March 8, 1932. F. M. CARROLL 1,848,159

PERFORATING MACHINE

Filed April 29, 1929 8 Sheets-Sheet 1

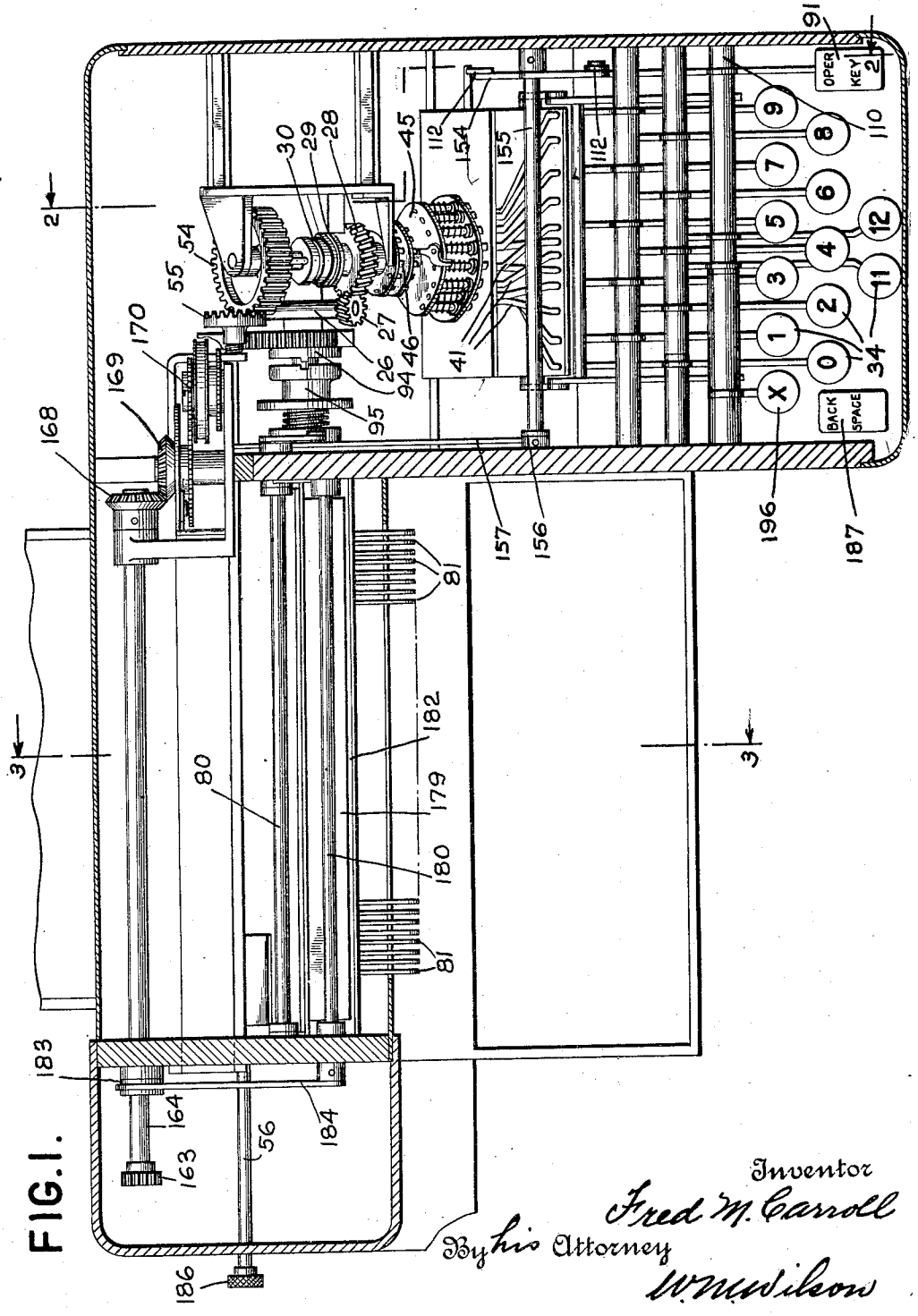


FIG. 1.

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FIG. 2.

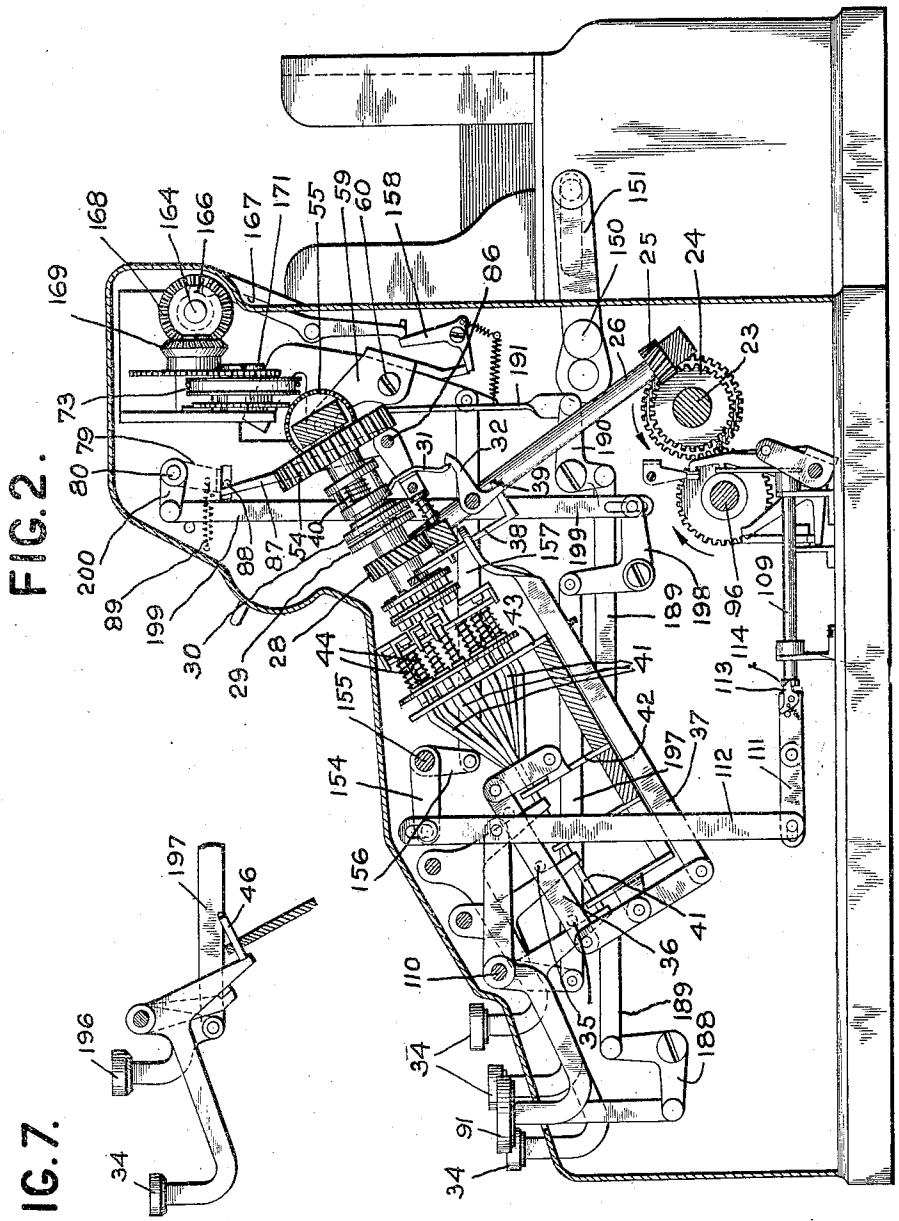


FIG. 7.

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PERFORATING MACHINE

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FIG. 3.

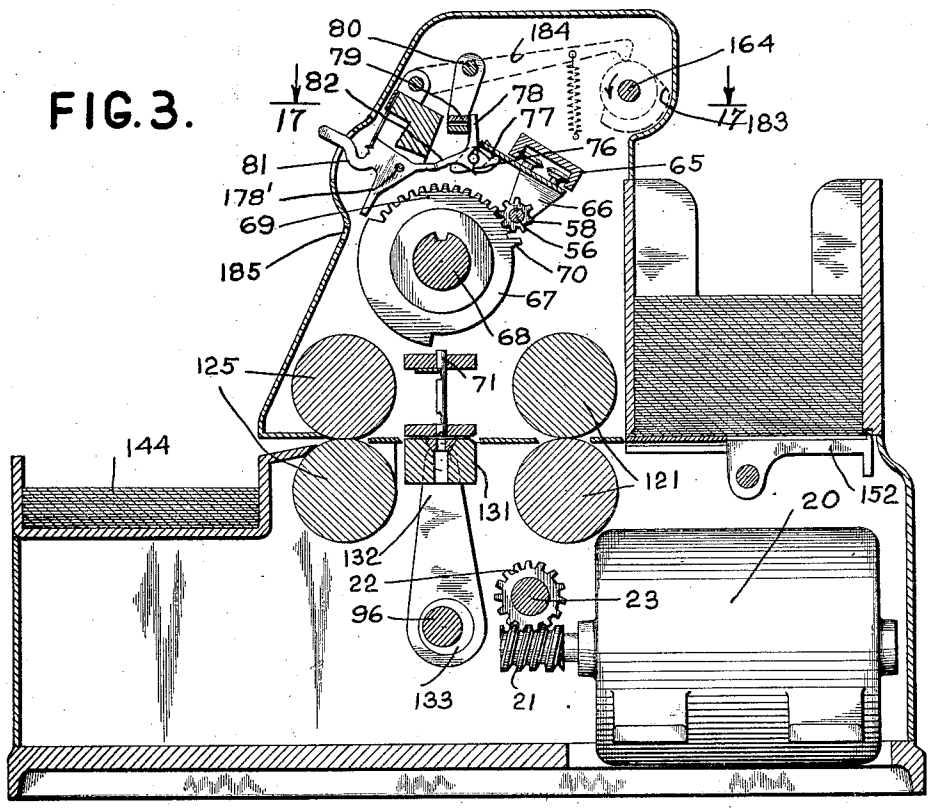
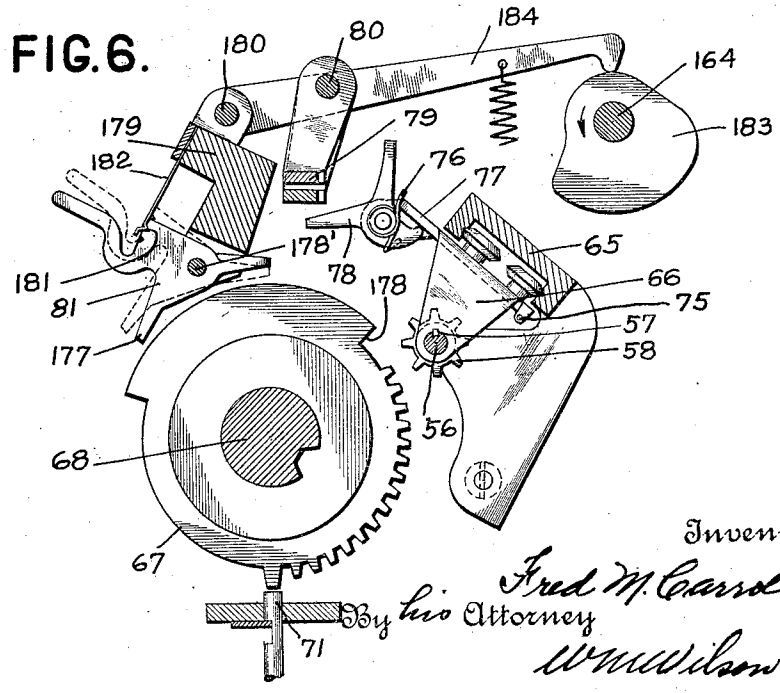


FIG. 6.



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PERFORATING MACHINE

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FIG. 4.

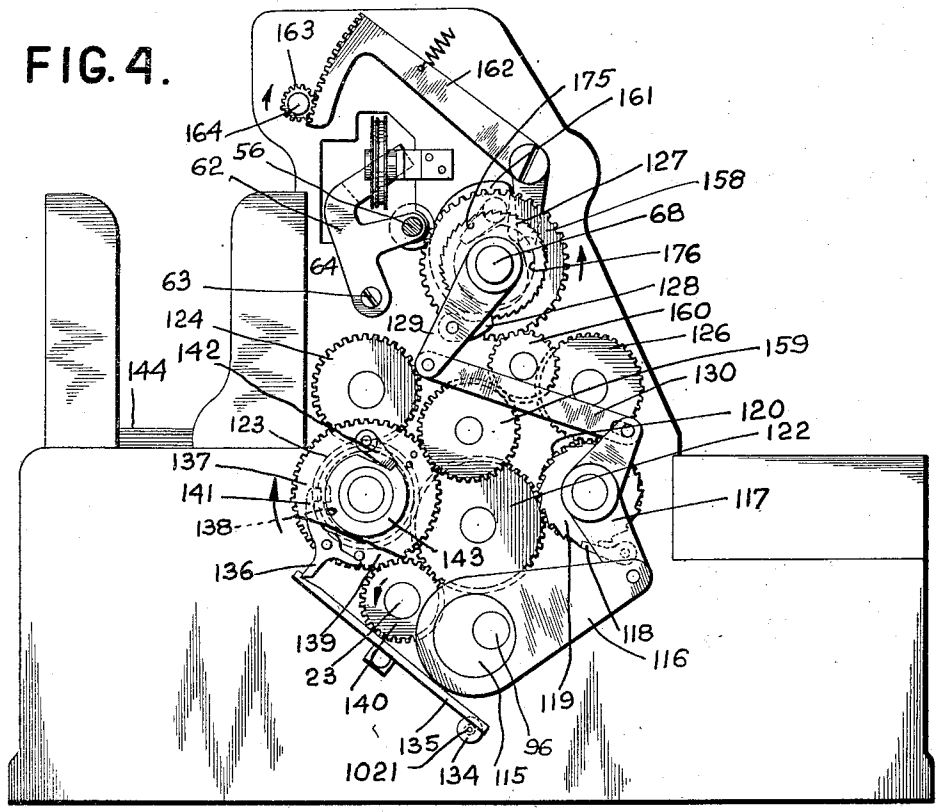
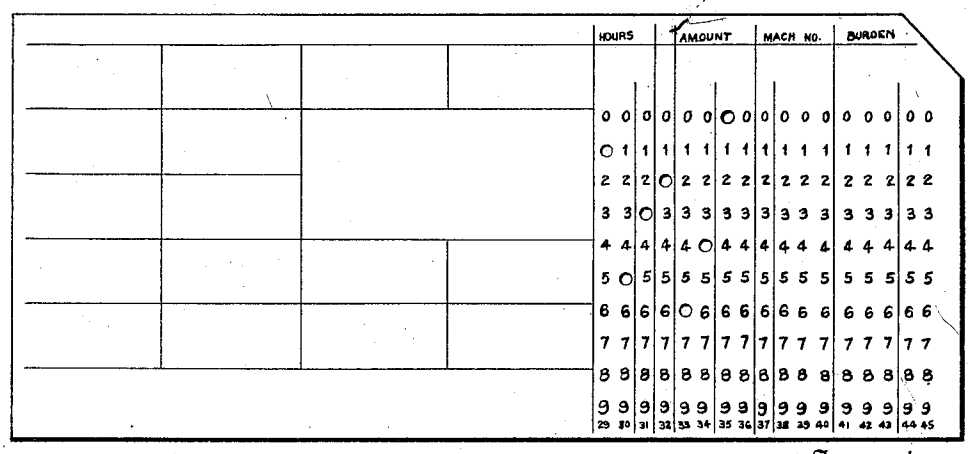


FIG. 19.



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PERFORATING MACHINE

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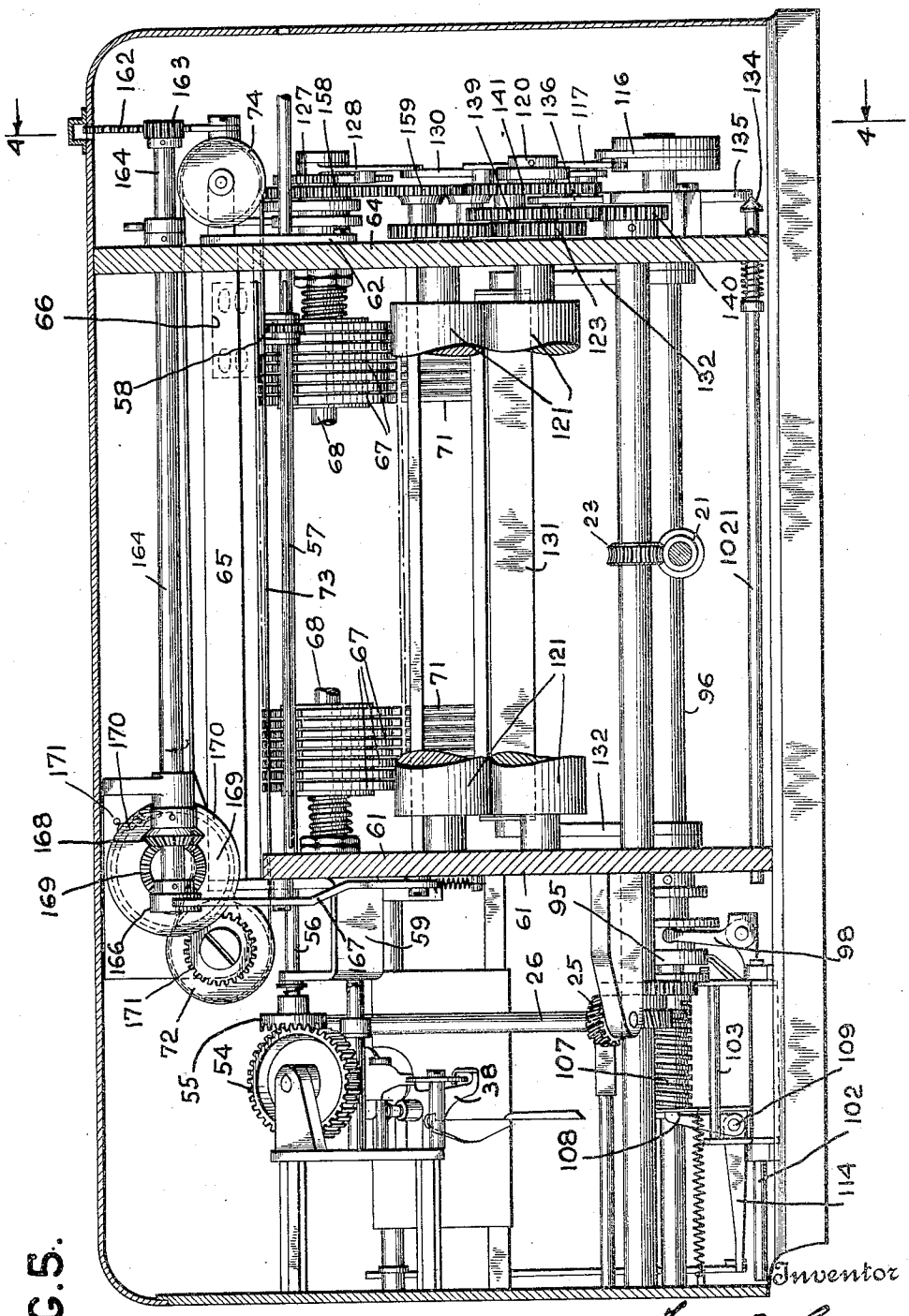


FIG. 5.

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PERFORATING MACHINE

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FIG. 8.

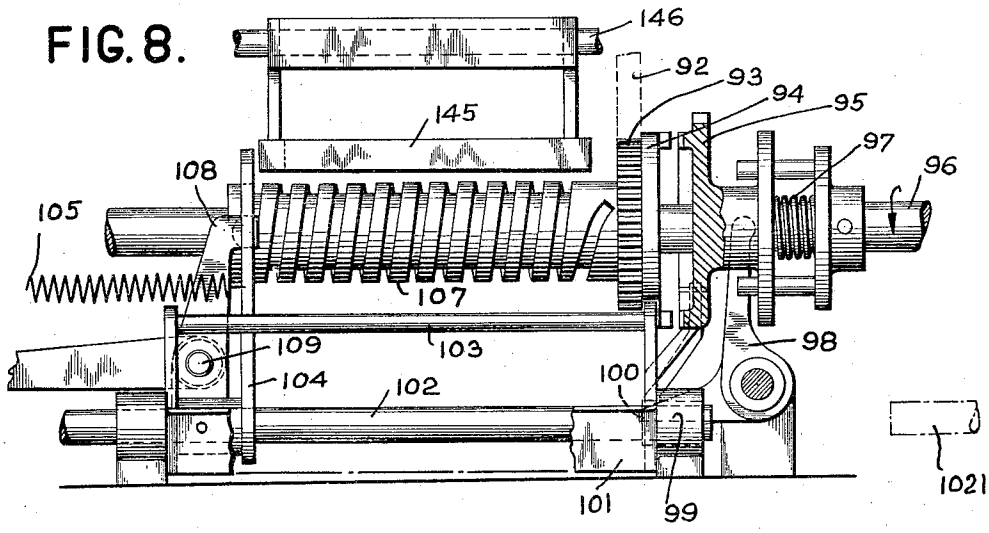


FIG. 9.

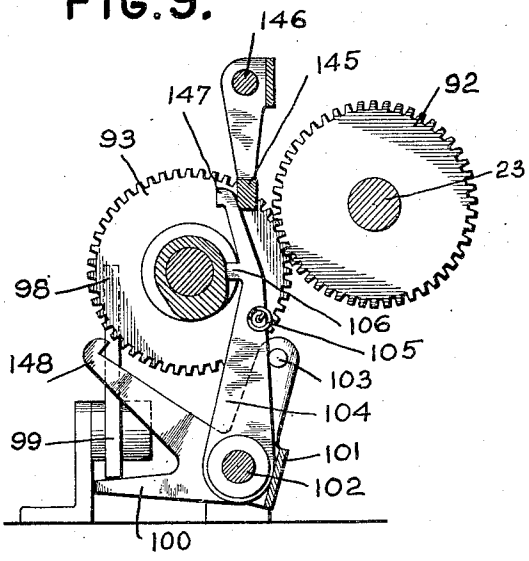
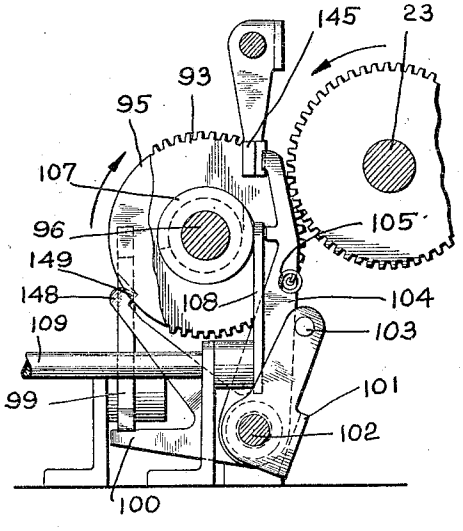


FIG. 10.



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FIG. 11.

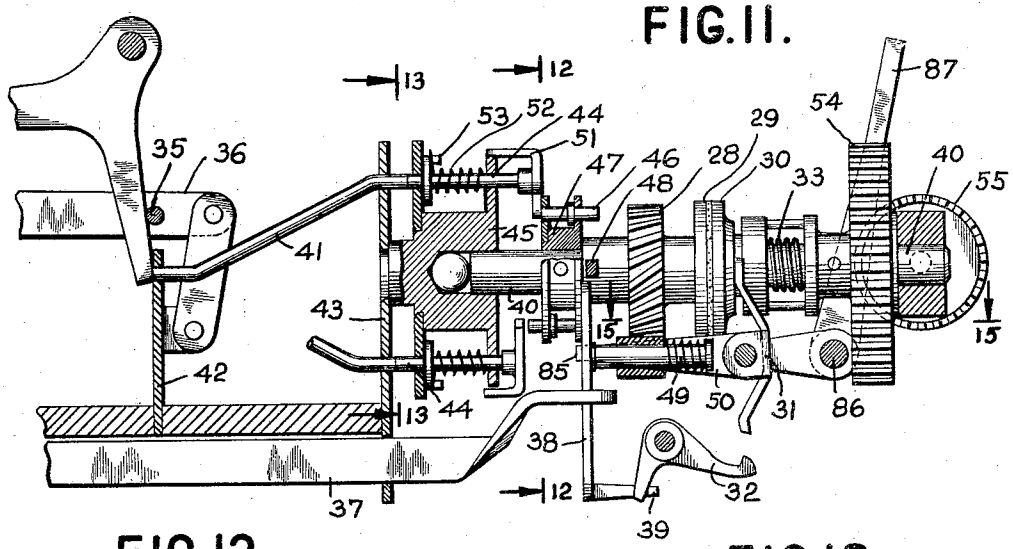


FIG. 12.

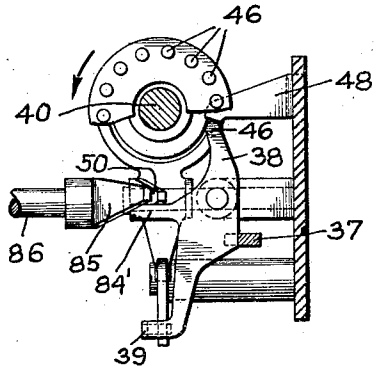


FIG. 13.

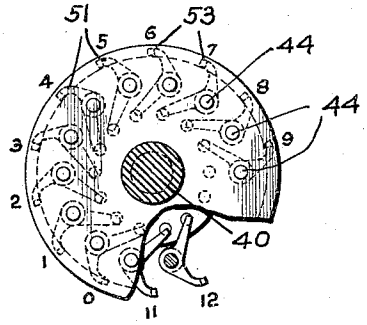


FIG. 14.

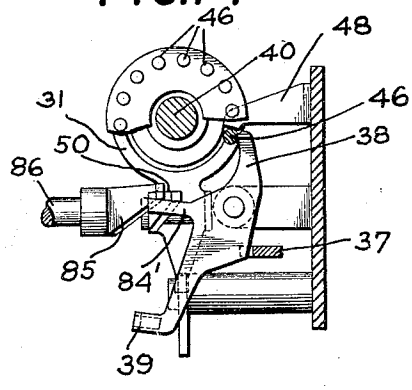
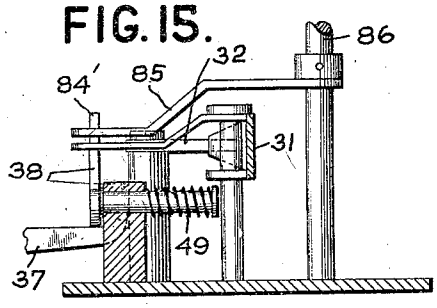


FIG. 15.



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March 8, 1932. F. M. CARROLL 1,848,159

PERFORATING MACHINE

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FIG. 16.

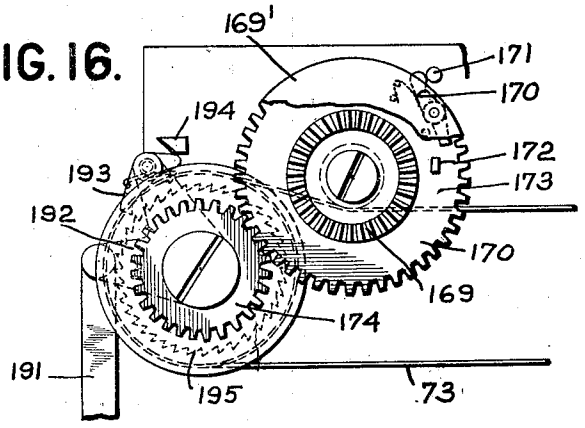


FIG. 17.

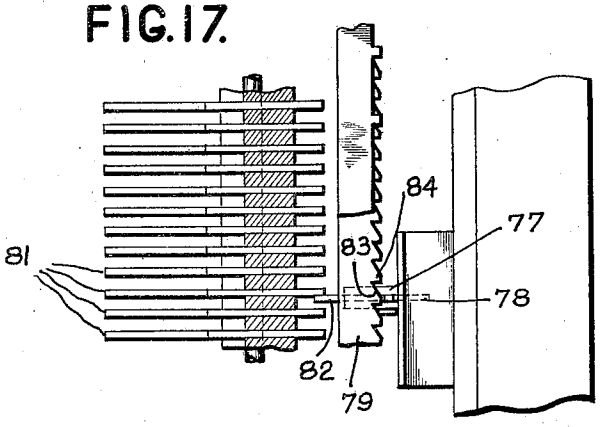
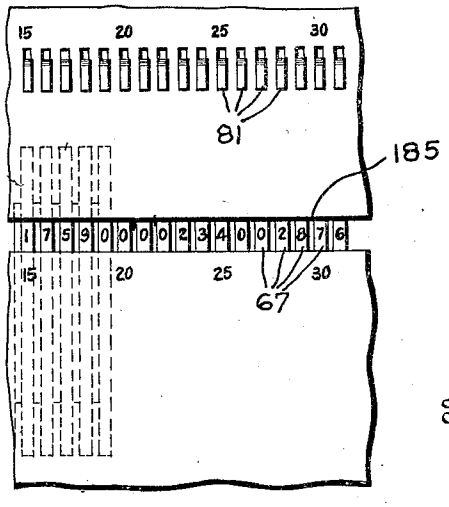


FIG. 18.



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Patented Mar. 8, 1932 1,848,159

UNITED STATES PATENT OFFICE

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PERFORATING MACHINE

Application filed April 29, 1929. Serial No. 358,940.

This invention relates to perforating machines capable of perforating record cards to designate variable and invariable data.

The present objects reside in the simplification of the punching mechanism heretofore devised, to lessen the energy required to select and operate the punches, to simplify the operation by automatically feeding record cards to and from the punches, and to provide a construction whereby the operator may determine, prior to the perforating operation, whether or not the card will be properly punched to accord with the facts to be indicated, and to coordinate with such construction a correcting device for the rectification of errors.

In the present machine, a single series of keys corresponding to the possible index points of a column are employed and operated successively in accordance with the data to be represented by perforations. Depression of these keys differentially control the setting of successively selected selector disks which are power driven to their differential positions to lessen the load upon the keys. At the termination of the key operation the setting of the various selector disks as determined by visible indicator wheels will represent the data to be indicated by perforations and at this point correction may ensue if necessary. The selector disks are adjusted individually different extents from the punches and which may represent a certain number of increments of operation from a starting position. The punches comprise a single line, one for each column to be punched. Upon completion of the set-up, an operating key is depressed which causes the record card to be fed intermittently to the line of punches and a collective intermittent rotation of the selector disks from their differentially set positions. The collective rotation of the disks is effected in increments of operation and in synchronism with the step-by-step feeding movement of the record card over the line of punches. When a projection of each selector disk occupies a position over a punch a perforating operation will result. In this manner the card will be completely perforated automatically and without attention of the operator.

The selector disks are restored to initial starting position after the termination of the punching operation to be subsequently adjusted in accordance with the new data to be entered. By selective manipulation of certain levers, the selector disks may be returned to their previous settings instead of their starting positions thereby effecting a repetition of the same data, or what is known as "gang punching". A new record card is automatically fed from a supply hopper to the punches at the time the punched card is fed to a suitable receptacle so that the attention of the operator may be solely devoted to the operation of the keys.

Certain other adjuncts are employed such as the correcting device heretofore mentioned, a direct and retrograde spacing key, all of which tend to make the operation of the machine simple and facile.

In the drawings:

Fig. 1 is a plan view of the improved machine, the casing and other parts having been removed to show more clearly certain parts.

Fig. 2 is an end cross sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is an end view taken on the line 4—4 of Fig. 5.

Fig. 5 is a plan view of the machine turned end for end with respect to Fig. 1.

Fig. 6 is an end view in side elevation of parts associated with the escapement and punch controlling devices.

Fig. 7 is a detail view of a portion of the key controlling mechanism.

Fig. 8 is a front view of a clutch and controlling device of the machine.

Fig. 9 is a sectional view of the parts shown in Fig. 8.

Fig. 10 is a right view of Fig. 8.

Fig. 11 is a view in side elevation partly in section of the key controlled differential mechanism.

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 11.

Fig. 13 is a sectional view taken on the line 13—13 of Fig. 11.

Fig. 14 is a view similar to Fig. 12 but showing some of the parts in operated position.

Fig. 15 is a plan view taken on the line 15—15 of Fig. 11.

Fig. 16 is a plan view of the mechanism provided for effecting a back spacing operation.

Fig. 17 is a plan view taken on the line 17—17 of Fig. 3.

Fig. 18 is a front view illustrating the manner in which the adjusted positions of the selecting disks may be verified.

Fig. 19 is a plan view of a typical record card capable of being punched by the illustrative machine.

Power for driving the various mechanisms is derived from a constantly running motor 20 (Fig. 3) the drive shaft of which carries a worm 21 meshing with a worm wheel 22 to drive a shaft 23. The driving connection between a connecting shaft 26 (Fig. 2) and the shaft 23 comprises the worm 25 and worm wheel 24. The shaft 26 at its other end has secured to it a worm 27 (Fig. 1) in mesh with a worm wheel 28 rotatable with the element 29 of a friction clutch 29—30 (see also Fig. 11). The clutch elements are normally held disengaged by a forked yoke 31 which is normally latched by a latching bell crank 32. When the latch is shifted to unlatching position a clutch spring 33 causes clutch elements 29—30 to frictionally engage each other.

At the termination of a card punching operation clutch elements 29—30 are disengaged but a driving relationship is initially effected upon the manual depression of one of the punch numeral keys 34 which is operated upon the institution of a new punching operation. These keys (Fig. 2) are pivoted in the usual manner so that upon a depression of any one the coaction of the related stem with one of a plurality of cross pins 35 will shift a parallel mounted bar 36 which draws forwardly a bar 37 to shift laterally an irregular shaped plate 38 (Figs. 11 and 12) which has a lug extension 39 in engagement with a tail of the pawl 32 to rock the latter and disengage it from the tail of yoke member 31. When the clutch connection is established a shaft 40 to which element 30 is secured will be driven but the extent of operation is dependent upon the key depressed.

Associated with each of the numeral keys is a rod 41 guided by a plate 42 at the end which cooperates with the key stem. The rods 42 diverge (as best shown in Fig. 2) and are guided at their other ends by a plate 43 so as to cooperate with the ends of concentrically arranged plunger operating rods 44. These rods are slidably mounted in a journal bar 45 carried by plate 43 and each rod when shifted, in turn, shifts one of a plurality of stop pins 46 slidably mounted in a cylinder 47 secured to shaft 40. When the clutch is established the coaction of the shifted one of the pins 46 with a frame extension 48 during a rotation of cylinder 47 determines the extent of rotation of shaft 40 (see Fig. 12).

As a key is depressed, plate 38 will be shifted against the tension of a spring 49 (Fig. 11) and since the inner face of the upper extension of the plate is in contact with the end of the stop pin 46 which engaged the extension 48 during the previous operation, it will force said pin to its inner or normal position freeing shaft 40 for rotation. The cylinder 47 will then rotate until the pin 46 shifted by the depressed key subsequently engages the stop extension 48 thus determining the differential movement of shaft 40.

The coaction of the shifted stop pin 46 with the upper extension of plate 38 will stop the rotation of shaft 40 and since the plate 38 has been brought into the plane of the shifted pin by depression of the related key (see Fig. 11) plate 38 will then be rocked (as shown in Fig. 14) and by its coaction with a cam extension 50 will shift the yoke member 31 to disengage the clutch elements 29—30 whereupon the yoke member 31 will be relatched by pawl 32. This operation will occur when the plate 38 is shifted by spring 49 and is coincident with the release of the depressed key. Plate 38 will then pass over the shifted pin 46 (see Fig. 14). The plungers 44 shift the stop pins 46 through levers 51 and it will be apparent that those pins 46 which have not been shifted will in their counterclockwise rotation about shaft 40 successively rock the rod 44 which has been shifted. This rocking movement is effected against the tension of a coil spring 52 which is effective to rotate and restore the rod 44 to its normal position as determined by an extension thereof with a stop lug 53.

Secured to shaft 40 is a gear 54 (Fig. 5) meshing with a gear toothed disk 55 secured to a transverse shaft 56 and splined at 57 to the shaft is an operating pinion 58. The shaft 56 at one end (as shown in Figs. 2 and 5) is journalled in a bail shaped member 59 pivoted at 60 to an intermediate frame member 61. The other end of shaft 56 is carried by a frame plate 62 (Figs. 4 and 5) pivoted at 63 to the parallel frame member 64. Secured between the plates 59 and 62 is a guide bar 65 (Figs. 3 and 5) in which is slidably mounted a yoke member 66 the side plates of which confine the pivoted pinion 58 (see Fig. 5) so that as the yoke member is shifted intermittently under control of an escapement mechanism it will be brought into selective operation with a series of spaced punch selector disks 67. The series of disks 67 have a frictional contact with their sup-

porting shaft 68 which permits an independent adjustment of each disk without affecting the position of the other disks.

When the frame comprising members 59—62—65 is in the position shown in Fig. 3 the pinion 56 may be brought into mesh with teeth 69 formed in the periphery of each of the disks 67 as the pinion is shifted on shaft 56 so that a differential rotation of pinion 58 will impart a like movement to the disk 67 in driving engagement with the pinion. In this manner the disks 67 are differentially set and each held in their set position by frictional contact with shaft 68. An intermittent shifting of pinion 58 will successively set the disks and since a key is operated for each card column the setting of the disks will represent the index point designation desired in the columns to be punched.

As each disk is differentially set by the depression of a key a punch selector projection 70 (Fig. 3) will be positioned arcuately a certain distance from the head of the related one of a series of punches 71 arranged in a single line. If the projection 70 is stepped around in increments in synchronism with the passage of card each projection 70 (see Fig. 6) will be positioned over the related punch at a certain time and the different punches will be selected for operation at differential times depending upon the initial setting of the disks 67. A perforating operation is effected at the termination of each step of movement resulting in the perforation of the card at the desired points.

The carriage is impelled by the usual spring controlled drum 72 (Fig. 5) to which is secured a wire 73 encircling a pulley 74. The wire 73 is secured at 75 (Fig. 6) to the carriage 66. Intermittent movement of the carriage is preferably secured by the follownng escapement device. Pivoted to extension 77 (Figs. 3 and 17) of the carriage 66 is a pawl 78 adapted to engage with interdental spaces of saw shaped teeth of an escapement bar 79. The bar 79 is dependingly hung from a pivot rod 80 and is capable of being shifted forwardly and then rearwardly as an incident to each depression of a key. Associated with each disk is a column selecting lever 81 having a rearward extension adapted to coact with an extension 82 (see Fig. 17) of the pawl 78 and stop the escapement action of the carriage 66.

When the bar 79, Fig. 6, is shifted rearwardly its coaction with the vertical extension of pawl 78 will rock the same clockwise and disengage the extension 82 (Fig. 3) from coaction with the side of the previously engaged lever 81, see Fig. 17, permitting the escapement drum to shift the carriage. The upper extension will then coact with the inclined edge 83, Fig. 17, of the notch as the bar 79 is shifted rearwardly to permit it to subsequently engage the straight edge 84 of the notch and during this time a spring 76 will rock the pawl counterclockwise to cause extension 82 to be shifted in lateral alignment with the next adjacent lever 81. As the bar 79 is restored to normal the pawl 78 will be brought out of engagement with the notch in the bar permitting the carriage to again step until the pawl 82 engages with the side of the next adjacent lever 81.

From Fig. 14 it will be observed that as a shifted pin 46 coacts with the upper extension of plate 38 a tail 84′ thereof contacting with an oblique arm 85 (see Fig. 15) will rock a spring restored shaft 86. Secured to shaft 86 (Fig. 2) is an arm 87 contacting with a pin 88 to shift the escapement bar 79 against the restoring action of a spring 89. The spring 89 is effective to restore the escapement bar effecting the escapement action of the carriage, this action occurring as an incident to each depression of a key 34 so as to successively bring setting pinion 56 in alignment with the series of setting disks 67.

For the purpose of initiating a card punching operation after the set up of the disks has been completed an operating key 91 (Fig. 1) is depressed. This initiates operation of the punching device, card feeding mechanism as well as setting in operation certain restoring devices all operating in a manner now to be described. Secured to the drive shaft 23 is a gear 92 (Figs. 8, 9 and 10) driving a gear 93 to which one element 94 of a clutch device 94—95 is secured. The former is loose on a shaft 96 but the element 95 is rotatable with the shaft 96 and is normally urged by a spring 97 to clutching position but is restrained by a lever 98. The tail 99 of the latter overlies a tail 100 which is an integral extension of one of the side plates of a yoke or bail 101 loose on a rod 102.

The arms of the bail 101 carry a rod 103, the spring 97 being effective to urge the rod 103 into contact with a lever 104 secured to rod 102 and biased by a spring 105 so that an extension 106 thereof may engage a helical screw thread of a cylinder 107 rotatable with the constantly rotating gear 93. This engagement is prevented by the interpositioning of a control lever 108 secured to a rod 109. The operating key 91 is a bell crank pivoted upon a rod 110 (Fig. 2) and is connected to a second bell crank 111 by a link 112. The bell crank 111 carries a wipe pawl 113 adapted to engage an arm 114 secured to shaft 109 in order to rock the latter upon depression of the key but permit the independent return of the latter. Rocking of shaft 109, as will be observed in Figs. 8 and 10, will permit arm 104 to be rocked by spring 105 permitting yoke 101 to be rocked by spring 97 to permit a clutch engagement of elements 94, 95 to drive shaft 96. At the same time extension 106 will engage the

screw thread and be shifted laterally along with the supporting rod 102.

Secured to shaft 96 is an eccentrically mounted disk 115 (Fig. 4) adapted to effect a reciprocating movement of an arm 116 connected to one arm of a bell crank 117 carrying a pawl 118 in engagement with a ratchet wheel 119. The latter is secured to a gear 120 adapted to drive a pair of feeding rollers 121 (Fig. 3) through a gear train comprising gears 122, 123, 124 to thus effect a step by step movement of a record card previously placed in feeding relation to said rollers at the termination of the preceding punching operation. As the card is stepped by rollers 121 it is fed to a pair of feeding rollers 125 which then assume the step by step feed of the record card by ratchet wheel 119 since the upper roller is geared to the lower by a gear 126. The successive rotations of shaft 96 will therefore step the record card and simultaneously by mechanism now to be described the disks 67 will be stepped around collectively to bring them into cooperation with the punches 71.

As shown in Figs. 4 and 5 the shaft 68 which carries the disks 67 has secured thereto a ratchet wheel 127 cooperating with a pawl 128 carried by an arm 129 connected to one arm of bell crank 117 by a link 130. By this means the control disks 67 are stepped around collectively as a unit from their initial set positions to bring the projections 70 (Fig. 3) into cooperation with the punches 71 at differential times at which instance the index point to be punched is at the punching line.

Actual perforating operations are performed by reciprocating a die plate 131 (Fig. 3) each time a new series of index points has been positioned at the punching line. The die plate 131 is carried by a pair of arms 132 mounted on shaft 96 by a pair of eccentrically mounted disks 133 to thus effect the desired reciprocation as the card is stepped by rollers 121 and 125.

As the projection 106 (Fig. 9) engages the helical screw thread of a cylinder 107 the lever 104 is shifted laterally and along with it the rod 102 to which it is secured. At the termination of the lateral movement of rod 102 which is coincident with the last punching operation, namely, the punching of the "12" index point, the rod 102 will strike a rod 1021 in alignment therewith and a conical extremity 134 thereof will rock a lever 135 (Fig. 4) to release an end of the latter from engagement with a clutch pawl 136 so that a spring (not shown) may cause the engagement of the pawl 136 with a notch 137 of a clutch disk 138 rotatable with a gear 139. The latter is in mesh with a pinion 140 secured to the drive shaft 23, which it will be recalled rotates constantly. When the clutch is established the gear 141 which carries the pawl 136 will be driven and through a clutch pawl 142 pivoted to gear 141 will drive a notched element 143 rotatable with the gear 123 (Fig. 3) driving the rollers 125 supplementally to cause the complete ejection of the punched record card to a receiving hopper 144.

Referring to Fig. 8 it will be observed that the lever 104 is normally positioned at one side of the end of a guide bar 145 dependingly hung from a rod 146 so that as the projection 106 engages the screw thread the extension 147 (Fig. 9) will contact one side of the bar 145. The termination of the screw thread acts to cam lever 104 forwardly, spring 105 being then effective to restore the lever 104 and rod 102, re-engagement of extension 106 with the screw thread during the restoring movement being effectively prevented by guide bar 145 permitting the extension 106 to ride over the arm 108 and finally occupy the position clearly shown in Fig. 10. When lever 104 is cammed forwardly it will rock bail 101 and the latter will rock bell crank 98, 99 to disengage the clutch elements 94—95 stopping the rotation of shaft 96. When bail 101 is rocked to permit establishment of the clutch connection a hook 148 integral with bail 101 is drawn out of engagement with a shoulder 149 of the clutch element 95 but re-engages therewith when the clutch connection is disestablished so as to lock element 95 in its normal starting position. Pawl 136 re-engages bar 135 (Fig. 4) at the termination of a complete revolution of gear 141 to disestablish this clutch connection.

When rollers 125 are ejecting the punched card the rollers 121 are being driven synchronously. Secured to the supporting shaft of lower roller 121 is a crank arm 150 (Fig. 2) connected to picker 152 (Fig. 3) by a link 151. The picker knife feeds a blank record card from the stack to the feeding rollers 121 which then transport the card to and under the line of punches 71.

Prior to the restoration of disks 67 to their normal positions the frame 66 carrying setting pinion 58 is shifted backwardly to clear the teeth of the operating disks. This result is effected by the following mechanism. When the operating key 91 is depressed the link 112 will rock an arm 154 (Fig. 2) and a shaft 155 secured thereto. Secured to rock shaft 155 is an arm 156 which is connected to the pinion carrying frame by a link 157 to directly shift the frame when the key is depressed. The frame is held in shifted position by a latching bell crank 158 during the time the pinion is restored so that at its normal position it is again in alignment with the first of the series of setting disks 67.

Gear 141 (Figs. 4 and 5) is adapted to drive a gear 158 through intermediate gears 159, 160 and a spiral cam 161 secured to the gear 158. A follower secured to the arm of the bell crank 162 coacts with the cam so that

a rack extension thereof rocks a pinion 163 secured to a shaft 164.

Secured to one end of rock shaft 164 is a cam 166 (Figs. 2 and 5) adapted to rock a bell crank 167 and thus actuate the holding pawl 158 to release the pinion carrying frame 66 whereby the setting pinion 58 is shifted forwardly into engagement with the teeth of the first setting disk 67.

A bevel gear 168 secured to rock shaft 164 (Fig. 2) drives a bevel gear 169 (Fig. 16) and a disk 169′ to which is secured a pawl 170. When the tail of pawl 170 leaves a pin 171 it will coact with a block 172 secured to the face of a gear 173 in mesh with a pinion 174 secured to the spring escapement drum so that the latter is thereby rewound thus causing wire 73 to positively restore the pinion carrying frame to its normal position, and when this position is assumed the latching pawl 158 (Fig. 2) previously mentioned, is actuated to permit pinion 58 to engage the teeth of the first setting disk 67. The construction shown in Fig. 16 permits the escapement drum to be unwound without affecting the shaft 164 and parts connected therewith.

Restoration of the setting disks to their normal position is effected by rotation of shaft 68 and since each disk has a frictional contact with the shaft they will all be restored to their normal starting points. To this end cam 161 is provided with a pawl 175 (Figs. 4 and 5) in the plane of a shouldered disk 176 secured to shaft 68 so that a complete rotation of the cam will cause the shaft and disks 67 to be collectively rotated and brought to their normal starting point. To determine the latter the stop extension 177 (Fig. 6) of each lever 81 is adapted to be brought into engagement with the shoulder 178 of the related disk and thereafter rocked away to permit a subsequent differential setting of the disk. The levers 81 are all pivoted upon a rod 178′ which is carried by a frame 179 dependingly hung from but secured to a rod 180. The levers may occupy either of two positions as determined by a pair of notches 181 and held in the desired position by a spring detent plate 182 having ridges adapted to coact with the notches. When a lever 81 is adjusted to the full line position (Fig. 6) and the frame 179 rocked at the appropriate time it will be clear that the extension 177 thereof will engage the shoulder 178 of the related disk to determine its starting point after which the extension is removed from the disk to permit free rotation of the latter during the next setting operation. For effecting the desired rocking movement of the frame a cam 183 secured to shaft 164 rocks an arm 184 secured to shaft 180.

It will be obvious that those levers which are shifted upwardly will be ineffective to stop the related disks 67 and they will be turned to their previously normal starting position which was in accordance with the previous key depressed. In this manner certain columns may be selected for a repetition of the same punchings.

Each disk, as differentially set by depression of a key, may be verified as to its setting by reading of the number brought in the range of a reading aperture 185 (Fig. 18). These numbers are carried by the periphery of each setting disk 67. If the setting should be incorrect, or require rectification or change, this can be selectively accomplished without requiring the machine to go through a reset cycle by manually shifting rod 56 laterally by means of a knob 186 (Fig. 1) projecting exteriorally of the casing. When the pinion 58 is correctly aligned with the disk 67 to be rectified by depression of the usual "backspace" key 187 (Fig. 1) rotation of knob 186 will effect the desired setting of the selected column disk. When the rod 56 is thus shifted the driving relationship between gears 54—55 (Fig. 5) is disestablished to allow free rotation of rod 56 by knob 186.

The back space key 187 (Fig. 1) when depressed rocks a bell crank 188 (Fig. 2) and through a link 189 rocks a supplemental bell crank 190 to draw down a link 191. This link 191 (Fig. 16) rocks a pawl carrying lever 192 to permit a pawl 193 to be removed from a stationary lug 194 and allow a spring to rock it to engage a ratchet wheel 195 secured to the spring drum. Thus the pinion carrying frame is shifted reversely to the desired position whereupon it will be held by the escapement mechanism to permit independent return of the key and connected operated parts. When the pinion carrying frame is reversely moved the upper extension of pawl 78 will drop into engagement with the adjacent notch so that the forward extension 82 drops below the rearward extension of the adjacent lever 81. Further shifting of the pawl 78 will cause the extension to be cammed by the inclined edge 83 upwardly to engage the side of the adjacent lever 81 holding the parts in shifted position.

A special key 196 (Fig. 7) designated "X" on its key cap is operated when it is desired to space the carriage 66 in the same direction the punch keys 34 do for the purpose of skipping certain columns, rectifying errors, etc. This key when depressed shifts a link 197 to rock a bell crank 198 which has a link connection 199 to an arm 200 secured to the escapement bar supporting shaft 80. Depression of the key will effect a successive escapement action of the carriage in the same manner as automatically effected by depression of a numeral punch key. Where the terms "record card column" and "index points" appear in the claims, it will be understood to mean that the record card is divided into parallel columns (as illustrated in Fig. 19) each column having nine or more different posi-

tions or index points. Each index point represents a different value by virtue of its location from a reference edge of the card so that when a perforated card is analyzed by passing it through a tabulating machine in a columnar direction, or analyzed at rest, the index points will control associated representing devices. The term "record card column containing index points" is, therefore, defined as a card column containing a series of different index points having varying control functions by virtue of their differential locations in the column.

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:

1. In a perforating machine comprising in combination with a single line of punches one punch for each column of a record card to be punched and each adapted to perforate at any one of a plurality of positions in a card column, means comprising keys adapted to select the punches for operation, and mechanism adjusted under control of the keys whereby the selected punches are rendered effective for punching operations during a continuous uni-directional movement of the card past the punches.

2. In a perforating machine, a single line of punches one for each column of a record card to be punched and each adapted to perforate at any one of a plurality of positions in a card column, means for feeding said record card in an intermittent movement past the punches, keys, and mechanism adjusted under control of said keys adapted to determine the time a punch is effective for a punching operation during a continuous uni-directional movement of the card.

3. In a perforating machine, a single line of punches one for each column of a record card to be punched and each adapted to perforate at any one of a plurality of positions in a card column, means for feeding said record card in an intermittent movement past the punches, keys, and adjustable devices adapted to successively select the punches and determine the time they are effective for operation during a continuous uni-directional movement of the card.

4. In a perforating machine, a punch adapted to perforate any one of a series of different index points in a card column, a series of keys, and a device adjusted under control of the keys for determining which index point will be perforated by the punch.

5. In a perforating machine, a punch adapted to perforate any one of a series of different index points in a card column, and a series of keys associated with the punch, and a controlling device adjusted under control of the keys for determining which index point will be perforated by the punch during an intermittent movement of the card past the punch.

6. In a perforating machine, a punch adapted to perforate any index point in a card column, a series of keys associated with the punch, and a punch controlling means adapted to be given a differential movement under control of the keys to determine which index point will be perforated by the punch.

7. In a perforating machine, a punch adapted to perforate any index point in a card column, a series of keys associated with the punch, and a punch controlling means adapted to be given a differential movement under control of the keys to determine which index point will be perforated by the punch during an intermittent movement of the card past the punch.

8. In a perforating machine, a series of keys, line of punches each being correlated with a column of a record card and each adapted to perforate at any one of a plurality of positions in a card column, and means comprising devices settable under control of the keys for successively selecting the punches and determining at which position in the card column during a continuous uni-directional movement of the card the punch will effect a perforation.

9. In a perforating machine, a single line of punches each punch being correlated with a column of a record card and each adapted to perforate at any one of a plurality of positions in a card column, a punch controlling means, a series of keys, and mechanism whereby said keys control the adjustment of the punching controlling means to determine at which position in the card column during a continuous uni-directional movement of the card the punch will effect a perforation.

10. In a perforating machine, a single line of punches each punch being correlated with a column of a record card and each adapted to perforate at any one of a plurality of positions in a card column, a differentially positioned punch controlling means associated with each punch a series of keys, and mechanism controlled by the keys adapted to control the differential positioning of said controlling means.

11. In a perforating machine, a series of keys, a single line of punches, each punch being correlated with a column of a record card, a differentially set punch controlling means, and means controlled by said keys for effecting an initial differential setting of said controlling means.

12. In a perforating machine, a series of keys, a single line of punches each punch be-

ing correlated with a column of a record card, punch controlling means, means under control of said keys for effecting differential setting movements of said controlling means, and means whereby said punches are rendered effective by said controlling means during the restoration of the latter from their differential settings.

13. In a perforating machine, a punch correlated with a column of a record card and adapted to punch any index point in a card column, means for intermittently feeding said card past the punch, a series of keys, mechanism controlled by said keys adapted to determine the point in the card feeding movement said punch is rendered effective to perforate said card.

14. In a perforating machine, a punch correlated with a card column, punch controlling means, and rotary means whereby said controlling means is adapted to render said punch effective for a perforating operation to perforate at any point in the column during a continuous uni-directional movement of said record card.

15. In a perforating machine, a series of punches one for each card column of a record card and adapted to punch any index point in a card column, a series of keys, and settable devices controlled by said keys adapted to determine the times at which said punches are effective to perforate said card during a continuous uni-directional movement of the latter past the line of punches.

16. In a perforating machine, a series of punches one for each card column of a record card, means adapted to feed said record card intermittently past said line of punches, punch controlling means, a plurality of keys adapted to differentially set said controlling means, and means whereby said punch controlling means are actuated from their differential set positions in a synchronous timed relationship with the feeding of the record card to determine when said punches are effective for a perforating operation on said record card.

17. In a perforating machine, a punch correlated with a column of a record card, punch controlling means adapted to be set to an initial position, and means whereby said punch controlling means controls the effectiveness of said punch during the restoration of the punch controlling means from an initially set position.

18. In a perforating machine a punch correlated with a column of a record card and adapted to perforate any index point of a column, punch controlling means, means for initially and differentially setting said controlling means, means for restoring said punch controlling means to its starting position, and means whereby said controlling means is permitted to assume its previous set position during the restoring operation.

19. In a perforating machine, a punch, punch controlling means, means associated with a single punch for differentially setting said punch controlling means, and selective means whereby said punch controlling means is restored to either its starting position or its previous differential setting.

20. In a machine of the class described comprising in combination with a feeding device actuated intermittently a plurality of times during a single operation of the machine for intermittently feeding record material having columns of numerals thereon, a plurality of punches, each adapted to selectively perforate a numeral in a correlated column during the feeding of the record material, and means comprising a differentially settable member for rendering a correlated punch operative.

21. In a machine of the class described, comprising in combination with a feeding device actuated intermittently a plurality of times during a single operation of the machine for intermittently feeding record material having columns of numerals thereon, a single series of keys one for each numeral in a column, and means controlled by said keys but effective independently of the operation of the keys for selectively perforating said numerals during the intermittent feeding of the record material.

22. In a machine of the class described, a plurality of punches for perforating a card, the punches and card having a movement relative to each other, a series of keys, differentially set means one for each punch under control of the keys for selecting a plurality of punches preliminarily to a punching operation, and means for rendering a plurality of punches effective at different times and when said punches and card are moved relatively to each other.

23. In a machine of the class described the combination of a reciprocating die, devices for reciprocating said die in one machine punching operation a plurality of times corresponding to the numerals in a column of a record card, a punch, and means for calling said punch in operation during a certain reciprocation of said die.

24. The machine according to claim 23 characterized by the provision of means for intermittently feeding the record card after each reciprocation of the die.

In testimony whereof I hereto affix my signature.

FRED M. CARROLL.