April 20, 1937. C. SMITH 2,077,964

ADDRESSING AND PRINTING MACHINE

Filed April 7, 1933 3 Sheets-Sheet 1

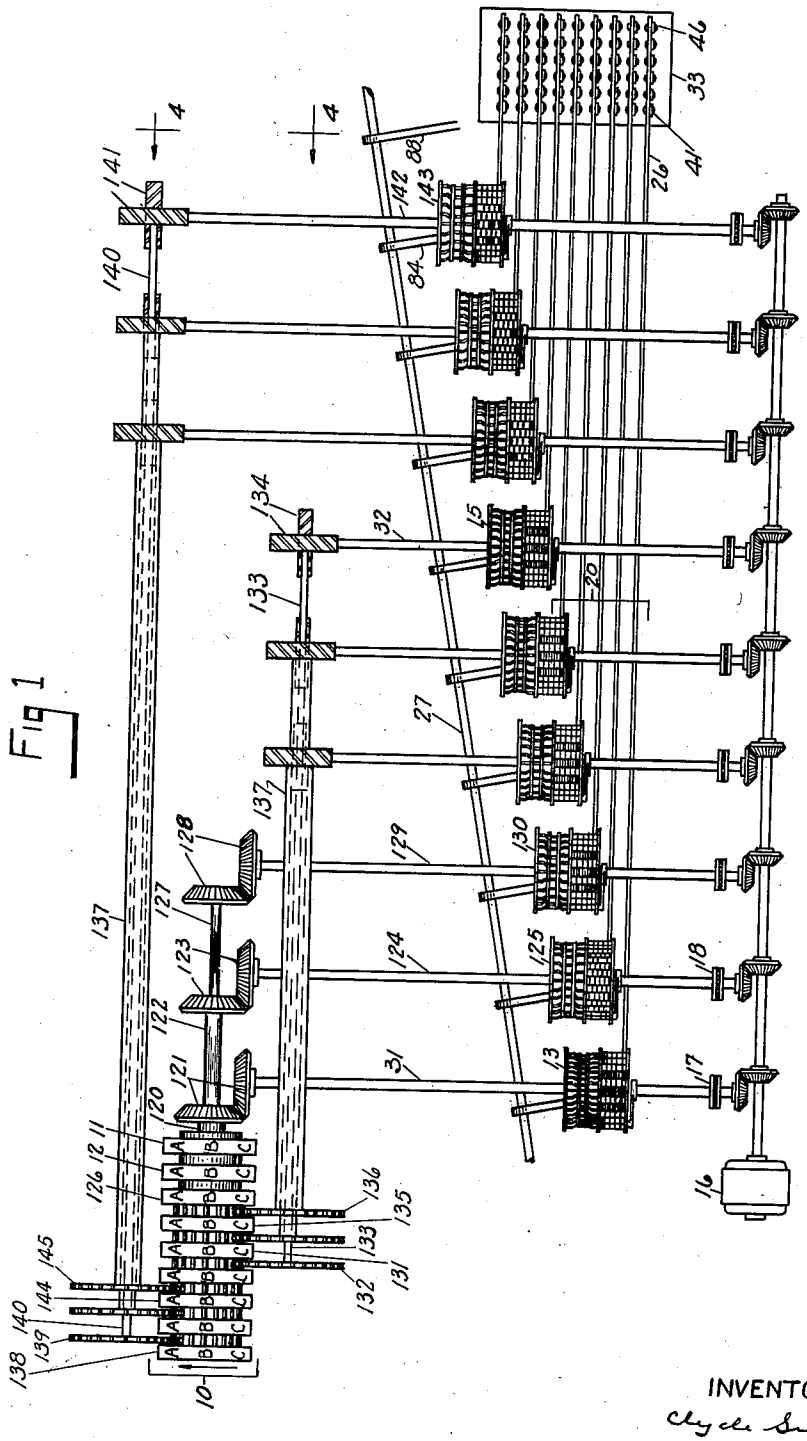



Fig 1

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Fig 2A

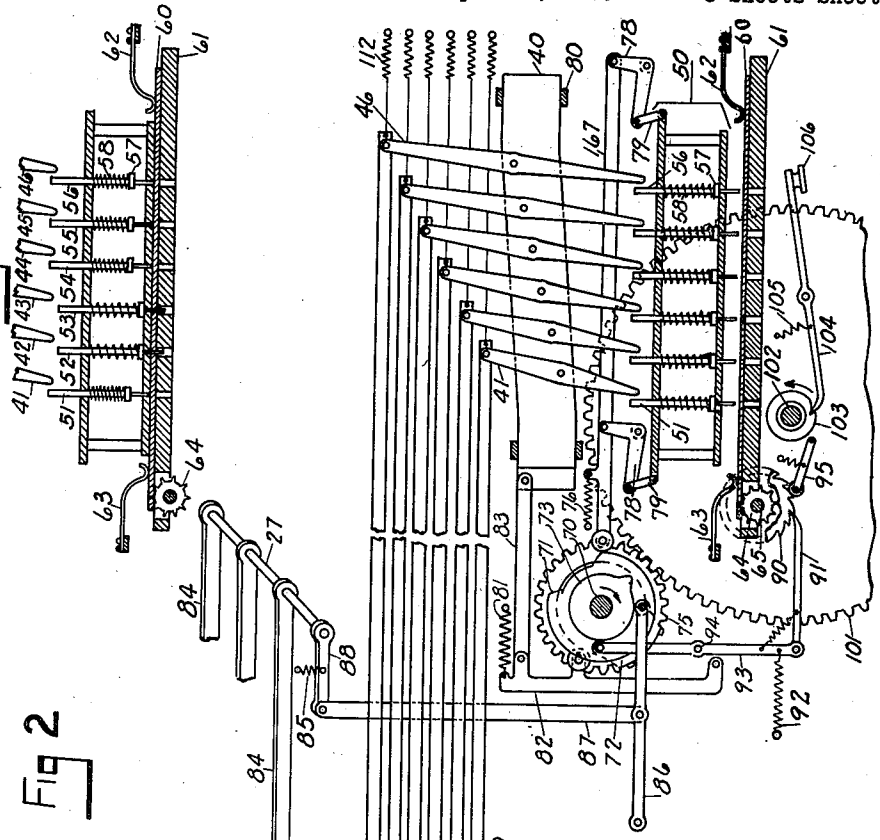


Fig 2

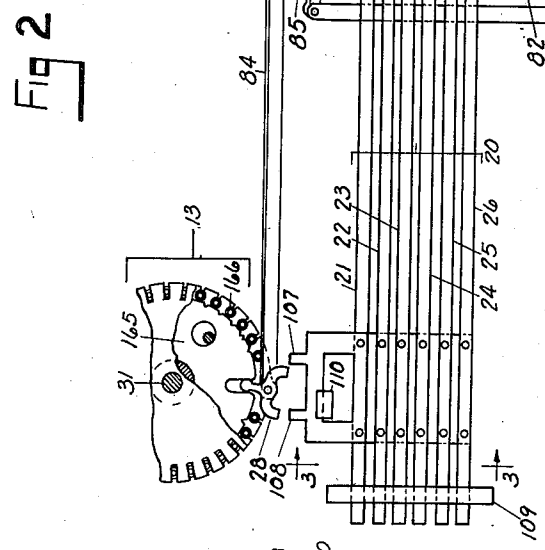
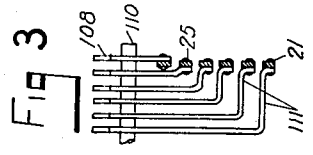


Fig 3



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Fig 4

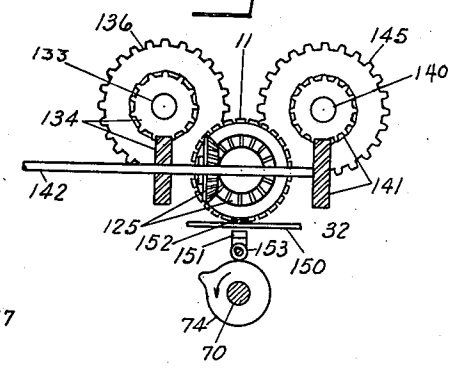



Fig 6

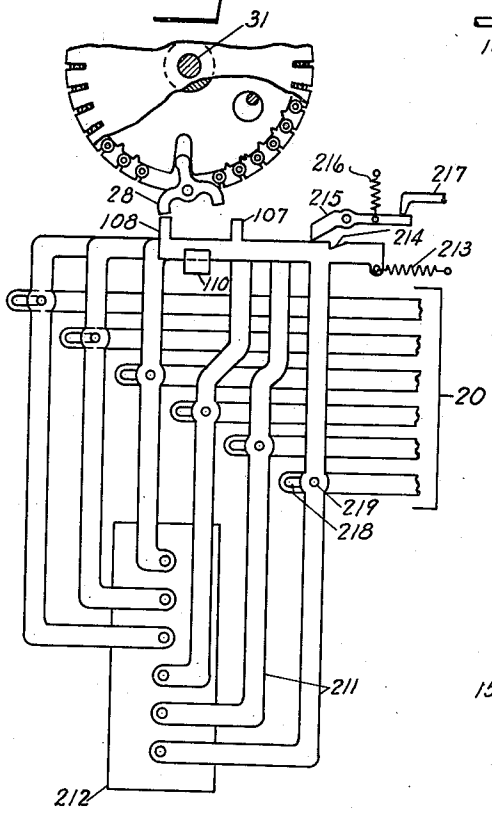
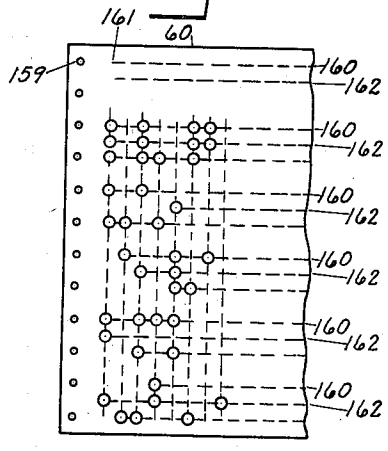



Fig 5




INVENTOR

Clyde Smith

Patented Apr. 20, 1937 2,077,964

# UNITED STATES PATENT OFFICE

2,077,964

## ADDRESSING AND PRINTING MACHINE

Clyde Smith, Hopkinsville, Ky., assignor to Addressograph-Multigraph Corporation, Cleveland, Ohio, a corporation of Delaware

Application April 7, 1933, Serial No. 664,952

14 Claims. (Cl. 101—58)

My invention pertains to printing devices of the general class used for addressing service, in which a plurality of names and addresses are recorded upon suitable means such as cards or metal plates by code methods, such as by code perforations in the cards or by symbols embossed upon the metal plates, and the records thus formed are used repeatedly for reproducing the names and addresses upon objects such as envelopes, checks, or periodical service bills of a public service corporation.

The principal object of my invention is to provide a record of light weight and compact form, such as cards of paper or fibre rather than sheets of metal, the name and address being recorded upon each card by code perforations preferably, and further to provide sensing means and translating means for sensing and translating the codes of names and addresses, or other matter, to be printed upon a receiving surface. The bosses upon metal plates increase the requirements of storage space for the records. The sensing and translating means should be of such rapid action that the speed of operation of my improved device will compare favorably with the speed of operation of devices and mechanisms which print directly from the record. I thus attain the double objects of equal speed and greater compactness of storage, together with the further objects of lesser weight and lesser cost of records as compared with any existing systems known to me.

Further objects are found in the combinations and relations of the constituent parts of my complete system.

This specification includes matter described and claimed in my copending application Ser. No. 603,582, filed April 6, 1932, and in my copending application Serial No. 664,951, filed April 7, 1933.

My improved addressing system will be understood by reference to a patent, No. 1,821,110, issued to Morton et al. for a stock ticker device, and by reference to the accompanying drawings, in which:

Figure 1 shows the general arrangement of parts of the translator and printer of my improved system.

Figure 2 shows details of a mechanism for sensing a record and transferring the code.

Figure 2—A shows a detail of Figure 2 in an operated position.

Figure 3 shows a sectional view of a part of Figure 2 on the line 3—3 of that figure.

Figure 4 shows an end view of the printer, taken on the line 4—4 of Figure 1.

Figure 5 shows a detail of a perforated card or sensing record.

Figure 6 shows a modification of the mechanism of Figure 2.

### *General operation*

Paper cards, preferably hard and thin, are perforated in code manner with a code for each character to be printed (a space between words or characters being considered as a blank character), and these codes are arranged in sets in the card, one set for each line to be printed. The cards are fed into a sensing device which senses the card repeatedly as many times as the possible maximum number of sets of codes. The maximum number of sensing devices is thus reduced to apparatus sufficient for the sensing of a single set of codes for a single line of printing, even though the card record may comprise several such sets.

The total codes for all characters to be printed in any line are sensed simultaneously and the several codes are transferred separately, and independently other than in time, to a plurality of disk-and-detector selectors of the nature described in the Morton patent named above. There are as many disk-and-detector selectors as the maximum number of characters (including spaces) in any line of printing.

At this point, a double operation, or "overlap", begins, the sensing mechanism operating to sense the second set of codes in the card and the printing mechanism operating to print the first line and both sets of operations proceeding concurrently, the timing of all operations being effected by a main controlling cam shaft. The record card is automatically stepped from sensing position to sensing position as each line of the code is sensed, and finally is automatically stepped out of sensing position, after which it may be replaced, manually or automatically, by the next record card of the lot.

### *Description of apparatus*

In Figure 1, the printer, 10, comprises coaxial printing wheels 11, 12, each of which is driven in selective manner by a Morton selector, 13, 125, which is powered by a motor, 16, through friction clutches, 17, 18, and which is controlled in code manner by transfer bars, 20, of which there is a set for each selector, with six bars, 21 to 26 (Fig. 2) in each such set. A common transfer shaft, 27, controls all transfer T-levers (Fig. 2) in all selectors. Each stop-arm shaft, 31, 124, is associated through suitable gearing with its

individual typewheel, 11, 12, so that the stop-arm and the type-wheel rotate together. The rectangle 33 represents sensing devices shown in detail in Figure 2.

In Figure 2, the equipment for sensing a single code for printing a single character is shown. The six transfer bars, 21 to 26, are connected pivotally to six sensing rockers, 41 to 46, which are pivoted separately upon the pivot plate, 40. A sensing frame, 50, carries six sensing fingers, 51 to 56, each having an integral collar, 57, and each being pressed by spring 58 toward the card, 60. The card, 60, is positioned automatically or manually upon the perforated sensing plate, 61. It is held lightly by springs 62, 63, and is engaged by the sprocket wheel, 64, fixed upon the shaft, 65.

Main cam shaft, 70, driven by power through a friction clutch not shown, carries cams 71, 72, 73, cam 74 (Fig. 4), and gear 75. Sensing frame 50 slides in the frame-work from its normal position shown toward the card, 60, so that the fingers, 51 to 56, engage the surface of the card and penetrate where perforations are found. The movement of the sensing frame, 50, is controlled by spring 76 jointly with cam 71 acting through arm 167, bell-cranks, 78, and links, 79. Pivot plate, 40, slides in frame fixtures, 80, and is controlled by spring 81, jointly with cam 72, acting through the cam follower arm 82 and link 83. Transfer rocking shaft 27 is equidistant from all of the Morton selectors, 13, and has an operating arm 84 for each selector, which in each selector operates the transfer T-levers, 28. It is operated by spring 85 jointly with cam 73, acting through cam follower arm 86, link 87, and arm 88. Feed sprocket 64 and shaft 65 have the driving ratchet, 90, which is operated by driving pawl 91 under control of spring 92 and cam 73 jointly, acting through cam follower arm 93 pivoted at 94. Jockey 95 positions the wheels 90 and 64 when not being driven by pawl 91.

Wheel 75 on shaft 70 meshes wheel 101 with a gear ratio of one to three. Wheel 101 is fixed upon shaft 102 together with the notched collar 103, with whose notch the stop finger, 104, engages under control of the spring 105 and operating button 106.

Figure 3 shows an arrangement of parts in which the several transfer bars 21 to 26, of Figure 2, which are restricted in arrangement by the closeness of the codes upon the record card, are distributed to the proper positions for the code teeth or fulcrums, 107, 108, as required in the Morton selector. Frame part 109 is a guide for the transfer bars, 21 to 26, and the comb-shape frame part, 110, is a guide for the extensions, 111, and serves also as an anvil for the thrust of the T-levers, 28, when propelled against the fulcrums, 107, 108, by the transfer arms, 84. The transfer bars, 20, are normally held by individual springs, 112.

Figure 4 shows a detail of printer, 10, of Figure 1. The printing wheels, 11, 12, (Fig. 1), are closely spaced, and the mechanical connections to the Morton selectors are arranged in several ways, so that each arrangement may be made less complex. Wheel 11 is driven by sleeve shaft 120, gears 121, and shaft 31, to selector 13. Wheel 12 is driven by sleeve shaft 122, gears 123, and shaft 124, to selector 125. Wheel 126 is driven by solid shaft 127, gears 128, and shaft 129, to selector 130. Wheel 131 is driven by gear 132, solid shaft 133, spiral gears 134, and shaft 32, to selector 15. Wheel 135 is driven by gear 136 and sleeved shaft 137. Wheel 138 is driven by gear 139 and solid shaft 140, spiral gears 141, and shaft 142, to selector 143. Wheel 144 is driven by gear 145. A greater number of printing wheels may be provided by increasing the feature of sleeving the shafts or by providing a greater number of plans of approach.

Figure 4 shows also the method of printing. The object to be printed upon, 150, is positioned between the platen 151 and the printing faces of the type-wheels, with the ribbon, 152, between the type-wheels and the surface of the object, 150. The platen, 151, is attached to the cam follower, 153, which is operated by the cam 74 on the shaft 70, which is shown also in Figure 2.

Figure 5 shows a design of record card, 60. Along its edge, or preferably along both edges, are the feed perforations, 159, for the feed sprocket, 64 (Fig. 2). Perforations in six horizontal rows, 160, constitute the perforations of one set of character codes to be sensed at one time. The perforations which are in one vertical row, 161 (in which there are spaces for six), and at the same time in one or more of the horizontal rows, 160, constitute those for one particular character code. The perforations in the set of six rows 162 constitute a second set for the second line of printing, and so on.

The card, 60, is shown perforated for three lines of printing. There is room in the illustration for a fourth set of perforations. The top of the card has space for the perforations for "case shift" as described in the Morton patent, although there is no case shift in the card as shown. The code reading is for J JONES B STREET ALBANY.

Of Figure 6 the apparatus will be more readily understood after a description of the operation of the system.

*Description of operation*

The card, 60 (Fig. 5), is placed in sensing position on the sensing plate 61 under clamping springs 62 and 63 and in engagement with the feed sprocket, 64. The operator then presses the knob, 106, and releases shafts 102 and 70 to rotate under power. Because the shaft 102 is geared three to one to the shaft 70, shaft 70 and its set of cams will make three complete revolutions before being brought to rest by the stop collar, 103, and the stop finger, 104. Interchangeable pairs of gear wheels can be utilized to vary this ratio as may be required by the kind of cards to be served.

First, the cam 71 clears its follower and the spring, 76, operates arm 167, bell-cranks 78, and links 79, and depresses the sensing frame, 50. Assuming that the second and third positions are perforated, the resulting sensing condition will be as shown in Figure 2—A. Sensing fingers 51, 54, 55, 56, are restrained by the card, 60, while sensing fingers 52 and 53 are not so restrained and pass to their extreme sensing positions. The lower ends of rockers 42 and 43 are now free to move while the other rockers are not.

Thereupon, cam 72 lifts its follower arm, 82, and draws the pivot plate, 40, which causes rockers 41, 44, 45, 46, to engage their corresponding sensing fingers and thus causes them to rock upon their pivots with the sensing pins as fulcrums, thereby propelling their transfer bars 21, 24, 25, 26, to the left, to bring corresponding fulcrums, 107, under T-levers, 28, at the same time removing corresponding fulcrums, 108, from under these T-levers. Sensing fingers 52 and 53 have entered the perforations in the card, 60, and have cleared the ends of rockers 42 and 43, so that these rockers are not engaged by sensing fingers but rock

upon their upper pivot pins instead, and transfer bars 22 and 23 are held by their springs, 112, and their fulcrums, 108 and 107, remain in the positions shown.

Next, cam 73 operates its follower lever, 86, which operates all arms, 84, and all T-levers, 28, to transfer all codes set upon the fulcrums, 107 and 108, to the code disks, 165, as described in the patent to Morton, and a detector or index pin, 166, responds. The apex of the cam, 73, is short, and the follower arm, 86, returns immediately, being followed immediately by the return of the cam follower arm 82 and then by the return of the cam follower arm 167, which returns the sensing frame, 50. All parts of the sensing equipment are now normal. Immediately, cam 73 operates its follower arm, 93, and steps the card, 60, into position for its second sensing. The transfer of the codes to the disks, 165, was made when the shaft 70 had turned about sixty degrees from normal. Immediately, the Morton selector starts its stop-arm, and with the stop-arm the printing wheels, 11, 12, etc., start toward their selective positions.

The speed of the shafts, 31, etc., is about double the speed of shaft 70; no printing wheel requires more than one revolution, so that when shaft 70 has reached a position of 240 degrees or more from normal (which is 180 degrees or more after the transfer at 60 degrees), the printing wheels all will have found their selective positions as described in the Morton patent; cam 74 will operate its follower, 153, and the platen, 151, will press the object, 150, and ribbon, 152, against the printing faces and will print upon the surface of the object, 150, the name or other intelligence coded into the record card by the perforations found by the sensing fingers of Figure 2.

The platen returns, the object, 150, which has received one line of print, steps into its next printing position (through means which it has not been deemed necessary to show); cam shaft 70 reaches and passes its starting point, and the cycle is repeated, this time with the sensing for the second set of perforations, indicated at 162 in Figure 5. The cycle is further repeated until the record of the card is exhausted, or until the stop cam 103 engages the stop finger, 104.

As described in the Morton patent, the printing wheels, 11, 12, etc., are not restored to any normal position, but remain positioned as last used until the next code is transferred to the code disks and a different detector pin is operated.

The Morton selector operates in stock ticker service at a speed of about 500 cycles per minute. Such speed, with allowance of the time of three printing cycles for the replacement of the card, 60, and the object, 150, would result in a speed of 5000 three-line addresses per hour. This compares favorably with the speed of contemporary addressing machines.

*Modification*

In Figure 6, the fulcrums, 107 and 108, and the fulcrum carriers, 111 (Fig. 2), are not attached directly to the transfer bars, 20, but take the form of carriers 211, pivoted separately to the fixed frame member, 212, and urged to normal by an individual spring, 213. Each is provided with a notch, 214, and a latch, 215, with spring, 216. The latches in each selector have a common cam follower, 217, operated similarly to arms 84 and shaft 27. The connection to the transfer bars 20 is by means of a slot, 218, in each bar and a pin, 219, in each fulcrum carrier, 211.

In the operation of this modification, the cam, 72 (Fig. 2), is changed to a short-apex cam like cam 73, so that the transfer bars, 20, merely kick over and back, the latches, 215, operating to catch and hold the corresponding members, 211, after which cam 73 and cam follower 86 make the transfer to the code disks of the Morton selectors, and a further cam follower controlled by the cam shaft 70 operates the member 217 to operate the latches, 215, to release the used members, 211.

I have shown but one embodiment of my invention. Modifications and departures from the design thus shown may be made without departure from the essence of my invention or from the scope of the appended claims.

I claim as my invention:

1. In a card controlled automatic addressing machine, a row of printing wheels sufficient to serve one entire line of the address at one time, a card controlled selector for each said printing wheel, said wheels and said selectors divided arbitrarily into a plurality of groups, and a plurality of sets of sleeved shafts, each such set of sleeved shafts connecting said selectors of each group to said printing wheels of that group individually.

2. In an automatic code controlled addressing machine, a row of printing wheels sufficient to serve one entire line of the address at one time, a selector for each said printing wheel, cam-controlled transfer means for transferring to said selectors at one time all of the codes representing the intelligence of the line to be printed, cam-controlled means for printing from all of said printing wheels simultaneously, and means common to said transfer means and to said printing means to ensure proper timing.

3. In an addressing machine under control of a record card having a plurality of groups of perforations therein, each of said groups comprising a plurality of rows of perforations, corresponding rows in each of said groups being equidistantly spaced one from the other, a plurality of printing means, a selector for each of said printing means, sensing means arranged in a plurality of rows, there being a row of sensing means for each selector and each of the rows of the sensing means being spaced one from the other to respectively cooperate with corresponding rows in the adjacent groups of perforations in the card, each of said rows of sensing means being responsive to a row of perforations in the card to actuate its associated selector to set up the associated printing means in accordance with the sensed perforations, and means for advancing the card to present the rows of perforations in the groups successively to said rows of sensing means to thereby successively set up said printing means under control of the perforations in the respective rows on the card.

4. In an addressing machine under control of a record card having a plurality of groups of perforations therein, each of said groups comprising a plurality of rows of perforations, each of said rows representing a character in a line of printing, corresponding rows in each of said groups being equidistantly spaced one from the other whereby the perforations in correspondingly spaced rows represent the characters in a single line of printing, a plurality of printing means arranged to print a line, a selector for each of said printing means, sensing means arranged in a plurality of rows, there being a row of sensing means for each selector and each of the rows of sensing means being spaced one from the other to respectively cooperate with corre-

sponding rows in the adjacent groups of perforations in the card, each of said rows of sensing means being responsive to a row of perforations in the card to actuate its associated selector to set up the associated printing means in accordance with the sensed perforations, means for making an impression from said printing means after set-up thereof to print a line, and means for advancing the card intermediate impression operations to present the rows of perforations in the groups successively to said rows of sensing means to thereby successively set up said printing means under control of the perforations in the respective rows on the card whereby successive lines may be printed by the printing means under control of said perforations.

5. In an addressing machine under control of a record card having a plurality of groups of positions where perforations may be located, each of said groups comprising a plurality of rows of such positions whereby perforations may be provided in code in each of said rows to represent a character in a line of printing, corresponding rows in each of said groups being equidistantly spaced one from the other, a plurality of printing means arranged to print a line, a code selector for each of said printing means, sensing means arranged in a plurality of rows, there being a row of sensing means for each selector and each of the rows of sensing means being spaced one from the other to respectively cooperate with corresponding rows in adjacent groups of perforation positions in the card, each of said rows of sensing means being responsive to perforations in a row of perforation positions in the card to actuate its associated selector to set up the associated printing means in accordance with the sensed perforations, and means for advancing the card to present the rows of perforation positions in the groups successively to said rows of sensing means to thereby successively set up said printing means under control of the perforations in the respective rows on the card.

6. In an addressing machine under control of a record card having a plurality of groups of positions where perforations may be located, each of said rows representing a character in a line of printing and each of said groups comprising a plurality of rows of such positions whereby perforations may be provided in code in each of said rows to represent a character, corresponding rows in each of said groups being equidistantly spaced one from the other whereby perforations at selected of the positions in correspondingly spaced rows represent the characters in a single line of printing, a plurality of printing means arranged to print a line, a code selector for each of said printing means, sensing means arranged in a plurality of rows, there being a row of sensing means for each selector and each of the rows of sensing means being spaced one from the other to respectively cooperate with corresponding rows in adjacent groups of perforation positions in the card, each of said rows of sensing means being responsive to perforations in a row of perforation positions in the card to actuate its associated selector to set up the associated printing means in accordance with the sensed perforations, means for making an impression from the printing means after set-up thereof to print a line, and means for advancing the card intermediate impression operations to present the rows of perforation positions in the groups successively to said rows of sensing means to thereby successively set up said printing means under control of the perforations in the respective rows on the card.

7. In an addressing machine under control of a record card having a plurality of groups of perforations therein, each of said groups comprising a plurality of rows of perforations, corresponding rows in each of said groups being equidistantly spaced one from the other, a plurality of printing means, a selector for each of said printing means, sensing means arranged in a plurality of rows, there being a row of sensing means for each selector and each of the rows of the sensing means being spaced one from the other to respectively cooperate with corresponding rows in the adjacent groups of perforations in the card, a set of slide rods connecting said sensing means to said selectors and having fixed thereto the code members of said selectors, each of said rows of sensing means being responsive to a row of perforations in the card to position the slide rod associated therewith and the code member in accordance with the sensed perforations, and means for advancing the card to present the rows of perforations in the groups successively to said rows of sensing means to thereby successively set up said printing means under control of the perforations in the respective rows on the card.

8. In a card-controlled printing machine, a printing member, a selector for positioning the printing member, feeling pins movable into alternative positions under control of a record card or the like, means for moving said pins axially into feeling relation with the card or the like to effect positioning of the pins under control of the card, a driven member, transfer means mounted on said driven member and movable therewith to engage the pins in one of the alternative positions thereof and to freely pass the pins in the other of the alternative positions thereof, and actuating means connected to said transfer means and said selector and operable to actuate said selector to selectively position said printing member, the actuation of said selector by said actuating means being determined by the transfer means upon selective engagement with, or movement past, positioned feeler pins.

9. In a card-controlled printing machine, a printing member, a selector for positioning the printing member, spring-pressed feeling pins movable into alternative positions under control of a record card or the like, means for moving said pins axially into feeling relation with the card or the like to effect positioning of the pins under control of the card, a driven member, transfer means mounted on said driven member and movable therewith relative to the pins, and actuating means connected to said transfer means and said selector and operable to actuate said selector to selectively position said printing member, said transfer means engaging feeling pins in one of the alternative positions and freely passing feeling pins in the other of the alternative positions upon operation of said driven member and thereby selectively operating said actuating means to selectively actuate said selector and thereby selectively position the printing member.

10. In a card-controlled printing machine, a printing member, a selector for positioning the printing member, feeling pins movable into alternative positions under control of a record card or the like, means for moving said pins into feeling relation with the card or the like to effect positioning of the pins under control of the card, a slidable member, rockers mounted on said slidable member and movable therewith to engage

pins in one of the alternative positions thereof and to freely pass pins in the other of the alternative positions thereof, and slides connected to said rockers and operable to position said selector in accordance with the positioning of said rockers as determined by the engagement of or the passage of said rockers over said pins.

11. In a card-controlled addressing machine, a mechanical card testing feeler settable to alternative positions according to a record sensed in the controlling card, a mechanical selector, a selective member in said selector for effecting positioning thereof, actuating means connected to said selective member, driven means, transfer means mounted on said driven means for movement relative thereto and connected to said actuating means, and means for driving said driven means to move said transfer means relative to the testing feeler, said transfer means engaging said testing feeler in one of the alternative positions to move relative to said driven means and effect selective actuation of said selective member and said selector and freely moving past said testing feeler in the other alternative position thereof and thereupon moving with said driven means without relative movement to effect a different operation of said selective member and selector.

12. In a card-controlled addressing machine, spring-actuated feelers adapted to search a card for records representing type characters and settable each one by its spring to one or the other of two positions responsive to records found in the card, a set of character types, a code disc selector for selectively positioning said character types in printing position, selector means for said code disc selector, actuating means connected to said selector means, transfer means connected to said actuating means and cooperating with said feelers to engage said feelers in one of the positions thereof and freely pass said feelers in the other position thereof to thereby selectively actuate the selector means of said selector, and means for moving said transfer means relative to said feelers.

13. In an addressing machine under control of a record card having a plurality of groups of positions where perforations may be located, each of said groups comprising a plurality of rows of such positions whereby perforations may be provided in code in each of said rows to represent a character in a line of printing, corresponding rows in each of said groups being equidistantly spaced one from the other, the spacing between adjacent rows in each of said groups being less than the extent of said rows, a plurality of printing means arranged to print a line, a code selector for each of said printing means, sensing means arranged in a plurality of rows, the length of the rows of sensing means being equal to the length of the rows of positions on the card, there being a row of sensing means for each selector and each of said rows of sensing means being spaced one from the other to respectively cooperate with corresponding rows in adjacent groups of perforations in the card, each of said rows of sensing means being responsive to perforations in a row of perforation positions in the card to actuate its associated selector to set up the associated printing means in accordance with the sensed perforations, means for advancing the card to present the rows of perforations in the groups successively to said rows of sensing means to thereby successively set up said printing means under control of the perforations in the respective rows on the card, and means for actuating card advancing means to advance the card in an amount equal to the spacing between rows of perforations in each group on the card, said advancing means being rendered operative intermediate sensing operations of the sensing means.

14. In an addressing machine under control of a record card having a plurality of groups of positions where perforations may be located, each of said groups comprising a plurality of rows of such positions whereby perforations may be provided in code in each of said rows to represent a character in a line of printing, corresponding rows in each of said groups being equidistantly spaced one from the other, the spacing between adjacent rows in each of said groups being less than the extent of said rows, a plurality of printing means arranged to print a line, a code selector for each of said printing means, sensing means arranged in a plurality of rows, the length of the rows of sensing means being equal to the length of the rows of positions on the card, there being a row of sensing means for each selector and each of said rows of sensing means being spaced one from the other to respectively cooperate with corresponding rows in adjacent groups of perforations in the card, each of said rows of sensing means being responsive to perforations in a row of perforation positions in the card to actuate its associated selector to set up the associated printing means in accordance with the sensed perforations, means for advancing the card to present the rows of perforations in the groups successively to said rows of sensing means to thereby successively set up said printing means under control of the perforations in the respective rows on the card, and means for actuating card advancing means to advance the card in an amount equal to the spacing between rows of perforations in each group on the card, said advancing means being rendered operative intermediate sensing operations of the sensing means, said operating means including means for ejecting the card from association with the sensing means after the sensing of all of the rows in the groups on the card.

CLYDE SMITH.