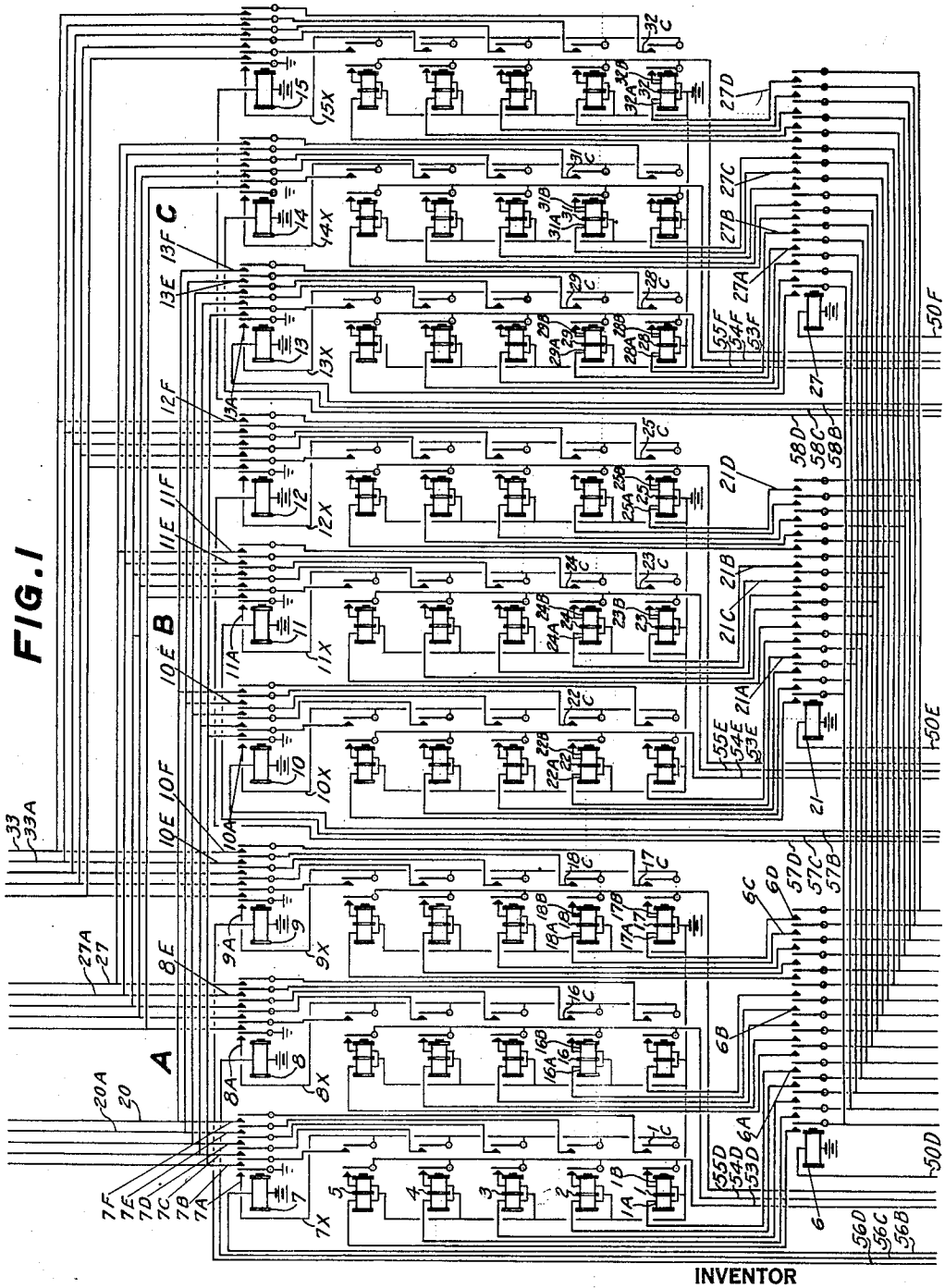
April 20, 1937. C. SMITH 2,077,965

ADDRESSING AND PRINTING MACHINE

Original Filed April 6, 1932 5 Sheets-Sheet 1

FIG. 1



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ADDRESSING AND PRINTING MACHINE

Original Filed April 6, 1932 5 Sheets-Sheet 2

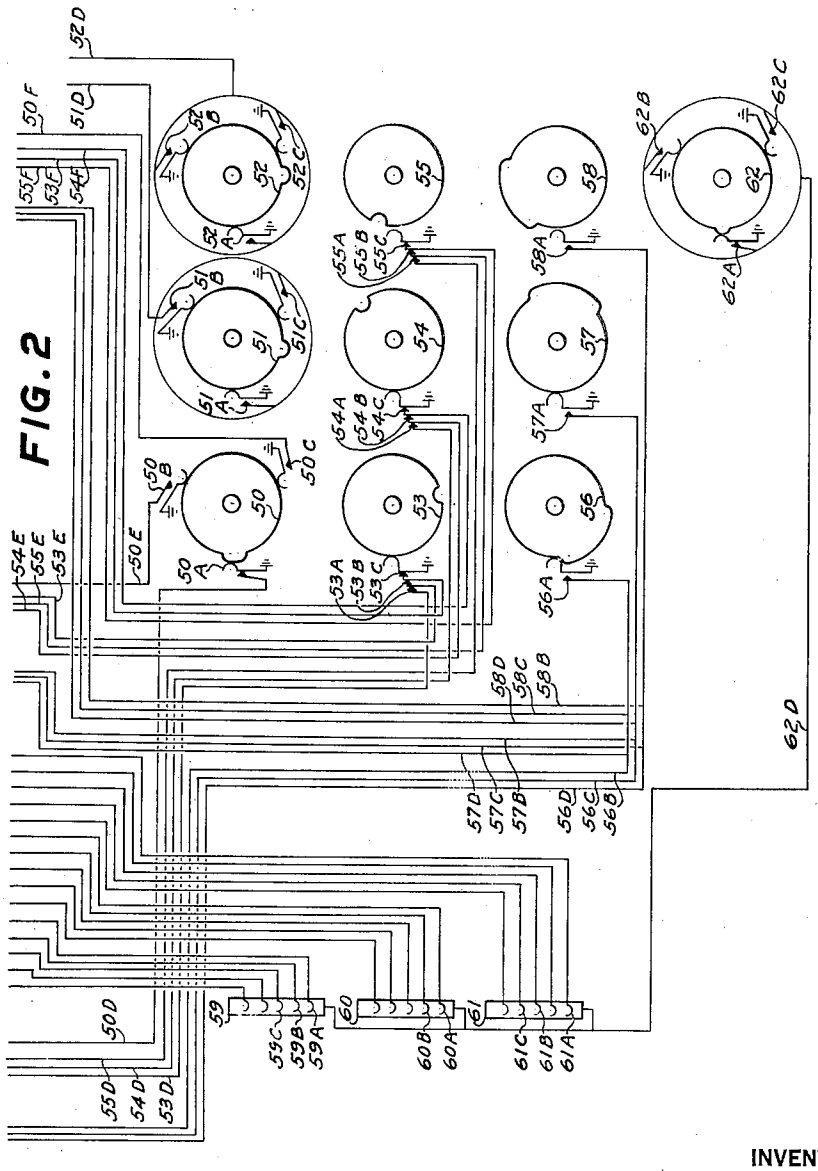

FIG. 2

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ADDRESSING AND PRINTING MACHINE

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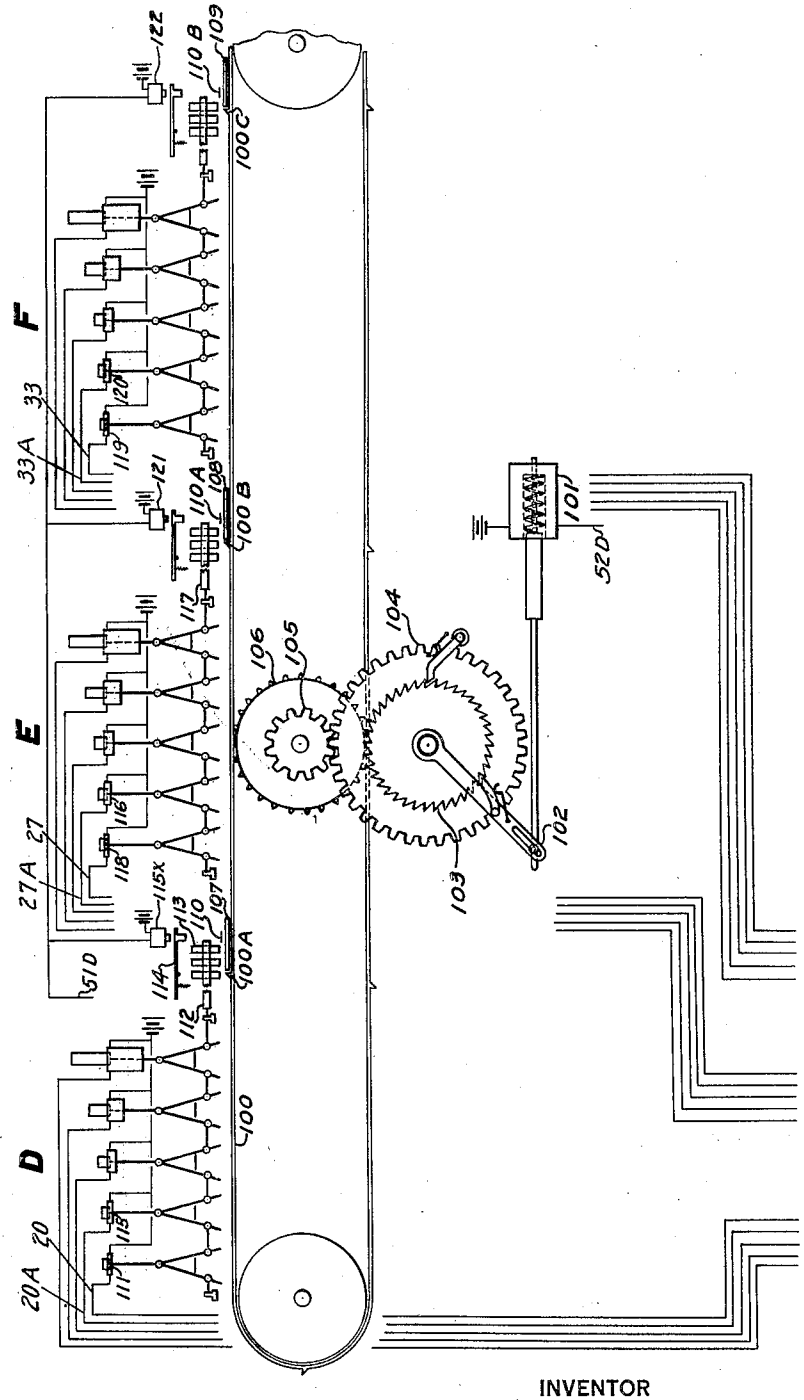
FIG. 3



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ADDRESSING AND PRINTING MACHINE

Original Filed April 6, 1932 5 Sheets-Sheet 4

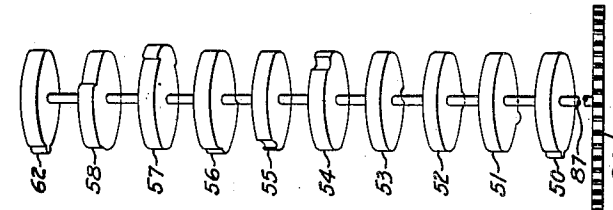


FIG. 5

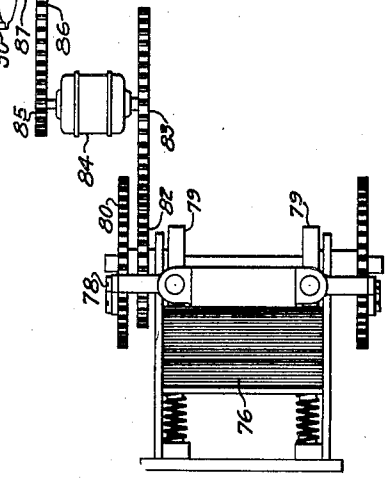


FIG. 7

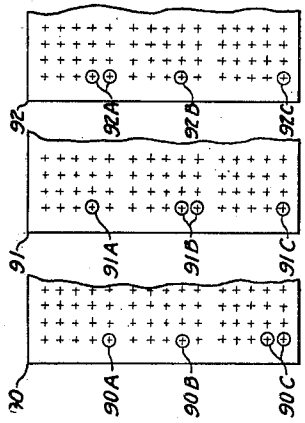
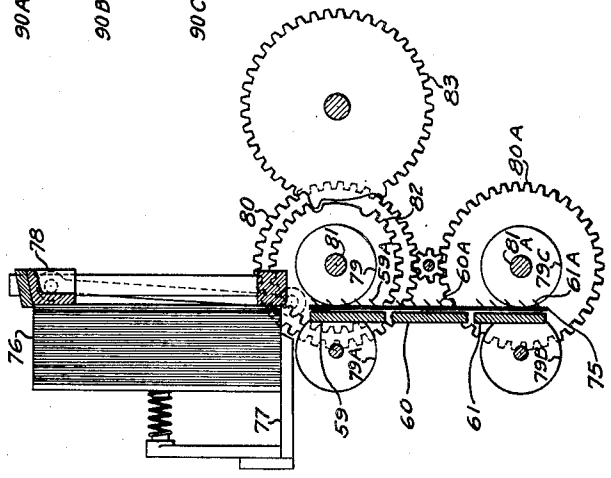


FIG. 4



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ADDRESSING AND PRINTING MACHINE

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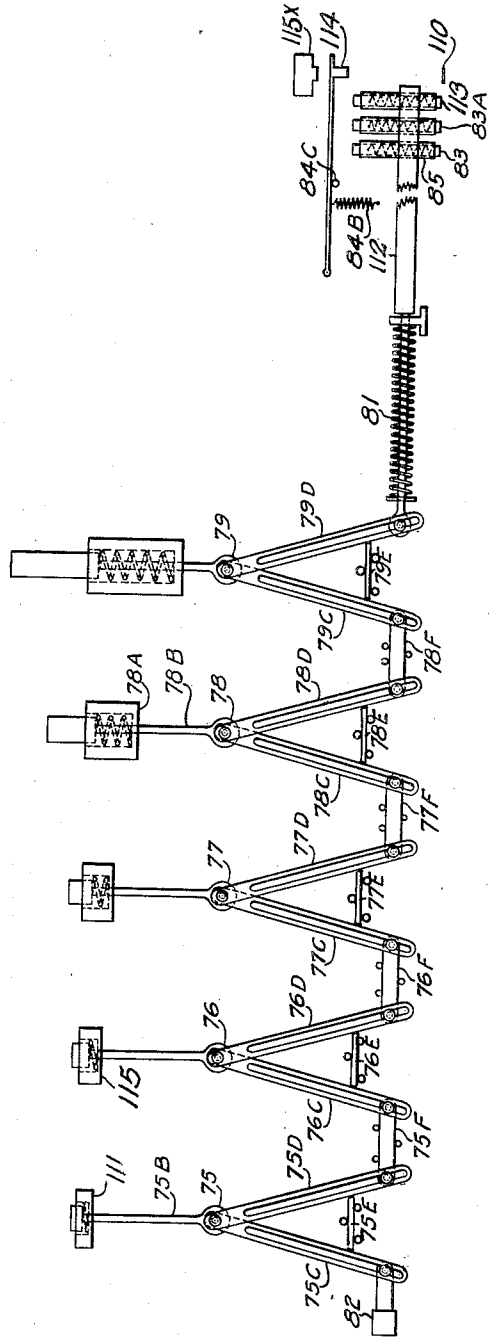
FIG. 6



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Patented Apr. 20, 1937

2,077,965

UNITED STATES PATENT OFFICE

2,077,965

ADDRESSING AND PRINTING MACHINE

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

Application April 6, 1932, Serial No. 603,582
Renewed September 12, 1934

84 Claims. (Cl. 101—58)

The kind of addressing machine to be described is one in which type-bars (preferably having metal type of typewriter style) are selected and set under electrical control (with five-unit code) for printing upon a succession of papers, as envelopes or bills. Inasmuch as addresses so to be printed are usually in two, three, or more lines, one below another, it is an object of the invention to provide for printing such lines one after another, from type elements placed in different positions, and to advance the papers by steps to such positions for receiving the impressions.

With papers thus advancing for successive lines of print, it is an object of the invention to print at the same time the due line on each of the several papers then positioned in the machine, and while the papers are in motion to set the type for the lines next due. In order to accomplish this, sets of relays are provided that take up, or store, the original electrical impulses and prepare suitable circuits, to be made effective in due operative steps.

A form of addressing machine widely in use utilizes for each addressing unit a metal plate which has been embossed so as to become a printing plate and which is held in a frame stiffened and shaped for handling and feeding through the printing mechanism. It is an object of the invention to substitute for such an addressing unit a very much cheaper card, with perforations representing letters or figures, or preferably, for heavy duty, a still thin and cheap sheet or plate of more durable insulating material, such as bakelite. Such a card or plate would permit the closing of selected electrical contacts which would control the selection of type-bars and type positions thereon.

It is an object of the invention to provide means of a character which by duplication or reduplication can be utilized to print at the same time in several places, as on a bill with stubs and a bookkeeping record, or on an envelope with its enclosures.

It is another object of the invention to keep the number of parts at a minimum. A single set of contact bars and fingers is provided for a succession of cards from each of which, upon momentary stoppage, the record for several successive lines of print is to be taken at once. A single set of printing elements is provided, of only such number as may be required for simultaneous printing; these are made accessible in common by relay registers in such number as may be required for storing the electrical records of the cards. For the selection and positioning of type, the perforations are made in five-unit code, reducing the number of circuits and register relays and simplifying the positioning movement below the requirements of a single-positioned perforation for each character. By various combinations of these and other elements, savings are effected in materials and in the time of operation. Perforations in code will have the effect also of keeping the size of the cards or plates at a minimum.

It is an object of the invention to provide printing mechanisms of a kind that can be spaced for the printing of successive lines in such wise that the lines are printed on paper which is moved from one such printing mechanism to another with spacing closer than the spacing of the several printers.

It will become apparent as the description proceeds that the means herein illustrated for addressing are adaptable for printing other matter, notably form letters, automatically set up and printed a line at a time according to matter prepared on perforated cards, and that such letters can likewise be addressed by the same means so that there is no difference in the character of the printing between the address and the body of the letter.

These objects will be attained by the mechanisms and circuits illustrated in the accompanying drawings, on five sheets, in which the various figures represent the items respectively enumerated:

Figure 1 shows three groups of register relays and their wiring.

Figure 2 is an end view of control cams and wiring, and a plan view of contact bars and fingers and wiring.

Figure 3 is a schematic plan of three printing elements and paper conveyor.

Figure 4 is a side view, partly in section, of card feed.

Figure 5 is a top plan view of card feed, and perspective view of control cams less contacts.

Figure 6 shows details of the permutation movement and type-bar.

Figure 7 contains fragmentary views of three cards.

Description of apparatus

Registers. Figure 1.—Three groups of registers are shown, A, B, C. Each of these groups includes three rows of five register relays each as **1, 2, 3, 4, 5**, and a shift relay, as **7**. Common to each group is a transfer relay, as **6**. The register relays are for the purpose of taking up the record of the card perforations, as transmitted through

the contacts closed on the bars, and later transmitting the record to the printing elements.

Each register group, as A, has three shift relays, as 7, 8, 9, one for each row of register relays. They are for the purpose of setting up circuits from contacts as 7A and 1C and transferring the circuits through contacts as 7B to the printing elements, at D, E, and F (Fig. 3). The contacts of these shift relays 7, 8, 9, are multipled to like-positioned contacts in the B and C groups, for the purpose of making each of the three printing elements common to three rows of relays, one in each of the three groups. Relay 7 shifts the circuit from the first register to the No. 1 printing element, at D; relay 8, from the second register to the No. 2 printing element, at E; relay 9, from the third register to the No. 3 printing element, at F. Like relays of the B and C register groups serve a like purpose. These relays are energized by cam wheels, as 56 (Fig. 2) closing contacts, as 56A, at predetermined intervals, as will be described.

Register relays, as selected through card perforations, are momentarily energized through the contact fingers and the contacts as 6A of the transfer relay (as 6, to be described) and windings as 1A. Once energized, they lock up through windings as 1B and contacts as 53A (Fig. 2); and remain energized until the record is transferred to the paper through the printing process. Each register relay has a contact, as 1C, for the purpose of setting up circuits from contacts as 7A through contacts as 7F of the shift relay, as 7, to the type-bar permutation magnets, as will be described.

For the purposes of this description only three rows of relays in each group are shown, a row for each type-bar that may print a character in the address. Each row, for this purpose, also represents a line of print; in practice there would be as many such rows in each group as type spaces in a line. A single row may be termed a "character register"; a plurality of rows (or, as illustrated, a single row) representing a line, a "line register". Each of the three groups illustrated includes three such line registers.

The selected relays in the three rows of the selected group are energized at the same time from contact fingers, as 59A (Fig. 2) and through contacts of a transfer relay as 6, as before stated, and are deenergized one row at a time as the character or line is printed.

The transfer relays 6, 21, 27 are for connecting to their respective register groups in turn all the contact bars and fingers closed through perforations in a card at a time, in order that the records of such cards may be transferred to respective registers for storage. Relay 6 is momentarily energized by contacts as 59A (Fig. 2) as a card reaches the registering position, as will be described.

The register relays of the A group are the first to energize, at the start of operations, those of the B group second, and of the C group third. They deenergize in each group in the order of the rows.

The relays of the A group energize and transfer the record of the first register to the first printing element, at D (Fig. 3), for the top line of the first paper. Next the relays of the B group energize, and transfer the record of the first register to the first printing element for the top line of the second paper; at the same time the second register of the A group transfers its record to the second printing element, at E, for the middle line of the first paper. Last in the first cycle, the relays of the C group energize, and transfer the record of the first register to the first printing element for the top line of the third paper; while the third register of the A group and the second register of the B group transfer their records respectively to the third printing element, at F, for the bottom line of the first paper and to the second printing element for the middle line of the second paper. Deenergization of each row of relays immediately follows the printing of their record. The first operation in the second cycle includes the printing of the top line of the fourth paper, the middle line of the third, and the bottom line of the second. Others follow in like rotation.

Control cams. Contact bars and fingers. Figure 2.—In this figure is a side view of the cams for controlling the several registers, transfer and shift relays, and printing elements; also three sets of contact fingers on three contact bars. There is an end view of the cams positioned on shaft in Figure 5, and a side view in section of the bars in Figure 4.

These cams are all mounted on the same shaft and are timed to coordinate the energization of the several relays with the card feed. They move 120 degrees for each card, and control circuits to register the perforation positions on the relays of the A, B, and C groups, with the effect of storage. The transfer of the record from the second card is timed to follow closely the first printing according to the first card, and the transfer of the record from the third card likewise to follow the second printing.

Cam 50 is for the purpose of closing contacts 50A, 50B, 50C, to energize transfer relays as 6. Cam 51 and contacts 51A, 51B, 51C, are for the purpose of energizing hammer magnets, as 115X (Fig. 6). Cam 52 and contacts 52A, 52B, 52C, are for the purpose of energizing solenoid 101 (Fig. 3) for advancing the paper step by step after each printing operation. Cams 53, 54, 55, and their several contacts are for the purpose of holding energized the selected relays of the several registers, when once energized from the contact bars and fingers, and releasing them row by row in the order outlined below. Cam 53 through contact 53A holds energized a measured length of time such of the first row of relays, 1, 2, 3, 4, 5, of the A group as may have been energized; contact 53B, the third row in the B group; and contact 53C, the second row in the C group.

In like manner, contacts 54A, 54B, 54C, hold energized the second, first, and third registers respectively of groups A, B, and C; and contacts 55A, 55B, 55C, the third, second, and first registers respectively of groups A, B, and C.

Cams 56, 57, 58, and contacts 56A, 57A, 58A, are for the purpose of energizing the shift relays, as 7, which set up circuits through the registers to the printing elements. These cams through their contacts control the shift relays in the same order as cams 53, 54, 55, control the continued energizations of the register relays. Contact 56A is multipled to conductors 56B, 57D, 58C, which lead to the first shift relay, 7, of the first register in the A group, the third shift relay, 12, in the B group, and the second shift relay 14, in the C group. Contact 57A is wired in like manner to the second shift relay 8, in the A group, the first shift relay, 10, in the B group, and the third shift relay, 15, in the C group. Contact 58A is wired to the third shift relay, 9, in the A group, the

second shift relay, 11, in the B group, and the first shift relay, 13, in the C group.

Cam 62 is for the purpose of grounding bars 59, 60, 61, on the stoppage of the card at its intermediate position when the fingers make contact with the bars.

Contact bars 59, 60, 61, are common to all three groups of registers. One bar is necessary for each character; the three bars here represent three lines, with but one character each. Each bar is fitted with five contact fingers, as 59A. These are wired to the contacts of the transfer relays, as 6, and in multiple with all other like contacts, in order that the fingers of each bar may be made common to the three register groups. These bars are momentarily grounded when the card stops, as indicated above. The fingers of bar 59 lead to the first register of each group; of bar 60, to the second; and of bar 61, to the third.

Printing elements. Figure 3.—Three permutation movements are shown in schematic form at D, E, and F, with printing apparatus, in side view, in position for printing, and a conventional belt conveyor, 100. The conveyor is fitted with shoes, as 100A, 100B, 100C, equally spaced to position the papers progressively in line with the several printing hammers. The paper feeding mechanism is not shown.

The permutation movement and its associated printing apparatus at D is positioned to print the top line of an address; at E, the middle line; at F, the bottom line.

The conveyor, 100, is drawn forward step by step at the end of each printing operation, by means of solenoid 101, ratchet movement 102, toothed wheel 103, gears 104 and 105, and wheel 106. Three papers, 107, 108, 109, are shown in position on the belt; 107 being in position for receiving the imprint of the first line, 108 for the second line, and 109 for the third line; the first line for papers 108 and 109 having been previously printed by the element at D, and the second line for paper 109 by the element at E.

Card feed. Figure 4.—A conventional card feed is illustrated, with a card, 75, in position in relation to the contact bars and fingers, as 59A, 60A, 61A. The cards are fed one at a time, with a momentary pause in the position shown, whereupon the bars are momentarily grounded, setting up circuits through the perforations to the fingers for energizing the selected register relays. Cards, 76, are shown stacked on the platform, 77, from which they are fed one by one by a reciprocating cross-head feed, 78, and feed rollers 79, 79A, 79B, 79C. Rollers 79 and 79C are rigidly attached to their respective shafts, 81 and 81A, as are their driving gears 80 and 80A. Gear 82, which is driven from gear 83, is also attached to shaft 81.

Gear 83 is driven by motor 84 and drives gear 82; gears 82 and 83 are mutilated for the purpose of momentarily stopping the motion of card 75 on its downward movement for establishing circuits between the contact bars and fingers.

Card feed and control cams. Figure 5.—Figure 5 is a top plan view of the card feed, as described, with the cams 50 to 58 and 62 shown in perspective view, less contacts, and mounted on shaft 87. These cams are also shown in Figure 2, in end view, with wiring. They are driven by gears 85 and 86, with a ratio of 1 to 3.

Permutation movement and type-bar. Figure 6.—A conventional permutation movement is illustrated, for positioning the selected type-bar character to be struck by the type hammer, 114, in printing. The movement has five permutation members, 75, 76, 77, 78, 79, each with a different length of stroke for displacing the type-bar a given distance. Member 75 effects a movement equivalent to one type space; 76, 2 spaces; 77, 4; 78, 8; 79, 16. Through the action of these members singly or in combinations, the type-bar may be moved into any position from 1 to 31. The type may be arranged on the bar with reference to frequency of printing, in such wise as to average the minimum movement in practical use. Each member consists of a solenoid, as 78A, a plunger rod, as 78B, two slide bars, as 78C and 78D, a spacing bar, as 78E, and a push bar, as 78F. The spacing and push bars are here shown held in position by guide pins.

On the energization of solenoid 78A, the down stroke of rod 78B forces slide bars 78C and 78D downward a like distance against spacing bar 78E, moving push bar 78F forward eight spaces, which has the effect of advancing the type-bar 112 against the tension of spring 81 a like distance. Backward movement (to the left) is prevented by the intervening spacing and push bars and back stop 82, and upward movement by various guide pins, as indicated in the drawings.

On the simultaneous energization of two solenoids, as 111 and 78A, their plunger rods 75B and 78B and slide bars 75C and 75D, 78C and 78D, are forced downward. The left-hand face of bar 75C is forced against back stop 82, and the inside faces of bars 75C and 75D against spacing bar 75E, moving push bars 75F, 76F, 77F, 78F, spacing bars 76E, 77E, 78E, 79E, slide bars 76C, 76D, 77C, 77D, 78C, 78D, 79C, 79D, and type-bar 112 forward one space; slide bars 78C and 78D being forced downward by rod 78B, these also advance in like manner push bar 78F, spacing bar 79E, and type-bar 112 eight spaces additional. The combined and concurrent action of the two members has advanced the type-bar nine spaces, in one continuous movement.

The movement is illustrated with capacity for the alphabet and a few other characters, though not for figures. In practice it might be well to arrange in addressing for a few special bars for figures at the beginning of the second line rather than to extend all bars to sufficient length for figures.

Only three types are shown, 83, 83A, 113. These are contained in conventional holders, as 85, which are attached to type-bar 112. 114 is a printing hammer, which is rigidly secured at its left end. 115X is a magnet for raising the hammer against the tension of spring 84B in a printing operation. The energization of magnet 115X is momentary; on its deenergization, spring 84B snaps the hammer downward against stop 84C, causing the face of the hammer to strike the type-bar a blow and causing the type through the ribbon 110 to stamp its impression on the paper.

Cards. Figure 7.—The left ends of three cards, 90, 91, 92, are shown in fragmentary view. The perforations illustrated are, in the first card 90A for the letter A (to represent a line of print), 90B for B, 90C for C; in the second card, for B, C, and A; in the third, for C, B, and A.

Description of operation.

Motor 84 is started, gear 83 advances gear 82, card 90 takes the position shown by card 75 in Figure 4, and pauses momentarily. The card is perforated as next above stated for the letters A, B, and C. At the position taken by the card,

cams 50 and 62 close contacts 50A and 62A; contact 50A grounds conductor 50D, energizing grounding transfer contacts 6A,6B,6C and 6D, of relay 6, energizing windings 1A, 16A, 17A and 18A, locking up relay 1, through winding 1B, conductor fingers 59A, 60B, 61A and 61B, are grounded, grounding transfer contacts 6A, 6B, 6C and 6D, of relay 6, energizing windings 1A, 16A, 17A and 18A, locking up relay 1, through winding 1B, conductor 53D and contact 53A, for the first line of the address. For the second line, relay 16 is locked up, through winding 16B, conductor 54D, and contact 54A. For the third line, relays 17 and 18 are locked up, through windings 17B and 18B, conductor 55D, and contact 55A. Register contacts 1C, 16C, 17C and 18C, close, preparing circuits for positioning the printing elements (Fig. 3) as will be described.

Gear 83 advances gear 82 to eject card 90; shaft 87 advances cams 50 and 62, opening contacts 50A and 62A, releasing transfer relay 6, and removing ground from bars 59, 60, 61. Cam 56 advancing closes contact 56A, grounding conductor 56B, energizing shift relay 7, grounding contact 7A, conductor 7X, register contact 1C, and transfer contact 7F, energizing solenoid 111, advancing type-bar 112 one type space, positioning type 113 under hammer 114 and over ribbon 110, in position to imprint the selected letter on paper 107. Cam 51 advances, closing contact 51A, grounding conductor 51D, 51D (Fig. 3), momentarily energizing magnet 115X, it deenergizes; hammer 114 strikes type 113 a blow, imprinting the letter A on paper 107 for the top line of the address.

Cam 56 advances, opening contact 56A, releasing shift relay 7, which releases solenoid 111. The type-bar returns to its normal position. Cam 53 also advances, momentarily opening contacts 53A, 53B, 53C; contact 53A releases relay 1.

Following the printing operation, cam 52 momentarily closes contact 52A, grounding conductor 52D, 52D (Fig. 3), energizing solenoid 101, advancing paper 107 to the position shown for paper 108 for the second line of the address.

Card 91 has advanced for the record of the second paper. Cams 50 and 62 advance to the second position, and close contacts 50B and 62B. Contact 50B grounds conductor 50E, energizing transfer relay 21. Contact 62B grounds bars 59, 60, 61, grounding fingers 59B, 60A, 60B and 61A, and energizing through transfer contacts 21A, 21B, 21C and 21D, relay 22 for the first line of the second paper, and relays 23 and 24 for the second line, and relay 25 for the third line of the same paper. Relay 22 locks up through winding 22B, conductor 54E, contact 54B, relays 23 and 24, windings 23B and 24B, conductor 55E, and contact 55B, relay 25, winding 25B, conductor 53E, and contact 53B.

Gear 83 advances gear 82 to eject card 91. Cams 50 and 62 advance, opening contacts 50B and 62B, releasing transfer relay 21 and removing ground from bars 59, 60, 61. Cam 57 has advanced to the second position, closing contact 57A, grounding conductors 56C, 57B, energizing shift relays 8 and 10, grounding contacts 8A, 10A, conductors 8X, 10X, register contacts 16C, 22C, shift contacts 8E and 10E, conductors 27A and 20A, energizing solenoids 115 and 116, advancing type-bars 112 and 117 two type spaces. Cam 51 closes contact 51B, grounding conductor 51D, 51D (Fig. 3), energizing magnets 115X and 121, with the effect as before described, imprinting the letter C on the top line of the second paper positioned at 107, and the middle line of the first paper positioned at 108.

Cam 57 advances, opening contact 57A, releasing shift relays 8 and 10, which release solenoids 115 and 116. Type-bars 112 and 117 return to their normal positions. Cam 54 advances, opening contacts 54A, 54B, 54C; contact 54A releases relay 16; contact 54B releases relay 22. Cam 52 closes contact 52B, energizing solenoid 101, advancing the first paper to the position indicated by 109 for the third line, and the second paper to position 108 for the second line.

Card 91 having been ejected, card 92 is positioned for transferring its record to the register relays for the third paper. Cam 50 closes contact 50C, grounding conductor 50F, energizing transfer relay 27. Cam 62 closes contact 62C, grounding bars 59, 60, 61, fingers 59A, 59B, 60B and 61A, energizing through transfer contacts 27A, 27B, 27C and 27D, relays 28 and 29, for the top line of the third paper, relay 31 for the middle line of this paper, and relay 32 for the bottom line of this paper.

Relays 28 and 29 lock up through windings 28B and 29B, conductor 55F, contact 55C, relay 31, winding 31B, conductor 53F, and contact 53C, relay 32, winding 32B, conductor 54F, and contact 54C, closing register contacts 28C, 29C, 31C and 32C. Cams 50 and 62 advancing opened contacts 50C and 62C, releasing transfer relay 27 and removing ground from bars 59, 60, 61.

Cam 58 advancing to the third position, closes contact 58A, grounding conductors 56D, 57C, 58B, energizing shift relays 9, 11, 13, which ground contacts 9A, 11A, 13A, conductors 9X, 11X, 13X, register contacts 17C, 18C, 23C, 24C, 28C, 29C, shift contacts 10F, 10E, 11F, 11E, 13F, 13E, conductors 33, 33A, 27, 27A, 20, 20A, energizing solenoids 111, 115, 118, 116, 119, 120, advancing each of the several type-bars three type spaces.

Magnets 115X, 121, 122, are energized from contact 52C, imprinting the letter C on the bottom line of the first paper, now in the position indicated by 109, the letter C on the middle line of the second paper, and the letter C on the top line of the third paper.

Cam 58 advances to its third position, opening contact 58A, releasing shift relays 9, 11, 13, which releases the several solenoids; the type-bars return to their normal positions. Cam 55 reaches its third position, opening contacts 55A, 55B, 55C. Contact 55A releases register relays 17 and 18; contact 55B, relays 23 and 24; contact 55C, relays 28 and 29.

Cam 52 reaches its third position, closing contact 52C, energizing solenoid 101, ejecting the first paper and advancing the second paper to the third position and the third paper to the second position. The fourth paper takes its position at the beginning.

Card 92 is ejected, and the fourth card sets up circuits as before described, to energize the register relays of the A group, and to print the top line of the fourth paper, while the middle line of the third and the bottom line of the second are likewise being set up and printed.

Succeeding operations take place in accordance with the foregoing description.

To carry out the object of providing for duplication or reduplication of printing in several places at one time, it will be apparent that the printing mechanisms can be so duplicated or reduplicated, and that the duplicates can be so controlled from the present registers through

circuits and mechanisms, or mechanisms duly multipled, as to control the type positioning and printing of all those required to operate with like effect at one time.

The mechanisms for carrying this invention into effect are illustrated in conventional forms. They might be made in widely different forms and with widely varying electrical and mechanical arrangements. I do not wish to be understood as limiting the embodiment of this invention to details herein illustratively shown, or its uses to those herein mentioned.

I claim:

1. In an addressing machine, the combination of registers settable concurrently from selectable contacts in corresponding groups, printing elements controllable respectively by said registers, and means for successively actuating successive groups of said printing elements to print successively the lines of an address according to the respective register settings.

2. In an addressing machine, the combination of a series of registers, contacts settable according to type characters, means for setting said registers in turn according to successively selected contacts, printing elements controllable in common by the several registers, and means for successively actuating said printing elements according to the successive register settings.

3. In an addressing machine, the combination of a series of groups of registers, means for setting the registers of a group from respective selectable contacts, means for so setting the series of register groups successively, a plurality of printing elements controllable in common by registers in the several groups, and means for concurrently actuating the several printing elements each according to a register setting.

4. In an addressing machine, the combination of a series of groups of registers, means for setting the registers of a group from contacts selectable through card perforations and representing respective lines of type, means for so setting the series of register groups in turn according to perforated cards successively positioned, a plurality of printing elements controllable in common by registers in the several groups, control means for selecting several printing elements at once for operation each according to the setting of a register of each group, and means for concurrently actuating the several printing elements so selected.

5. In an addressing machine, the combination of type carriers arranged in a plurality of groups, electrically controlled means for positioning type, contacts settable according to type characters, locking relays selectable according to set contacts, type-positioning-control circuits closable by such relays, and means for delayed electrification of such circuits, group by group corresponding to said groups of type carriers.

6. In an addressing machine, the combination of electrically controlled means for positioning type, contacts settable according to type characters, groups of locking relays selectable according to contacts settable in corresponding groups, type-positioning-control circuits in corresponding groups closable by such relays, means for delayed electrification of such groups of circuits, and means for controlling the electrifying means of such groups of circuits in turn.

7. In an addressing machine, the combination of a group of registers each including locking relays settable from contacts representing respective lines of type, a printing element including register-controlled type-positioning and printing means, and means for controlling successive printings according to the relays set for each type line.

8. In an addressing machine, the combination of a plurality of registers settable at once according to contacts representative of type characters, a like plurality of printing elements controllable by said registers, and means controlled in common for printing successively under control of such registers in turn and for positioning a paper successively in relation to said printing elements.

9. In an addressing machine, the combination of a plurality of series of registers, a series of code contacts one for each register in any one series, settable according to codes for type characters, means for setting said several series of registers in rotation according to successive selections of said contacts, printing-type elements controllable in common by the several series of registers successively, and means for repeatedly actuating said printing elements according to the successive register settings.

10. In an addressing machine controlled by a sensing record, the combination of a plurality of line-printing devices, a plurality of type members in line in each said device, a plurality of code-registering selectors, one for each of said type members, means whereby each selector controls its associated type member to present for printing a type represented by a registered code, sensing means controlling said selectors to control said type members line by line to register successively the lines of an address, one line in each of said line-printing devices, and means for operating said line-printing devices to print successively upon one record sheet.

11. In an addressing machine controlled by a sensing record, the combination of a plurality of line-printing devices, a plurality of type members in line in each said device, a plurality of code-registering selectors, one for each of said type members, each selector controlling its associated type member to present for printing a type represented by a registered code, sensing means controlling said selectors to control said type members line by line to register successively the lines of an address, one line in each of said line-printing devices, said sensing means operable by successive sensing records to control a plurality of said line-printing devices simultaneously, whereby a plurality of lines are printed simultaneously upon a plurality of record sheets.

12. In an addressing machine for printing a multi-line address on paper by a plurality of printers, the combination of a plurality of series of registers, one series for each line, settable contact means for controlling registrations concurrently on all of said registers according to characters of all the lines, a plurality of printers, one for each line, means for transferring the registration for the first line to the first printer, means for operating the first printer to print the first line and for moving the paper from the first printer to the second printer, means for transferring the registration for the second line to the second printer, means for operating the second printer to print the second line, and so on, whereby the lines are printed on the paper with spacing closer than the several printers.

13. In an addressing machine for printing a multi-line address on paper by a plurality of printers, the combination of a plurality of registers, one for each line, settable contact means

for controlling registrations concurrently on all of said registers according to characters of all the lines, a plurality of printers, one for each line, means for transferring the registration for the first line to the first printer, means for operating the first printer to print the first line and for moving the paper from the first printer to the second printer, means for transferring the registration for the second line to the second printer, means for operating the second printer to print the second line, and so on, whereby the lines are printed on the paper with spacing closer than the spacing of the several printers, duplicate sets of registers, and overlap means whereby the several operations may be performed serially and concurrently on a plurality of papers for variant addresses.

14. In an addressing machine controlled by a sensing record the combination of a plurality of line-printing mechanisms each adapted to print a line, sensing devices for controlling said line-printing mechanisms, and means for printing by said mechanisms upon a receiving surface lines with spacing closer than the spacing of the several line-printing mechanisms.

15. In an electrical addressing machine, the combination of electrically controlled means for positioning at one time all type required to print a line, storage means for codes for a plurality of lines, and means for transferring codes from said storage means to said electrically controlled means line by line.

16. In a card controlled device, a card container, card sensing devices, means to shift a card from said card container to said card sensing devices, storage means adapted to register at one time all sensed indications, printing devices controllable by said storage means, and transfer means for transferring said stored indications piecemeal to said printing devices.

17. In a card controlled device, a card container, card sensing devices, means to shift a card from said container to said card sensing devices, storage means adapted to register at one time all sensed indications and to store and retain the said sensed indications, printing devices controllable by said storage means, transfer devices for transferring said stored indications piecemeal to said printing devices, and means to shift said card away from said card sensing devices and operative while said storage means retains a registration of said sensed indications.

18. In a card controlled printing machine, sensing means for closing electrical contacts through all perforations in a card, means for feeding cards to said sensing means, a master contact for closing circuits through closed ones of said contacts, sequence means for closing and opening said master contact while said contacts are closed, and means for operating said sequence means in timed relation with the operation of the card feeding means.

19. In a card controlled printing machine, a plurality of registers, a plurality of electrical circuits leading to said registers, means for selectively connecting said circuits to said registers, means for electrifying said circuits intermittently, means for operating the selecting and electrifying means in timed relation, and sensing means comprising contacts closed through perforations in a card for preparing said circuits for electrification.

20. In a printing machine, registering means controlled by a card for registering representations of a large number of characters, and printing means under control of the registering means for automatically printing simultaneously a smaller number of characters than the number of characters registered in said registering means.

21. In a printing machine controllable from a sensing record, the combination of record-sensing contacts, registers arranged in a plurality of groups and all settable concurrently by control of said record-sensing contacts, printing means operable by control of said registers, and means for successively actuating said printing means to print successive lines under control of successive groups of said registers.

22. In a printing machine controllable from a sensing record, the combination of record-sensing means, registers settable concurrently by said record-sensing means, printing means settable under control of said registers, means for independently and successively setting up said printing means under control of said registers, and means for successively operating said printing means to make an impression therefrom after set-up thereof.

23. In a printing machine controllable from a sensing record containing perforations for a plurality of lines of printing, the combination of record-sensing means, a plurality of registers settable concurrently by said record-sensing means, each of said registers being set for one line of printing, a plurality of printing means respectively settable under control of said registers, means for independently and successively setting up said printing means, and means for successively operating said printing means to print successive lines on a single receiving surface.

24. In an addressing machine controllable from sensing records in succession, each such record containing perforations for a plurality of lines of printing, the combination of record-sensing means for sensing one record a group of registers settable concurrently by said record-sensing means and responsive to one of said sensing records, a plurality of printing means operable successively to print successive lines on a single receiving surface under control of separate subgroups of said group of registers and further groups of similar registers settable from sensing records and acting to control said printing means in overlap manner.

25. In an addressing machine the combination of electrically controlled means for positioning type, locking registers settable concurrently according to codes for type characters, control circuits for said means and closable by said registers, and means for electrifying such circuits by groups in predetermined delayed sequence and thereby starting the type positioning action.

26. In an addressing machine, the combination of means for positioning at one time all types required to print a line, card controlled storage means for type codes for a plurality of lines, and means for transferring codes line by line from said storage means to said means for positioning types.

27. In a printing machine controlled by records each of which contains codes for a plurality of lines, storage means for codes, printing means, sensing means for transferring codes from said records to said storage means record by record, and transfer means for transferring codes from said storage means to said printing means line by line.

28. In an addressing machine, the combination of a plurality of line-printing devices, a plurality of type members in line in each said device.

a plurality of code-registering selectors, one for each of said type members, sequence means controlling said selectors to control said type members line by line to register successively the lines of an address, one line in each of said line-printing devices, and means for operating said line-printing devices to print successively upon one record surface.

29. In a record-controlled addressing machine, a plurality of printers each settable under control of said record and each adapted to print one line of an address, means for moving a paper from printer to printer, and sequence means for printing upon said paper a plurality of lines, successively, one line by each of said printers.

30. In a record-controlled addressing machine, a plurality of printing mechanisms each adapted to print one line of an address, sensing means responsive to said record and operating to control said printing mechanisms to vary the characters printed, means for operating said printing mechanisms successively to print upon a receiving surface, and means for moving said receiving surface between printing operations.

31. In a record-controlled printing machine, a plurality of printing mechanisms responsive to said record to vary the characters printed and each adapted to print one line, means for operating said mechanisms successively to print upon a receiving paper, and means for moving the said receiving paper between successive printings through a distance other than the distance between printers.

32. In a card-controlled addressing machine, printing means adapted to print a complete line at one printing impression, a plurality of sets of code storage relays, sensing means for searching a card for setting all relays to register in code manner in response to any records found in said card, and sequence means for using line by line consecutively the stored registrations of said sets of storage relays to control said printing means line by line.

33. In a card-controlled addressing machine, sensing means for closing electrical contacts through perforations in a card, a master contact for closing circuits through closed ones of said contacts representing characters for a plurality of lines of printing, storage registers responsive to said closed circuits to effect registrations thereof, and means for utilizing said registrations line by line.

34. In a card-controlled addressing machine, a plurality of electrical circuits, means for electrifying said circuits intermittently, sensing means comprising contacts closed through perforations in said card for preparing said circuits for electrification, and storing devices responsive to closed ones of said circuits and representing characters for a plurality of lines of printing.

35. In a card-controlled addressing machine, a plurality of registers, circuits for operating said registers, sensing devices adapted to close contacts in said circuits through perforations in cards to select among said registers, a master contact for closing said circuits to operate said selected registers, locking circuits for said operated registers, and sequence means for closing said contacts, closing said master contact, opening said master contact and opening said contacts in the order of closing and opening as recited.

36. In a printing machine, a plurality of code registers adapted to register character codes for a number of characters exceeding the number of characters in a line of printing, printing means adapted to print a line of characters simultaneously, and transfer means adapted to transfer from said code registers to said printing means character codes for a number of characters sufficient to print a line.

37. In a card-controlled addressing machine, a plurality of code registers, code contacts closable through perforations in a control card, means for closing circuits including said contacts and representing only codes for characters closable through perforations in said control card to operate said registers, a plurality of printing means, and means for sequentially setting up said printing means under control of said registers one at a time.

38. In a card-controlled addressing machine, a plurality of code registers, means for simultaneously closing circuits representing only codes for characters to be entered in said registers, printing elements for printing said characters, and means for successively setting up said printing elements by registers which have been operated by said card-controlled circuits to successively print said characters.

39. In a form-controlled addressing machine, storage means of capacity for storing the address of one complete product of the machine, form-sensing means of capacity for fully setting said storage means at one operation, printing means of capacity for printing one complete product of the machine and under control of said storage means, and sequence means for operating said printing means to print said product part by part according to corresponding parts of said storage means.

40. In a form-controlled addressing machine, a plurality of storage means each of capacity for storing the address for one complete product of the machine, form-sensing means of capacity for fully setting one of said storage means at one operation, printing means of capacity for printing one complete product of the machine and under control of said storage means, and sequence means for operating said printing means to print concurrently a plurality of said products part by part according to corresponding parts of a plurality of said storage means.

41. In a form-controlled addressing machine, storage means of capacity for storing an address of a plurality of lines for one complete product of the machine, form-sensing means of capacity for fully setting said storage means at one operation, printing means of capacity for printing a plurality of lines equivalent to one complete product of the machine and under control of said storage means, and sequence means for operating said printing means to print said product line by line according to corresponding parts of said storage means.

42. In a form-controlled addressing machine, a plurality of storage means each of capacity for storing an address of a plurality of lines for one complete product of the machine, form-sensing means of capacity for fully setting one of said storage means at one operation, printing means of capacity for printing a plurality of lines equivalent to one complete product of the machine and under control of said storage means, and sequence means for operating said printing means to print a plurality of said products line by line in overlap manner according to corresponding parts of a plurality of said storage means.

43. In a form-controlled addressing machine, storage means of capacity for storing an address of one complete product of the machine, form-sensing means of capacity for fully setting said storage means at one operation, a plurality of printing means under control of said storage means, and sequence means for operating said printing means severally to print said complete product part by part according to corresponding parts of said storage means.

44. In a form-controlled addressing machine, a plurality of storage means each of capacity for storing an address for one complete product of the machine, form-sensing means of capacity for fully setting one of said storage means to represent a complete address at one operation, printing means severally adapted to respond to all of the several parts of said storage means, and sequence means controlling said several printing means concurrently to print simultaneously a plurality of said machine products part by part in overlap manner, according to the setting of corresponding parts of said plurality of storage means.

45. In an addressing machine controlled by a form having perforations for characters only, said perforations arranged in positions upon said form corresponding to positions of the said characters upon a printed product element, registers, one for each character position of said printed product, operable into printer controlling conditions under control generated by virtue of said perforations in corresponding character positions in said form, printers having a non-printing position and operable into printing conditions each under control generated only by one of said registers in printer-controlling condition, and control means for said registers for said printers and for said product element whereby said printers are moved from non-printing position and printing is effected upon said element in only printing positions indicated by perforations in corresponding character positions in said form.

46. In a line-by-line addressing machine controlled by a form having perforations for characters only, said perforations arranged in positions upon said form corresponding to positions of the said characters in a line of a printed product element, registers, one for each character position of said printed product, operable into printer-controlling conditions under control generated by virtue of said perforations in corresponding character positions in said form, printers having a non-printing position and operable into printing conditions each under control generated only by one of said registers in printer-controlling condition, and control means for said registers and said printers whereby said printers are moved from non-printing position and printing is effected upon said element in only printing positions indicated by perforations in corresponding positions in said form.

47. In a line-by-line printing machine controlled by a form having perforations for characters only, said perforations arranged in positions upon said form corresponding to positions of said characters in a line upon a printed product element, printers having a non-printing position and operable into printing conditions under control by said perforations in corresponding character positions in said form, and control means for said printers whereby said printers are moved from non-printing position and printing is effected upon said product element in only printing positions indicated by perforations in corresponding positions in said form.

48. In a line-by-line printing machine controlled by a form having perforations for characters only, printers operable into printing conditions under control by said perforations in corresponding character positions, said printers having normal non-printing conditions, and control means for said printers whereby said printers are moved from non-printing position and printing is effected upon product elements in only printing positions indicated by perforations in the control form.

49. In a record card-controlled printing machine, storage means, means for sensing a card and entering at least a part of the record thereon in said storage means, printing means, and means for setting up said printing means according to a record entered in said storage means whereby said printing means may be operated to print according to the record entered in said storage means.

50. In a record card-controlled printing machine, storage means, means for sensing a card and entering at least a part of the record thereon in said storage means, printing means, means for setting up said printing means according to a part of the record entered in said storage means whereby said printing means may be operated to print according to the part of the record entered in said storage means in accordance with which the printing means is set up, a second printing means, and means for setting up said second printing means according to another part of the record entered in said storage means whereby the second printing means may be operated to print according to the part of the record entered in said storage means in accordance with which said second printing means is set up.

51. In a record card-controlled printing machine, storage means, means for sensing a card and entering at least a part of the record thereon in said storage means, printing means, means for setting up said printing means according to a part of the record entered in said storage means, a second printing means, and means for setting up the second printing means according to another part of the record entered in said storage means after the first named printing means has been set up.

52. In a record card-controlled printing machine, storage means, means for sensing a card and entering at least a part of the record thereon in said storage means, printing means, means for setting up said printing means according to a part of the record entered in said storage means, means for operating the printing means to make an impression therefrom after set-up thereof, a second printing means, and means for setting up the second printing means according to another part of the record entered in said storage means after an impression has been made from the first printing means.

53. In a record card-controlled printing machine, card feeding means, storage means, means for sensing a card fed by the card feeding means and for entering at least a part of the record thereon in said storage means, printing means, and means for setting up said printing means from at least a part of the record entered in said storage means after said card feeding means has fed the card from which a record was entered in the storage means from cooperation with the sensing means.

54. In a record card-controlled printing machine, card feeding means, storage means, sensing and entering means, operating means for operating said sensing and entering means to sense a card for a record thereon and enter the sensed record in the storage means, printing means, means for setting up said printing means from at least a part of the record entered in said storage means, and means for operating the setting up means subsequent to operation of the first named operating means.

55. In a record card-controlled printing machine, card sensing means, means for feeding cards past said card sensing means, storage means, means for entering a record sensed by the sensing means in the storage means, printing means, means for setting up said printing means from at least a part of the record entered in said storage means, sheet feeding means, and means for operating the printing means after set-up thereof to make an impression on a sheet fed thereinto by the sheet feeding means.

56. In a record card controlled printing machine, card sensing means, means for feeding cards past said card sensing means, storage means, means for entering a record sensed by the sensing means in the storage means, printing means, means for setting up said printing means from a part of the record entered in said storage means, sheet feeding means, means for operating the printing means after set-up thereof to make an impression on a sheet fed thereinto by the sheet feeding means, a second printing means, means for setting up the second printing means from another part of the record entered in said storage means, and means for operating the second printing means to make an impression on a sheet fed thereinto from the first printing means by said sheet feeding means.

57. In a printing machine, means for simultaneously sensing a plurality of lines of a record, a printing means for each line, and means for successively setting up the printing means to successively print the sensed lines.

58. In a printing machine, means for simultaneously sensing a plurality of lines of a record, separate storage means for each sensed line and under control of the sensing means, a printing means for each line, and means for successively setting up the printing means from the storage means to successively print the sensed lines.

59. In a printing machine for successively printing related lines of a record, means for separately storing the lines, means for simultaneously sensing the lines and separately entering the lines in the storing means, a printing means for each line, and means for successively setting up the printing means each from a separate storing means.

60. In a printing machine for simultaneously sensing a plurality of lines of record on a card or the like, a register, means for transferring the sensed lines of the record into the register, printing means for separately printing the sensed lines, and means for transferring the sensed lines to the printing means line by line.

61. In a printing machine controlled by cards or the like bearing records each consisting of a plurality of lines of printing, storage means, means for sensing a card or the like and simultaneously entering the record of the plurality of lines in the storage means, printing means for separately printing lines of printing, and means for setting up the printing means from the storage means whereby the printing means may be operated to separately print lines of the record entered in the storage means.

62. In an addressing machine controlled by cards or the like bearing records of addresses consisting of a plurality of lines of printing, storage means, means for sensing a card or the like and simultaneously entering the record of an address in the storage means, printing means for separately printing the lines of an address, and means for successively setting up the printing means from the storage means to successively print the lines of the address.

63. In a printing machine, card feeding means for feeding cards each bearing a record of a plurality of lines of printing, sheet feeding means for feeding sheets each to receive impressions of a plurality of lines of printing, printing means for separately printing the lines of printing on each sheet, means for sensing the cards and setting up the printing means, and means for operating the card feeding means, sheet feeding means and sensing and setting up means whereby a card and a completely printed sheet are ejected in each operation of the machine.

64. In a printing machine, card feeding means for feeding cards each bearing a record of a plurality of lines of printing, sheet feeding means for feeding sheets each to receive impressions of a plurality of lines of printing, printing means for separately printing the lines of printing on each sheet, storage means, means for sensing a card and simultaneously entering in the storage means a record of a plurality of lines of printing, printing means for separately printing lines of printing on each sheet, means for setting up the printing means from the storage means, and means for operating the card feeding means, sheet feeding means, sensing and entering means, storage means, printing means and printing means setting up means to eject a card and a completely printed sheet in each operation of the machine.

65. In a printing machine, card feeding means for feeding cards each bearing a record of a plurality of lines of printing, sheet feeding means for feeding sheets each to receive impressions of a plurality of lines of printing, printing means for separately printing the lines of printing on each sheet, a plurality of storage means, means for sensing cards and selectively entering the records of a plurality of lines of printing in the storage means, printing means for separately printing lines of printing on each sheet, means for setting up the printing means selectively from the storage means whereby each printing means is set up from a different storage means for each printing operation, and means for operating the card feeding means, sheet feeding means, sensing and entering means, storage means, printing means and printing means setting up means to eject a card and a completely printed sheet in each operation of the machine.

66. In an addressing machine, a plurality of printing mechanisms each having settable types and adapted to print one line of an address, means for moving a paper from printer to printer, means for printing upon said paper a plurality of lines of the address, successively, one line by each of said printing mechanisms, and means in each said printing mechanism to reset said settable types between successive printings.

67. In an addressing machine, a plurality of printing mechanisms each having settable types and adapted to print one line of an address, means for operating said mechanisms succes-

sively, means in said printing mechanism to reset said settable types between successive printings, and means for moving a receiving paper between successive printings.

68. In an addressing machine, a plurality of printing mechanisms each having settable types and adapted to print a line of an address, means for operating said mechanisms successively to print upon a receiving paper, means in each said printing mechanism to reset said settable types between successive printings, and means for moving the receiving paper between successive printings through a distance other than the distance between printers so that the spacing apart of the printings on the paper will be different from the spacing apart of the said printers.

69. In a card controlled addressing machine, printing means adapted to print a complete line at one printing impression, a plurality of sets of storage relays, sensing means for searching a card and for setting all relays to register in code manner in response to any records found in said card, and sequence means for using a portion only of the stored registrations of said sets of storage relays to control said printing means.

70. In a card controlled addressing machine, a printing mechanism, a storage set of relays comprising a feeding relay, a plurality of groups of storage relays, and a plurality of delivery relays; means including said feeding relay for electrifying in code manner all of said storage relays under control of a card, and means including said delivery relays for controlling said printing mechanism by group after group of said storage relays successively.

71. In a card controlled addressing machine, a printing mechanism, a storage set of relays comprising a feeding relay, a plurality of groups of storage relays, and a plurality of delivery relays; means including said feeding relay for electrifying in code manner all of said storage relays in accordance with a control card, means including said delivery relays for controlling said printing mechanism by group after group of said storage relays successively, and a sequence system of contacts for controlling the sequential actions of said relays.

72. In a card controlled addressing machine, a series of printing mechanisms, a plurality of storage sets of relays comprising feeding relays, groups of storage relays, and a plurality of delivery relays; means including said feeding relays for electrifying in code manner a plurality of groups of said storage relays, variant groups successively by control of successive cards, and means including said delivery relays for controlling independently said printing mechanisms.

73. In a card controlled addressing machine, a series of printing mechanisms, a plurality of storage sets of relays comprising feeding relays, groups of storage relays, and a plurality of delivery relays; means including said feeding relays for electrifying in code manner a plurality of groups of said storage relays, variant groups successively by control of successive cards, means including said delivery relays for controlling independently and simultaneously said printing mechanisms, paper shifting means, and cam controlled contacts operable in sequential relation for controlling the operation and cooperation of said relays, said printing mechanisms and said paper shift means whereby a plurality of lines of an address are read simultaneously from a card and stored and a variant plurality of lines of addresses are delivered simultaneously to said printing mechanisms for printing upon various papers being simultaneously addressed.

74. In an addressing machine controlled by cards or the like bearing records consisting of a plurality of lines of printing, storage means, means for sensing a card or the like and simultaneously entering the record of an address in the storage means, printing means for separately printing the lines of an address, selector means for setting up said printing means, and means for successively actuating the selector means from said storage means to successively print the lines of the address.

75. In a printing machine for simultaneously sensing a plurality of lines of a record on a card or the like, a register, means for transferring the sensed lines of the record into the register, printing means for separately printing the sensed lines, selector means for setting up the printing means, and means for transferring the sensed lines to the selector means line by line to thereby set up the printing means line by line.

76. In a printing machine, means for simultaneously sensing a plurality of parts of a record on a card or the like, a register, means for transferring the sensed parts of the record into the register, printing means for separately printing the sensed parts, and means for transferring the sensed parts from the register to the printing means.

77. In a printing machine, means for simultaneously sensing a plurality of parts of records on cards or the like, a register, means for transferring the sensed parts of the records into the register, printing means for separately printing the sensed parts, means for transferring the sensed parts from the register to the printing means, and means for operating said transferring means to simultaneously transfer the sensed parts to the printing means.

78. In a printing machine, means for sensing a plurality of parts of a record on a card or the like, a register, means for entering the sensed parts of the record in the register, printing means, and means for operating the printing means under control of the register to effect printing of the sensed parts.

79. In a printing machine, means for sensing a plurality of parts of a record on a card or the like, a register, means for entering the sensed parts of the record in the register, a plurality of printing means, and means for operating the printing means under control of the register to effect printing of the respective sensed parts in the respective printing means.

80. In a printing machine, means for sensing a plurality of parts of a record on a card or the like, a register, means for entering the sensed parts of the record in the register, printing means, means for transferring the sensed parts from the register to the printing means, and means for operating the printing means to print the sensed parts in predetermined arrangement.

81. In a printing machine, means for sensing a plurality of parts of a record on a card or the like, a register, means for entering the sensed parts of the record in the register, printing means, and means for transferring the sensed parts from the register to the printing means and operable to effect operation of the printing means to print the sensed parts in predetermined arrangement.

82. In a printing machine, means for simultaneously sensing a plurality of parts of a record on a card or the like, a register, means for trans-

ferring the sensed parts of the record into the register, printing means for separately printing the sensed parts, means for transferring the sensed parts from the register to the printing means, and means for releasing said register after the transfer of said sensed parts to said printing means.

33. In a printing machine, means for sensing a plurality of parts of a record on a card or the like, a register, means for entering the sensed parts of the record in the register, printing means, means for operating the printing means under control of the register to effect printing of the sensed parts, and means for releasing said register after operation of said printing means under control of the register.

34. In a printing machine, means for sensing a plurality of parts of a record on a card or the like, a register, means for entering the sensed parts of the record in the register, a plurality of printing means, means for operating the printing means under control of the register to effect printing of the respective sensed parts in the respective operating means, and means for releasing said register after operation of said printing means under control of the register.

CLYDE SMITH.

CERTIFICATE OF CORRECTION.

Patent No. 2,077,965. April 20, 1937.

CLYDE SMITH.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, lines 3, 4 and 5, strike out the words "grounding transfer contacts 6A, 6B, 6C and 6D, of relay 6, energizing windings 1A, 16A, 17A and 18A, locking up relay 1, through winding 1B, conductor" and insert instead transfer relay 6, closing its several contacts. Contact 62A grounds conductor 62D and bars 59, 60, 61, and through perforations 90A, 90B, 90C,; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of April, A. D. 1939.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.