Oct. 30, 1934. F. J. SPRAGUE 1,978,967

ELECTRIC SELECTOR DEVICE

Original Filed July 6, 1931 6 Sheets-Sheet 1

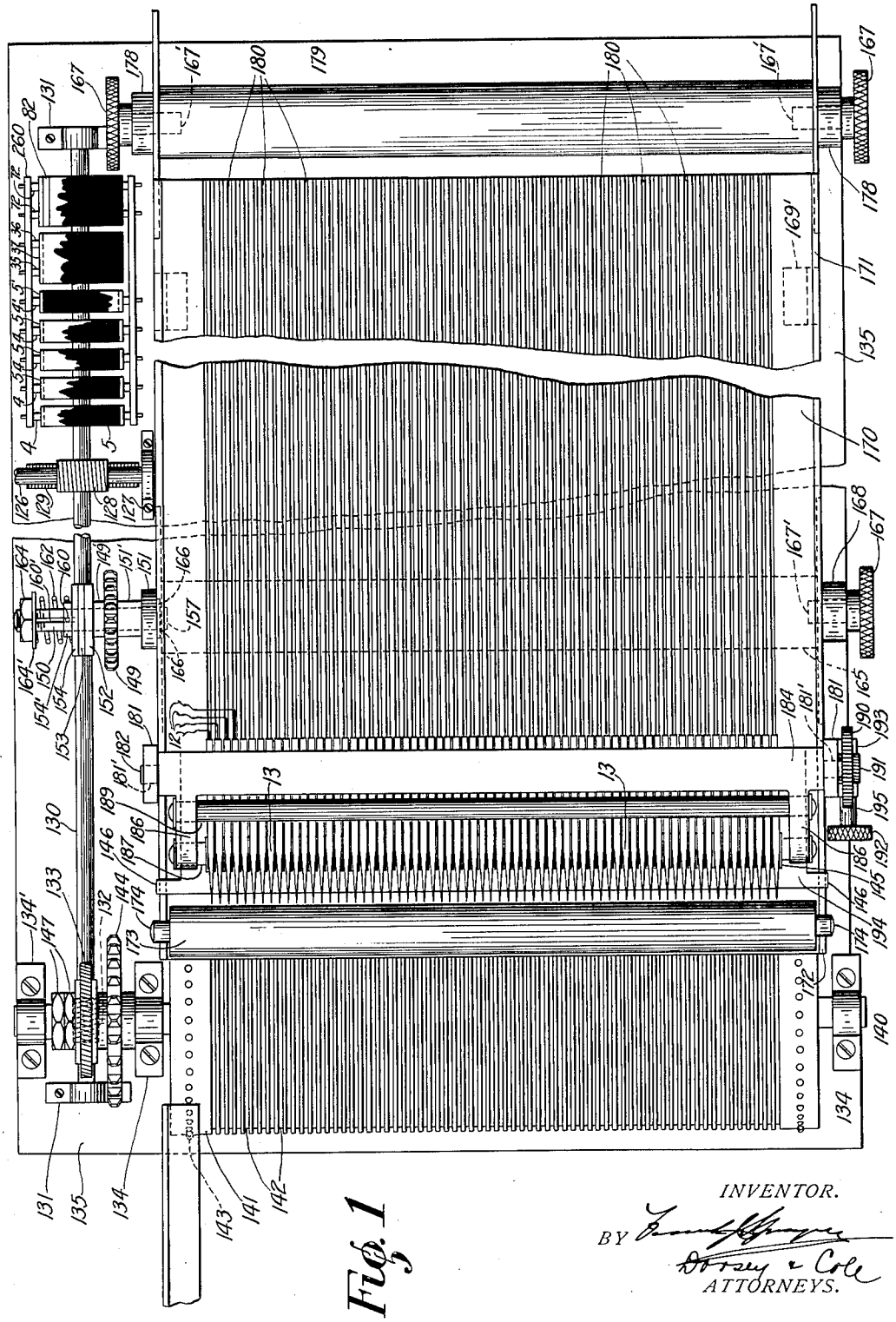


Fig. 1

INVENTOR.

BY

Dorsey & Cole

ATTORNEYS.

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Original Filed July 6, 1931 6 Sheets-Sheet 2

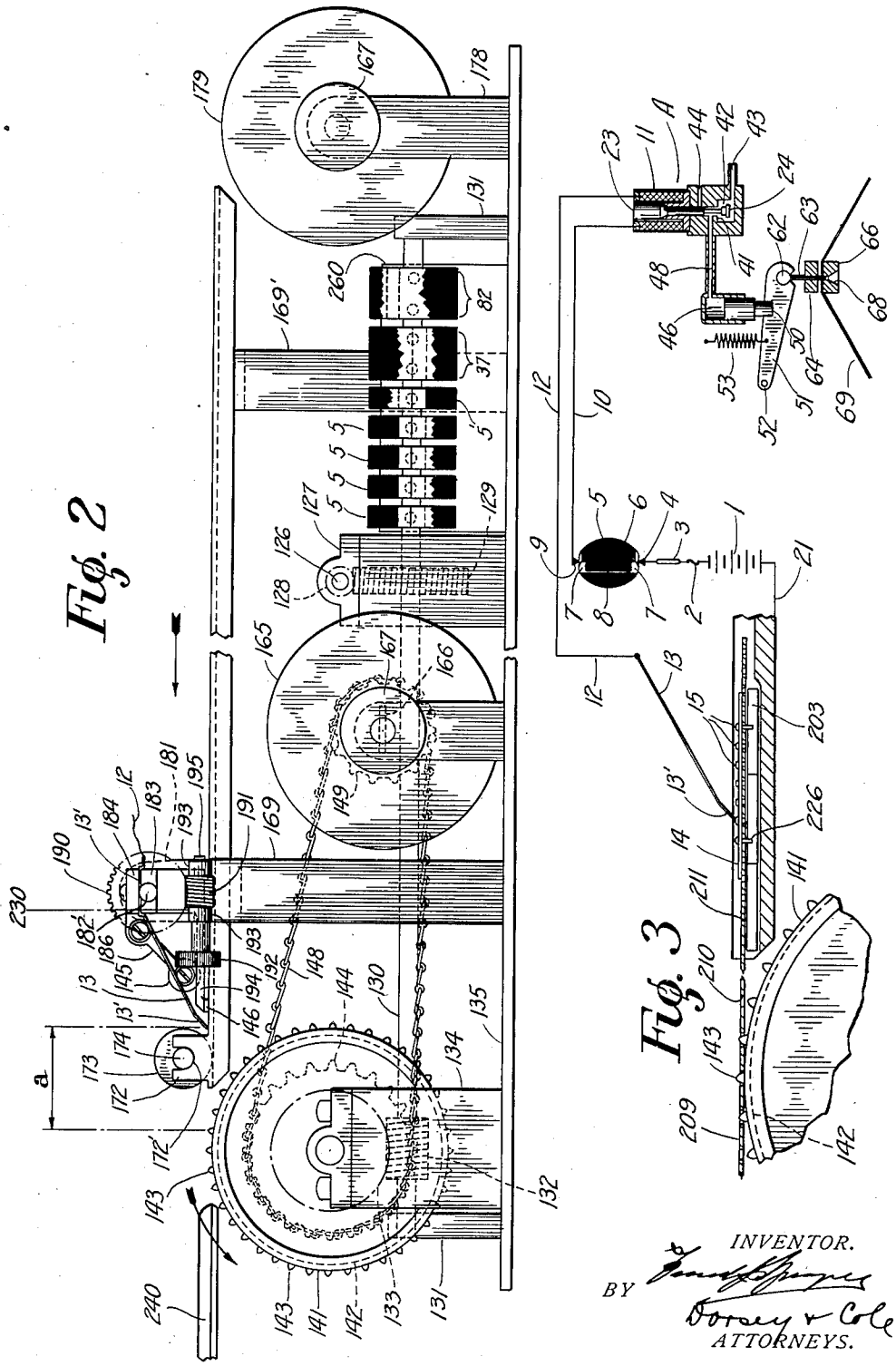


Fig. 2

Fig. 3

INVENTOR.

BY

Dorsey & Cole

ATTORNEYS.

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ELECTRIC SELECTOR DEVICE

Original Filed July 6, 1931 6 Sheets-Sheet 3

Fig. 4

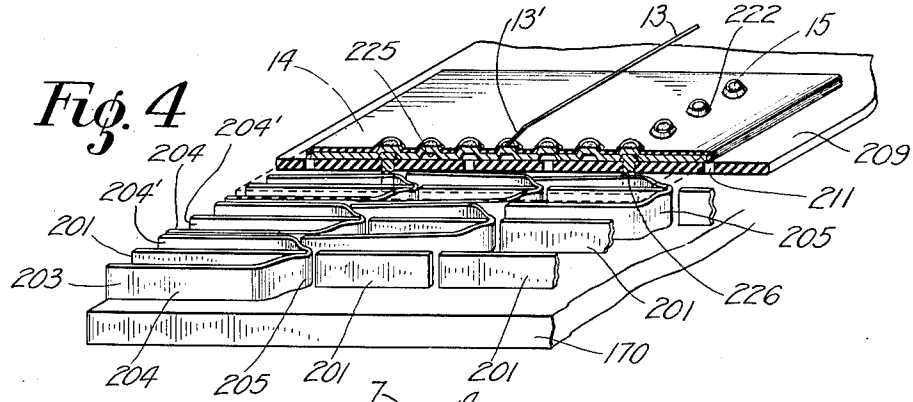


Fig. 5

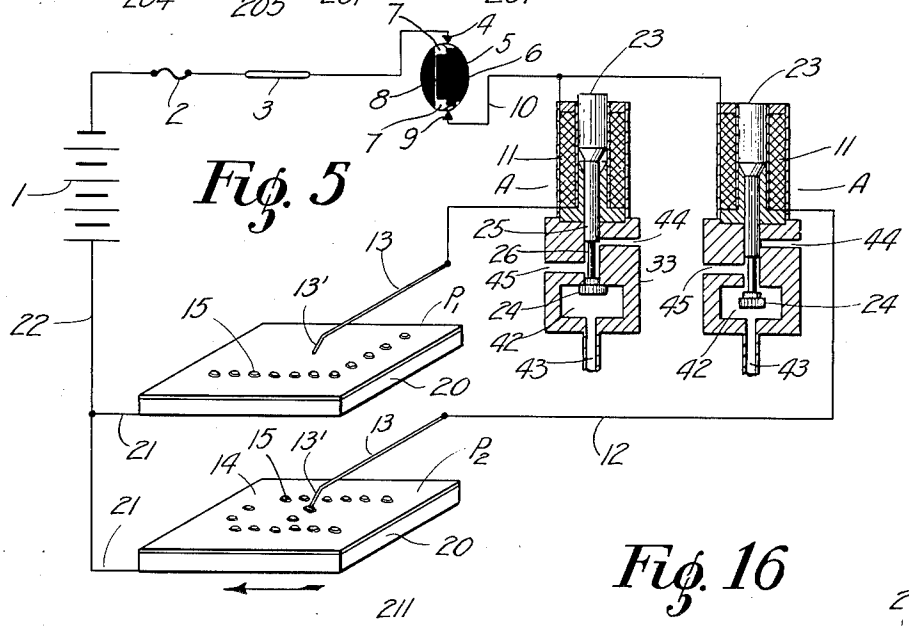
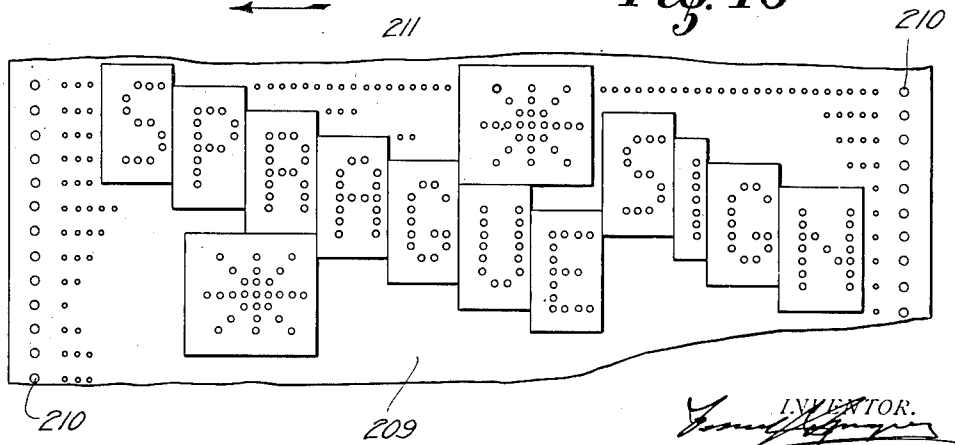


Fig. 16



INVENTOR.

BY

Dorsey & Cole

ATTORNEYS.

Oct. 30, 1934. F. J. SPRAGUE 1,978,967

ELECTRIC SELECTOR DEVICE

Original Filed July 6, 1931 6 Sheets-Sheet 4

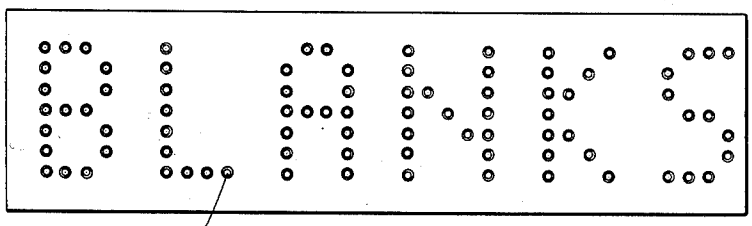


Fig. 6

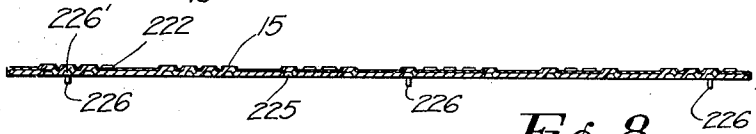
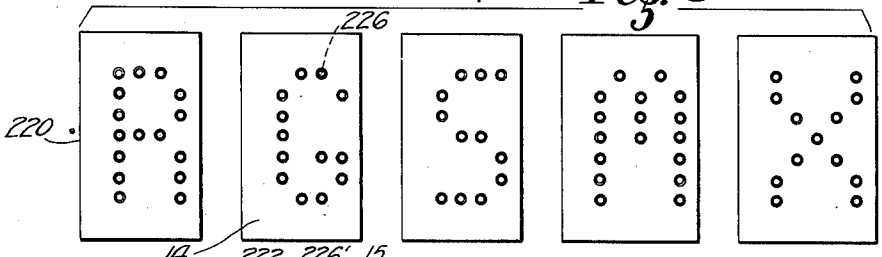


Fig. 7

Fig. 8



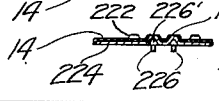
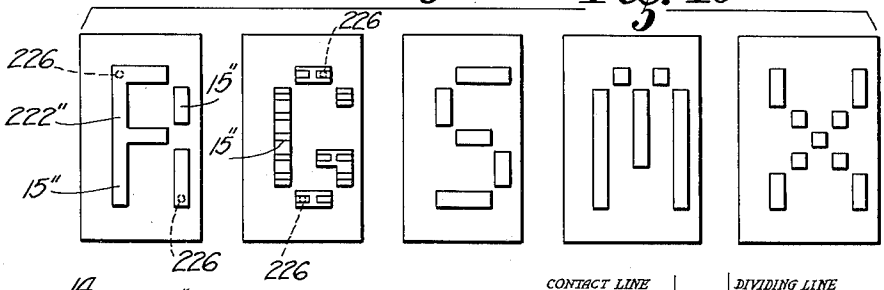


Fig. 9

Fig. 10



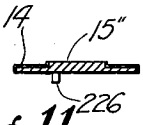


Fig. 11

Fig. 12

INVENTOR.
BY Frank J. Sprague
Dorsey & Cole
ATTORNEYS.

Oct. 30, 1934. F. J. SPRAGUE 1,978,967

ELECTRIC SELECTOR DEVICE

Original Filed July 6, 1931 6 Sheets-Sheet 5

Fig. 13

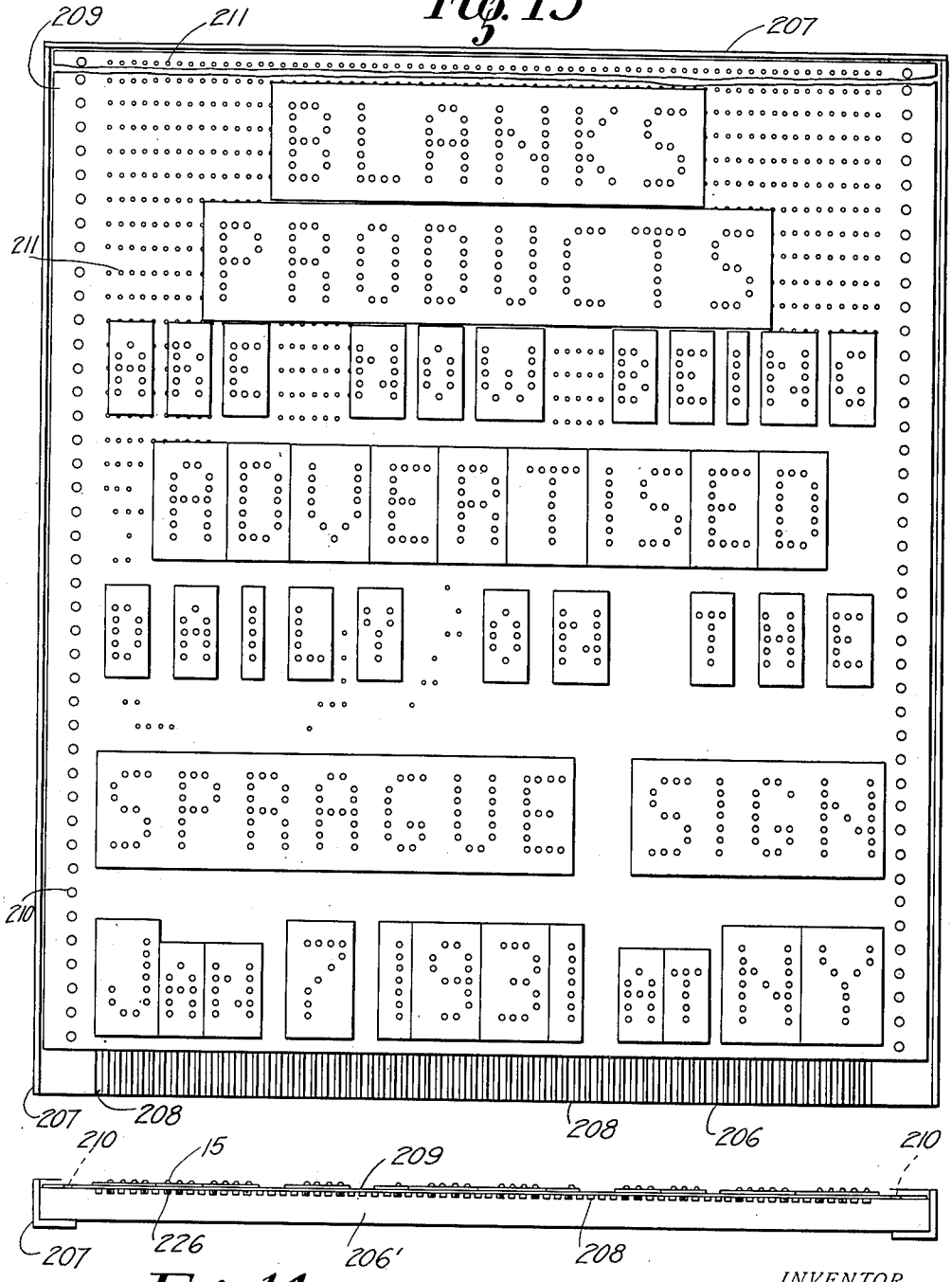


Fig. 14

INVENTOR.

BY

Dorsey & Colle

ATTORNEYS.

Oct. 30, 1934. F. J. SPRAGUE 1,978,967

ELECTRIC SELECTOR DEVICE

Original Filed July 6, 1931 6 Sheets-Sheet 6

Fig. 15



INVENTOR.

BY

Dorsey & Cole

ATTORNEYS.

Patented Oct. 30, 1934

1,978,967

UNITED STATES PATENT OFFICE

1,978,967

ELECTRIC SELECTOR DEVICE

Frank J. Sprague, New York, N. Y., assignor to Sprague Signs, Inc., Wilmington, Del., a corporation of Delaware

Original application July 6, 1931, Serial No. 549,078. Divided and this application January 20, 1933, Serial No. 652,715

5 Claims. (Cl. 200—46)

My invention relates to apparatus and methods for the manufacture of perforated records, and more particularly to a selector system for the selective actuation of perforating means used in the manufacture of such records, which records may be used for instance for the selective energization of the lamps of a sign display device.

In my copending application Ser. No. 549,078 filed on July 6, 1931, of which the present application is a division, I have described a method and apparatus by means of which perforated records corresponding to a prearranged text can be produced in a very simple manner and at a very high rate of speed.

The present application relates to the novel electrical and mechanical means for the control of the perforating machines and while the use of the present invention is primarily described in connection with the apparatus of said original application, various novel features of my invention may have a more general application.

The various objects of my invention appear as the specification progresses and will be more specifically pointed out in the appended claims.

In the drawings which form part of this specification,

Figure 1 is a plan view of the contact selector with its drive mechanism and the circuit-breakers of a control apparatus according to the invention adapted to be used, for instance, in connection with a record-punching apparatus, as described in my prior application.

Fig. 2 is a side elevation of the apparatus shown in Fig. 1.

Fig. 3 is an enlarged view of part of the apparatus shown in Fig. 2, also showing schematically a punch, an electro-pneumatic valve and its circuit controlled by a selector contact finger.

Fig. 4 is a fragmentary perspective view of one end of the selecting platform, also showing a portion of a type letter with the platen, and a contactor finger of the selector.

Fig. 5 is a schematic diagram showing the control and actuation of two electro-pneumatic valves from their respective contact fingers.

Fig. 6 is a plan view of one form of pattern for a type word.

Fig. 7 is a sectional elevation of Fig. 6.

Fig. 8 is a plan view of a group of individual type letters.

Fig. 9 is a sectional elevation of one letter of the group of Fig. 8.

Fig. 10 is a plan view of a group of individual type letters representing the same characters as those of Fig. 8, but having another construction.

Fig. 11 is a sectional elevation of one letter of the group of Fig. 10.

Fig. 12 is a partial plan view of a set-up of type letters on a platen.

Fig. 13 is a plan view of a platen with set-up characters and the set-up tray.

Fig. 14 is an end view of Fig. 13.

Fig. 15 is a portion of the record reproduced from the pattern of Fig. 16.

Fig. 16 is a portion of a pattern showing design types and types in staggered arrangement.

My apparatus comprises a selector device cooperating with suitable patterns and also provided with control means in the form of circuit-breakers to control further apparatus.

The selector device is preferably synchronized with such further apparatus, for instance with a punching device as described in my above original application by means of which a paper roll is selectively punched to obtain perforated records corresponding to the pattern fed through the selector device. Such a punching device is fully described in my above referred to application and in the present application only such portions thereof will be described and illustrated as are necessary for the full understanding of the operation of the devices forming part of the present invention.

The general principle of operation of my selector device in connection with a punching device is shown in Fig. 5.

Two patterns P1 and P2 of the type more fully described later on, consist of a metallic base 20 and having raised conductive portions or contacts 15 giving the outline of the desired letter or design and being provided with an insulating top coating 14.

The patterns are placed side by side (and not on top of one another as is shown in Fig. 5 merely for the sake of clarity) in a manner later to be described, on the selector device and are moved past corresponding contact spring 13 having bent portion 13'. Cooperating with the selector device is a rotating circuit-breaker or circuit-breakers 5. To each contact spring 13 is connected the coil 11 of an electro-pneumatic punch actuating valve A and the devices A are selectively energized through selective energization of the coil 11 by means of circuits controlled by the moving patterns, selector contacts 13 and circuit-breaker 5.

The circuit-breaker 5 comprises a rotating disc 6 of insulating material in which are embodied two peripherally located short contact segments 7—7 interconnected by an embedded connector

8. Two oppositely located contact brushes or springs 4 and 9 cooperate with the rotating disc.

The energizing circuit of the coil 11 comprises a battery or other suitable source of electric supply 1, a switch 3, and preferably interposed between the two is a fuse 2.

The same circuit is also illustrated on the right-hand side of Fig. 3, where also the punching means actuated by the electro-pneumatic valves A are also shown. These punching means, as will later be more fully described, upon energization of their respective electro-pneumatic valves A, perforate the advancing paper sheet 69 to provide them with perforations corresponding to the disposition of the contact 15 of the advancing patterns.

It should be noted that my means later to be described, rotation of the disc 6 of the circuit-breaker 5, the advance of the paper 69 and the advance of the patterns P1 and P2 are so interlocked that the disc 6 will complete one full revolution between the time that a contact finger 13 contacts with two successively spaced contacts 15, and that the paper 69 will be advanced the distance corresponding to the progress of the pattern. It should also be understood that if desired other fixed relations between the rotation of the circuit Figure 5, the advance of the pattern and the advance of the paper, may be provided.

It should be further noted that the contact segments 7—7 of the circuit-breaker are so disposed and proportioned relative to the advance of the pattern that the circuits of the coil 11 are made and broken at the circuit-breakers 5 instead of the contacts 13—15. The number of electro-pneumatic valves A which are provided on the punch, corresponds to the maximum number of contacts 15 which may appear in a single line and if the number of valves A is sufficiently large a plurality of circuit-breakers 5 is provided, which groupwise control the electro-pneumatic valves A and is more fully described in my above referred to application.

From the above it will be seen that the coil 11 will be energized when its respective selector contact 13 contacts with the corresponding contact 15 of the pattern, but the circuit will be established only while the circuit-breaker 5 is closed, and that the burning of the contacts 13 and 15 is prevented as the circuit is closed and opened at the circuit-breaker 5.

The energizing circuit of the coil 11 thus established may be traced as follows: from coil 11 to the contact finger 13 and its bent end 13', to contact 15, base 20, conductor 21, battery 1, fuse 2, switch 3, contact spring 4, contacting segments 7—8—7, contact spring 9, conductor 10 back to coil 11.

As also appears from Fig. 5, while the circuit-breaker 5 closes the circuit of both electro-pneumatic valves A shown, only the magnet corresponding to pattern P2 is energized, as the circuit of the other magnet is broken at its pattern.

As the punching apparatus does not form a part of my present invention, its full description and illustration is deemed unnecessary and it should be here merely stated that when the magnet 11 of an electro-pneumatic valve A is energized, it causes attraction of a plunger 25 which thereby, as shown on the right side of Fig. 3 through admission of air through the interconnecting passages 43 and 48 into a chamber 46 causes the depression of a lever 51 pivoted at 52. The free end of lever 51 carries a punch 63 which, when thus depressed, causes the perforation of the paper 69, passing between a lower and upper guide block 66 and 64 respectively.

When a magnet is not energized its punch retracts within the guide box 64 and does not interfere with the passage of the paper.

The selector device which is shown in Figs. 1 and 2 will be described later. I shall first proceed in describing a preferred form of patterns.

Such patterns comprise conductive and insulating portions, and preferably form types the conductive portions of which consist of individual contact points or contact strips suitably arranged in groups to define characters or designs, whereby the corresponding perforations obtained by the punching apparatus on the paper record reproduce these characters or designs essentially in the same form.

To form the patterns the types are preferably prearranged or set-up in proper disposition to constitute successive lines of a text or the elements of a design, and for this purpose I use a base platen of insulating material adapted to carry a convenient number of type lines and make provision for the continuous successive feed of the patterns, so that the resulting perforated roll, if desired, may carry an uninterrupted text or a design of any desired length.

Fig. 13 illustrates such a pattern platen 209, which for the set-up of the types is placed in a set-up tray 206. The set-up tray 206 comprises a suitable base 206' of wood or other material, and is provided on its sides and top with retaining walls 207, illustrated as angle pieces.

The platen 209 is preferably a thin but strong sheet of insulating material; for instance, it may be a bakelite sheet.

The platen 209 is provided on each side, near the edge, with a row of guide holes 210. Between the two rows of holes 210 are horizontal rows of smaller holes 211, the latter forming a rectangular hole system substantially covering the whole platen. However, horizontal and vertical spacing of the perforations 211 need not be equal, such spacing being determined by considerations later to be discussed.

The base 206' is provided with longitudinal grooves 208 adapted to align with the vertical rows of holes 211, and provide clearance for locating pins 226 of the type later more fully described.

Figs. 8 and 9 illustrate one form of a type 220, which consists of a metallic plate or base 224, provided with embossings 222. The base 224 is covered on its upper surface and on its edges with an insulating coating 14, whereas the top surface of the embossings 222 are not coated and form the metallic contact surfaces 15. The contact points 15 defining the characters are selected from an imaginary rectangular point system in which the unit spacing is the same vertically and horizontally.

The base 224 is provided with a number of metallic pins 226 projecting downward therefrom, these pins being soldered or otherwise affixed to the base, preferably by having conical heads 226' which are disposed in the impressions 225 (see Fig. 7) formed under the embossings 222. As a rule two pins 226 suffice for a type, one at the top and the other at the bottom thereof, preferably located diagonally opposite each other.

The number and disposition of the embossings 222 and thus of the contacts 15 of a type, is such that their arrangement conforms to the desired character or design. A succession of characters

forming simple or oft-recurring words or syllables may be combined on a single base, and an example of such combination is shown in Figs. 6 and 7.

A modified form of type is shown in Figs. 10 and 11 in which successive embossings in the same horizontal and vertical lines are replaced by rectangular raised strips 222'' with their contact surfaces 15'' conductive over their entirety.

It should be noted that in view of the cooperative arrangement of the circuit-breakers 5 and fingers 13 relative to the pattern, as will later appear, only those portions of the contact surfaces 15'' are operatively effective which correspond to respective contact points 15 of the types of Fig. 8, such effective portions being indicated in cross-hatching on the second letter of the group of Fig. 10.

The type letters may be made in various ways. For instance, by stamping them out of thin metal sheets or by casting same of suitable metal. The types shown in Fig. 10 are especially well adapted for casting. When the types are cast the pins 226 are preferably integral with the type. For the insulating layer of the type I prefer to use japanning or insulating enamels.

For proper horizontal and vertical spacing of the types, margins are provided around the contours of the characters of said types. For instance, if it is desired to have a minimum of three spaces between adjacent characters of a line and a minimum of four spaces between the characters of two successive lines—the spaces being expressed in distances between the center-points of two adjacent contacts 15—the types (as shown in Fig. 8) are provided at the top, at the bottom and at the left side of the character with a margin of two spaces, whereas at the right side the margin is one space. Similar margins are provided on the types of Fig. 10 and on the combinations of Fig. 6.

It is evident that other spacings can be provided by a suitable selection of the margins.

The holes 211 of the pattern plate 209, which are retaining holes for the pins 226 of the types and rectangularly cover the platen as described in connection with Fig. 13, have preferably a horizontal spacing of one space (as above defined) and a vertical spacing of two spaces. Should the vertical spacing be reduced to a single space, the vertical margins or the types would also have to be reduced to a single space.

It will be readily seen that the previously described disposition of the locating pins 226 insertion of the types on the platen 209 is easily accomplished, and at the same time if desired the whole perforated portion of the platen 209 may be covered by a continuous text or design.

It is obvious that the margins provided on the types represent the minimum spacing between characters or lines and a more open spacing can be obtained by not adjacently placing the types. Nor is it necessary to form straight horizontal lines, but the types may be staggered as might be desirable in case of designs or to simulate various printed forms as shown in Fig. 16.

I have found, especially in the case of types made of thin material, that the insulation on the edges of the base 224 may wear off, and when such an exposed edge passes a contact finger 13, (assumed the above marginal disposition), the circuit of the corresponding electro-pneumatic valve A is completed and undesired perforation is produced. Such occurrence can be prevented by so selecting the margins that the side edges do not align with the contact fingers of the selector 13, and the top and bottom edges pass said fingers at a time period when the circuit-breakers prevent completion of the electric circuits through the fingers 13.

Types having such marginal arrangement are shown in Fig. 12. The margins are in this case one-half, one and a half, two and a half, etc. spaces (as previously defined), thereby the side edges of the bases 224 are half-way between two vertical rows of holes 211—which as later appears—also places these edges half-way between two adjacent contact fingers 13. The top and bottom edges fall half a space from a horizontal row of holes 211, whereas as shall appear, the circuit-breakers 5 complete the circuits through the fingers 13 only at a time when a horizontal row of holes either aligns with fingers 13 or is spaced from the fingers by one unit space.

The selector device through which the patterns are fed for the selective energization of the electro-pneumatic valves A of the punching mechanism, is shown in Figs. 1 and 2. The selector device comprises a table for the feeding of the patterns, a bank of contact fingers 13 for the selection of the electro-pneumatic valves A and a drive for the advance of the pattern, which drive is also interconnected with the drive of the circuit-breakers 5 and other circuit-breakers hereafter described, these circuit-breakers being preferably arranged alongside of the selector device.

The selector device comprises a base 135, which by means of four pedestals 169—169 and 169'—169' supports a platform 170 adapted to receive the platens 209. The platform approximates the length of the platen 209 and is slightly wider than the platen. It is provided with retaining walls 171—171, on each of its sides, which walls also serve as guides for the platens as the latter are moved over the upper surface of the platform 170.

The platform 170 is provided with grooves 180 paralleling the retaining sides 171 thereof, the grooves being disposed to align with the vertical rows of holes 211 of the platen and provide clearance for the locating pins 226 of the types 220 projecting downwardly through the platen. The grooves 180 start at the incoming end of the platform 170 and terminate at a point 230 corresponding about to the center line of the pedestals 169 near the outgoing end of the platform.

Carried by the extensions 181—181 of the pedestals 169—169 near the outgoing end of the platform 170 is provided—in a manner later more fully disclosed—a bank of selector contact fingers 13 arranged in a single row across the platform. The contact fingers 13 are insulated from each other and their number and disposition corresponds to that of the grooves 180, and thus align with the vertical rows of holes 211 of the platen 209 when the platen is placed on the platform.

As previously explained, the spacing of the contact points 15 is such that they all fall along vertical rows of holes 211; thus it will appear that as the pattern is advanced and the types with their contact portions 15 pass under the contact fingers 13, the contacts 15 falling in any vertical row pass a selector contact 13 corresponding to said row and thus the bank of contact fingers 13 explores all of the contact points 15 or the entire operative area of the platen 209.

The extensions 181—181 form bearings 181'—181' for pivots 182—182 of an insulating cross-strip 183. On the top of the strip 183 and secured thereto is a second insulating strip 184, between

which the selector contacts 13 are properly spaced and clamped. The contacts 13 are thereby securely held and insulated from each other.

The selector contacts 13 are preferably resilient springs which in their operative position slant towards the outgoing end of the platform at an angle of about 30°. At their contacting ends 13' the springs 13 are bent to an angle of about 45° and reduced in width. However, this width still exceeds the diameter of the platen holes 211, preventing the springs from dropping in these holes. At their other ends the springs 13 after passing with a horizontal portion 13'', clamped between the insulating strips 183 and 184, are connected to conductors 12 leading to their respective electro-pneumatic valves A (see Figs. 3 and 5).

The upper strip 184 is provided near its two ends with arms 186—186 slanting towards the outgoing end of the platform at an angle of about 45°, these arms supporting at their free ends a transverse rod 187 of insulating material underlying the contact springs 13. The rod 187 carries insulating washers 145 which maintain the proper spacing between the free ends of adjacent contact springs 13. A second rod 189 of insulating material is mounted between the arms 186—186 at their root adjacent to member 184, said rod 189 bearing on the contacts 13 near the point where they emerge from the insulating strips 183 and 184. The rod 189 provides and maintains the desired deflection and tension of the spring contacts 13 and insures such deflection and tension to be the same for the individual springs.

Beneath the insulating strips 183 and 184 and suitably secured thereto is a plate of insulating material which extends under the contact fingers 13 approaching their contact points 13'. The plate 194 is distanced from the platform by stops 146, which provide for a proper clearance for the types; these stops also limit the downward movement of the spring contacts 13. On the other side of the contact points 13', near the outgoing end of the platform 170, is provided a loosely mounted roller 173 supported by short projecting shafts 174—174 journaled in open bearings 172'—172' formed in two upward extensions 172—172 of the retaining walls 171—171. The bearings 172'—172' freely support the roller permitting its easy rotation, upward displacement, as well as its removal.

The end of the shaft 182' of the cross-member 183 projects through its bearing 181' to carry a worm gear 190. Mounted on the outside of support extension 181 below the worm gear 190 and meshing with it is a worm 191 supported in bearings 193—193. The worm 191 is provided with a shaft 195, the left end of which carries a knurled knob 192 through which rotative adjustment of the unit comprising the contact fingers 13, strips 183 and 184, rods 187 and 189 and the plate 194, about the shaft 182' can be effected. Rotation of the knob permits adjustment of the contact pressure exerted by the springs 13, and also permits lifting of the unit out of its operative position.

The outgoing end of the platform 170 (starting from a point indicated as 230 on Figs. 6 and 7) is provided with a resilient contact system adapted to engage the pins 226 of the types. This contact system is shown in Fig. 4 and insures electric connection between the pins 226 of the types and the base 170 while the types pass under the selector contacts 13.

Upright metal strips 201 are provided in three crosswise rows. The number of contact strips 201 per crosswise row is one less than the number of grooves provided on the platform 170 whereby the corresponding strips of the three crosswise rows align with each other; however, they do not form a continuation of the grooves 180, but are spaced centrally thereto.

Associated with each strip 201 is a substantially U shaped spring 203, the two legs 204 and 204' of which are parallel with the strip 201 and the central portion 205 of which is pinched to the incoming end of the strip 201. The two legs 204 and 204' of two adjacent springs of the same crosswise row, contact with each other substantially throughout their length and align with the corresponding groove 180. Such pair of spring legs 204 and 204' form a contact pair for the pins 226 of the types. When such a pin 226 leaves its groove 180 it engages the contact pair aligning with this groove, whereby a wiping contact is established between the pin and the contact pair which is maintained during the passage of the pin 226 between the contact pair.

The springs 203 of two successive strips 201 overlap each other to such extent that the contact at a pin 226 is not broken when it passes from one contact pair to the next pair in advance.

While three successive rows of strips 201 and of corresponding springs 203 are shown, the number may be varied. However, it is advisable that when a type passes the selector contacts 13 at least two of its pins 226 should be simultaneously engaged by the spring contacts 203—203.

For the advance of the platen 209 I provide, as shown in Figs. 1, 2 and 3, a toothed drum 141 having its shaft 140 journaled in pedestal bearings 134—134 supported on the base 135 beyond the outgoing end of the platform. Thereby the platen 209 tangentially passes over the drum, and upon rotation of the drum its teeth 143 successively engage the guide holes 210 of the platen 209.

As the platen and its types leave the outgoing end of the platform 170 and pass over the drum 141, the downwardly projecting pins 226 of the type occupy peripheral clearance grooves 142 provided on the drum, said grooves being similar in size and relative disposition to the grooves 180 of the platform 170.

One end of the shaft 140 (shown as the upper end on Fig. 1) is extended to carry a worm gear 133 adjustably affixed thereto and secured in its desired position by two lock nuts 147—147, beyond which the free end of the shaft is journaled in a third bearing 134' also supported on the common base 135.

The worm gear 133 is driven by means of a worm 132 of a driving shaft 130, the latter being journaled on its two ends in bearings 131—131 affixed to the base 135. The shaft 130, near its center is provided with a worm gear 129, driven by a worm 128 provided on a shaft 126, which is journaled at one end in a bearing 127 mounted on the base 135, this shaft being that of an electric or other suitable motor (not shown). As will appear, counter-clockwise rotation of the motor shaft 126 produces through the worm 128, worm gear 129, shaft 130, worm 132 and worm gear 133, a similar rotation of the drum 141, which when engaging with its teeth 143 the guide holes 210 of a platen 209 provide for a continuous advance of the pattern to and beyond the selector contacts 13. A frame 240 is provided at the outgoing end of the platform beyond the drum 141 to receive the patterns as they leave the selector device.

As the engagement of the holes 210 by the teeth 143 of the drum 141 only takes place after the head end of the platen 209 has left the platform 170 and synchronism between the advance of the platen and the other apparatus is only established through the drum 141, it is necessary that the first platen of a series of platens be provided with a blank entering margin corresponding or slightly exceeding a distance *a*, shown in Fig. 2, which is approximately the distance between the selector springs 13 and the engagement point of the teeth 143 with the guide holes 210.

Once synchronism is established, additional platens do not require such blank margins, provided such platens are fed to follow the preceding platens without interspace.

The plate 194 and the roller 173 previously described are provided to prevent the raising or rocking of the types as they engage the selector springs 13.

The pivotal mounting of the unit carrying the contacts 13 previously described, provides besides adjustment of the contact pressure, easy access to the nest of contact springs, for cleaning and inspection, after the contact carrying unit has been swung upwards.

The open bearings 172—172 allowing easy removal of the roller 173, further aid in making accessible the entire portion of the platform 170 occupied by the nest of springs 203.

The passage through the selector device of a pattern actuates, as before described, the punches 63 to produce on the roll 69 a simulation of the characters of the pattern in which the type or designs of the pattern are defined by perforations.

A perforated roll may in turn be used as a pattern for the repeated duplication of the original, and for this purpose I prefer to make the perforated roll a duplicate of the original pattern, not only in respect to the relative disposition of the guide holes 210 with the guide holes 96, and the contact surfaces 15 of the types with the holes 99 produced thereby, but also in their actual size and spacing, so that when the roll 69 is used as a pattern for duplication the perforations 99 forming the letters or designs of the new pattern present an organization of holes to the contact fingers 13, corresponding in size and disposition to the contact surfaces 15 of the original pattern.

In using a perforated roll as a pattern, for instance one as shown in Fig. 15, the contact fingers 13 contact directly through the pattern, i. e., through the perforations 99 of the roll 69, with the platform 170 and thus complete directly through the platform 170 the circuits of the selected electro-pneumatic valves A. A thin metal plate (not shown) is placed over the platform 170 covering the nest of springs 203 and presents a smooth conductive surface to the contact fingers 13.

I provide beyond the entrance end of the platform a spool 179 adapted to receive the perforated roll to be duplicated, and a second spool 165 in the rear thereof, which is driven by means later more fully described, and which serves to rewind the roll after its passage under the contact fingers 13 and over the drum 141.

The guide holes 96 of the paper record, for reasons more fully described in said above referred to application, are disposed similarly to the guide holes 210 of the platen and therefore engage in the same way the teeth 143 of the drum 141, as do the guide holes 210.

Bearings 178—178 affixed to the base 135 at the entering end of the platform removably and loosely support the spool 179 by means of retractable pivots 167'—167' carried by the knurled knobs 167—167. The spool 165 located about midway along the length of the base 135 is pivotally and removably supported between pedestal bearings 151 and 168.

The pedestal bearing 168 is similar to, but lower than the bearing 178, while the bearing 151 is provided with an outward extension 151' supporting a shaft 150. The shaft 150 extends inwardly and on its end 157 it is provided with a transverse pin 166 adapted to engage corresponding slots 166' in the ends of the spool.

The spool 165 is driven from the drum 141 by means hereafter described.

The shaft 150 extends beyond the bearing extension 151' and loosely carries on its extended portion a sprocket 149, which however, does not operatively engage the shaft 150. Attached to the sprocket 149 by means of a tubular extension 149' is a friction disc 152. Loosely carried by the shaft 150 is a friction washer 153 of fibre or other suitable material, interposed between the friction disc 152 and a similar disc 154. The disc 154 is provided with a collar 154'. A pin 160 engages the collar 154' and a slot 160' provided along the shaft 150. The pin 160 thereby prevents rotation of the disc relative to the shaft 150, but at the same time permits lateral movement of the disc 154 along said shaft.

The outer end of the shaft 150 is threaded at 150' to receive a nut 164, which bears a washer 164' between which and the disc 154 is interposed a spring 162 pressing against the disc 154 and thus against the washer 153 and the disc 152. Adjustable frictional engagement between the disc 152 and its sprocket 149, and the shaft 150 (through engagement of the pin 160 of disc 154 with the slot 160' of said shaft) and its transverse pin 166 is thus established, the friction depending upon the adjustment of the spring tension.

A sprocket 144 is fixedly mounted on the shaft 140 of the drum 141, between the pedestal bearings 134 and 134', said sprocket being larger in diameter than the sprocket 149 carried by the shaft 150. The sprocket 149 is driven from the sprocket 144 by means of a chain 148 at a rate inversely proportional to the sprocket diameters.

As the paper is wound up on the roll 165 the outside diameter of the spool increases due to the successive layers of the paper wound thereon. Should the speed of the shaft 150 be kept at a constant ratio relative to the speed of the shaft 140, the increasing diameter of the paper wound on the spool 165 would tend to tear the paper as it is unwound from the drum 141. To maintain the advance of the paper constant, a slip is provided between the sprocket 149 and the shaft 150 by the means previously described, whereby such slip prevents tearing of the paper.

The circuit-breakers 5 previously described are carried by the shaft 130 on its portion extending beyond the worm-gear 129 toward the incoming end of the selector. Beside the circuit-breakers 5 of which four are shown, three further circuit-breakers 5', 37, and 82, are carried by the shaft 130, the latter two circuit-breakers being of double width.

The circuit-breakers 82, 5' and 37 control electro-pneumatic magnets of the punching device which on their turn cause the synchronized advance, stoppage and guide perforation of the pa-

per record as is fully described in my above referred to application.

It should be well understood that circuit-breakers or other circuit control devices having other functions can be synchronized with the selector device should the latter be used with other apparatus, than the punching device of my previously referred to application.

From the foregoing it appears that the common shaft 130 serves to drive the circuit-breakers as well as the drum 141. The rate of advance of the pattern is determined by the rate or rotation of the drum 141, and the rate of advance and perforation of the paper roll in the punching apparatus, as is more fully described in my above referred to application, is determined by the rate of rotation of the circuit-breakers. Thus, the rates of advance of the pattern and of the paper are properly synchronized, although the advance of the pattern is continuous while the advance of the paper is intermittent.

To simplify the use of punched records as patterns I prefer not only to maintain a fixed relation between the advance of the pattern and that of the paper, but also to make the steps of advance equal.

To produce a perforated record from a pattern, a roll of paper or similar material is passed through punch blocks 64—66.

The pattern from which the record is to be punched is set up on the set-up tray 206, whereby a platen 209 is placed on the tray and the types set up according to the text or design required, quite similarly to type-setting for printing. The pins 226 of the types thereby engage the holes 211 of the platen 209 and secure the types on the platen.

The first pattern, as previously explained, is provided with a head margin and is placed on the platform 170, and manually advanced to and beyond the selector springs 13 until the guide holes 210 engage the corresponding teeth 143 of the drum 141.

After such engagement, the pattern is advanced automatically through rotation of the drum 141. At the same time the contacts 15 of the types pass under the selector contacts 13, and the circuits of the electro-pneumatic valves A are energized selectively during the closure of the circuit-breakers 5. The time of closure of the circuit-breakers 5, as stated, is such that the circuits of the electro-pneumatic valves A are both made and broken at the circuit-breakers 5 rather than at the contacts between 13 and 15. Energization of the selected electro-pneumatic valves A causes the corresponding punches 63 to perforate the paper 69, whereby the perforations 99 so effected, correspond in disposition to that of the contacts 15 of the types.

To provide proper adjustment for synchronism between the worm gear 133 and the circuit-breakers, the drum 141 is released from the shaft 130 in the way previously described and rotated until it is properly synchronized with the circuit-breakers, in which position it is secured. Thus the drum 141 and shaft 130 are again connected.

In case it is desired to duplicate a record from a master record instead of a pattern, the master record is inserted on the spool 179 and threaded over the platform 170 and through springs 13 over the drum 141 and the take-up bobbin 165. In this case, as stated, a metal strip is placed over the nest of contact springs 203 to complete the electric circuits, which are now established through the perforations 99 of the master record. The guide holes 96 thereby engage the teeth 143 of the drum 141, and the advance of the master record and its cooperation with the other parts of the mechanism is the same as in the case of the pattern.

It will be realized that my invention has various important advantages and permits, for instance, the perforation of records in a simple expedient way well adapted for commercial production. Operating speeds as high as 300 to 400 lines of perforations per minute, can be thereby obtained, giving perfect records without any inaccuracies due to omitted, misplaced or undesired perforations.

The only operation requiring skill is the setting-up of the patterns, which is done much along the lines of regular type-setting. However, setting-up by my method provides for much greater flexibility than regular type setting, as characters of any type and size may be intermingled and arranged in any desired spacing in straight or staggered lines, and combined in any suitable way with designs.

No special skill is required for the feeding of the pattern onto the selector device and once engagement of the teeth 143 of the drum 141 with the guide holes 210 of the first pattern is obtained, the subsequent patterns are simply fed in close succession. Thereby types of the tailend line of a pattern may extend to the headend line of the succeeding pattern.

In case the record is made from a master record, the operation is even simpler. In this case after the threading of the master record, the whole operation is entirely automatic.

While I have described my invention in connection with specific embodiments and as applied to a punching device as described in my prior application, I do not wish to be limited to such embodiment and application and the appended claims should be construed as broad as permissible in view of the prior art.

What I claim as new and what I desire to secure as Letters Patent is:

1. In a selector device for perforating records from a pattern provided with contacts, a platform adapted to receive the pattern and means to advance said pattern on the platform, selector contacts arranged transversely in respect to the advance of the pattern and adapted to engage said pattern contacts, projections on said pattern to provide electric connections between the pattern and the platform when the pattern passes the region of the selector contacts, and grooves in said platform for the clearance of said projections before they enter such region.

2. In a pattern for selective perforation of records, a type-carrying platen provided with a series of perforations and contact carrying blocks adapted to engage said perforations for the positioning of the contact blocks.

3. In a device for selective perforation of records, selector means comprising a bank of selector contacts, a perforated platen provided with a series of perforations, metallic types provided with raised contact surfaces, and locating pins to engage said perforations and position said types relative to the platen, said selector contacts being so dimensioned as not to protrude through the perforations of the platen.

4. In an electric contacting system, projecting pins carried by traveling members and transversely and longitudinally spaced substantially V-shaped contact springs, two legs of adjacent

contact springs engaging a pin as the member passes over the springs, successive springs overlapping each other to provide for a substantially uninterrupted engagement of said contact pin with the contact springs.

5. For the selective closure of the circuits of an electrically-controlled perforating machine, a supporting structure and a bank of selector contacts transversely disposed on said structure, a carrier of insulating material adapted to be passed along said structure, metallic types provided with raised contact surfaces disposed on said carrier and adapted to selectively close said circuits when contacting with cooperating selector contacts, a perforated record of insulating material adapted to pass along said structure and said selector contacts interchangeably with said carrier, and removable means for selectively closing said circuits through perforations of said record passing respective selector contacts.

FRANK J. SPRAGUE.