movable member to a starting position.

6. A card punching device comprising a body, a structure slidably connected to said body for linear movement relative thereto, a punch element carried by said structure and mounted for vertical movement, there being a die beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, means biasing said punch element upwardly to a normal limit of movement, a pivoted stop plate carried by said body and provided with a plurality of successive steps one of which is a starting step and the remainder of which progress around said wheel in one direction, means biasing said structure for linear movement in one direction toward said plate, said structure having a portion normally engaging said starting step, and means operative as said punch element approaches said normal limit of movement after

having moved downwardly to perforate the card for positively moving said wheel to bring the next successive step into alignment with said portion of said structure to be engaged thereby.

7. A device constructed in accordance with claim 6 wherein the means for moving said wheel comprises an arm, a pawl carried by said arm, said wheel being provided with ratchet teeth engageable by said pawl to effect said movement of said wheel, means biasing said arm for movement in a direction to effect said movement of said wheel, and means operable by said punch element in downward movement thereof for moving said arm in the other direction whereby, upon upward movement of said punch element, said last-named biasing means will move said wheel.

8. A card punching device comprising a body, a structure slidably connected to said body for linear movement relative thereto, a punch element carried by said structure and mounted for vertical movement, there being a die beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, means biasing said punch element upwardly to a normal limit of movement, a pivoted stop plate carried by said body and provided with a plurality of successive steps one of which is a starting step and the remainder of which progress around said wheel in one direction and are arranged progressively closer to the pivot axis of said stop plate, means biasing said structure for linear movement in one direction toward said plate, said structure having a portion normally engaging said starting step, said stop plate having ratchet teeth, a pawl movable in one direction to engage one of said teeth and in the other direction to be released therefrom, means having mechanical connection with said punch element to move said pawl in said other direction upon downward movement of said punch element, and means for moving said pawl in said one direction when said punch element moves upwardly and approaches said normal limit of movement.

9. A device constructed in accordance with claim 8 wherein the means for moving said pawl in said other direction comprises a rocker, mechanical connections between said rocker and said pawl, and mechanical connections between said rocker and said punch element.

10. A device constructed in accordance with claim 8 wherein the means for moving said pawl in said other direction comprises a rocker, mechanical connections between said rocker and said pawl, and mechanical connections between said rocker and said punch element, the means for moving said pawl in said one direction as said punch element approaches its normal limit of movement comprising a biasing spring.

11. A card punching device comprising a body, a structure slidably connected to said body for linear movement relative thereto, a punch element carried by said structure and mounted for vertical movement, there being a die beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, means biasing said punch element upwardly to a normal limit of movement, a pivoted stop plate carried by said body and provided with a plurality of successive steps one of which is a starting step and the remainder of which progress around said wheel in one direction and are arranged progressively closer to the pivot axis of said stop plate, means biasing said structure for linear movement in one direction toward said plate, said structure having a portion normally engaging said starting step, said stop plate having ratchet teeth, a pivoted arm, a pawl carried by said arm and engageable with one of said teeth upon movement of said arm in one direction to turn said stop plate and present the next successive step to engagement with said portion of said structure, said pawl being disengageable from said teeth upon movement of said arm in the other direction, motion transmitting means between said punch element and said arm to move the latter in said other direction upon downward movement of said punch element, and a biasing spring for moving said arm in said one direction as said punch element moves upwardly and approaches its normal limit of movement.

12. A card punching device comprising a body, a structure slidably connected to said body for linear movement relative thereto, a punch element carried by said structure and mounted for vertical movement, there being a die beneath said punch element and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, means biasing said punch element upwardly to a normal limit of movement, a pivoted stop plate carried by said body and provided with a plurality of successive steps one of which is a starting step and the remainder of which progress around said wheel in one direction and are arranged progressively closer to the pivot axis of said stop plate, means biasing said structure for linear movement in one direction toward said plate, said structure having a portion normally engaging said starting step, said stop plate having ratchet teeth, a pivoted arm, a pawl carried by said arm and engageable with one of said teeth upon movement of said arm in one direction to turn said stop plate and present the next successive step to engagement with said portion of said structure, said pawl being disengageable from said teeth upon movement of said arm in the other direction, a rocker pivotally supported by said body, means connected between said punch element and said rocker to rock the latter in one direction upon downward movement of said punch element, a connection between said rocker and said arm for moving the latter in said other direction upon rocking movement of said rocker in said one direction, and a biasing spring for moving said arm in said one direction when said punch element moves upwardly and approaches its normal limit of movement.

13. A card punching device comprising a body, a structure slidably connected to said body, said body and said structure constituting a pair of relatively linearly movable units, a punch assembly carried by said structure and mounted for linear movement relative thereto transversely of said first-named linear movement, a punch element carried by said punch assembly and mounted for vertical movement, said structure comprising a die plate beneath said punch element and having a single line of die openings adapted to be selectively aligned with said punch element as said punch assembly is moved in its linear movement, a movable stop member carried by one of said units, and means rendered effective upon upward movement of said punch element after it has been moved downwardly to punch the card, in any position of said punch assembly in its linear movement, to present a different portion of said member to engagement with a portion of the other unit to effect and limit said linear movement of said structure in one direction with said punch element arranged over a different point on the card.

14. A card punching device comprising a body, a carriage slidably connected to said body for longitudinal movement relative thereto, a cross head slidably connected to said carriage for movement transversely of said body, a punch element carried by said cross head and mounted for vertical movement, said carriage comprising a die plate beneath said punch element and having a single line of die openings transverse to said body and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, means biasing said punch element for upward movement to a normal limit of movement, a movable member carried by said body and provided with a plurality of steps, said carriage having a normal starting position in which a portion thereof engages one of said steps, a rocker carried by said body and pivoted thereto for rocking movement on an axis transverse thereto, means carried by said cross head and engaging said rocker in any position of said cross head transversely of said body to rock said rocker in one direction upon downward movement of said punch element, operating means movable in one direction for effecting movement of said movable member to move the next step of such member to a position in which it is engageable by said portion of said carriage, means biasing said operating means for movement in said direction, and means connected between said rocker and said operating means for moving the latter in the other direction when said rocker rocks in said one direction whereby the biasing means for said operating means will move the latter in said one direction upon upward movement of said punch element.

15. A card punching device comprising a body, a carriage slidably connected to said body for longitudinal movement relative thereto, a cross head slidably connected to said carriage for movement transversely of said body, a punch element carried by said cross head

and mounted for vertical movement, said carriage comprising a die plate beneath said punch element and having a single line of die openings transverse to said body and over which a card is adapted to be arranged to be perforated upon downward movement of said punch element, a plate arranged beneath said body, a shaft supporting said plate for rocking movement relative to said body, said plate having a plurality of successive steps one of which is a starting step and the remainder of which progress in one direction around said plate at progressively decreasing distances from the axis of said shaft, a finger carried by said carriage, means biasing said carriage for linear movement in one direction relative to said body to maintain said finger in engagement with one of said steps, a rocker extending transversely of said body and pivotally connected thereto for rocking movement on an axis transversely of said body, a lever pivotally connected to said cross head and mechanically connected to said punch element and engaging said rocker to rock the latter in one direction upon downward move-

ment of said punch, actuating means for turning said plate, means biasing said actuating means for movement in one direction to turn said plate, and mechanical means connecting said rocker to said actuating member to move the latter in the other direction and then release it upon upward movement of said punch element whereby said last-named biasing means will cause said actuating means to turn said plate to present the next successive step to engagement by said finger.

16. A device constructed in accordance with claim 15 wherein said rocker comprises a plate extending throughout the width of said body and bent intermediate its ends to provide a portion overlying said body and engageable with said lever and a depending portion arranged adjacent one end of said body, said mechanical means comprising a rod connected between the depending portion of said rocker and said actuating member.

No references cited.