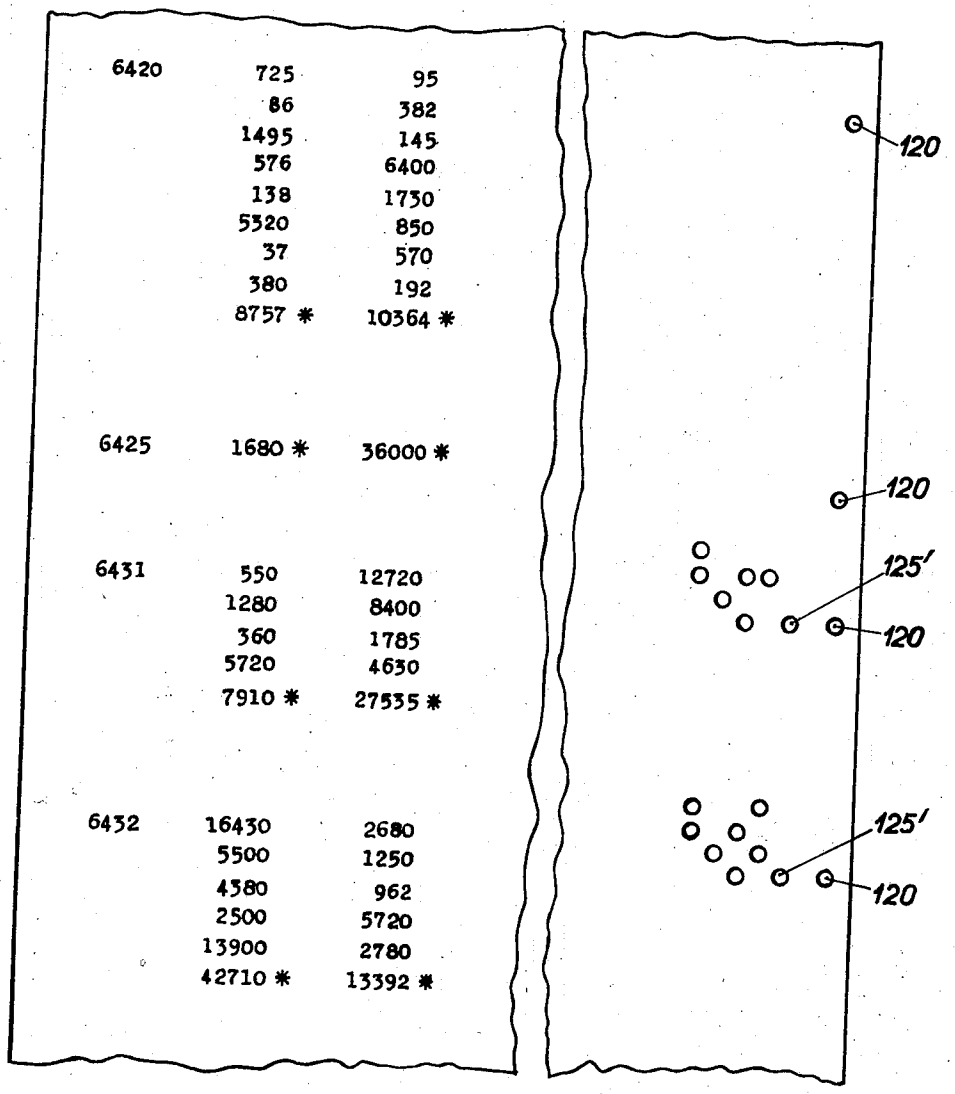
July 2, 1940. M. MAUL 2,206,640

RECORD SHEET PUNCHING MACHINE

Filed Nov. 16, 1938 6 Sheets-Sheet 1

Fig. 1



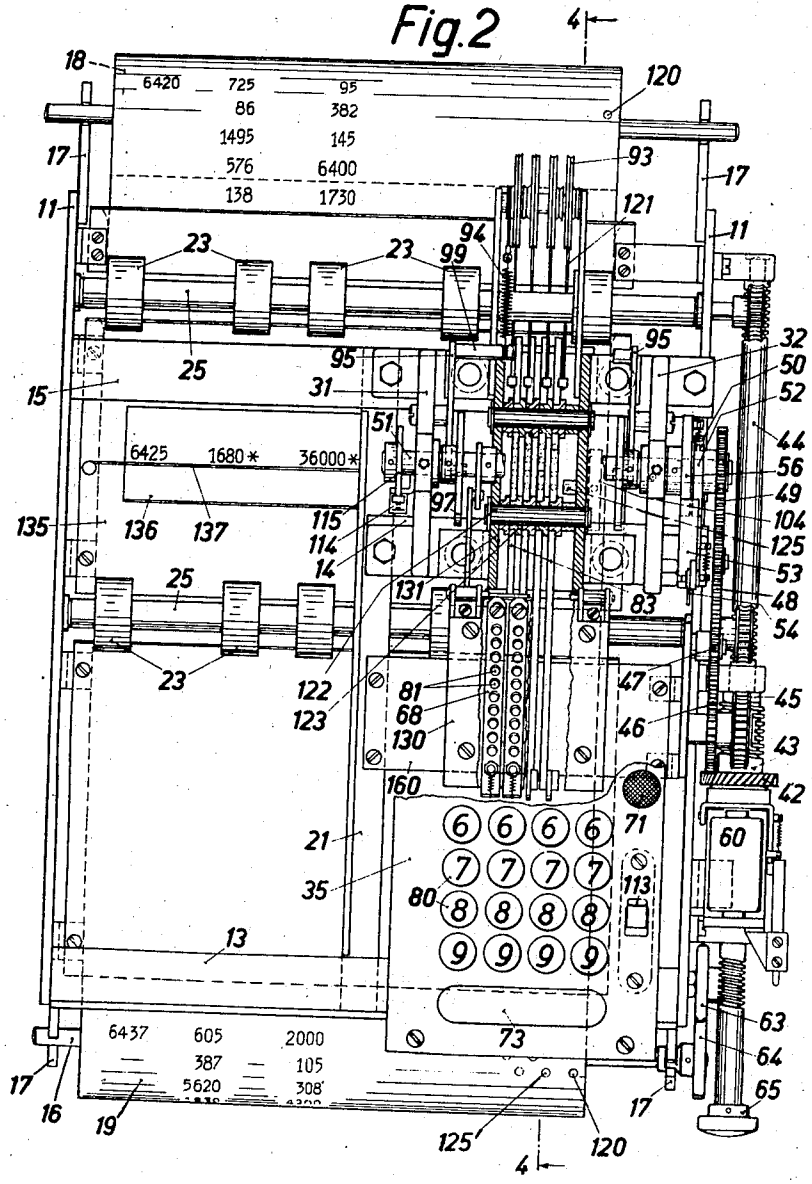
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RECORD SHEET PUNCHING MACHINE

Filed Nov. 16, 1938 6 Sheets-Sheet 2

Fig.2



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6 Sheets-Sheet 3

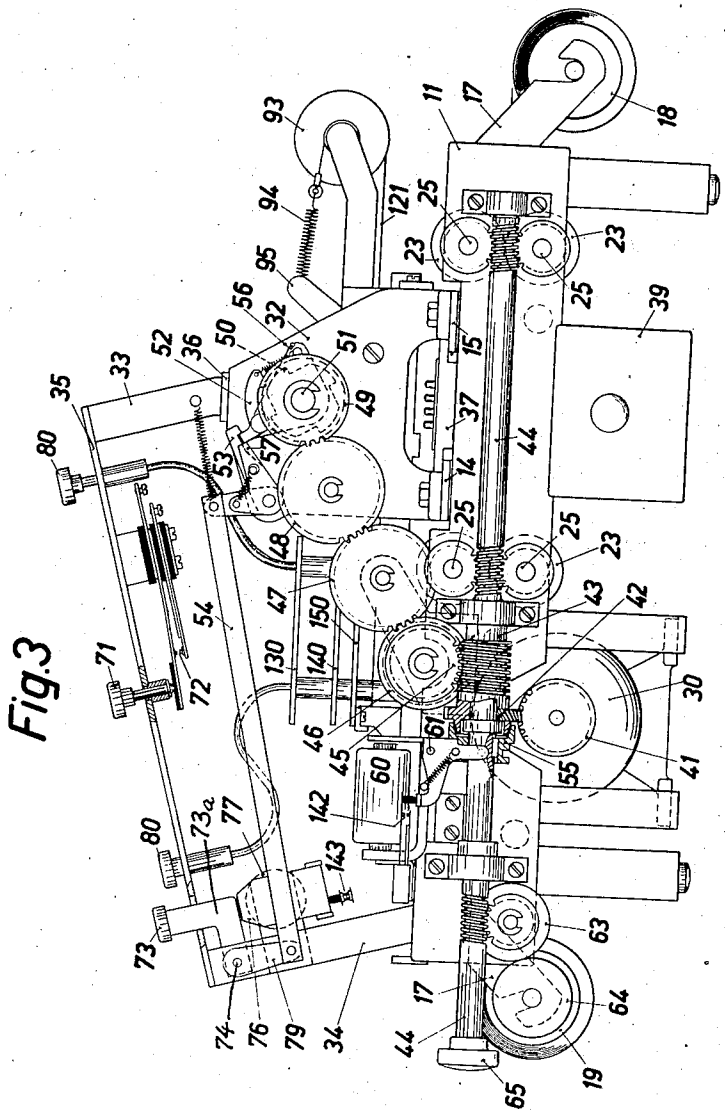


Fig.3

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RECORD SHEET PUNCHING MACHINE

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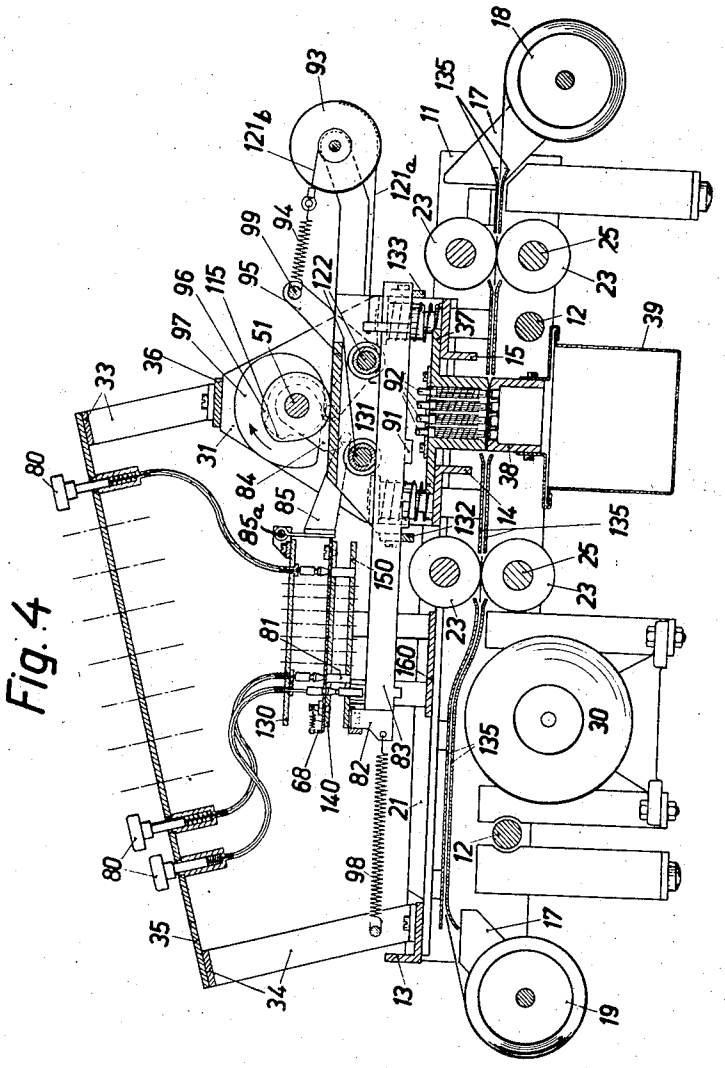


Fig. 4

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RECORD SHEET PUNCHING MACHINE

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Fig. 5

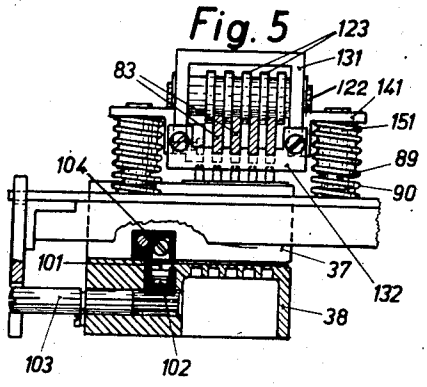


Fig. 6

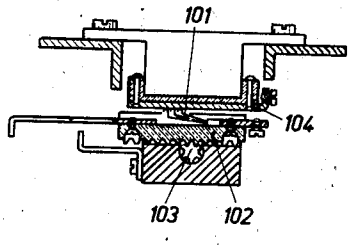


Fig. 7

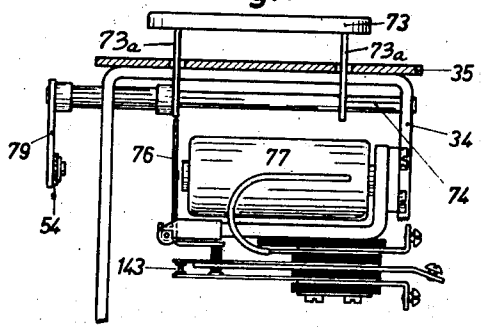
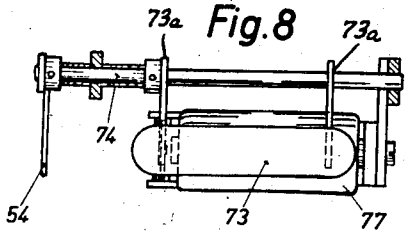


Fig. 8



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RECORD SHEET PUNCHING MACHINE

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Fig.9

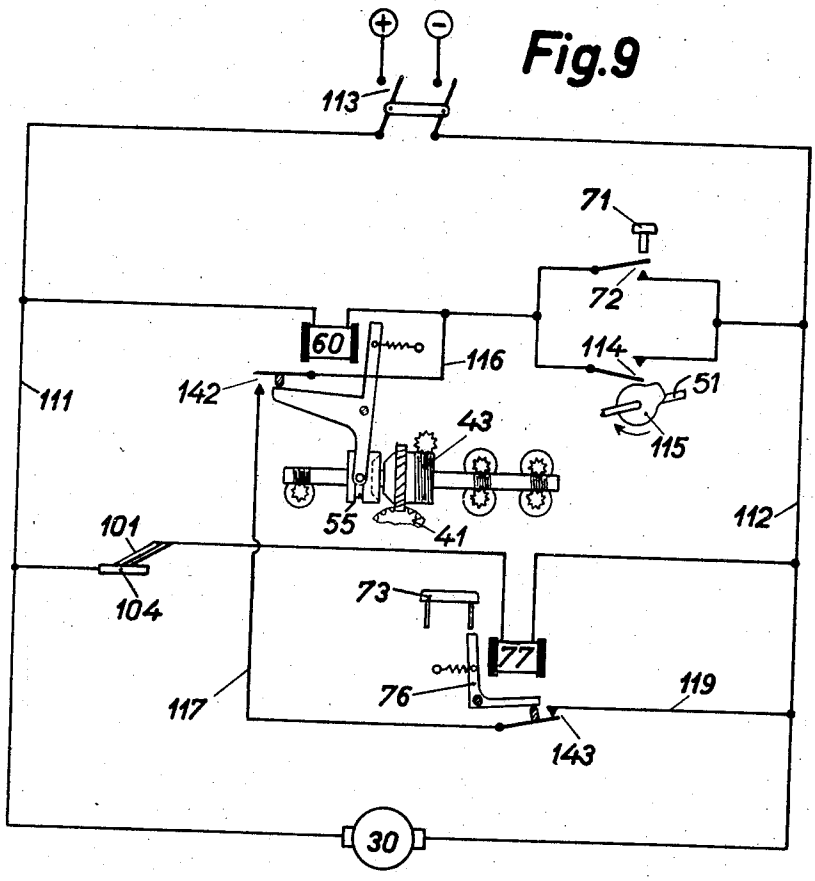
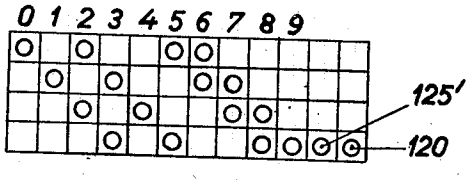


Fig.10



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UNITED STATES PATENT OFFICE

2,206,640

RECORD SHEET PUNCHING MACHINE

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Application November 16, 1938, Serial No. 240,879
In Germany January 5, 1938

9 Claims. (Cl. 164—112)

In machines of the type controlled by perforated record cards which are utilized for accounting, bookkeeping and statistical purposes, it is essential in many cases that the printed records obtained under control of the perforated record cards contain not only numerical data but in addition thereto address data. One manner in which this may be obtained consists in representing the addresses by perforations in the perforated record cards so that the perforations representing the address cause, upon the passage of the record card through an alphabet printing tabulating machine, the printing of the address in addition to the numerical data which is printed by the numerical printing mechanism of the machine under control of the fields of the record cards representing numerical data. In some types of machines the record cards representing the addresses may contain only address representing perforations.

Another arrangement whereby address data may be printed has been disclosed in U. S. Patent No. 2,002,437. According to the disclosure in this patent, representations of numerical designations are punched on a record sheet in addition to the numerical data printed thereon. The perforations representing the designations, which are made in successive sections of the sheet, are compared with designations placed upon address printing plates which are passed through the same machine. Upon the agreement of the perforations on the sheet with the designations on the address printing plate, a printing operation is effected from the printing plate and the address data is thereby printed upon the section of the record sheet containing the designation perforations corresponding to the designations of the address printing plate from which the printing operation is effected. The operation of the combined, tabulating, punching and addressing machine is entirely automatic so that the successive sections of the sheet are imprinted with the related addresses. The address printing plates which are not selected for printing operations pass ineffectively through the machine.

The last mentioned method of operation is carried out by a special construction of an accounting machine such as, for instance, a printing tabulating machine which is provided with an address printing mechanism. The numerical data is printed upon the sheet under control of record cards so as to print the data represented by such record cards. The machine just described must be provided with a punching mechanism which causes under control of certain fields of the record cards the perforation of the sheet to represent the designation numbers related to the address printing plates from which printing operations are to be effected. The record sheet which is thus perforated may be then utilized to control the printing of addresses on the sheet in the type of combined tabulating, addressing machine heretofore described.

It is obvious from the above that the placing of the perforations in the record sheet must be effected by means of a punching mechanism incorporated in the tabulating machine. The method just described may be used in connection with other types of accounting machines such as adding machines, cash registers and the like which are, as a usual rule, not provided with any means capable of printing addresses on a record sheet.

In certain types of machines it is not possible, or at least undesirable, to incorporate in such machines the special printing mechanism for punching address plate selection designations on the record sheet and this may be due, for example, to the fact that space limitations in the machine will prevent the incorporation of such mechanisms or for the reason that the machines are already in commercial operation.

It is obvious from the preceding that in order to attain the object it will be necessary to provide a punching mechanism in order to punch the address printing plate selecting designations on the record sheet. The result, however, may be obtained by a method which primarily involves three steps and avoids the prior objections mentioned. In the first step of operation the numerical data is printed on the record sheet by means of the usual numerical printing mechanism and at the same time a guide hole is punched for each printed section of the record sheet. Such punching means for punching a guide hole may be easily incorporated in existing machines. In the second step of operation, by means of a separate punching machine the address printing plate selecting designations are punched on the record sheet under manual control. The perforations are made in the sheet in accordance with the address plate selecting designations printed upon the record sheet. In the third and final step of operation, the record sheet is passed through an address printing machine of the type previously described so as to print in each section of the sheet address data related thereto.

It is the principal object of the present invention to provide a machine by means of which the

second step of the method may be carried out. In the preferred construction of the machine the sheet is fed through the punching machine section by section. The address printing plate selecting perforations to be made upon a section of the sheet are determined by the printed data on the sheet which is visually read by the operator. By means of a key controlled punching mechanism punches are selected under control of the keys and operated by power means so as to effect the punching operation. After the successive depression of the keys have selected the punches, the power means is released under control of a punch control release bar so as to cause the power operation of the selected punches. After the punching operation the record sheet is fed to the extent of one section and such feeding operation is effected automatically and during this operation the punch control release bar is locked against further depression. However, in order to speed up the operation of the machine, the punch selecting keys may be preliminarily operated in accordance with the numerical data on the successive section. By means of the guide holes previously described the sheet feeding mechanism will be automatically stopped when a guide hole is sensed by a sensing device in the machine.

The preferred electro-mechanical construction of the machine utilizes a one revolution clutch which controls the connection of the means for effecting the operation of the punches and the power drive and the engagement of such clutch is placed under control of the punch control release bar. When one revolution of the clutch is terminated an electrical contact is closed so as to cause energization of the sheet feeding clutch control magnet which thereupon causes the rotation of feed rollers so as to feed the record sheet to the extent of a successive section. The electrical circuit for the clutch magnet includes a stick circuit and such stick circuit is interrupted under control of a relay. The last mentioned relay is controlled as to its effectiveness by the sensing device for the guide hole so that upon encountering a guide hole in the sheet, the relay is effective to open the stick circuit of the clutch feed magnet and thereupon sheet feeding operations terminate. The relay also has provisions to cause the punch control release bar to be locked against depression during the time that the record sheet is being fed.

The sensing device for the guide hole is preferably adjustable so that the area receiving the perforations may be selected within certain limits.

Further objects of the instant invention reside in any novel feature of construction or operation or novel combination of parts present in the embodiment of the invention described and shown in the accompanying drawings whether within or without the scope of the appended claims and irrespective of other specific statements as to the scope of the invention contained herein.

A preferred embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is an illustration of a printed record sheet which shows in the lower part thereof perforations which are already made by the machine constructed according to the present invention. This figure also illustrates the aforementioned guide holes 120 which are punched by special punching means in the tabulating machine.

Fig. 2 is a plan view, certain of the parts being shown in section or broken away to more clearly understand the construction, and the record sheet is shown inserted in the machine.

Fig. 3 is a view in side elevation of the machine.

Fig. 4 is a transverse and sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a detail view partially in section showing the guide means for the punch selector bars and the means for effecting the adjustment of the sensing device for the guide holes.

Fig. 6 is a detail view partially in section and shows the construction of the guide hole sensing device.

Fig. 7 is a detail view showing the electromagnetically controlled lock mechanism for the punch controlled key.

Fig. 8 is a plan view of the parts shown in Fig. 7.

Fig. 9 is an electrical wiring diagram of the machine.

Fig. 10 is a representation of the code of digit representing perforations for selection of the address printing plates.

Fig. 1 shows a portion of the printed record sheet the two lower sections being shown perforated in accordance with the present invention and by the machine to be hereinafter disclosed, and shows in upper sections the form the sheet is in when such sections are to be perforated. The numerical data which is printed at the left-hand columns has, of course, been printed by the tabulating machine. These printed items represent group numbers at the extreme left, and in the next two columns groups of related items. The group numbers are represented in the sheet shown in Fig. 1 by the numerals 6420, 6425, 6431 and 6432. Each group of items comprises a number of printed items arranged one below another and below the lowermost item of a group there is represented a related total as well as an asterisk. In the present illustration only two groups of items are represented indicating, for example, weights and amounts. In some instances more columns of items are printed upon the record sheet. It is pointed out that since the second group from the top comprises a single item, this item also represents the group total.

On the record sheet shown in Fig. 1, and which is to be passed through the punching machine, there is also provided a single guide hole 120 for each group of items and such guide holes are, as heretofore pointed out, effected by means of a specially provided punch incorporated in the tabulating machine which produces the printed record sheet. The guide holes, as has been explained, serve in the present machine to control the extent of paper feed and terminate such record feeding operations so as to position the sheet beneath the punches in such a position that the lowermost hole positions of the coded perforations is on the same horizontal line as the guide hole.

To more clearly illustrate, it will be noted that for a group of items the group number, 6431, is printed on the record sheet shown and by means of the present punching machine the correlated section of the sheet is perforated so as to represent by the code of perforations illustrated in Fig. 10 the digits, 6431. The positioning of the sheet so as to receive these perforations is placed under control of the guide hole 120 related to the groups of items.

In the present instance, a guide hole 120 is

correlated with each group of items. Obviously, if the printed record sheet comprises successively printed items which are not correlated, a guide hole 120 may be provided for each line of printed items, or one for each total if only totals are printed on the record sheet. In Fig. 1 it has been assumed that the guide hole 120 shown is correlated with the second item of each group but obviously the guide hole could just as well be coordinated to the first or any other item or the total of each group.

In Fig. 1 it has been assumed that the record sheet has been fed through the punching machine constructed according to the present invention so that the two lowermost sections thereof are punched to represent by the code of perforations the numbers, 6431 and 6432. The guide holes 120 for such sections serve to determine the position of the sheet for receiving such perforations. Since in the addressing operations a supplemental guide hole is desirable the present machine is preferably provided with a supplemental punching means to cause the punching of a supplemental guide hole 125' and such perforation is effected simultaneously with the address plate selecting designation perforations and such perforations 125' are preferably located adjacent the holes 120 and for each section are preferably located in a horizontal line.

Since the construction of the special punching means in the tabulating machine for perforating the guide hole 120 in the record sheet requires that such perforations be placed at a definite and unchangeable position in the sheet and since, on the other hand, the address printing may be required on the sheet at various positions, the supplemental guide hole 125' may be displaced with respect to the guide hole 120. For this reason, the sensing device for the guide hole 120 is preferably adjustable so that the location of the special guide hole 125' may be selected in accordance with different requirements.

General construction of the machine

The machine includes a set of punches which are selected for perforating operations by means of combinational punch selector bars and the adjustment of these bars is determined by the depressed keys of the keyboard. The operation of the punches is effected by means of a motor drive. For this purpose the punching mechanism is clutched to a continually running motor by means of a one-revolution clutch and such clutch connection is effected under control of a punch control key. The record sheet is fed to present successive sections of the record sheet to the punching mechanism by means of rollers which have a frictional drive connection with the aforesaid continually runnning motor.

Framework construction of the machine and parts carried thereby

The framework of the machine consists of two side frame plates 11 (Fig. 2) which are transversely connected by means of rods 12 (Fig. 4) and also by angle plates 13 and 15 also shown in Fig. 4. The angle plates 13 and 15 are connected with each other by means of a plate 21 (see Fig. 2). An angle plate 14 (Figs. 2 and 4) has one end thereof secured to the right end side frame plate 11 and at the other end to the plate 21.

Secured to the rearward extremities of the side plates is a pair of brackets 17 and (as best shown in Fig. 2), these brackets form the supporting means for the record sheet supply roll which is to be perforated by the machine. The record sheet is fed from the supply roll through the machine and after it has been perforated the perforated portion is wound upon a storage roller 19. The storage roller is carried by forwardly extending brackets 17 (Fig. 2) also carried by the side frame plates 11.

The shafts 25 (Figs. 3 and 4) for the two pairs of feed rollers 23 are journaled in the side frame plates 11 and it will be seen from Fig. 4 that the feeding rollers are positioned at both sides of the punching mechanism. The storage roller 19 has a frictional drive connection to the motor and which driving connection will be subsequently described.

A motor 30 (Figs. 3 and 4) comprises the prime mover for the machine and is suitably supported by the framework of the machine and is located between the side frame plates 11 at the bottom of the machine. From the motor 30 there is a drive for operating the punching mechanism and also a driving means for rotating the feeding rollers 23 and which driving means will be subsequently described.

Secured to the angle plates 14 and 15 are upstanding brackets 31 and 32 (Figs. 3 and 4), the upper ends of which are transversely connected by a bar 36 and secured to said bar there is a bracket 33. To the angle plate 13 there is secured a bracket 34 at the front part of the machine and the brackets 33 and 34 together form the supporting means for the keyboard 35.

The punches 98 are supported by a carrier bar 37 (Fig. 4) which is supported by the angle bars 14 and 15. A die plate 38 (Fig. 4) is located beneath the punches and has an opening to a box 39 which receives the chips formed by the punching operation. The punch selecting mechanism for selecting the punches is mounted beneath the keyboard 35. Between the brackets 31 and 32 the guiding means and the driving means for the punch selectors are arranged.

Driving mechanism

Secured to the armature shaft of the motor 30 is a worm gear 41 (Fig. 3) in a driving engagement with a worm gear 42. The worm gears 41 and 42 have the same number of teeth and obviously a gear ratio of 1:1. The worm gear 42 is an integral part of a sleeve 43, which, in turn, is loosely mounted upon a drive shaft 44. Integral with the sleeve 43 is a worm wheel which is in driving engagement with a worm gear 45 which is fastened to a gear 46 (see Fig. 2). The gear 46 is adapted through a train of gears 47, 48, and 49 to rotate a clutch wheel 50, the clutch wheel 50 and gear 49 being connected together by means of a sleeve which is loosely mounted upon a drive shaft 51.

The clutch wheel 50 is one element of a one-revolution clutch adapted to effect a driving engagement between the motor and the operating means for the aforementioned punches. The clutch also includes an arm 56 which is secured to the drive shaft 51 (Figs. 2, 3, 4). The shaft 51 is journaled in the brackets 31 and 32. Pivotally mounted upon the clutch arm 56 is a spring urged clutch pawl 52 and said pawl is in the plane of the clutch wheel 50, and is normally held out of operative engagement therewith by means of a clutch release arm 53. The clutch release arm as well as a rebound preventing arm 57 are pivotally mounted on the bracket 32. When the clutch release arm 53 is rocked by

the forward shifting of a bar 54 (Fig. 3) pivotally connected thereto, the clutch pawl 52 is released for engagement with the clutch wheel 50 thereby effecting a driving connection between the arm 56 and the shaft 51 so that the drive shaft 51 will be rotated for the extent of one-revolution. When one-revolution of the shaft has been effected, the clutch release arm having been released, will now be in the path of the clutch pawl 52, and effect its disengagement from the clutch wheel 50. The construction and operation of the one-revolution clutch just described are very well known in the art to which the present invention appertains, and for this reason is only briefly described and explained herein.

As previously indicated the pairs of feeding rollers 23 are driven by the motor 30 through a frictional driving means which will now be described. From Fig. 3 it will be seen that the sleeve 43 terminates at its left and in a bevel portion which is one element of the friction clutch. This element is received by a similar shaped recess of the supplemental frictional drive element 55 which is slidably mounted on the shaft 44 and has a sliding key connection therewith. In order to effect the frictional driving connection between the elements of the friction clutch there is provided a clutch control magnet 60, the armature of which is pivoted at 61 and which has depending extensions carrying pins engaging a groove of the clutch element 55. It is obvious that when the magnet 60 is energized the clutch member 55 will be brought into frictional engagement with the correlated friction element of the continually driven sleeve 43 so as to effect a rotation of the sleeve 43. From Fig. 3 it will be seen that the shaft 44 is provided with threaded portions formed as worm wheels meshing with worm gears secured to the shafts 25 to which are fixed the feeding rollers 23.

By means of the frictional drive connection just described the shaft 44 is also adapted to rotate the paper feeding storage roller 19. To this end the shaft 44, as best shown in Fig. 3, is adapted to rotate a circular member 19 which is preferably a rubber roller 63. The latter is in frictional driving engagement with an element 64 which is preferably also a rubber roller and which is secured to the supporting shaft of the paper sheet storage roller 19. Due to the ratio of the diameters of the members 63 and 64 the paper storage roller 19 is rotated so as to be capable of winding up the paper strip to a greater extent than that fed by the rotation of the feeding rollers 23 so that, independently of the diameter of the paper feeding storage roller, the latter will always tightly wind up the paper strip and when a sufficient rotation has been given to the paper storage roller 19 to effect this operation a subsequent slippage will be effected between the elements 63 and 64. In order to enable the manual feeding of the record sheet through the machine the shaft 44 is provided at its extremity, as best shown in Fig. 3, with a knob or hand wheel 65.

In order to guide the record sheet through the machine guide plates 135 (Fig. 4) are provided. Since the group number to be punched upon the record sheet must be visually read from the record sheet one of the paper guide plates 135 is provided with a cut-out portion forming a window 136, best shown in Fig. 2. Across this window there is extended a guide wire 137 which indicates the number next to be punched.

The arrangement is such that the punches 98 will effect the punching in an area which is in juxtaposition to the printed group numbers and the guide hole 125' will be punched on the same horizontal line as the guide hole 120. From Fig. 2 it will be obvious that the record sheet has been fed to such an extent that the group number, 6425, is visible through the window 136 and is just above the designating element 137 and the last-mentioned number is now to be punched by a punching mechanism now to be described in detail.

Keyboard and control keys

The present machine discloses a keyboard comprising four rows of keys 80 designated 9—0, and thus the machine has a capacity for punching in four denominational places. This capacity is usually sufficient for ordinary requirements but the capacity of the machine may be altered to meet different requirements by varying the size of the keyboard and associated punching mechanism. In Fig. 2 only the lower keys of the four rows are shown so as to more clearly illustrate certain other parts in this figure. In addition to the four rows of numeral keys 80 the machine is provided with a start key 17 (Figs. 2 and 3) which, upon depression thereof, closes start key contacts 72. In order to initiate a punching operation, after the punches have been selected by the depression of the keys 80, a manually operated punch control release bar 73 is provided and as best shown in Figs. 3, 7 and 8 the punch release bar 73 is carried by a pair of bell crank arms 73a one of which is secured to a shaft 74. To the shaft 74 there is secured a depending arm 79 which is pivotally connected to the bar 54. It is obvious that when the punch release bar 73 is manually rocked the shaft 74 and arm 79 will also be rocked to shift the bar 54 to the left, as shown in Fig. 3, thereby effecting the clutch engagement in the manner previously described.

Below the release bar 73, there is provided a relay 77 (Figs. 7, 8) the armature 76 of which is underneath one of the bell crank arms 73a when the magnet of the relay 77 is deenergized. However, when the magnet of relay 77 is energized the armature 76 will be drawn to the right, as viewed in Fig. 7, so as to unlock the punch release bar 73 permitting a punching operation.

Figs. 3 and 4 disclose only several of the numeral keys and the lowermost key of a row is shown in depressed position. Each numeral key 80 is connected by a Bowden wire with a punch bar selector stop 81 (Fig. 4) there being a row of these stops, one for each key 80 and actuated thereby. The selector stops 81 are normally in elevated position out of the path of stops 82 of the related punch selection bar 83. The lower ends of the Bowden wires are slidably mounted in a frame plate 130 and the selector stops 81 are slidably mounted in spaced frame plates 140 and 150. The frame plates 130, 140 and 150 comprise a frame which is supported by means of rods secured to a plate 160 which, in turn, is fastened to one of the side frame plates 11 and the plate 21.

Slidably mounted on the frame plate 140 is a series of detent plates 68 there being one provided for each row of selector stops 81 and the detent plates are of a construction which is very well known. Each detent plate is adapted to hold the actuated selector stop 81 in depressed position until the completion of the punching

operation. At the completion of the punching operation a cam 84 fixed to the shaft 51 will, in its clockwise rotation, engage the free end of an arm 85 which is pivotally mounted on a rod 85a thereby rocking said arm and shift the detent plate 68 to the left, as shown in Fig. 4, thereby unlocking the depressed selector stops 81 of the related row. By means of a spring, clearly shown in Fig. 4 and mounted beneath each key, the key 80 and the related selector stop 81 are returned to normal position.

The punch selector bars 83 are, in general, guided in a casing and together with the casing they are depressed by means of a punch operating cam. The casing is shown in section in Fig. 4 and in end view in Fig. 5 and comprises a U-shaped frame 131. Referring to Fig. 5, to the U-shaped frame 131 there are secured brackets 141 carrying sleeves 151 which are slidable upon guide rods 89 fastened to the angle plates 14 and 15. Between the brackets 141 and the angle plates are located springs 90 which normally urge the frame upwardly so that the upper plate of the U-shaped frame 131 is in direct engagement with a punching cam 96, as best shown in Fig. 4.

The punch selector bars 83 are supported and slidably guided by means of combs 132 and 133 (Figs. 4 and 5) which are carrierd by the U-shaped frame 131 and also by means of guide rollers 123 which are loosely mounted upon rods 122 carried by the U-shaped frame 131. The selector bars 83 are provided with punch selecting elements 91 (Fig. 4) adapted to overlie one or more of the punches 92 and the punch selecting elements 91 are so arranged that upon the adjustment of a selector bar 83 to any of the ten different positions punches 92 will be selected which will punch the sheet with perforations representing the digits by the combinational designation shown in the code in Fig. 10.

Each selector bar, as best shown in Fig. 4, is connected at its right end to one extremity of a wire 121a and the other extremity of the wire 121a is connected to a reduction roller 93 at the periphery thereof of its larger diameter. The reduction roller 93 also has a portion of a smaller diameter to which is connected one end of a wire 121b and which wire is joined to a rod 99 through a spring 94. The rod 99 is carried by a pair of arms 95 which are pivotally mounted in the brackets 31 and 32 and one of said arms 95 has a forward extension adapted to be actuated by means of a cam 97 secured to the shaft 51. The timing of the cams 96 and 97 is such that upon the release of the one revolution clutch the cam 97 will first rock the arms 95 and the rod 99 thereby extending the springs 94 which cause the rotation of the reduction rollers 93 and through the wires 121a draw the punch selector bars 83 to the right until the stops 82 of the selector bars engage the selector stops 81 which have been actuated by the previous depression of the keys 80. In the normal position shown in Fig. 4, the initial tension of the spring 98 connected to a related punch selector bar 83 is greater than the initial tension of the spring 94 but upon the extension of the spring 94, in the manner just explained, the tension of spring 98 will be overcome so that the punch selector bar 83 will be moved to the right until stopped by one of the punch selector stops and held in such position thereby selecting certain of the punches 92 for operation.

When the punches have been selected in this manner the cam 96 will then be effective to depress the punch operating frame so that the selected punches 92 will be forced through the record sheet and into the die 38. Upon further rotation of the punch operating cam 96 the punch operating frame will return to its normal position and the cam 96 will thereafter relax the tension of the springs 94 so that the punch selector bars 83 may return to home position by means of the springs 98. However, before the return of selectors 83 the cam 84 will rock the arm 85 shifting all of the detent plates 68 to the left to release the selector stops 81. The record sheet is still being fed to the next section and, therefore, it will be possible to depress the keys to select punches to represent the group number of the next section. The release of the previously depressed keys will be an indication to the operator that the keys can again be depressed.

Perforating means for punching guide holes 125'

In order to effect the punching of the supplemental guide hole 125', which has a function previously explained in connection with the description of the record sheet shown in Fig. 1, a supplemental punch 125 (shown only in Fig. 2) is provided. The supplemental punch is carried by the punch operating frame and is therefore effective to perforate the record sheet with a guide hole 125' each time that the sheet is perforated by the selected punches 92.

The guide hole 120 is sensed in the present machine by an electrical sensing device comprising brushes 101 (see Figs. 5 and 6) which are carried by an adjustable carrier 102 which is of insulating material and is slidably mounted in the die plate 38. The sensing brushes 101 pass through the guide holes 120 and make contact with a contact plate 104. By means of a pinion 103 the carrier 102, and therefore the brushes 101, may be adjusted in the direction of the travel of the record sheet. As will be subsequently explained the feeding of the record sheet continues so long as the brushes 101 are prevented from contacting the plate 104 through the record sheet and when the brushes 101 make contact therewith through a guide hole 120 record sheet feeding operations are terminated. Obviously, by the adjustment of the brushes 101 the extent of paper feed may be varied and therefore the area in which the numeral representing perforations and the guide hole 125' are to be located may be selected at will, for reasons previously explained.

General summary of operation

To start the operation of the machine the printed record sheet (Fig. 1) which is to be punched is inserted in the machine and the leading portion thereof which is unprinted and unpunched is manually inserted and fed through the machine and wound upon the storage roller 19. As previously stated the manual record sheet feeding operation may be effected by means of the knob 65 (Figs. 2 and 3). Thereafter the main line switch 113 (Fig. 9) is closed so that the motor 30 receives current by means of the line wires 111, 112 and the motor remains in continual operation as long as the switch 113 remains closed. Thereafter the start key 71 is depressed so as to close its contacts 72 causing the card feed clutch magnet 60 (Figs. 3 and 9) to be connected across the line wires 111, 112 thereby initiating the record feeding operation.

When the armature of the magnet 60 is attracted, it will be seen from Figs. 3 and 9 that stick contacts 142 will be closed thereby closing a stick circuit for the card feed clutch magnet 60 extending from the line 111, to magnet 60, contacts 142, line 117, contacts 143 now closed, and wire 119 to the other line side 112. It will be obvious, therefore, that even if the start key 71 is released the sheet feeding operation will continue until the first guide hole 120 encounters the sensing brushes 101. This will cause, as shown in Fig. 9, the energization of a relay magnet 77 and the latter will attract its armature 76 and open contacts 143 (Figs. 7 and 9) thereby opening the stick circuit for the card feed clutch magnet 60 and terminate sheet feeding operations. The energization of the relay magnet 77 will, as shown in Figs. 7 and 9, attract its armature 76 so as to unlock the punch release bar 73.

Thereafter the punch selecting keys 80 are depressed in accordance with the group number visible through the window 136 (Fig. 2) and printed on the section of the record sheet which is to be punched. The depression of the keys 80 will actuate certain of the punch bar selector stops 81 (Fig. 4) and when all of the keys 80 have been depressed the punch release bar 73 is now depressed to cause the engagement of the one revolution clutch 50—52 shown in Fig. 3 to thereby cause the rotation of the shaft 51. In accordance with the actuated punch bar selector stops 81 the selector bars 83 will be differentially positioned so as to select cetain of the punches 92. Thereafter the punch operating cam 96 will cause the depression of the punch operating frame so that the selected punches 92 will perforate the record sheet to represent by combinational designations the printed group number. In addition to this punching the supplemental punch 125 (Fig. 2) will punch the record sheet with a second guide hole 125'.

Shortly before the completion of the punching operation a cam 115 secured to the shaft 51 (Figs. 4 and 9) will close contacts 114 to cause the reenergization of the magnet 60 thereby automatically initiating the feeding of the record sheet. When such feeding operation is initiated the guide hole 120 will be moved away from the brushes 101 thereby deenergizing the relay 77 so as to cause the closure of the contacts 143 and permitting the closure of the stick circuit for the card feeding clutch magnet 60 through such contacts 143 and the contacts 142. As will be obvious such stick circuit will remain established after cam controlled contacts 114 are opened.

Shortly after the punching operation is initiated the detent plates 68 (Fig. 4) will be moved to the left to release the depressed keys 80 and while the record sheet is being fed to position the next section to the punching position the numeral keys may be depressed in accordance with the group number of the next section if such is visible in the machine or is noted before the record sheet feeding operation is started. The punching operation is, however, prevented from occurring while the record sheet is being fed due to the fact that relay magnet 77 is deenergized during the record feeding operation so that its armature will lock the punch release bar 73.

When the guide hole 120 of the second record sheet section encounters brushes 101 the relay magnet 77 will be energized opening contacts 143 to open the stick circuit of the card feed clutch magnet 60. Record sheet feeding operations will now be terminated and if the numeral keys 80 have already been depressed in accordance with the group number of the second section of the record sheet the punch control release bar 73 may then be depressed. Punching and re-starting of the record feed will take place in the manner previously described.

When the last section of the record sheet has been punched the trailing end of the record sheet may be manually fed out of the machine by the rotation of the knob 65 (Fig. 2).

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a machine for punching a continuous record sheet in sections thereof each of which is provided with a guide hole, the combination of a punching mechanism, a plurality of manually operated punch selecting keys certain ones of which are depressible prior to an operation of the machine, record feeding means for feeding said record sheet, a punch control release bar, power driven means released by said punch control release bar for causing an operation of punches selected by said keys and for automatically initiating an operation of the record feeding means at the termination of the punching operation during which operation said keys may be depressed to select punches to effect the punching of another number on the successive section of the sheet, a sensing device for said guide holes, and means controlled by said sensing device for stopping record feeding operations when said sensing device senses a guide hole correlated with the successive section of the record sheet.

2. In a machine for punching a continuous record sheet in sections thereof each of which is provided with a guide hole, the combination of a punching mechanism, and means for operating punches therefor, a plurality of manually operated punch selecting keys, certain ones of which are depressible prior to an operation of the machine, a continually rotatable power driven means, record sheet feeding means, a punch control release bar, means controlled by said punch control release bar for effecting a clutch driving connection between said power driven means and the means for operating the selected punches, electromagnetic control means for controlling said record sheet feeding means, electrical means operated by the means for operating the selected punches for causing said electromagnetic control means to effect a driving connection between said continually rotatable power driven means and said record feeding means at the completion of the punching operation, a relay and contacts thereof, a stick circuit for said electromagnetic control means including said contacts and contacts closed by said electromagnetic means when the latter is operative to effect the aforesaid driving connection, an electrical sensing device for said guide holes, means controlled by said sensing device upon sensing a guide hole for a successive record sheet section for energizing said relay to open its contacts and thereby disable the stick circuit to terminate record feeding operations, and means controlled by said relay for lock-

ing said motor release bar when said relay is de-energized and for unlocking said motor release bar when said relay is energized.

3. In a machine for punching a continuous record sheet in sections thereof each of which is provided with a guide hole, the combination of a punching mechanism, a plurality of manually operated punch selecting keys certain ones of which are depressible prior to an operation of the machine, record feeding mean for feeding said record sheet, a punch control release bar, power driven means released by said punch control release bar for causing an operation of punches selected by said keys and for automatically initiating an operation of the record feeding means at the termination of the punching operation, during which operation said keys may be depressed to effect the punching of a number on the successive section of the sheet, a sensing device for said guide holes, means controlled by said sensing device for stopping record feeding operations when said sensing device senses a guide hole correlated with the successive section of the record sheet, means for carrying said record sensing device, and means for adjustably mounting said record sensing carrying device to effect its adjustment in the direction of record feed to thereby select the area that the record sheet is to be punched by the selected punches.

4. In a machine for punching a continuous record sheet in sections thereof each of which is provided with a guide hole, the combination of a punching mechanism including a supplemental guide hole punching means, a plurality of manually operated punch selecting keys certain ones of which are depressible prior to an operation of the machine, record feeding means for feeding said record sheet, a punch control release bar, power driven means released by said punch control release bar for causing an operation of punches selected by said keys and said supplemental guide hole punching means and for automatically initiating an operation of the record feeding means at the termination of the punching operation, during which operation said keys may be depressed to effect the punching of a number on the successive section of the sheet, a sensing device for said guide holes, means controlled by said sensing device for stopping record feeding operations when said sensing device senses a guide hole correlated with the successive section of the record sheet, means for carrying said record sensing device, and means for adjustably mounting said record sensing carrying device to effect its adjustment in the direction of record feed to thereby select the area that the record sheet is to be punched by the selected punches and by said supplemental guide hole punching means.

5. In a punching machine for punching a continuous record strip provided with guide holes, the combination of a punching mechanism including punches, a plurality of punch selecting elements certain ones of which are settable prior to an operation of the punches, record feeding means, power driven means for causing an operation of the selected punches and for automatically initiating an operation of the record feeding means at the termination of punching operations during which time the punch selecting elements are settable, a sensing device for sensing said guide holes, and means controlled by said sensing device for stopping record feeding operations upon said sensing device sensing a guide hole to thereby determine the position of the record strip for the subsequent punching operation.

6. In a punching machine for punching a continuous record strip provided with guide holes, the combination of a punching mechanism including punches, means for concurrently operating said punches, a plurality of punch selecting elements certain ones of which are settable prior to an operation of the punches, record feeding means, power driven means released after said elements are set for causing an operation of the operating means for said punches and for automatically initiating an operation of the record feeding means at the termination of punching operations during which time the punch selecting elements are settable, a sensing device for sensing said guide holes, and means controlled by said sensing device for controlling record feeding operations upon said sensing device sensing a guide hole to thereby determine the position of the record strip for the subsequent punching operation.

7. In a punching machine for punching a continuous record strip provided with guide holes demarcating sections of the strip into different lengths, the combination of a punching mechanism including punches, a plurality of punch selecting elements, certain ones of which are settable prior to an operation of the punches, record feeding means, power driven means for causing an operation of the selected punches and for automatically initiating an operation of the record feeding means at the termination of punching operations during which time the punch selecting elements are settable, a sensing device for sensing said guide holes, and means controlled by said sensing device for stopping record feeding operations upon said sensing device sensing a guide hole to thereby determine the extent of feed of the record strip for positioning the subsequent section for the subsequent punching operation thereon.

8. In a punching machine for punching a continuous record strip provided with listed data of variable lengths, numerical data, and demarcated into sections of corresponding different lengths by guide holes, the combination of a punching mechanism including punches, a plurality of punch selecting elements, certain ones of which are settable prior to an operation of the punches in accordance with said numerical data, record feeding means, power driven means released for causing an operation of the selected punches and for automatically initiating an operation of the record feeding means at the termination of punching operations during which time the punch selecting elements are settable in accordance with the data of a successive section, a sensing device for sensing said guide holes, and means controlled by said sensing device for stopping record feeding operations upon said sensing device sensing a guide hole to thereby determine extent of record strip feed to position the record strip for the subsequent punching operation on a successive section thereof.

9. In a punching machine through which is passed a record strip comprising several sections demarcated by guide holes each of which sections contains data to be also represented by punching, said data being visible by the operator of the punching machine, a plurality of punch selecting elements, certain ones of which are selected in accordance with the data on a successive section, record strip feeding means,

power driven means releasable by the operator for causing an operation of the punches selected by said elements and for automatically initiating the operation of the record feeding means to bring a successive record section into view to enable the related data to be read by the operator, during which feeding operation the punch selecting elements are operated in accordance with said data, a sensing device for sensing said guide holes, and means controlled by said sensing device for stopping record feeding operations to thereby position the subsequent section of the strip for a punching operation thereon.

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