Jan. 7, 1947. A. W. MILLS ET AL. 2,413,883

PRINTING MECHANISM

Filed Dec. 23, 1943 3 Sheets-Sheet 1

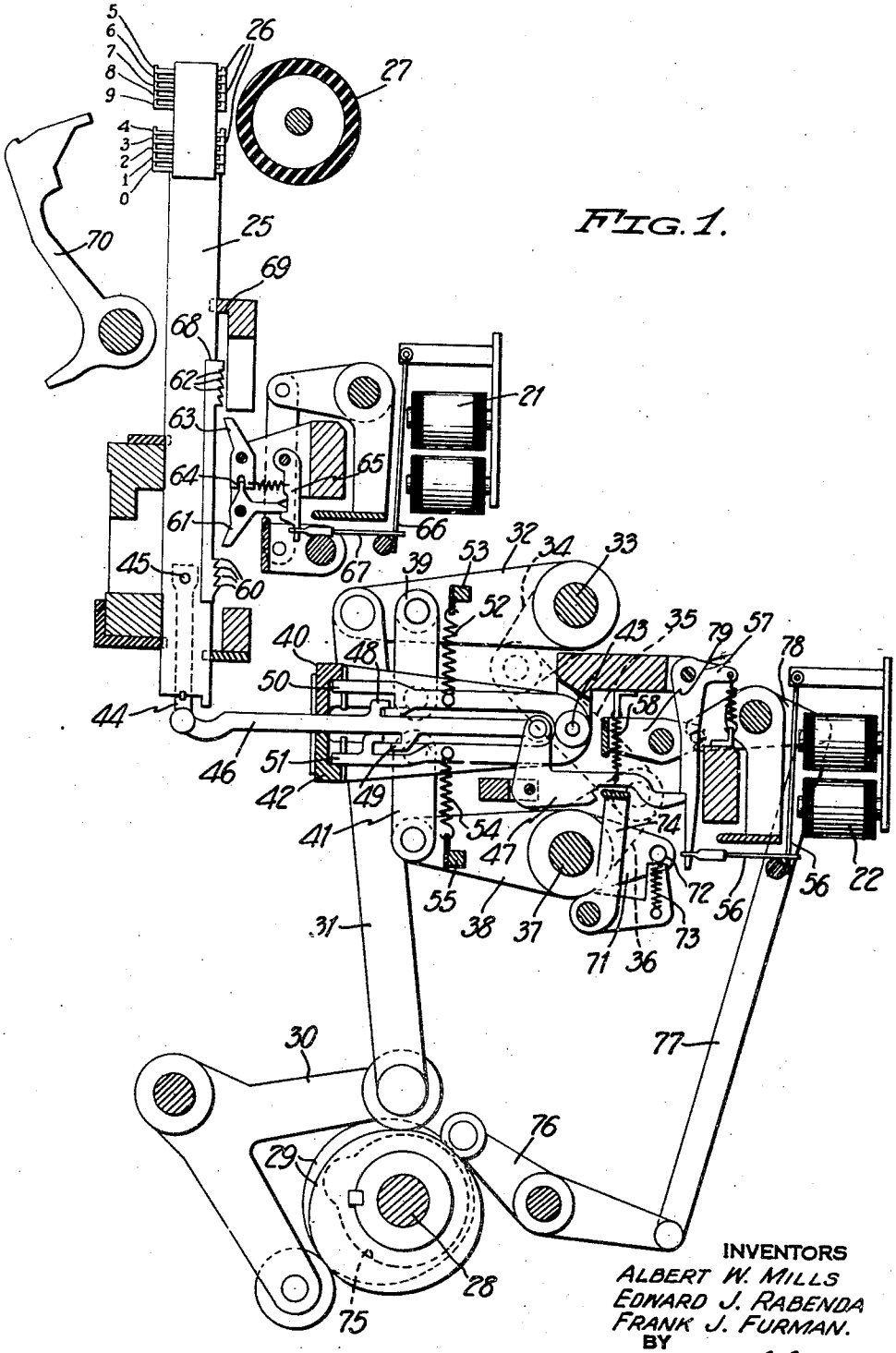


FIG. 1.

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Filed Dec. 23, 1943 3 Sheets-Sheet 2

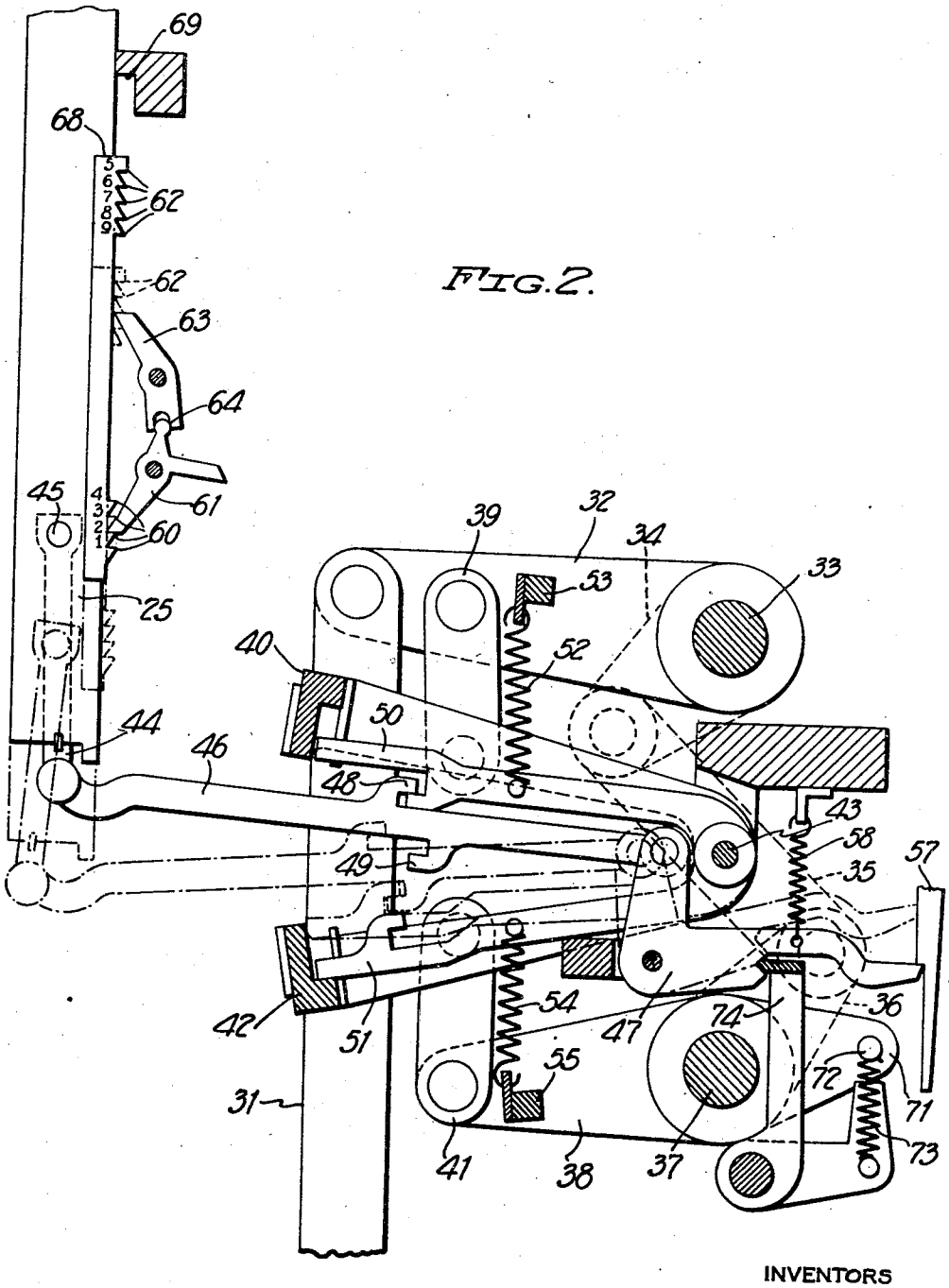


FIG. 2.

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FIG. 3.

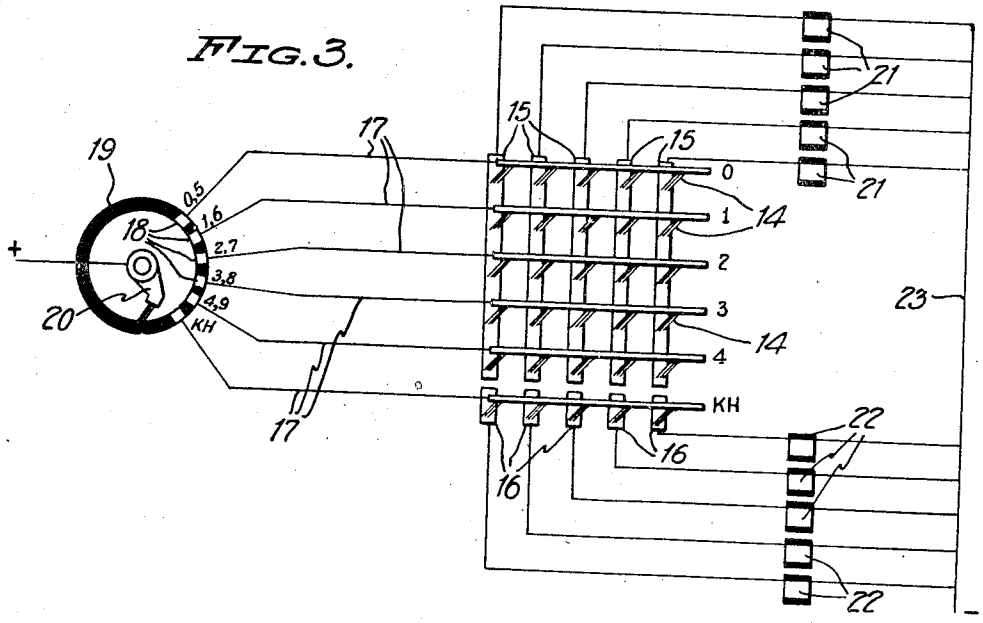
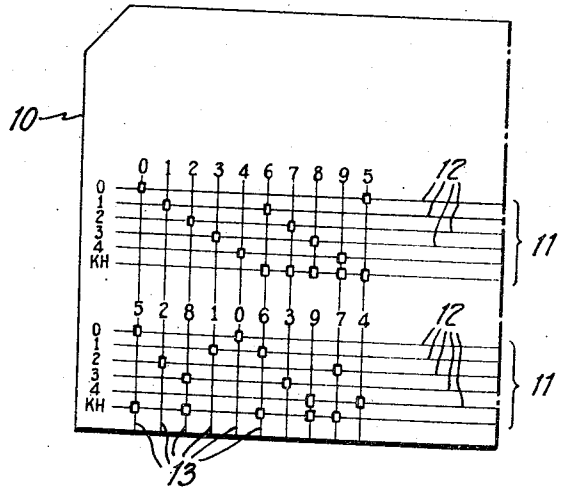


FIG. 4.



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PRINTING MECHANISM

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Application December 23, 1943, Serial No. 515,373

5 Claims. (Cl. 101—93)

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This invention relates to printing mechanism and more particularly to printing mechanism controlled by perforated record cards.

The principal object of the invention is to provide an improved printing mechanism arranged for printing numerical data at high speed under control of combinational perforations in record cards.

A further object is to provide an improved record card and coding arrangement for recording numerical data.

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 is a central section of the improved printing mechanism.

Fig. 2 is an enlarged scale detail of the operating ball mechanism.

Fig. 3 is a wiring diagram.

Fig. 4 is a fragment of a record card.

The record card 10 of Fig. 4 is provided with two fields 11, each having six horizontal data receiving lines 12, designated 0, 1, 2, 3, 4, and KH. Vertical lines 13, whose spacing may be closer than illustrated, designate columnar positions at whose intersection with lines 12, rectangular perforations may be made in accordance with the digital code shown. In this coding, the digits 0, 1, 2, 3, and 4 are represented by perforations on the like identified lines 12, while the digits 5, 6, 7, 8, and 9 are represented by the holes 0, 1, 2, 3, and 4, respectively, accompanied by a key hole on line designated KH.

These perforations are sensed by the device diagrammatically shown in Fig. 3 as comprising horizontal rows of brushes 14 and vertical conductors 15 and 16. The card 10 is placed between the conductors and brushes and the perforations are thereby concurrently sensed by the brushes 14 making contact with a conductor 15 or 16 through a perforation., The brushes 14 are connected by wires 17 to segments 18 of a distributor 19 whose rotating brush 20 is connected to positive source of current. The conductors 15 are wired to digit selecting magnets 21 and the conductors 16 are wired to group selecting magnets 22. After the card is placed in sensing position, brush 20 is rotated counterclockwise, and in any card column containing a key hole KH a circuit is completed from positive source, brush 20, segment 18, designated KH, wire 17, brush 14, key

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hole KH, conductor 16, magnet 22, wire 23 to negative source of current. In columns having no key hole, this circuit will, of course, not be completed. As brush 20 thereafter sweeps across the remaining segments 18, the magnet 21 related to a card column will be energized at a differential time depending on the location of the hole in that column. For example, with a hole in the 1 position the circuit is completed when brush 20 contacts the segment 18 designated 1, 6 and this circuit is traceable from positive source, brush 20, the 1, 6 segment 18, wire 17, brush 14, the 1 hole in the card, conductor 15, magnet 21 to wire 23. It follows therefore that for holes representing digits 0, 1, 2, 3, and 4, magnet 22 is not energized and magnets 21 are energized at differential times. For holes representing digits 5, 6, 7, 8, and 9, magnet 22 is first energized and magnets 21 are thereafter energized at differential times.

The devices controlled by magnets 21 and 22 will now be explained. In Fig. 1 the type bar 25 is guided for vertical reciprocation and at its upper end supports two groups of horizontally slidable types 26 which, with the machine at rest occupy the position shown. That is the 5–9 types are above the printing line opposite platen 27 and the 0–4 types are below the printing line. To select a type 0–4 the bar 25 is moved upwardly and to select a type 5–9 the bar 25 is moved downwardly. The presence or absence of a key hole KH determines for the related type bar in which direction it shall travel.

Main shaft 28 has secured thereto a pair of complementary cams 29 which oscillate follower 30 and reciprocate a link 31 whose upper end is pivoted to an arm 32. This arm is secured to a shaft 33 which through arm 34, link 35 and arm 36 rocks a shaft 37 to which is secured an arm 38. Arm 32 is connected by a link 39 to a bail 40 and arm 38 is connected by a link 41 to a bail 42, both of which bails are pivoted on a common rod 43. Through this linkage, when link 31 is elevated, bails 40 and 42 rock in opposite directions about rod 43 to the position shown in Fig. 2 and when the link 31 is lowered the bails return to the position of Fig. 1.

Each type bar 25 has a link 44 pivoted thereto at 45 and this link is connected to an interposer 46 whose right end is pivoted to a bell crank lever 47. Interposer 46 is provided with hooks 48 and 49 which cooperate, respectively with hooks on levers 50 and 51 pivoted on rod 43. Lever 50 is normally urged in a clockwise direction by a spring 52 anchored to a block 53 on arm 32 and lever 51 is normally urged in a counterclockwise

direction by a spring 54 anchored to a block 55 on arm 38. Thus as the arms 32 and 38 rock outwardly the arms 50 and 51 are drawn therewith through springs 52 and 54.

Interposer 46 is normally hooked in engagement with lever 50 so that it is rocked clockwise with lever 50 to elevate type bar 25. Prior to the rocking of the parts from the position of Fig. 1, the interposer 46 may be shifted to the left to uncouple it from lever 50 and engage it with lever 51 through hook 49. Such shifting is brought about by energization of magnet 22 which attracts its armature 56 and through rod 57 rocks a latch 57 counterclockwise to release bell crank lever 47 whose spring 58 will thereupon rock it to the broken line position of Fig. 2 and will shift interposer 46 to the left. Then when arm 38 rocks counterclockwise, the interposer 46 is drawn by spring 54 and lever 51 in the same direction to lower the type bar 25, as indicated by broken lines in Fig. 2. Briefly then, when magnet 22 remains deenergized the type 25 moves upwardly from its position of Fig. 1 to advance the 4, 3, 2, 1, and 0 types 26 past the printing position as the distributor brush 20 (Fig. 3) contacts the 4, 3, 2, 1, and 0 segments 18. If magnet 22 is energized, then the bar 25 moves downwardly from its position of Fig. 1 to advance the 9, 8, 7, 6, and 5 types 26 past the printing position as the distributor brush 20 contacts the same segments 18.

When bar 25 moves upwardly, teeth 60 pass the toe of a pawl 61 and when the bar moves downwardly, teeth 62 pass the toe of a pawl 63. The two pawls are articulated at 64 and are normally held out of line with the teeth 60, 62 by a spring urged latch 65. When magnet 21 is energized, its armature 66, through rod 67, rocks latch 65 to release pawls 61, 63 to stop the bar. This stopping action is shown in Fig. 2 where pawl 61 is shown as engaging the 2 tooth 60 during the ascent of bar 25. If the bar were descending at such time pawl 63 would have engaged the 7 tooth 62 as indicated by broken lines. In the case of a zero designation, no tooth 60 is provided so the type bar is not interrupted in its ascent and the upper end 68 strikes bar 69 to position the zero type 26 in printing position. Hammer 70 is thereafter actuated to take an impression from the positioned types.

When arm 38 rocks counterclockwise, an extension 71 carrying a pin 72 extends a spring 73 to rock a detent 74 against bell crank lever 47 to hold it in normal position or rocked position during the actuation of the type bar. After the parts are again restored to home position a cam 75 rocks a follower 76 and through link 77 lever 78 rocks a bail 79 to positively return bell crank 47 to its latched position and to return interposer 46 to the position of Fig. 1.

Recapitulating, the preliminary sensing of the key hole position KH determines whether the type bar is to move up or down and interposer 46 is accordingly left coupled to bail 40 or uncoupled therefrom and coupled to bail 42. Thereafter the hole positions 4, 3, 2, 1, and 0 are tested in order and in synchronism with the type bar movement, and upon completion of a circuit to magnet 21 the bar is appropriately interrupted in its ascent or descent to present the selected type for printing. It will be appreciated that bails 40, 42 have an invariable excursion of fixed extent and that when a bar is stopped the interposer 46 and lever 50 or 51 stops therewith, with spring 52 or 54 yielding as arm 32 or 38 completes its stroke.

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.

What is claimed is:

1. In a printing machine, a type bar having two groups of type elements, one normally above and the other below a printing line, means for selectively moving the bar to cause either group of elements to successively pass the printing position, ratchet teeth carried by the bar, a pawl structure and record controlled means for causing said pawl structure to engage said teeth during movement of the bar in either direction to interrupt said movement and select a type element in either group for printing.

2. In a printing machine, a type bar, a first spring actuator for elevating the bar, a second spring actuator for lowering the bar, record controlled means for selectively coupling the bar to either actuator whereby the bar will be selectively elevated or lowered through one of the spring actuators, a pawl structure adjacent to the bar and engageable therewith to interrupt movement of the bar and record controlled means for causing the pawl structure to engage the bar at differential times during its movement whereby the bar will be differentially positioned during its up or down movement.

3. In a printing machine, means for sensing a record column in which digits are recorded by a designation in one of five index point positions or by such designation accompanied by a designation in a key position, a type bar having two groups of type elements, one normally positioned below a printing line and including elements representing digits designated by a single designation, and the other group normally positioned above the printing line and including elements representing digits represented by two designations, means for normally elevating said type bar to move the elements of the first group past the printing position, means controlled by said sensing means upon sensing a designation in the key position for preventing operation of said elevating means and for causing lowering of the type bar to move the elements of the second group past the printing position, and means controlled by the sensing means upon sensing a designation in one of said five index point positions for differentially interrupting movement of the type bar in either direction to select the related type element in either of the two groups.

4. In a printing machine, means for sensing a record column in which digits are recorded by a designation in one of five index point positions or by such designation accompanied by a designation in a key position, a type bar having two groups of type elements, one normally positioned to one side of a printing line and including elements representing digits designated by a single designation, and the other group normally positioned to another side of the printing line and including elements representing digits represented by two designations, means for normally elevating said type bar to move the elements of one group past the printing position, means controlled by said sensing means upon sensing a

designation in the key position for preventing operation of said elevating means and for causing lowering of the type bar to move the elements of the second group past the printing position, and means controlled by the sensing means upon sensing a designation in one of said five index point positions for differentially interrupting movement of the type bar in either direction to select the related type element in either of the two groups.

5. In a printing machine, means for sensing a record column in which digits are recorded by a designation in one of five index point positions or by such designation accompanied by a designation in a key position, a type bar having two groups of type elements, one normally positioned to one side of a printing line and including elements representing digits designated by a single designation, and the other group normally positioned to another side of the printing line and

including elements representing digits represented by two designations, means for normally moving said type bar in one direction to move the elements of one group past the printing position, means controlled by said sensing means upon sensing a designation in the key position for preventing operation of said moving means and for causing movement of the type bar in the opposite direction to move the elements of the second group past the printing position, and means controlled by the sensing means upon sensing a designation in one of said five index point positions for differentially interrupting movement of the type bar in either direction to select the related type element in either of the two groups.

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