Nov. 19, 1935. J. C. GATES 2,021,302

PERFORATING APPARATUS

Filed May 13, 1932 6 Sheets-Sheet 1

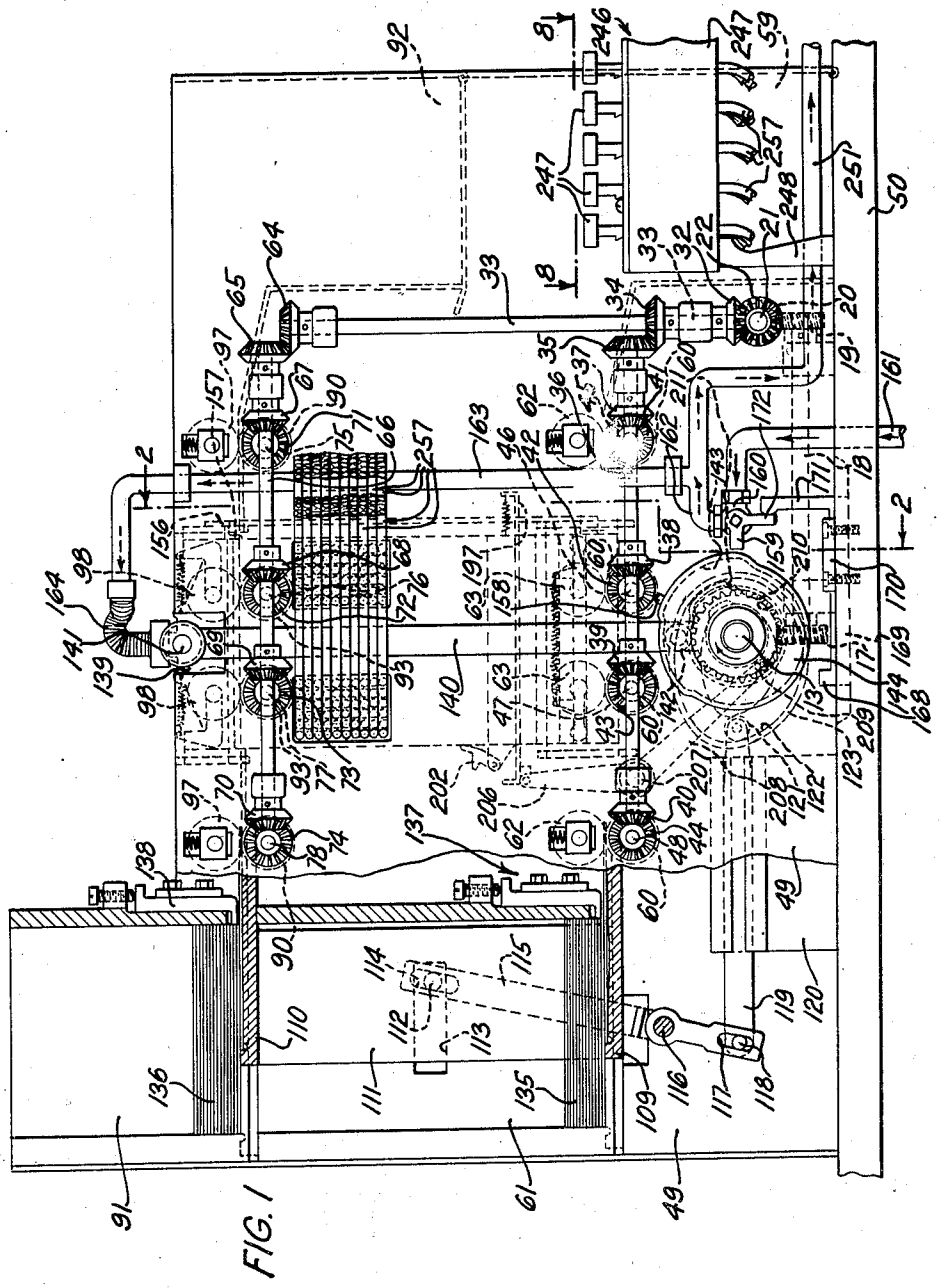


FIG. 1

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PERFORATING APPARATUS

Filed May 13, 1932 6 Sheets-Sheet 2

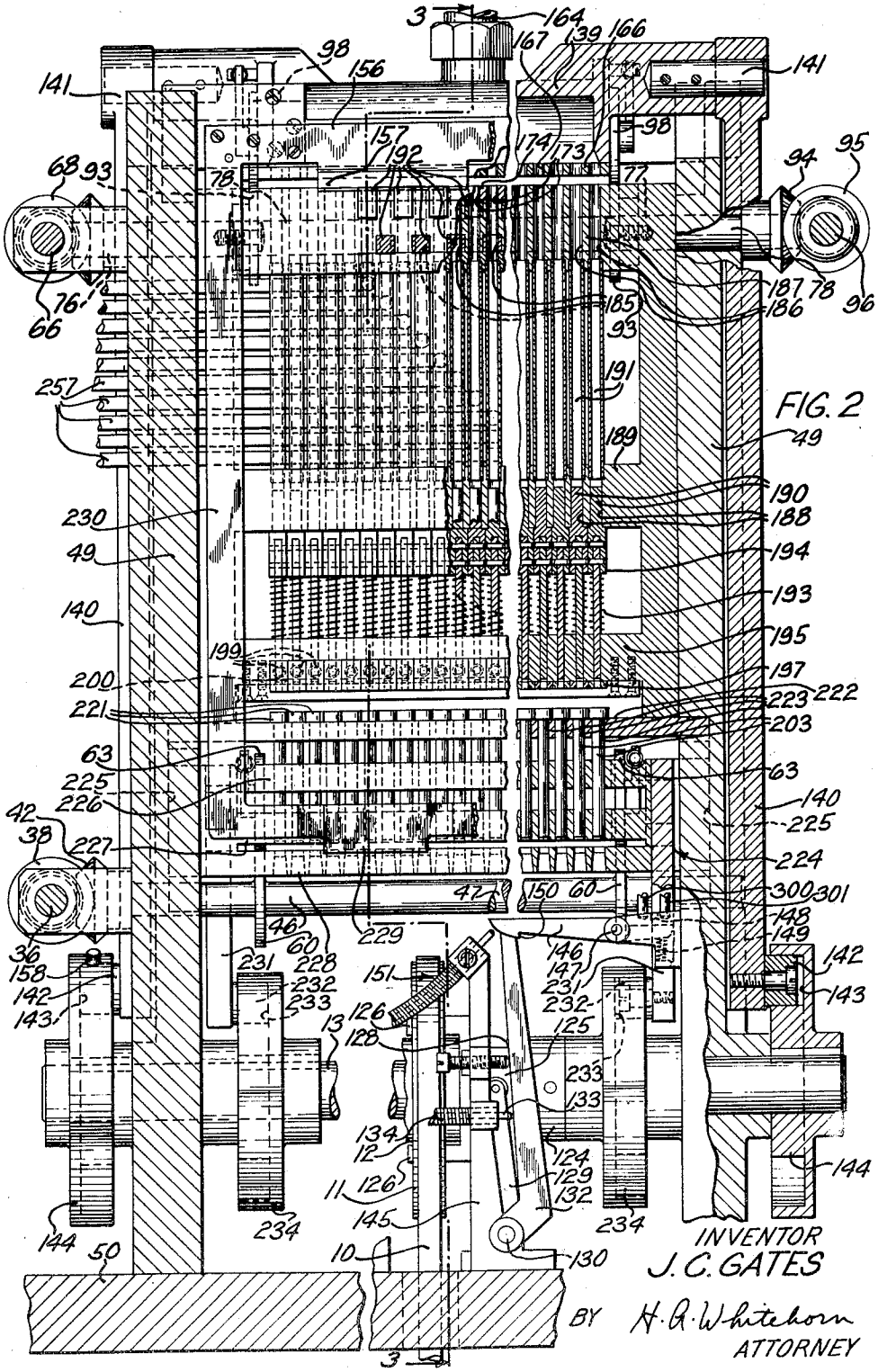


FIG. 2

Nov. 19, 1935. J. C. GATES 2,021,302

PERFORATING APPARATUS

Filed May 13, 1932 6 Sheets-Sheet 3

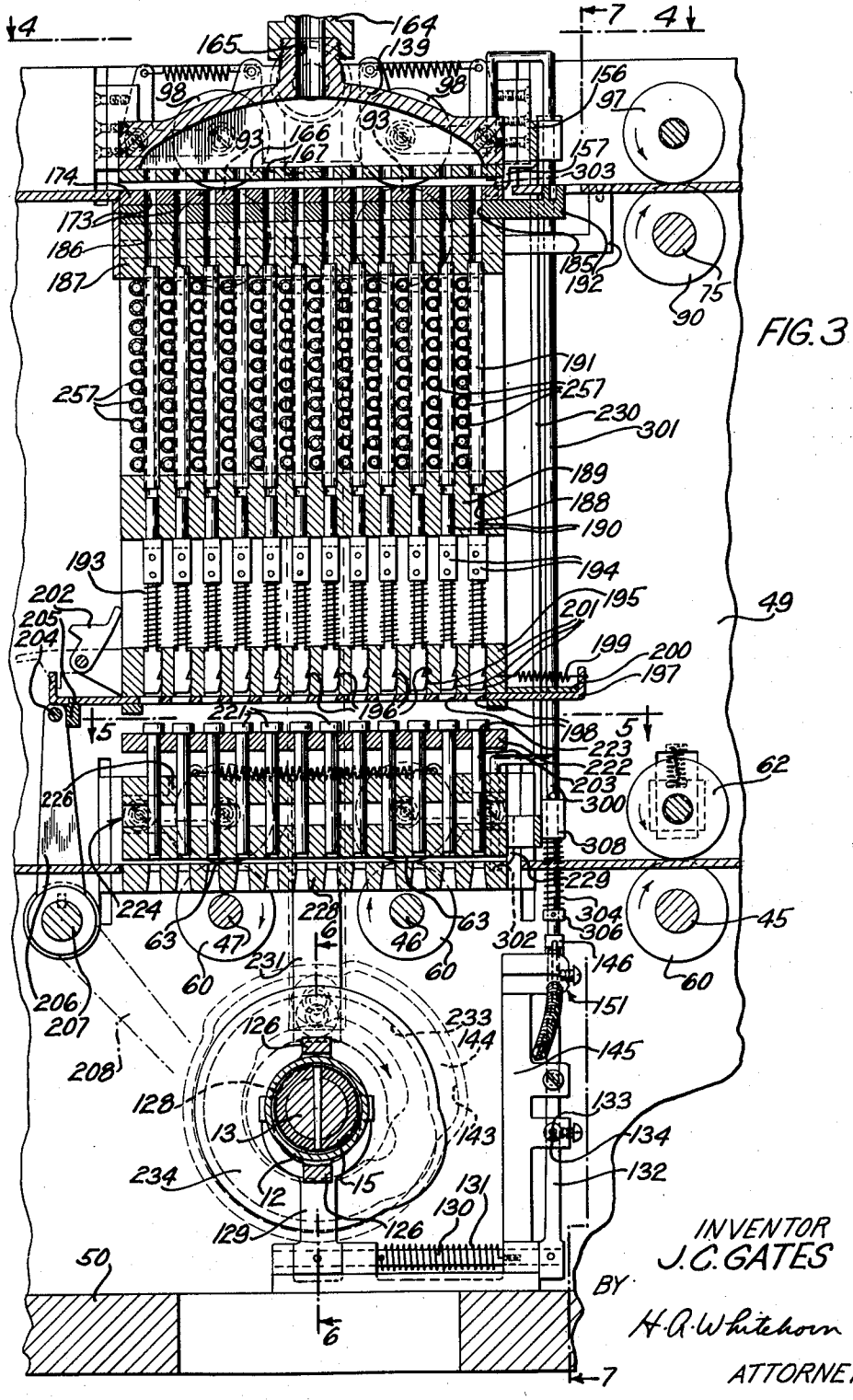


FIG. 3

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PERFORATING APPARATUS

Filed May 13, 1932 6 Sheets-Sheet 4

FIG. 5

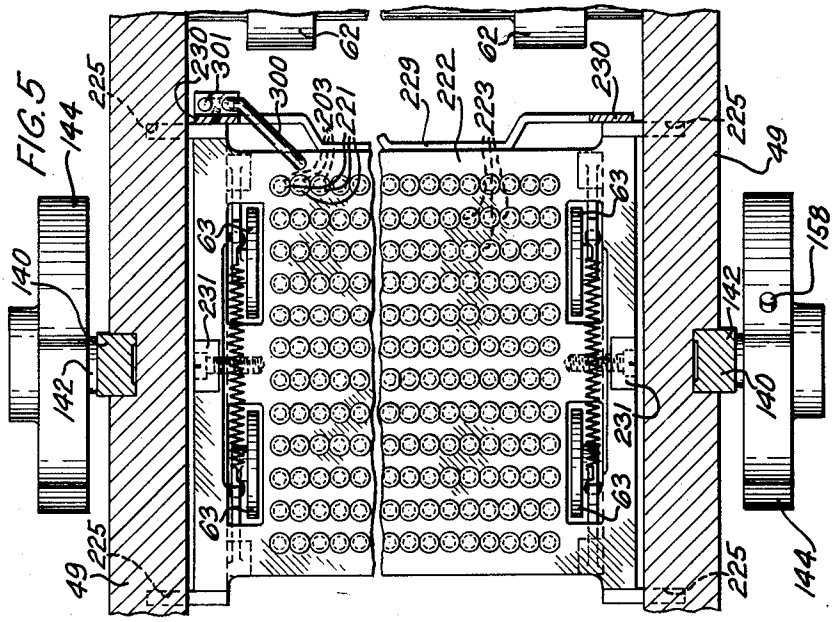
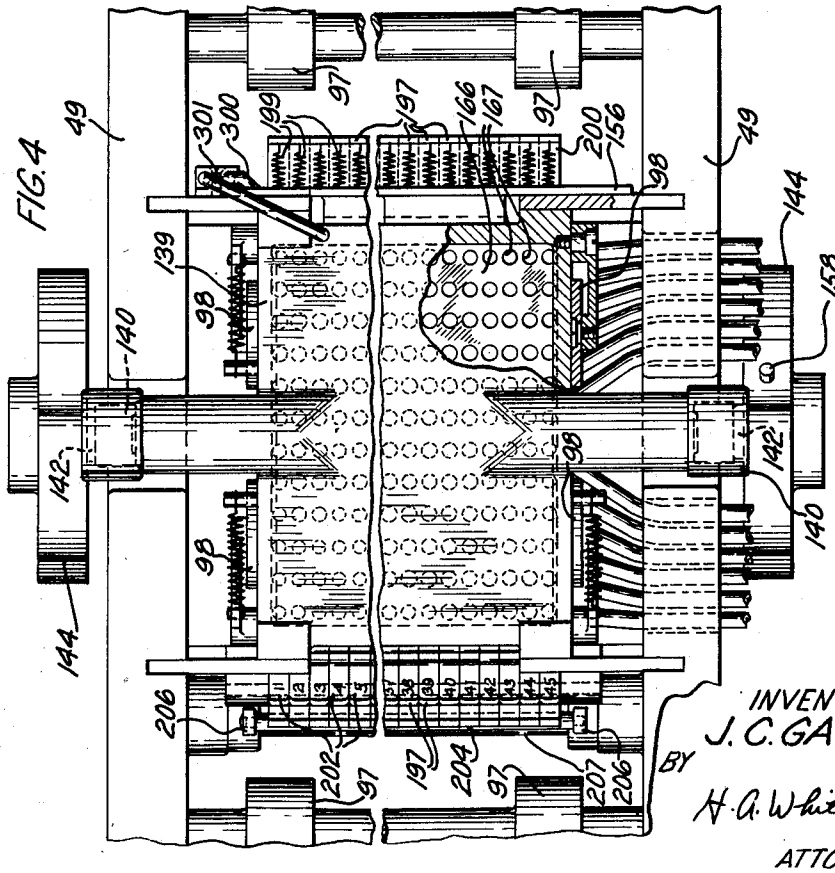


FIG. 4



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Nov. 19, 1935. J. C. GATES 2,021,302

PERFORATING APPARATUS

Filed May 13, 1932 6 Sheets-Sheet 5

FIG. 6

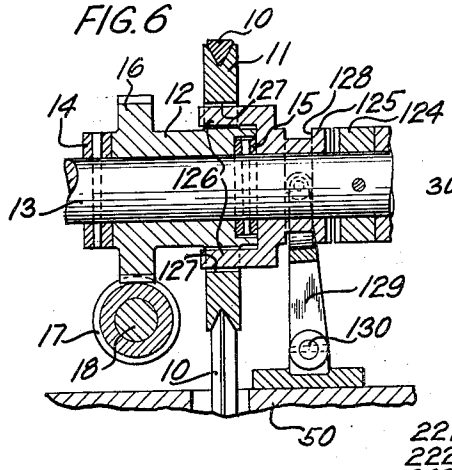


FIG. 7

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Nov. 19, 1935. J. C. GATES 2,021,302

PERFORATING APPARATUS

Filed May 13, 1932 6 Sheets-Sheet 6

FIG. 8

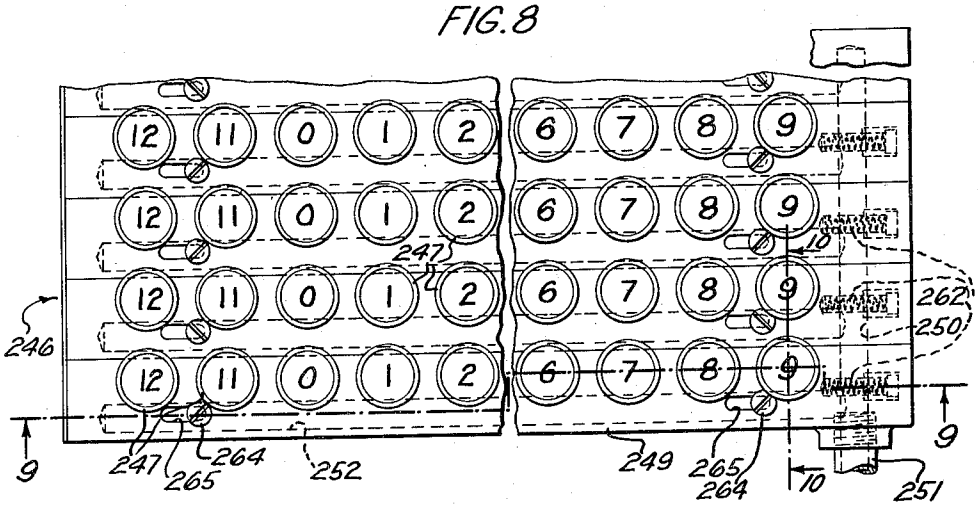


FIG. 9

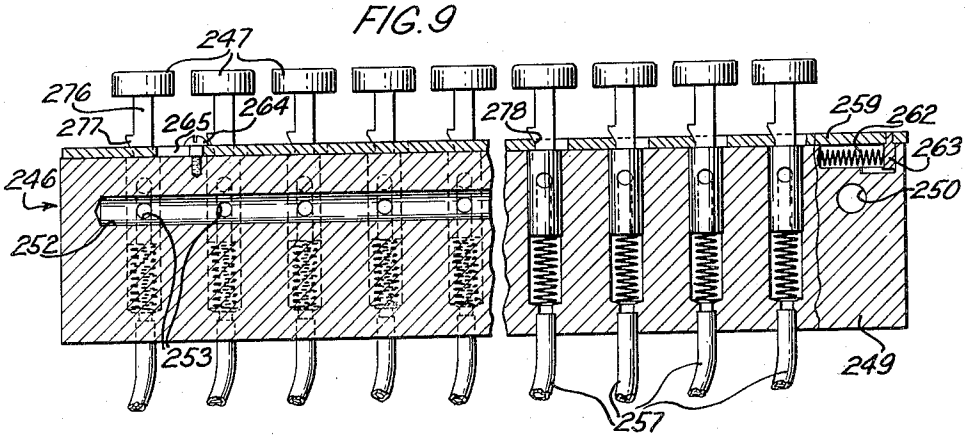
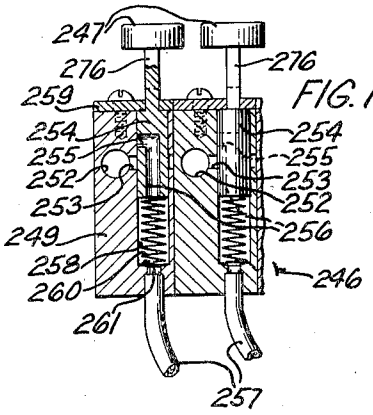


FIG. 10



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Patented Nov. 19, 1935 2,021,302

UNITED STATES PATENT OFFICE

2,021,302

PERFORATING APPARATUS

John C. Gates, Downers Grove, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application May 13, 1932, Serial No. 611,013

11 Claims. (Cl. 164—114)

This invention relates to perforating apparatus, and more particularly to a manual control device for a pneumatically settable card duplicating apparatus.

It is an object of the present invention to provide a pneumatically settable recording apparatus having dual control means.

In accordance with one embodiment of the invention, a perforating apparatus is provided for making duplicates of a supply of record cards having information marked therein wherein the information in the cards to be duplicated is set up in a perforator by directing air under pressure through apertures in the card to be duplicated for actuating settable pistons and wherein an auxiliary control is provided whereby the information in certain of the columns of the cards being duplicated is rendered ineffective to control the settable pistons and information is set into the perforators by the operation of manually actuatable keys.

These and other objects of the invention will be apparent from the following detailed description, when considered in connection with the accompanying drawings, wherein

Fig. 1 is a side elevational view of a record card duplicating apparatus embodying the novel features of the invention;

Fig. 2 is an enlarged fragmentary vertical sectional view taken along the line 2—2 of Fig. 1 in the direction of the arrows, parts being broken away to show more clearly the details of construction;

Fig. 3 is a fragmentary vertical sectional view taken substantially along the line 3—3 of Fig. 2 in the direction of the arrows;

Figs. 4 and 5 are fragmentary horizontal sectional views taken along the lines 4—4 and 5—5, respectively, of Fig. 3 in the direction of the arrows;

Figs. 6 and 7 are fragmentary vertical sectional views taken along the lines 6—6 and 7—7, respectively, of Fig. 3 in the direction of the arrows;

Fig. 8 is a fragmentary plan view of the keys for manually controlling the information marked in cards looking in the direction of the arrows 8—8 shown in Fig. 1;

Fig. 9 is a vertical sectional view taken along the line 9—9 of Fig. 8 in the direction of the arrows, and

Fig. 10 is a fragmentary sectional view taken along the line 10—10 of Fig. 8 in the direction of the arrows.

Referring now to the drawings wherein like reference characters designate the same parts throughout the several views, power for driving the various movable parts of the mechanism is supplied from the motor (not shown) through a belt 10 (Figs. 2, 6, and 7) which drives a pulley 11 fixed to a sleeve 12. The sleeve 12 is freely rotatable upon a shaft 13, suitably supported in a manner to be described hereinafter, being held against lateral movement thereon by collars 14 and 15 (Fig. 6) pinned to the shaft and has formed integrally therewith a worm gear 16 which meshes with a worm gear 17 fixed to one end of a shaft 18. Mounted upon the other end of the shaft 18 (Fig. 1) is a worm gear 19 which meshes with a worm gear 20, fixed to a stud shaft 21, and carrying a beveled gear 22. Meshing with the beveled gear 22 is a beveled gear 32 mounted on one end of a shaft 33 which carries intermediate its ends a beveled gear 34 for driving a beveled gear 35 pinned to a shaft 36. The shaft 36 carries beveled gears 37, 38, 39 and 40 which mesh with and drive beveled gears 41, 42, 43 and 44, mounted on shafts 45, 46, 47 and 48, respectively.

The shafts 45, 46, 47 and 48 extend transversely through the machine and are journaled in side plates 49 mounted upon a base 50 and have enlarged portions 60 (Figs. 2 and 3) which serve as lower card feed rollers for advancing a card to be perforated from a magazine 61 to a hopper 59 (Fig. 1). Cooperating with the enlarged portions 60 of the shafts 45, 46, 47 and 48 are a plurality of spring pressed upper card feed rollers 62 and 63 (Figs. 1, 2 and 3) which are not positively driven and which are normally urged downwardly into contact with the enlarged portions 60. The upper card feed rollers 62 and 63 are of a known type and a detailed description thereof is not believed to be necessary.

Pinned to the upper end of the shaft 33 (Fig. 1) is a beveled gear 64 meshing with a beveled gear 65 secured to a shaft 66 suitably journaled on the side plate 49 and carrying beveled gears 67, 68, 69 and 70. Meshing with the beveled gears 67, 68, 69 and 70 are beveled gears 71, 72, 73 and 74, respectively, mounted upon shafts 75, 76, 77 and 78, respectively. The shafts 75 and 78 are journaled in the side plates 49 and extend through the entire machine, whereas the shafts 76 and 77 are stud shafts journaled in one of the side plates 49. Formed integrally with the shafts 75 and 78 are a plurality of enlarged portions 90 (Fig. 1) which serve as lower card feed rollers for advancing a card to be perforated from a magazine 91 to a hopper 92 (Fig. 1) and formed integrally with the shafts 76 and 77 are similar

enlarged portions 93 which cooperate with the rollers 90 in advancing cards from the magazine 91 to the hopper 92.

The shaft 78 carries on its right end (Fig. 2) a beveled gear 94 which meshes with a beveled gear 95 mounted upon a shaft 96 journaled upon the right hand side plate 49 (Fig. 2) for driving stud shafts similar to the stud shafts 76 and 77 which carry card feed rollers 93. Cooperating with the enlarged portions 90 and 93 are a plurality of spring pressed upper card feed rollers 97 and 98 (Figs. 1, 2, 3 and 4) similar to the upper card feed rollers 62 and 63.

Cards to be advanced by the card feed rollers from the magazines 61 and 91 to the hoppers 59 and 92 are picked up one at a time from the bottom of their respective magazines by card feed knives 109 and 110, respectively, positioned in the bottom of the magazines and connected together by plates 111 to which are fixed pins 112 extending outwardly from the plates 111 through slots 113 in the side plates 49. The pins 112 extend into camming slots 114 formed in the arms of a bifurcated lever 115 oscillatable about a shaft 116 secured to the side plates 49. The lower end of the bifurcated lever 115 is slotted at 117 to receive a camming pin 118 mounted upon the end of a reciprocable lever 119 slidable in a bracket 120 positioned upon the base 50. The end of the reciprocable lever 119 opposite to the one which holds the camming pin 118 has a roller 121 positioned thereon and extending into a cam groove 122 formed in a cam 123 mounted upon the shaft 13. Upon rotation of the shaft 13 the reciprocable lever 119 will be reciprocated and will cause the card feed knives 109 and 110 to engage the bottom card of supplies of cards 135 and 136, respectively, to advance them in their associated card feed rollers, suitable mechanism being provided at 137 and 138 to permit only one card at a time to be advanced from each of the supplies 135 and 136. The shaft 13 is journaled in the side plates 49 and has pinned thereto a driven clutch member 124 (Figs. 2, 6 and 7). Cooperating with the driven clutch member 124 is a driving clutch member 125 which is slidable longitudinally of the shaft 13 and which is provided with horizontally extending arms 126 which are slidable in apertures 127 in the pulley 11. The driving clutch member 125 rotates with the pulley 11 and is provided with a circumferentially extending groove 128 into which extend the arms of a bifurcated lever 129 (Figs. 3, 6 and 7) pinned to a shaft 130 journaled upon the base 50 and normally urged to rotate in a counterclockwise direction (Figs. 2, 6 and 7) by a coil spring 131 (Fig. 3), thereby to hold the driving clutch member 125 out of engagement with the driven clutch member 124. Also pinned to the shaft 130 is a vertically extending control lever 132 (Figs. 2, 3 and 7) which will normally be held in the position shown in Figs. 2 and 7 by the spring 131 but which may be moved to the right (Figs. 2 and 7) to rock the shaft 130 in a clockwise direction and through the bifurcated lever 129 move the driving clutch member 125 into engagement with the driven clutch member 124. The lever 132 has cooperating therewith a flexible shaft commonly known as a "Bowdin" wire 133 for moving it to the right (Fig. 7). The "Bowdin" wire 133 is enclosed in a casing 134 secured to a bracket 145 mounted upon the base 50 and the "Bowdin" wire may be operated by a suitable push button (not shown) of a known type conveniently mounted for operation by an operator. The lever 132, upon being moved to the right (Fig. 7) will engage a latch member 146, pivoted to the side plate 49 at 147 and normally urged to rotate about its pivot in a counterclockwise direction into engagement with a stop member 148 by a spring 149. When the lever 132 is rocked to the right (Fig. 7) it will lock the driving clutch member 125 in engagement with the driven clutch member 124, due to the engagement of the end of the control lever 132 with a stop 150 formed on the latch member 146, thereby to cause the shaft 13 to rotate continuously until the latch member 146 is released from the lever 132. A second "Bowdin" wire mechanism indicated generally at 151 (Figs. 2, 3 and 7) and mounted upon the bracket 145 may be actuated to move the latch member 146 upwardly out of engagement with the lever 132, thereby to permit the spring 149 to return the lever 132 to its normal position as shown in Figs. 2 and 7 for moving the driving clutch member 125 out of engagement with the driven clutch member 124.

Each card as it is advanced from the supply of cards 136 passes under a pneumatic head 139 (Figs. 1, 2, 3 and 4) which is reciprocably mounted in the side plates 49 and which is reciprocated in timed relation to the advancement of cards from the magazines to the hoppers. A pair of links 140 (Figs. 1 and 2) are fixed to the pneumatic head 139 at 141 and carry at their lower ends cam rollers 142 engaging in cam grooves 143, formed in cams 144 fixed to the shaft 13. In each revolution of the shaft 13 the pneumatic head 139 will be moved downwardly to engage a card advanced thereunder from the magazine 91 and will thereafter be raised to the position shown in Figs. 2 and 3.

Carried by the pneumatic head 139 is a card stop bracket 156 (Figs. 7 and 3) to which there is affixed a card stop 157 which is adapted upon movement of the pneumatic head 139 downwardly to move into the path of a card being advanced from the magazine 91 to stop the card in position under the head 139. Shortly after the pneumatic head 139 is moved downwardly to stop a card in position thereunder, the pneumatic head will engage the card and then a camming pin 158 (Fig. 1) mounted upon one of the cams 144 will engage with and move a valve operating lever 159 in a counterclockwise direction (Fig. 1) to open a valve 160 and permit air under pressure from a source (not shown) to pass from a pipe 161 into a pipe 162 which is interconnected with the pneumatic head 139 by a pipe 163 and a flexible connection 164. A blast of air under pressure will thus be delivered through a port 165 (Fig. 3) formed in the pneumatic head 139 and into the interior of the head. The upper surface of the head 139 is dome-shaped and extends downwardly to a grid 166 which is sealed thereto and which is provided with 45 columns of apertures 167, there being 12 apertures in each column. These apertures 167 are so positioned as to be in direct alignment with every possible hole position of a statistical card advanced from the supply of cards 136 when the card is stopped under the pneumatic head 139, and the blast of air directed from the pipe 161 upon the opening of the valve 160 will be directed through the grid and through all of the holes in a card, a duplicate of which is to be made.

Shortly after the opening of the valve 160 due to the engagement of the camming pin 158 with

the valve operating lever 159, the camming pin will engage an upwardly extending arm 168 of a reciprocable lever 169 slidably mounted on the base 50 by means of a bracket 170 and having an arm 171 thereof engaging a downwardly extending portion 172 of the valve actuating lever 159. When the camming pin 158 strikes the arm 168 of the lever 169, it will move the lever 169 to the left (Fig. 1) thereby to rock the valve operating lever 159 in a clockwise direction (Fig. 1) to close the valve 160 and shut off the supply of air under pressure from the pipe 162.

In direct vertical alignment with the apertures 167 in the grid 166 are a plurality of apertures or ports 173 in a grid 174 which communicate with a plurality of apertures 186 formed in a valve block 187. Positioned for vertically reciprocable movement in apertures 188 formed in a cylinder block 189 are a plurality of pistons 190, and interconnecting the apertures in the cylinder block and the apertures in the valve block 187 are a plurality of pipes 191 through which air may be directed to actuate the pistons 190.

The valve block 187 as shown in Figs. 2 and 3 has slide valves 192 slidably mounted therein provided with a plurality of ports 185 for interconnecting the apertures 173 with their corresponding apertures 186 when the slide valves are in their normal position as shown in Fig. 3. However, the slide valves 192 may, when it is desired to disregard some of the information perforated in a card to be duplicated, be moved to the right (Fig. 3) to move the apertures in the valves out of alignment with the apertures 173 and 186. In the embodiment of the invention disclosed herein there are provided ten slide valves for controlling the columns of perforations associated with columns 31 to 40 of a 45 column statistical card. In a manner to be described hereinafter and in accordance with the present invention these particular columns associated with columns 31 to 40 of the statistical cards being duplicated may be controlled to perforate in the duplicate card being perforated, information not present in the card being duplicated.

The pistons 190 are normally held in their uppermost position as shown in Fig. 3 by coil springs 193 which encircle a portion of the pistons 190 and are so positioned as to engage the underside of an enlarged portion 194 of the piston and the upper surface of a guide plate 195. The lower portions of the pistons 190 are slidable in the guide plate 195 and each of them is provided with a notch 196 so that when a piston or pistons in a column of pistons is moved downwardly it or they will be locked in their downward position due to the engagement of the notch 196 with a spring pressed latch plate 197 provided with a plurality of apertures 198 corresponding in number to the number of pistons. There is provided one latch plate 197 for each column of pistons and these plates are normally urged to the left (Fig. 3) by contractile springs 199 which normally tend to move them into engagement with a stop member 200 extending transversely to the direction of movement of the latch plates 197 to prevent them from moving to the left (Fig. 3) beyond a predetermined point where a tapered edge 201 formed on each of the pistons may engage one edge of its associated aperture 198 to cam the latch plate 197 to the right (Fig. 3) until the plate engages in the notches 196. If it is desired to have any column of a duplicate statistical record card left unperforated despite the fact that the record being duplicated has perforations in that particular column, the latch plate 197 for that column may be latched in its right hand position (Fig. 3) by means of manually settable stops 202 of which there is provided one for each latch plate and which are normally positioned in their inoperative or upper position as shown in full lines in Fig. 3.

The pistons 190, upon being actuated to move downwardly, will be latched in their downward position by the latch plates 197 for a predetermined time in the cycle of the mechanism to control perforating pins 203 (Figs. 2 and 3) of which there is provided one for each possible card hole in a statistical record card having 45 columns with 12 possible card holes in each column. After the pistons 190 have controlled the operation of the perforating pins 203, as described hereinafter, the pistons will all be simultaneously released to permit their associated springs 193 to move them to their upper position as shown in Fig. 3 due to the movement of all of the latch plates 197 to the right (Fig. 3) by a release bar 204 common to all of the latch plates 197 engaging release pins 205 fixed to each of the latch plates. The release bar 204 is fixed to the ends of a pair of levers 206 pinned to a shaft 207 journaled in the side plates 49 and having pinned thereto a lever 208 shown in dot and dash lines on Fig. 3 and dotted lines in Fig. 1. The lever 208 carries at its lower end (Fig. 1) a cam roller 209 which rides in a cam groove 210 in a cam 211 fixed to the shaft 13 so that once in each revolution of the shaft 13 the shaft 207 will be oscillated to move all of the latch plates 197 (Fig. 3) to the right to release their associated pistons 190.

The perforating pins 203 are each provided with a head 221, the lower edges of which rest upon a guide plate 222 for normally supporting the perforating pins 203 in the position shown in Figs. 2 and 3, the guide plate 222 being provided with a plurality of apertures 223 in which the perforating pins 203 are slidable and being supported between the side plates 49.

A guide plate and die unit indicated generally by the numeral 224 is reciprocably mounted in the side plates 49 at 225 and comprises upper and lower guide plates 226 and 227, respectively, and a die plate 228. The guide plates 226 and 227 and the die plate 228 are each provided with apertures in direct vertical alignment with the apertures in the guide plate 222 in which the perforating pins 203 may move and the guide plate 227 and die plate 228 are spaced apart sufficiently to permit the passage of a statistical record card therebetween, suitable slots being cut in all of the plates to receive the card feed rollers 60 and 63.

A card which has been advanced under the perforating pins 203 will be stopped thereunder simultaneously with the stopping of the card moving under the pneumatic head 139 by a card stop 229 formed integrally with downwardly extending portions 230 of the card stop bracket 156. The guide plate and die unit 224 has a pair of actuating levers 231 secured thereto, the lower ends of which carry cam rollers 232 which extend into a cam groove 233 formed in a cam 234 mounted on the shaft 13 (Fig. 2). Each time the shaft 13 passes through one complete revolution the guide plate and die unit 224 will be moved upwardly and a card positioned therein will raise all of the perforating pins 203 with it, except those pins which encounter the lower end of the pistons 190 which have been depressed due to a

blast of air being directed at the upper surface thereof, and thus pistons which are depressed will cause the perforating pins associated therewith to perforate the record card positioned in the guide plate and die unit 224.

The invention has been described as a machine for perforating statistical record cards having 45 columns of possible card holes, and in such a device there will of necessity be provided 45 columns of perforating pins with 12 pins in each column, and a corresponding number of pistons 190. The invention contemplates a perforating mechanism, which may be used as a duplicating machine and which is provided with mechanism for manually controlling the perforation of predetermined columns on the record cards which will form the duplicate record whether or not corresponding columns of the card being duplicated has information perforated therein. In order to accomplish this, there has been provided a keyboard 246 (Figs. 1, 8, 9 and 10) having 10 columns of keys 247 with 12 keys in each column for controlling the perforations inscribed in duplicate cards in the 31st and 40th columns thereof. The keyboard 246 (Fig. 1) is mounted upon brackets 248 secured to the base 50 and comprises as shown in Figs. 8, 9 and 10, a valve block 249 in which the keys 247 are slidably mounted. The valve block 249 is provided with a passageway 250 extending transversely of the 10 columns of keys and connected by a pipe 251 to the pipe 162 running to the valve 160. Communicating with the passageway 250 are a series of passageways 252 extending longitudinally of the columns of the keys provided with ports 253 adjacent each key 247, thereby to direct air under pressure from a source (not shown) through the valve 160 to each key 247 on the keyboard whenever the valve 160 is opened by the camming pin 158. Each of the keys 247 comprises a valve portion 254 slidably positioned in an aperture 258 and having a port 255 formed therein communicating with a vertically extending passage 256 which, upon depression of the key, will interconnect the main supply of air under pressure to a pipe 257 individual to each of the keys. The valve portion 254 of the keys is normally urged upwardly into engagement with a stop plate 259, of which there is provided one for each column of keys, by a coil spring 260 engaging the lower surface of the valve portion 254 and a shoulder 261 formed in the aperture 258. The plates 259 are normally urged to the right (Figs. 8 and 9) by compression springs 262 mounted in the valve blocks and engaging a depending portion 263 of the plates 259, retaining screws 264 threadedly engaging the valve block 249 being provided for extending through slots 265 formed in the plates 259 so that the plates will be freely slidable upon the upper surface of the blocks 249. Interconnecting the buttons of the keys 247 and the valve portion 254 is a shank portion 276 which slides in an aperture 278 in the plate 259 and which has an enlarged portion 277 formed thereon for camming the plate 249 to the left (Fig. 9) upon depression of a key, releasing any other key which may have been depressed in that column and thereafter engaging the under surface of the plate 259 to lock the last key actuated in a particular column in its downward position. Any key locked in its downward position will interconnect its port 255 with the associated port 253 for supplying air through the pipe 257 associated therewith to the pipe 191 associated with the particular key actuated.

In the event that there are no perforations in a record card to be duplicated in the particular rows corresponding to the rows in a duplicate record in which it is desired to perforate information under manual control, the depression of a key on the keyboard 246 prior to the feeding of cards under the pneumatic head 139 will cause a perforation to be made in the duplicate card in a position corresponding to the key actuated. However, if the cards being duplicated have information therein in the rows where it is desired to have a manual control on the duplicate card, it is necessary to render ineffective the automatic control of the pistons 190, and therefore there is provided in the valve block 187, the slide valve 192, whereby the control of the perforations in the duplicate card in the 31st to 40th columns thereof, may be effected by the keys 247.

Mechanism has been provided as shown in Figs. 2, 3, 4, 5 and 7, for stopping the feeding of cards to the perforating mechanism and the pneumatic head whenever the supply of cards in either of the magazines 61 or 91 has been exhausted. This mechanism comprises a pair of card engaging levers 300 and 301 which are carried by the card stops 229 and 156, respectively, which move downwardly to stop a card simultaneously. As shown in Figs. 3 and 7, the card engaging levers 300 and 301 have an inverted U-shaped formation at their upper ends, the left arms of which (Figs. 3 and 7) are adapted to move into apertures 302 and 303, respectively, when there is no card in the perforating mechanism or under the pneumatic head 139. The card engaging levers 300 and 301 are normally urged downwardly by coil springs 304 and 305 positioned therearound and engaging shoulders 306 and 307, respectively, formed on the card engaging levers and also engaging the under surface of a bracket 308 formed on the downwardly extending portion 230 of the card stop bracket 156, pins 309 and 310 being passed through the card engaging levers 300 and 301, respectively, to engage the brackets 308 and 156, respectively, to prevent the springs 304 and 305 from moving the levers 300 and 301 downwardly beyond a predetermined point. The lower ends of the card engaging levers 300 and 301 are in direct vertical alignment with the latch member 146 and in the event that there is no card under the pneumatic head 139, the card stop bracket 156, in moving downwardly, will cause the end of the card engaging lever to engage the end of the latch member 146 to rock it (Figs. 2 and 7) in a clockwise direction to release the lever 132, thereby permitting the spring 131 to move the driving clutch member 125 out of engagement with the driven clutch member 124, to stop the rotation of the shaft 13. In a similar manner if there is no card present in the perforating mechanism, the lever 300 will move downwardly into its associated aperture 302 and actuate the latch member 146 to stop all of the mechanism except the card feed rollers which are continuously rotated. However, if there are cards under the pneumatic head 139 and in the perforating mechanism, neither of the card engaging levers 300 or 301 will be moved downwardly into engagement with the latch member 146 and the machine will continue to withdraw cards from the magazines 61 and 91 until the supply of cards in either one or the other of the magazines is exhausted, or, until the "Bowdin" wire 151 is actuated manually to stop the machine.

A better understanding of the mechanism will

be had from the following brief description of the operation thereof.

Let it be assumed that it is desired to perforate in a group of statistical record cards a duplicate of the information in certain rows of a series of other cards, and in addition it is desired to perforate in the new group of cards certain constant information which is common to a plurality of cards. The embodiment of the invention disclosed herein is of a type in which the 31st to 40th columns of the duplicate cards may have information perforated therein not found in the cards being duplicated, and therefore let it be assumed that it is desired to perforate in the group of cards being prepared the numerals 2, 3 and 8, in the 31st, 33rd and 35th columns of the cards. This may be accomplished regardless of whether the cards being duplicated have information perforated in the 31st, 33rd and 35th rows or not. A supply of blank record cards should be deposited in the magazine **61** and the supply of cards which it is desired to duplicate should be placed in the magazine **91**. The slide valves **192** associated with the 31st, 33rd and 35th columns of the record card should then be moved to their extreme right hand position (Fig. 3) so that in the event that there is information in the cards to be duplicated which it is not desired to have perforated in the duplicate cards, the 31st, 33rd and 35th columns of the cards to be duplicated will not control the pistons associated with those columns. Before the machine is started to perform the duplicating operations, the keys **247** associated with the numbers 2, 3 and 8 in the columns of keys associated with the 31st, 33rd and 35th columns of the record cards should be depressed to a position where the stop plates **259** associated therewith will lock the keys in their downward position to interconnect their ports **255** with the ports **253** communicating with the passages **252** and **251**.

After the information which is common to a plurality of duplicate cards and which is not perforated in the cards being duplicated has been set up on the keys **247**, the "Bowdin" wire **133** may be actuated to move the lever **132** to the right (Fig. 7) to a position where it will be latched by the latch member **146**, thereby to permit the driving clutch member **125** to be held in engagement with the driven clutch member **124** for rotating the shaft **13**. Early in the cycle of rotation of the shaft **13** the cam lever **119** will be moved to the left (Fig. 1) and shortly thereafter moved to the right to rock the bifurcated lever **115** and thereby to cause the card picker knives **109** and **110** to feed a card from the bottom of each of the magazines **61** and **91** into engagement with their associated card feed rollers which will advance the cards into the perforating mechanism and under the pneumatic head **139**, respectively. The cards from the supplies **136** and **135** upon reaching a position under the pneumatic head **139** and in the perforating mechanism will be stopped in these positions due to the movement of the card stops **157** and **229** downwardly into the path of the cards, the card stops both being interconnected with the pneumatic head **139** which at this time in the cycle of rotation of the shaft **13** is driven downwardly to engage the card advanced thereto from the supply of cards **136**. As soon as the cards are stopped in the perforating mechanism and under the pneumatic head **139**, the camming pin **158** will engage the valve lever **159** to open the valve **160** and permit air under pressure to be directed through the pipe **162** and **163** into the pneumatic head **139** and through the apertures in the card held under the pneumatic head **139** to actuate the pistons **190** associated with the card positions in which perforations occur to drive the pistons downwardly and cam the latch plate **197** to the right against the tension of the springs **199**. The pistons **190** will be locked in their downward position by their associated plates **197** engaging the notches **196** formed in the pistons in all of the rows where the slide valves **192** have not been operated, and in the rows where the slide valves **192** have been operated the pistons will not be affected unless a key or keys **247** on the keyboard **246** associated with those particular rows have been depressed. In the problem selected for illustration, the slide valves **192** have been moved to their right hand position (Fig. 3) to render ineffective for control by the card being duplicated those pistons associated with the 31st, 33rd and 35th columns of the record card. The keys representing the digits 2, 3 and 8 in the 31st, 33rd and 35th columns of the record card have been depressed and when the valve **160** is opened, air under pressure will be directed through the pipe **251** and passages **250** and **252** through the ports **253** and **255** associated with the actuated keys representing the digits 2, 3 and 8 in the 31st, 33rd and 35th columns of the card and through the pipes **257** to the pipes **191**, thereby to actuate the pistons representing the digits 2, 3 and 8 associated with the 31st, 33rd and 35th columns of the record cards. These pistons will also be locked in their downward position by their associated latch plates **197**, simultaneously with the locking of the pistons associated with the other columns of the card being duplicated.

After the pistons **190** have been locked in their downward position, the camming pin **158** will move the reciprocable lever **169** to the left (Fig. 1) to close the valve **160** and immediately thereafter the cams **234** will raise the die plate **228** and guide plates **226** and **227** upwardly. A card positioned between the die plate **228** and guide plate **227** will move all of the perforating pins **203** upwardly except those pins which engage the lower ends of the pistons **190** which have been locked in their downward position. Those perforating pins **203** which are restrained against upward movement with the die plate by the pistons **190**, will be driven through the card held upon the die plate and will perforate the card in the position representing the digits 2, 3 and 8 in the 31st, 33rd and 35th columns, respectively, and will also perforate the card with all of the information in the card withdrawn from the supply of cards **136** except any information which occurred in the 31st, 33rd and 35th columns thereof.

After the record card has been perforated in this manner, the cams **234** will move the guide plate and die unit **224** downwardly to withdraw the perforating pins **203** from the card and thereupon the pneumatic head **139** will be cammed upwardly by its cams **144** and the cards under the head **139** and between the guide plate **227** and die plate **228** will be released by their respective card stops **157** and **229** whereupon the card being duplicated and the duplicate cards will be directed to the hoppers **92** and **59**, respectively.

In each cycle of rotation of the shaft **13** a card will be drawn from each of the supplies **135** and **136** and a duplicate card will be perforated in accordance with the information in the card

withdrawn from the supply 136, and in accordance with the information set up by the operation of the keys 247. The shaft 13 will continue to rotate until the machine is stopped due to the operation of the "Bowdin" wire 151 or until the supply of cards in either of the magazines 61 or 91 is exhausted and one of the card engaging levers 300 or 301 actuates the latch member 146 to automatically stop the machine.

Although a specific embodiment of the invention has been described hereinbefore, it is to be understood that the structure described is capable of many modifications and alterations without departing from the scope of the invention which is to be limited only by the scope of the appended claims.

What is claimed is:

1. A perforating apparatus comprising means for directing air pressure through apertures representing information in a record member to take information from the record member, means responsive to the air directed through the record member to perforate a duplicate of said information in a second record member, means for rendering the air under pressure directed through the apertures ineffective to control certain of the perforating means, and manually controlled means for controlling certain of the perforating means.

2. In a pneumatic card duplicating mechanism, a plurality of perforating members, a plurality of pistons controllable by perforations in a record member for controlling the operation of said perforating members, means for rendering certain of said pistons irresponsive to perforations in said record member, and manually operable means for controlling said last mentioned pistons.

3. In a perforating mechanism, a plurality of perforators, a plurality of pistons for controlling the operation of said perforators, means for directing air under pressure through a record member to control selected ones of said pistons, and manually operable means for selectively controlling others of said pistons.

4. In a perforating apparatus, a source of air under pressure, pistons actuatable by said air under pressure, manually operable means, means for selectively directing the air pressure through apertures in a record card or through said manually operable means to said pistons, and perforators controlled by said pistons.

5. In a perforating apparatus, pneumatically controlled perforators, manually operable valves, a source of air under pressure, and means for selectively directing the air under pressure through said valves or through apertures in a record sheet to control the operation of said perforators.

6. In an apparatus for duplicating a perforated record sheet, pneumatically controlled means for determining the location of perforations in the perforated record sheets, means controlled thereby for registering the location of the perforations in the perforated record sheet, a plurality of perforating members, means for actuating the perforating members to cause the registering means to selectively control the effect of the perforating members on a second record member, and a plurality of manually actuatable valves for nullifying the operation of selected ones of the pneumatically controlled means and controlling the registering means.

7. In an apparatus for duplicating a perforated record sheet, pneumatically controlled means for determining the location of perforations in the perforated record sheets, means controlled thereby for registering the location of the perforations in the perforated record sheet, a plurality of perforating members, means for actuating the perforating members to cause the registering means to selectively control the effect of the perforating members on a second record member, means for rendering said pneumatically controlled means ineffective for determining the location of perforations in certain areas of the perforated record sheets, and a plurality of manually actuatable valves for controlling the registering means associated with those areas of the record sheet in which the determination of the location of perforations by the pneumatically controlled means is rendered ineffective.

8. In a record marking apparatus, pneumatically controlled marking members, manually operable keys, and means for effecting the control of the marking members either in response to apertures in a record sheet or by said keys including means for rendering the sheet ineffective to control the marking members responsive to the keys.

9. In a perforating apparatus, means for directing air under pressure through apertures representing information in a record member, means for marking information on a second record member, means controlled by air under pressure passing through the first mentioned record member for controlling some of the marking means, manually controlled means for controlling others of the marking means, and means for selectively rendering either the manually controlled means or the air passing through the record member effective to control predetermined marking means.

10. In a perforating apparatus, means for marking a card, a source of air under pressure, means controlled by said air under pressure for controlling said marking means, means for mounting a perforated card in a position for controlling the passage of air to said pressure controlled means, and manually controlled means for controlling the passage of air to said pressure controlled means.

11. In a perforating apparatus, a source of air under pressure, pistons actuatable by said air under pressure, and means for selectively directing the air under pressure through apertures in a record or through manually operated means to said pistons.

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