May 30, 1961 T. GASSINO ET AL 2,986,255

PUNCHING APPARATUS FOR PRINTING MECHANISMS

Filed May 5, 1959 2 Sheets-Sheet 1

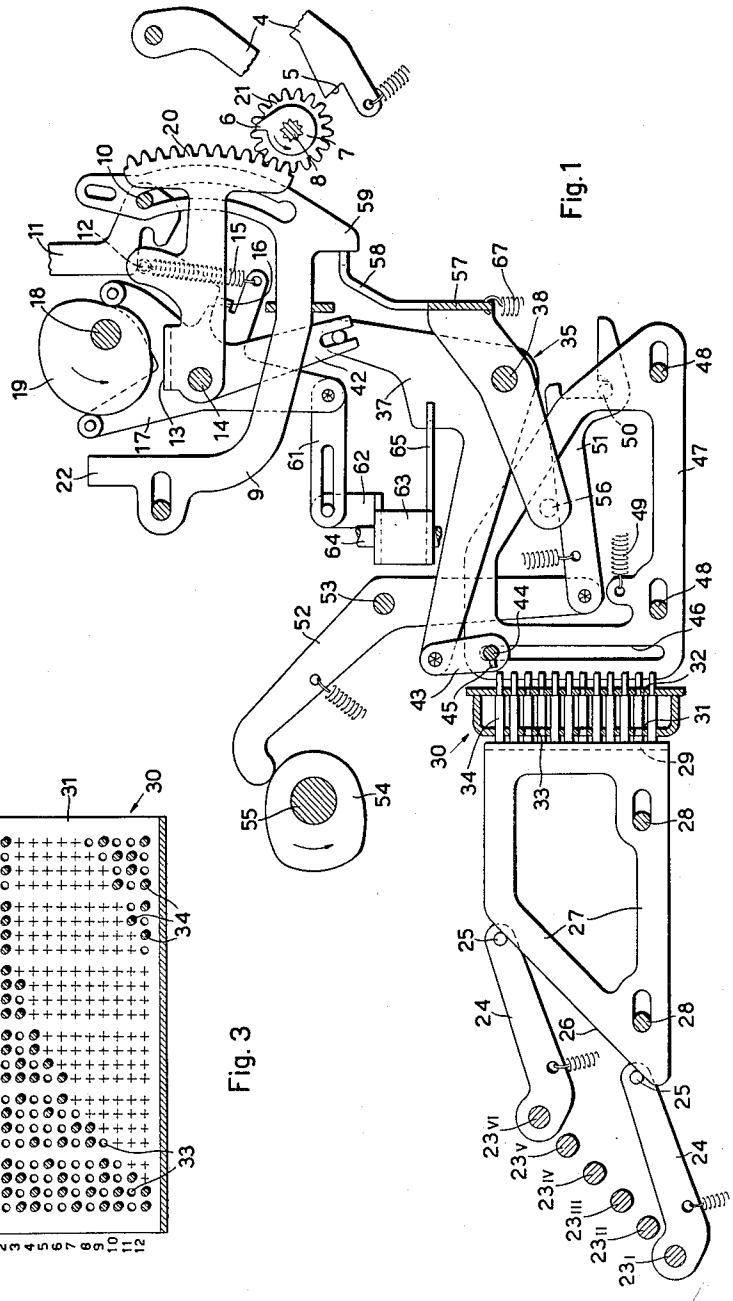

Fig. 1

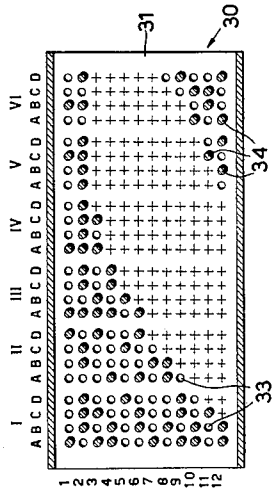

Fig. 3

INVENTORS
TERESIO GASSINO
GUGLIELMO LANZA

BY

Kenyon & Kenyon
ATTORNEYS

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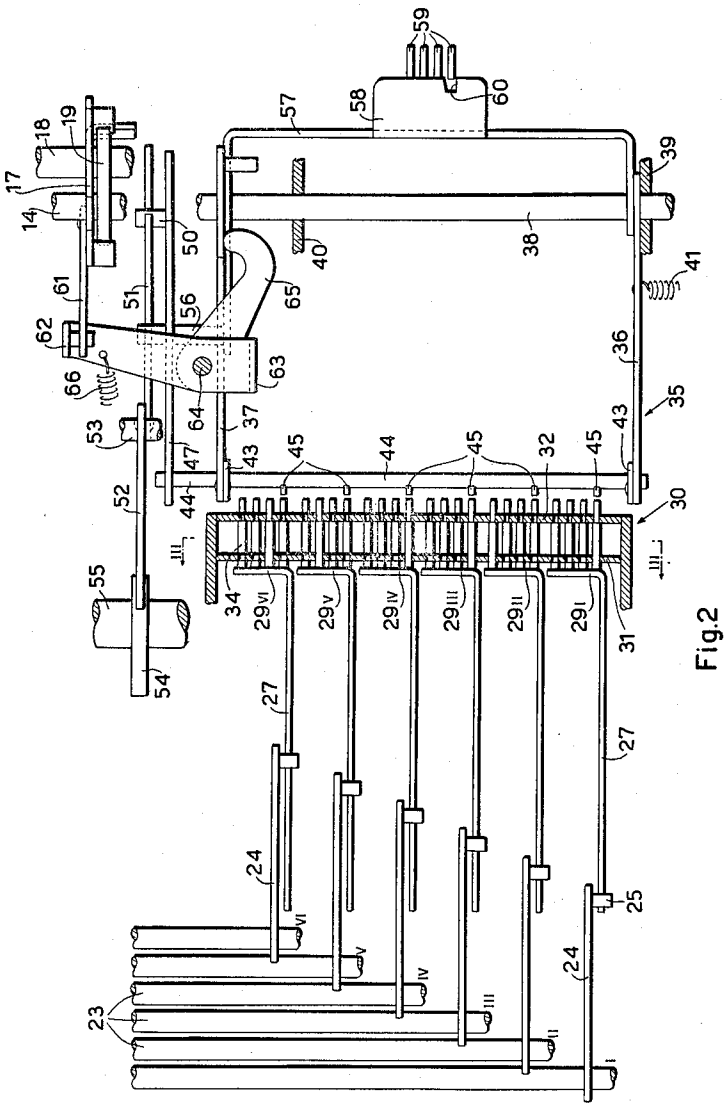

Fig.2

INVENTORS
TERESIO GASSINO
GUGLIELMO LANZA

BY

Kenyon & Kenyon
ATTORNEYS

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PUNCHING APPARATUS FOR PRINTING MECHANISMS

Teresio Gassino and Guglielmo Lanza, Ivrea, Italy, assignors to Ing. C. Olivetti & C., S.p.A., Ivrea, Italy, a corporation of Italy

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7 Claims. (Cl. 197—16)

The present invention relates to a tape punching apparatus for printing mechanisms adapted to punch the printed characters on a paper tape according to a multiunit code.

In conventional data punching apparatus the code is rigidly predetermined by a coding device such as represented, for example, by a conventional set of notched code bars. Where such a punching apparatus is designed for punching data in an integrated data processing system using a predetermined code, the apparatus is capable of being used in a system using a different code.

The object of the invention is to provide a punching apparatus adapted to be used according to any desired code.

According to the invention, in a data punching apparatus having a number of punch pin actuators selectable according to a multiunit code, we now provide a coding device comprising a number of fields corresponding to said number of punch pin actuators, and a translating device, one of said devices being variably movable with respect to the other device along the dimensions of said coding device according to the data to be punched, each one of said fields including a plurality of elements presettable according to said code and individually conditionable by said translating device upon said variable movement to select the corresponding punch pin actuator.

Further objects, features and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 shows a partial left-hand longitudinal sectional view of a punching apparatus according to the invention, embodied in a printing mechanism of the type described in the U.S. Patent 2,865,486;

Fig. 2 is a partial sectional plan view of Fig. 1;

Fig. 3 is a diagrammatic sectional view taken on line III—III of Fig. 2.

The punching apparatus shown in the drawings is embodied, by way of example and without any limiting implication, in the printing mechanism illustrated in connection with the United States Patent 2,865,486, to which references may be had for a more detailed description thereof. Briefly summarizing, said printing mechanism comprises a plurality of forty-eight types arranged on a set of four type carriers mounted on a common support variably movable according to a first direction to select one type carrier of said set, the selected type carrier being simultaneously movable according to a second direction to select one of its twelve types according to the character to be printed. To this end each type carrier is actuated by a corresponding type carrier actuator, key controlled means being provided for variably moving said type carrier actuator according to a character to be printed. More particularly, said key controlled means include means for variably moving said set of type carrier actuators according to a first direction, and means for individually variably moving said type carrier actuators according to a second direction.

With reference to Fig. 1, upon depression of one of the forty-eight printing keys, not shown in the drawings, a corresponding lever 4 is rocked clockwise in order to set its shoulder 5 into the path of a projection 6 of a disk 7. The forty-eight disks 7 are secured to a grooved shaft 8 according to twelve differential angular positions corresponding to the twelve types of each type carrier.

Depression of the key will further set a slide 9 corresponding to the type carrier carrying the selected type. Upon being so set the slide 9 is moved rearwards together with a corresponding type carrier actuator 11 connected hereto by means of a pin 10. The type carrier actuator 11 so moved will thus engage a universal bar 12 secured to a moving means such as a bail 13 pivoted on a stationary shaft 14. Normally the bail 13 is urged by a spring 15 to contact a lug 16 of a moving means such as a lever 17 pivoted on the shaft 14. Each of the four slides 9 when moved rearwards will further set an arresting projection 22 integral therewith on the transverse path of the common support mounting the type carriers.

Finally, the depressed key will start a printing cycle during which a main operating shaft 18 of the printing mechanism will be rotated through a full revolution. The shaft 18 by means of a cam 19 rocks the lever 17 first clockwise and then counterclockwise. During its clockwise rotation the lever 17 will variably move the common support carrying the set of type carrier actuators 11 according to a transverse direction until arrested by the arresting projection 22 of the set slide 9. Simultaneously the bail 13 is urged by the spring 15 to rock clockwise and by means of a toothed sector 20 and a gear 21 it rotates the shaft 8 counterclockwise until the projection 6 is arrested by the set shoulder 5. Thus the universal bar 12 will variably move the individually engaged type carrier actuator 11 downwards according to a vertical direction.

It will thus be apparent that the moving means 17 and 13 are concurrently operable according to a character to be printed.

The data punching apparatus according to the invention is adapted to punch code combinations representing the characters to be printed according to a multiunit code such as a six unit code. The punching apparatus is provided with a number of six punch pins not shown in the drawings, each one controlled by a corresponding punch pin actuator selectable according to said code and formed of a shaft 23I, 23II, 23III, 23IV, 23V and 23VI. When a shaft 23 is rotated counterclockwise, for example in the manner described in the copending United States patent application Serial No. 726,547 in connection with the shafts 50, the corresponding punch pin is conditioned for punching a hole in the paper tape.

Secured to each shaft 23 is an arm 24 provided with a stud 25 normally contacting an inclined edge 26 of a slide 27 slidably mounted on a pair of stationary shafts 28 and formed with a forward bent lug 29I, 29II, 29III, 29IV, 29V and 29VI (Fig. 2). Located in front of the six lugs 29 is a coding device 30 comprising a number of six fields I, II, III, IV, V and VI (Fig. 3) corresponding to said number of punch pin actuators. Each field of the coding device 30 is provided with a plurality of elements arranged in rows and columns. More particularly, the coding device 30 is formed of a stationary box made of a forward plate 31 and a rear plate 32 provided in each field I to VI with a plurality of lodgings or holes 33 arranged in four vertical columns A, B, C, D, one for each type carrier of the printing mechanism, and in twelve horizontal rows 1 to 12, one for each type of each type carrier.

The elements 33 of the coding device 30 are presettable, means 34 being provided for presetting said elements according to the desired multiunit code. More particularly, each hole 33 is adapted to house a preset-

table interponent such as a shiftable pin 34, whereby the pins housed in the holes of the various fields will represent the code combinations of the characters to be punched. For example, the first type of the first type carrier corresponds to the six holes located according to the coordinates 1 and AI to AVI; the second type of the first type carrier corresponds to the six holes located according to the coordinates 2 and AI to AVI; the first type of the second type carrier corresponds to the six holes located according to the coordinates 1 and BI to BVI, and so on. If it is desired to represent the first type of the first type carrier with the code combination mark-space-mark-mark-space-space, a pin 34 will be preset in the holes 33 located according to the coordinates 1 and AI, AIII, AIV (see also Fig. 2). In this connection it will be irrelevant which is the actual character of said first type of said first type carrier, because the relationship between the forty-eight characters controlled by the four type carrier actuators 11 and the forty-eight six-unit code combinations representable by the coding device 30 may be established at will.

The pins 34 are kept in their normal position of Figs. 1 and 2 by the bent lug 29 of the slides 27. Located in front of the coding device 30 is a translating device 35 (Fig. 2), one of said devices, such as the translating device being variably movable with respect to the other along the rows and columns of the coding device 30 according to the data to be punched. More particularly, the translating device 35 is formed of a pair of arms 36 and 37 secured to a shaft 38 transversely slidable on a pair of side frames 39 and 40 of the machine. Normally the arm 36 laterally contacts the side frame 39 by the urge of a spring 41. The arm 37 (Fig. 1) is pin-and-slot connected to an arm 42 of the bail 13.

The translating device 35 also comprises a pair of links 43 connected to the pair of arms 36 and 37 and secured to a pin bar formed of a horizontal transverse shaft 44 provided with a number of counterelements each one for one of the fields I to VI, said counterelements being formed of six pins 45 (Fig. 2) so distanced apart as to face the corresponding holes 33 of the adjacent fields. The shaft 44 engages a vertical slot 46 (Fig. 1) of a slide 47 slidably mounted on two stationary pins 48.

The slide 47 is provided with a pin 50 normally engaged by a hook 51 linked to a lever 52 pivoted at 53. The lever 52 is spring urged to contact a cam 54 secured to a shaft 55 which is the main shaft of the punching apparatus and which upon depression of a printing key is adapted to be started concurrently with the main shaft 18 of the printing mechanism for a punching cycle.

The hook 51 is spring urged to normally contact a pin 56 of a bail 57 which is pivotally mounted on the shaft 38 between the two arms 36 and 37 of the translating device 35, whereby the bail 57 may be rotated irrespective of the translating device 35 and is transversely slidable therewith. The bail 57 is formed with a bent lug 58 cooperating with a projection 59 provided on each one of the four slides 9. A notch 60 (Fig. 2) adapted to be entered by a selected one of said projections 59 is provided on the lug 58.

Finally, a link 61 pivoted on the lower arm of the lever 17 is pin-and-slot connected to a bent lug 62 of bail 63 (Fig. 2) fulcrumed on a vertical shaft 64. An arm 65 of the bail 63 is urged by a spring 66 to normally contact the arm 37 of the translating device 35.

The punching apparatus operates as follows:

As described hereinbefore, upon depression of a printing key a corresponding one of the four slides 9 (Fig. 1) is moved rearwards, a corresponding one of the forty-eight levers 4 is rocked clockwise and the main shafts 18 and 55 are started. The projection 59 of the moved slide 9 upon engaging the lug 58 rocks the bail 57 counterclockwise thus disengagaing the hook 51 from the pin 50. The cam 19 of the shaft 18 rocks the lever 17 clockwise and the bail 13 will follow the lever 17 until the projection 6 of the disk 7 corresponding to the depressed key is arrested by the rocked lever 4. During the movement of the bail 13 the arm 42 rocks the translating device 35 counterclockwise and lowers the shaft 44 through an extent corresponding to the extent of the downward movement of the individual type carrier actuator 11 engaging the universal bar 12.

Simultaneously, the lever 17 moves the link 61 rearwards thus enabling the bail 63 to be rocked counterclockwise (Fig. 2) by the spring 66 whose urge prevails over the urge of the spring 41, whereby the translating device 35 and the bail 57 are shifted rightwards (upwards in Fig. 2). When the notch 60 of the lug 58 reaches the projection 59 of the moved slide 9, the bail 57 is at once restored clockwise (Fig. 1) by the spring 67 and due to the engagement of the notch 60 with the projection 59 the rightward movement of the translating device 35 is arrested. Furthermore, the pin 56 of the bail 57 releases the hook 51 which will reengage the pin 50 of the slide 47.

It will thus be apparent that during the cycle of the shaft 18 the translating device 35 is variably moved, by means of the link 61 controlled by the moving means 17 and by means of the arm 42 controlled by the moving means 13, along the rows and columns of the coding device 30 to change the cooperative relationship of each pin 45 and the holes 33 and pins 34 of the corresponding field in order to place said pins 45 in front of the holes 33 and pins 34 representing the code combination of the character to be printed according to the depressed key.

Upon about 180 degrees of rotation of the shaft 55 the cam 54 rocks the lever 52 clockwise. By means of the hook 51 the lever 52 will shift the slide 47 rearwards, whereby the pin shaft 44 by means of its six pins 45 will engage the pins 34 representing the code combination to be punched and shift said pins rearwards. The shifted pins 34 in turn will engage the lugs 29 of the corresponding fields thus shifting the corresponding slides 27 rearwards. The inclined edge 26 of each slide 27 so shifted now rocks the corresponding arm 24 and shaft 23 counterclockwise to actuate the corresponding punch pin.

It is thus clear that in each field of the coding device 30 the preset pins 34 are individually conditionable by the translating device 35 upon the variable movement thereof to select the corresponding punch pin actuator 23.

Upon completion of the cycle of the shaft 55 the cam 54 enables the lever 52 to be restored together with the hook 51 and the slide 47. The arms 24 are then restored by their springs and the slides 27 are restored by the studs 25, thus restoring the pins 34 as well. The cam 19 of the shaft 18 in turn restores the lever 17 which rocks the bail 13 counterclockwise, whereby the arm 42 will rock the translating device 35 clockwise, and lift the pin shaft 44, while the rod 61 restores the bail 63, enabling the translating device 35 and the pin shaft 44 to be returned leftwards by the spring 41.

If two accidentally simultaneously depressed printing keys shift two slides 9, the bail 57 after having been rocked counterclockwise is prevented from being rocked clockwise because of the limited transverse extent of the notch 60, whereby the hook 51 is not released and its subsequent rearward movement does not affect the coding device 30. For this case there may be provided an auxiliary slide, not shown in the drawings, similar to the slides 27 and adapted to select the shafts 23 according to the code combination corresponding to letter spacing. To this end the auxiliary slide may be engaged by a member normally connected to the lever 52 operable thereby and adapted to be disconnected therefrom when the bail 57 is rocked clockwise.

It will be understood that many changes and improvements in the form and details of the mechanism illustrated may be made by those skilled in the art without departing from the spirit of the invention. For example, the hook 51 may be controlled both by the bail 57 and by a

member operated either manually or automatically in order to punch only predetermined data.

We claim:

1. In an apparatus for selectively punching a plurality of coded data according to a multiunit code, means for selecting said data, a set of selectable punch pin actuators equal in number to the units of said code, a coding device comprising a number of fields each one for one of said punch pin actuators, each field including a plurality of presettable elements each one for one of said data, the elements of each field being arranged in rows and columns and being conditionable to individually select the corresponding punch pin actuator, means for presetting said elements according to said code, a translating device including a number of counterelements each one for one of said fields, each counterelement being adapted to cooperate with an associated preset element in the corresponding field, means controlled by said selecting means for variably shifting one of said devices with respect to the other along said rows and columns to change the cooperative relationship of each counterelement and the elements of the corresponding field, and means for causing said counterelements to condition the associated preset elements.

2. In an apparatus for selectively punching a plurality of coded data according to a multiunit code, means for selecting said data, a set of selectable punch pin actuators equal in number to the units of said code, a coding device comprising a number of fields each one for one of said punch pin actuators, each field including a plurality of lodgings each one for one of said data, the lodgings of each field being arranged in rows and columns, each lodging being adapted to house an interponent presettable therein according to said code, said interponents being conditionable to individually select the corresponding punch pin actuator, a translating device including a number of counterelements each one for one of said fields, each counterelement being adapted to cooperate with an associated interponent in the corresponding field, means controlled by said selecting means for variably shifting one of said devices with respect to the other along said rows and columns to change the cooperative relationship of each counterelement and the lodgings and interponents of the corresponding field, and means for causing said counterelements to condition the associated interponents.

3. In an apparatus for selectively punching a plurality of coded data according to a multiunit code, means for selecting said data, a number of selectable punch pin actuators equal in number to the units of said code, a coding device comprising a number of fields each one for one of said punch pin actuators, said coding device being formed of a stationary box including in each field a plurality of holes each one for one of said data, the holes of each field being arranged in rows and columns, each hole being adapted to house a pin presettable therein according to said code, said pins being shiftable to individually select the corresponding punch pin actuator, a translating device including a number of counterpins each one for one of said fields, each counterpin being adapted to shift a faced preset pin in the corresponding field, means controlled by said selecting means for variably shifting said translating device with respect to said coding device along said rows and columns to change the operative relationship of each counterpin and the holes and preset pins of the corresponding field, and means for causing said counterpins to simultaneously shift the faced preset pins.

4. In a printing mechanism for selectively printing a plurality of characters, a set of type carrier actuators, means for variably moving said type carrier actuators according to a character to be printed, and an apparatus for punching data corresponding to said character and coded according to a multiunit code, said apparatus comprising a set of selectable punch pin actuators equal in number to the units of said code, a coding device comprising a number of fields each one for one of said punch pin actuators, each field including a plurality of presettable elements each one for one of said characters, the elements of each field being arranged in rows and columns and being conditionable to individually select the corresponding punch pin actuator, means for presetting said elements according to said code, a translating device including a number of counterelements each one for one of said fields, each counterelement being adapted to cooperate with an associated preset element in the corresponding field, means controlled by said moving means for variably shifting one of said devices with respect to the other along said rows and columns to change the cooperative relationship of each counterelement and the elements of the corresponding field, and means for causing said counterelements to condition the associated preset elements.

5. In a printing mechanism for selectively printing a plurality of characters, a set of type carrier actuators, first means for variably moving said set of type carrier actuators according to a first direction, second means for individually variably moving said type carrier actuators according to a second direction, said first and second means being concurrently operable according to a character to be printed, and an apparatus for punching data corresponding to said character and coded according to a multiunit code, said apparatus comprising a set of selectable punch pin actuators equal in number to the units of said code, a coding device comprising a number of fields each one for one of said punch pin actuators, each field including a plurality of presettable elements each one for one of said characters, the elements of each field being arranged in rows and columns according to said first and second direction and being conditionable to individually select the corresponding punch pin actuator, means for presetting said elements according to said code, a translating device including a number of counterelements each one for one of said fields, each counterelement being adapted to cooperate with an associated preset element in the corresponding field, means controlled by said first and second moving means for variably shifting one of said devices with respect to the other along said rows and columns to change the cooperative relationship of each counterelement and the elements of the corresponding field, and means for causing said counterelements to condition the associated preset elements.

6. A printing mechanism according to claim 5, characterized in that each field comprises as many columns as are the type carrier actuators of said set and as many rows as are the types of each type carrier actuator.

7. In a printing mechanism for selectively printing a plurality of characters, a set of type carrier actuators, first means for variably moving said set of type carrier actuators according to a first direction, second means for individually variably moving said type carrier actuators according to a second direction, said first and second means being concurrently operable according to a character to be printed, and an apparatus for punching data corresponding to said character and coded according to a multiunit code, said apparatus comprising a set of selectable punch pin actuators equal in number to the units of said code, a coding device comprising a number of fields each one for one of said punch pin actuators, said coding device being formed of a stationary box including in each field a plurality of holes each one for one of said characters, the holes of each field being arranged in rows and columns according to said first and second direction, one column for each type carrier actuator of said set and one row for each type of each type carrier actuator, each hole being adapted to house a pin presettable therein according to said code, said pins being shiftable to individually select the corresponding punch pin actuator, a translating device including a number of counterpins each one for one of said fields, each counterpin being adapted to shift a faced preset pin in the corres-

ponding field, means controlled by said first moving means for variably shifting said translating device with respect to said coding device along said rows and further controlled by said second moving means for variably shifting said translating device with respect to said coding device along said columns to change the operative relationship of each counterpin and the holes and the preset

pins of the corresponding field, and means for causing said counterpins to simultaneously shift the faced preset pins.

References Cited in the file of this patent

UNITED STATES PATENTS

2,784,785 Doty ---------- Mar. 12, 1957