

May 7, 1946.

M. R. DILLING

2,399,724

ALPHABET PRINTING MECHANISM

Filed June 24, 1943

3 Sheets-Sheet 1

FIG. 1.

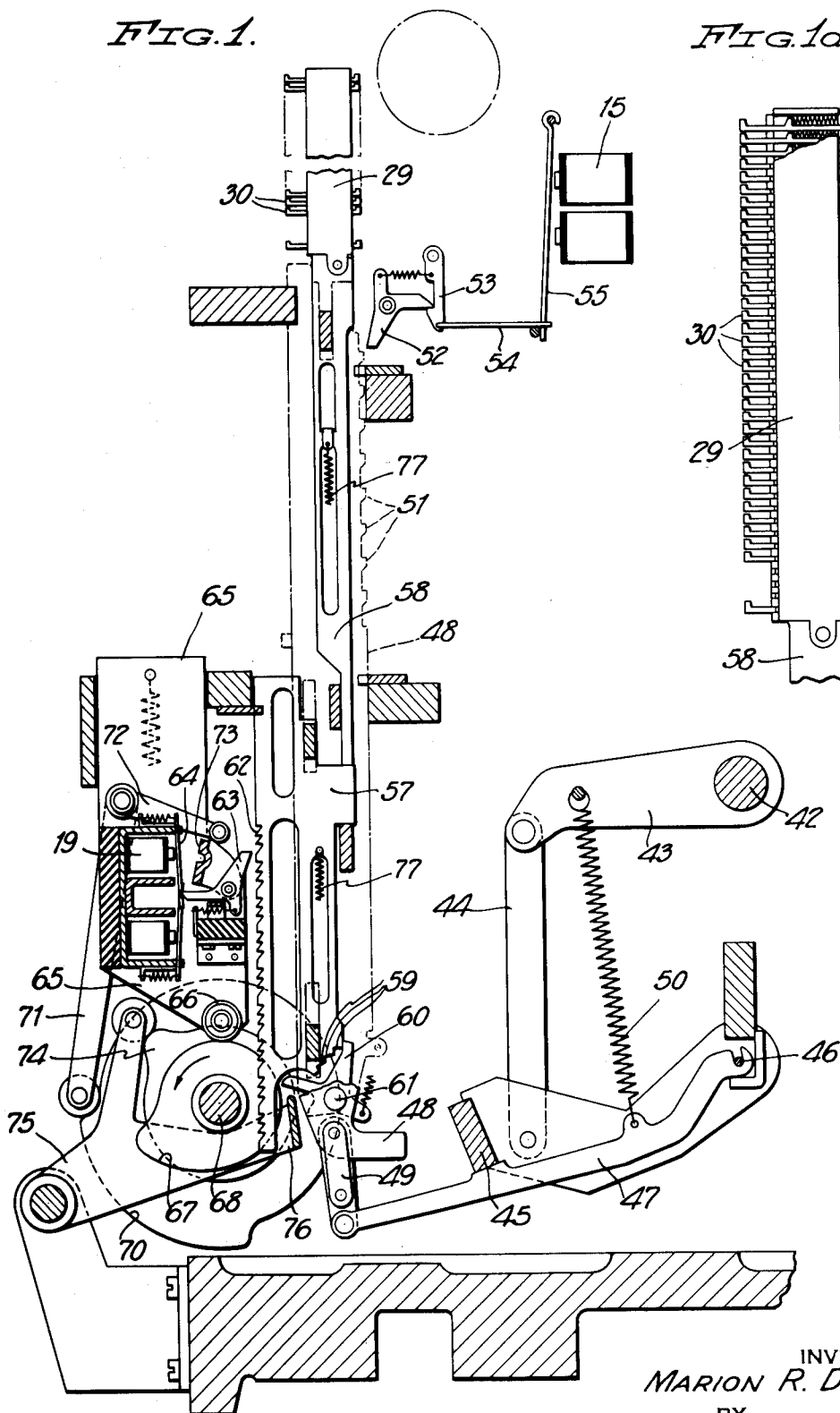
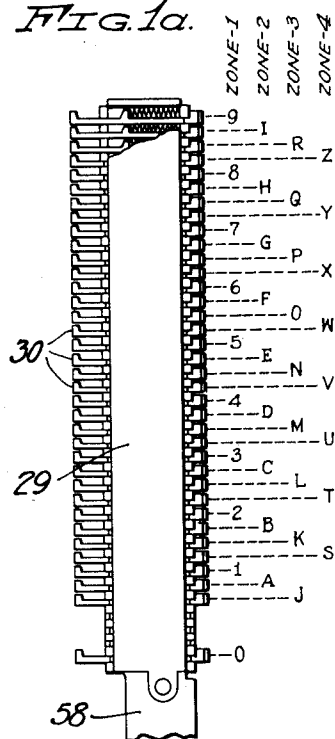


FIG. 1a.



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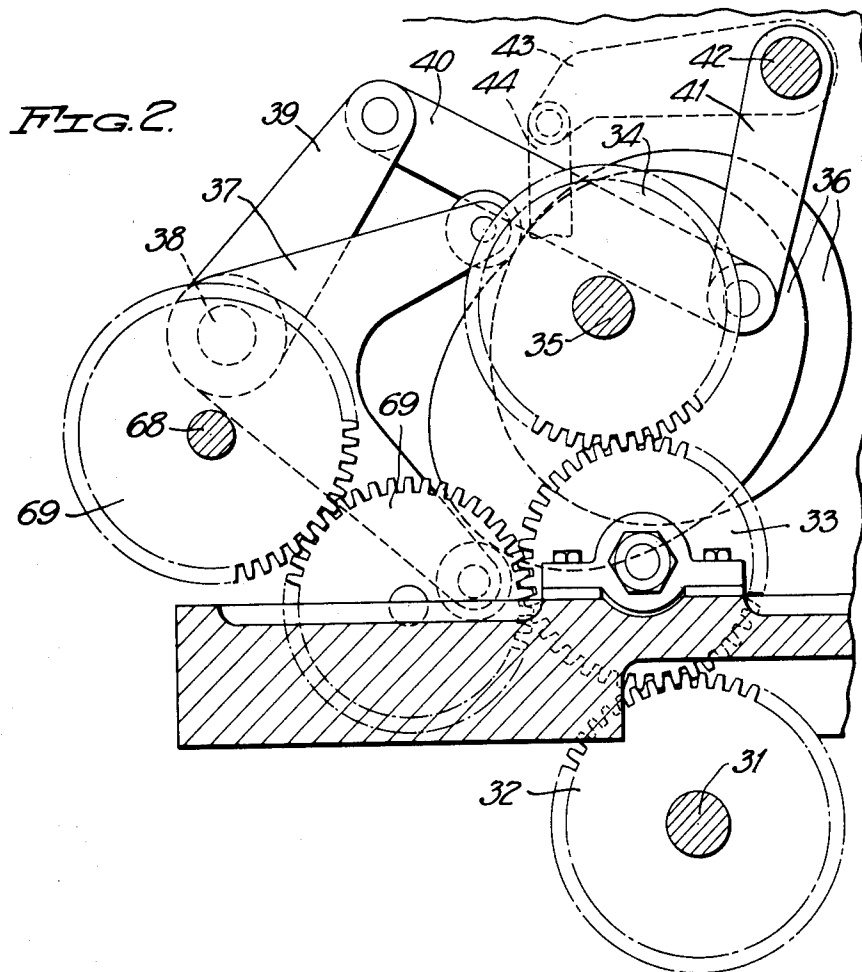
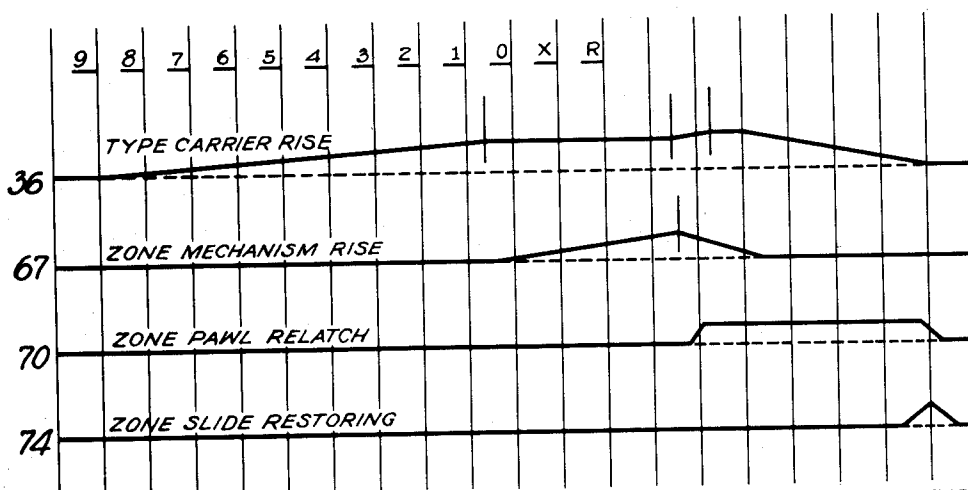


FIG. 3.



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FIG. 4.

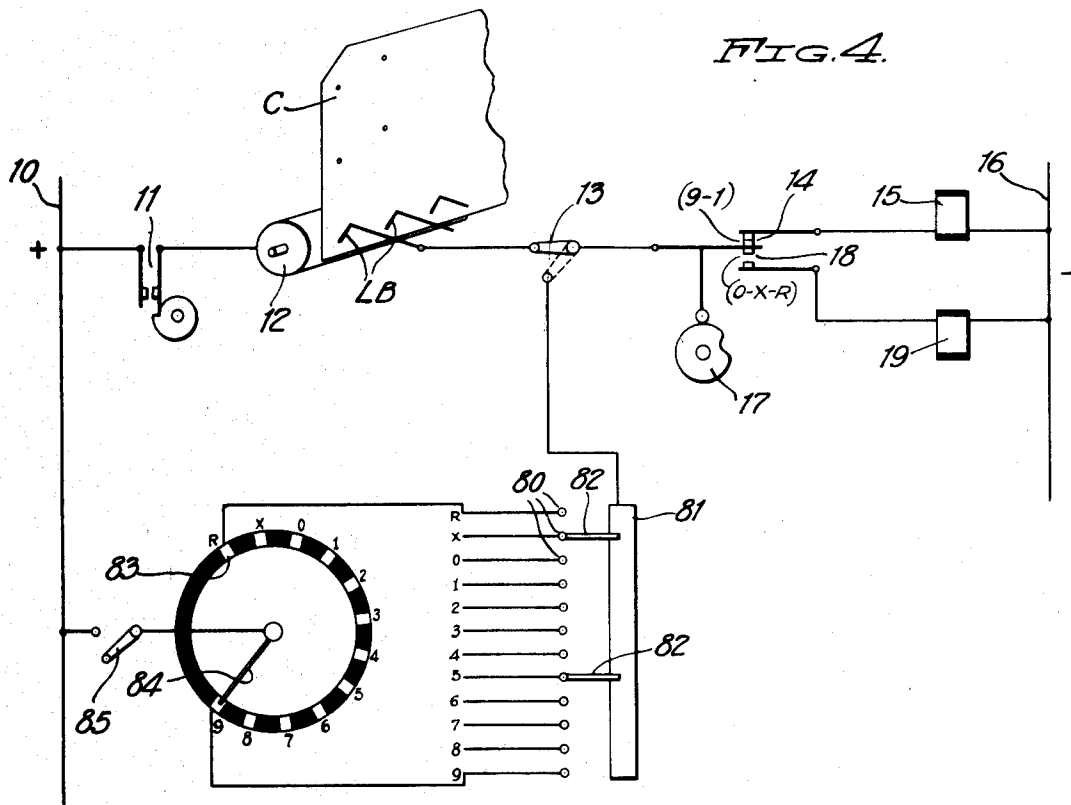
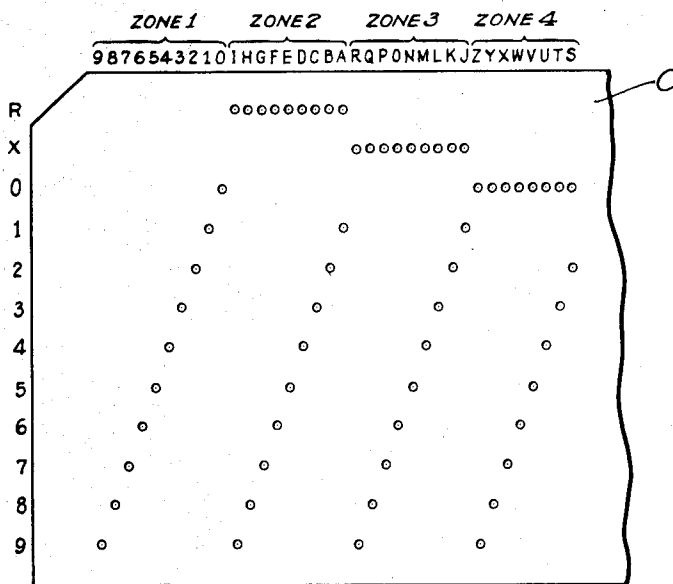


FIG. 5.



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ALPHABET PRINTING MECHANISM

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Application June 24, 1943, Serial No. 492,051

2 Claims. (Cl. 101—93)

The present invention relates to printing machines of the record card controlled type, and its principal object resides in the provision of simplified mechanism for printing alphabetic information.

An object of the invention is to provide an improved form of zoning mechanism for alphabet printing type bars employed in the well known "International" accounting machines.

A further object is to provide an alphabet printing mechanism which is completely operative during a single card cycle of the machine.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 represents a sectional view of a printing mechanism of an accounting machine showing the essential elements thereof.

Fig. 1a is a detail of the type head showing the manner of arrangement of the type elements thereof.

Fig. 2 is a view showing certain of the drive mechanism for the unit.

Fig. 3 is a timing chart.

Fig. 4 is a wiring diagram showing diagrammatically the connections for one type bar.

Fig. 5 is a fragment of a record card showing the combinational arrangement of the perforations to represent the alphabetic characters and also the usual digit perforations.

The machine to which the present improvements are applied is of the type shown in Mills Patent 2,016,882, granted October 8, 1935, to which reference may be had for more detailed explanation of the prior mechanism, of which a brief explanation will now be given.

The arrangement of the perforations on the record card will first be explained. Referring to Fig. 5, the record card C has the usual perforations for indicating numerical values as shown at the left end of the card. The alphabetic characters from A to I are combinations of one of the numerical characters from 9 to 1, plus a perforation in the R index point position. The characters J to R each comprise a perforation in one of the numerical positions 9 to 1, plus a perforation in the X index point position. The remaining letters of the alphabet, namely, S to Z, each comprise a combination including one of the perforations 9 to 2, plus a perforation in the 0 index point position. The record cards are placed in

the card feed mechanism of the machine, which is not shown but which may be of the type fully shown and described in Peirce Patent 1,827,259, granted October 13, 1931.

Fig. 4 shows the card analyzing elements of the card feeding mechanism diagrammatically, as representing the analyzing brushes LB past which the cards are traversed in succession. A representative circuit through one of the brushes LB may be traced from the positive side of line 10, through cam contacts 11 (which are closed only while the cards are in contact with the brush LB), common contact roller 12, perforation in the record card, brush LB, switch 13, pair of contacts 14, digit selecting magnet 15, to negative side of line 16. The contacts 14 are controlled by a cam 17 so that they are closed only while the index point positions 9 to 1 inclusive are at the brush LB. After the 1 index point position has passed the brushes and before the 0 position arrives thereat, contacts 14 open and the companion contacts 18 close, so that the circuit through any of the positions 0, X or R will extend through contacts 18 to energize the zone magnet 19.

In Fig. 1a is shown the type head 29 which is provided with a plurality of type elements 30 upon which the digits and alphabetical characters are arranged as indicated. For the purpose of explanation, the various characters are arranged and labeled in accordance with a particular zone; thus, the digits are included in zone 1, the letters A to I in zone 2, J to R in zone 3, and S to Z in zone 4. The type head is arranged to be moved past the printing position in synchronism with the movement of the card past the sensing brush LB and, as the 9 index point position on the card traverses the brush, the type element 30 bearing the character 9 will be in printing position.

Referring now to Fig. 2, the main operating shaft 31 of the machine, from which the card feeding mechanism may also be driven, carries a gear 32 which through an idler 33 drives a gear 34 mounted on a shaft 35. Secured to the shaft 35 is a pair of complementary cams 36 which are adapted to oscillate a bifurcated follower arm 37 secured to a rod 38 upon which is also attached an arm 39 which has a link connection 40 to an arm 41 secured upon a shaft 42.

In Fig. 1, shaft 42 carries arms 43 which have depending link connection 44 with a ball 45 pivoted at 46. Also pivoted at 46 is a type carrier actuating arm 47 which is connected at its free end to the lower extremity of type carrier 48 through link connection 49. Arm 47 is urged in

a clockwise direction by spring 50 which is connected at its upper end to a cross bar extending between arms 43. Thus, as the arms 43 and bail 45 are rocked in a clockwise direction through the action of cams 36, the spring 50 will rock the arm 47 in the same direction and will cause elevation of the type carrier 48 which is suitably mounted for vertical movement.

Carrier 48 is provided with a series of stops 51 and, as the carrier is moved upwardly, the stops 51 move past a stopping pawl 52 in succession. This pawl is held in position in Fig. 1 by a latch 53 which has link connection 54 with armature 55 of the digit or print magnet 15. Energization of magnet 15 under control of perforations in the digit positions 9 to 1 of the record card will trip latch 53 to permit pawl 52 to rock into engagement with the type carrier, under the influence of its spring, and engage one of the stops 51 to interrupt further upward movement of the type carrier, and at such time the type carrier will be interrupted with a type element 30 in position to present the digit, corresponding to the perforation through which the circuit to energize magnet 15 was completed, in printing position.

The afordescribed manner in which digits are selected for printing is substantially in accordance with the manner in which digits are usually selected in this type of machine.

Where alphabetical characters are to be printed, the type head 29 will be displaced upwardly one, two or three steps with respect to the type carrier 48 accordingly as the character to be printed lies in zone 2, zone 3, or zone 4 so that if, after the print magnet 15 is energized under control of a 9 perforation, the R perforation is later analyzed by the brush LB, the type head 29 will be displaced upwardly one step, thereby presenting the I type to the printing line rather than the 9 type. Similarly, if the perforation accompanying the 9 perforation had been in the X position, the type head 29 would be displaced upwardly two steps to present the R type, and in a similar manner the zone perforation of 0 accompanying the 9 perforation will effect an upward movement of the type head 29 three steps to place the Z type in printing position. This displacement of the type head with respect to the carrier has been effected in the prior machine of Patent 2,016,682 under control of a second set of analyzing brushes which analyze the zone positions 0, X and R prior to the sensing of the digit position by the brushes LB, and such prior sensing occurred in the preceding cycle. It thus required two sets of sensing brushes and overlapping operations occurring in each of two cycles to effect alphabetic character selection.

In accordance with the present invention, the zone perforations are sensed by a single set of brushes, subsequent to the sensing of the digit positions, and all positions are sensed during a single cycle of operation. Furthermore, the mechanism involved in effecting the zoning is considerably simplified over that of the previous machine.

Referring to Fig. 1, type carrier 48 supports the type head 29 and also supports a so-called zone slide 57. As shown in Fig. 1, the head 29 is provided with a shank 58 which abuts the upper end of slide 57. Throughout the operation, the shank 58 and slide 57 operate together and may be considered as integral. Their construction as two separate parts is so that the head may be

independently removed from the machine for purposes of replacement. The lower end of the zoning slide 57 is provided with steps 59 which are adapted to be engaged by a bell crank pawl 60, which is pivoted at 61 to the carrier 48 and serves to hold the carrier and head in displaced relationship. The left edge of zone slide 57 is provided with ratchet teeth 62 with which a pawl 63 is adapted to cooperate to raise the slide one, two or three steps.

Pawl 63 is normally latched out of engagement by armature 64 of the zone magnet 18, and the entire assembly is supported in side plates 65 suitably mounted for vertical reciprocation. The lower end of plate 65 carries a roller 66 through which a cam 67 controls the reciprocation of the plates together with the magnets and pawls. Cam 67 is mounted on a shaft 68 (see Fig. 2) which is driven through gearing 69, 32 and 33 from the main shaft 31.

The operation of the mechanism may be best explained by reference to the time chart (Fig. 3), wherein a cycle of operation is indicated, and the times in the cycle at which the index point positions are sensed are designated as 9, 8, 7, 6, etc. During the sensing of the positions 9 to 1, the type carrier rises taking with it the type head 29 and zone slide 57 with the parts in the relative positions shown in Fig. 1, that is, the head 29 and slide 57 are in their lowermost position on the carrier. During this upward movement of the carrier, magnet 15 will be energized in response to a perforation in one of the digit positions 9 to 1, and the resultant tripping of latch 52 will interrupt further movement of the carrier and head with the type element 30, corresponding to the digit hole sensed, in printing position. This will bring one of the sets of three teeth 62 in the zone slide into cooperative relationship with the zone pawl 63, and as seen in Fig. 3 the zone mechanism carried by the plates 65 now rises as the 0, X and R index point positions pass the sensing brush. If a 0 hole is encountered, magnet 19 is energized as explained and pawl 63 is tripped to engage the lowermost of the set of three teeth 62, so that the zone slide 57 will be carried up with the zone mechanism three steps, and pawl 60 will engage the appropriate step 59 to maintain the parts in such displaced relationship. If an X hole is encountered, the pawl 63 will be tripped a point later to engage the next higher tooth 62, so that the displacement would be but two steps and, if an R hole were encountered, the energization of magnet 19 would occur still later to engage the third tooth 62, and upward displacement of slide 57 would be but one step. The upward displacement of the head with respect to the type carrier will, of course, selectively position the first, second or third next lower type element to the printing line to supersede the initial positioning of the digit type element during this zoning operation of the cycle.

Referring to Fig. 3, it is seen that the initial rise of the carrier is interrupted after the 1 position, and the effect of this is to stop the type carrier for which no circuits have been completed with the 1 digit in printing position, and the carriers are held in this position throughout the zoning portion of the cycle, after which the carriers that have not been stopped are permitted to complete their upward movement to present a blank position to the printing line. In cases where the column sensed contains only a 0 position, the sensing of the 0 will displace the type head 29, so that the lowermost or 0 type element

30 will advance to the printing position during the resumed upward movement of the carrier. After the type selection has been effected, the printing hammer is tripped to take an impression, and restoration of the mechanism takes place with the carriers moving downwardly as indicated in Fig. 3.

Before the carriers descend, a cam 70 on shaft 60 will rock lever 71 pivoted to frame 65, and through a follower 72 will rock a bail 73 which engages pawl 63 to restore the latter and hold it for the period indicated in Fig. 3, while the type bars descend. This is to prevent any inadvertent interference with the descending type carrier and zone slide by the pawl 63. Near the very end of the cycle a further cam 74 will engage and rock a lever 75 after the type carrier has been fully restored, so that a cross bar 76 will engage and rock latch 68 clockwise, whereupon under the action of springs 77 the head 20 and zone slide 57 will move downwardly with respect to carrier 40 into their initial position of Fig. 1.

The alphabetic type bar positioning mechanism as just described may be controlled from sources of information other than the record card described, one of which other sources may be a data storage or setup device, such as the one diagrammatically represented in Fig. 4, by a series of contact segments designated 80 and a common conductor 81 between which electrical connection was formed by selectively positionable members 82 in positions representing alphabetic data.

Thus, for example, with members 82 connecting the 11 segment 80 and the 5 segment 80 to the conductor, there is represented the alphabetic character N. The segments 80 are wired to segments 83 of a commutator whose brush 84 may be driven from the cycle shaft 35, so that the segments 9, 8, 7, 6, etc., are contacted by the brush 84 at the same time that the correspondingly numbered index point positions of the record card are contacted by the sensing brush LB. If switch 13 is moved to its dotted line position and a switch 85 is closed, operation will be as follows: At the 5 time in the cycle a circuit is

completed from positive line 10, through switch 85, brush 84, the 5 segment 83, the 5 segment 80, the lower element 82, conductor 81, switch 13, contacts 14, to the digit magnet 15 and line 16.

5 This results in the positioning of the carrier to present the 5 type in printing position. Later in the cycle the circuit is completed from line 10, switch 85, brush 84, the X segment 83, the X segment 80, the upper element 82, conductor 81, switch 13, contacts 18 now closed, zone magnet 19, to line 60. This second circuit will have the effect of causing upward displacement of head 20 with respect to carrier 40 to present the N type element in printing position.

15 While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

25 What is claimed is:

1. In a printing mechanism having a type carrier and a type head slidably mounted thereon, means for moving the carrier and type head together as an integral unit, toward printing position and means for interrupting both the carrier and type together with a selected type element in printing position, in combination with an upwardly movable carriage, and means for coupling said type head to the carriage at differential times after the carrier has been positioned to effect a relative movement between the type head and the carrier.

2. The invention set forth in claim 1 in which the coupling means comprises a pawl and magnetic means movable with the carriage for causing the pawl to engage the type head upon energization of the magnet.

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