Oct. 10, 1933. C. C. McCAIN 1,930,058

AUTOMATIC KEY OPERATING MECHANISM FOR EMBOSSING MACHINES AND THE LIKE

Filed Sept. 26, 1929 3 Sheets-Sheet 1

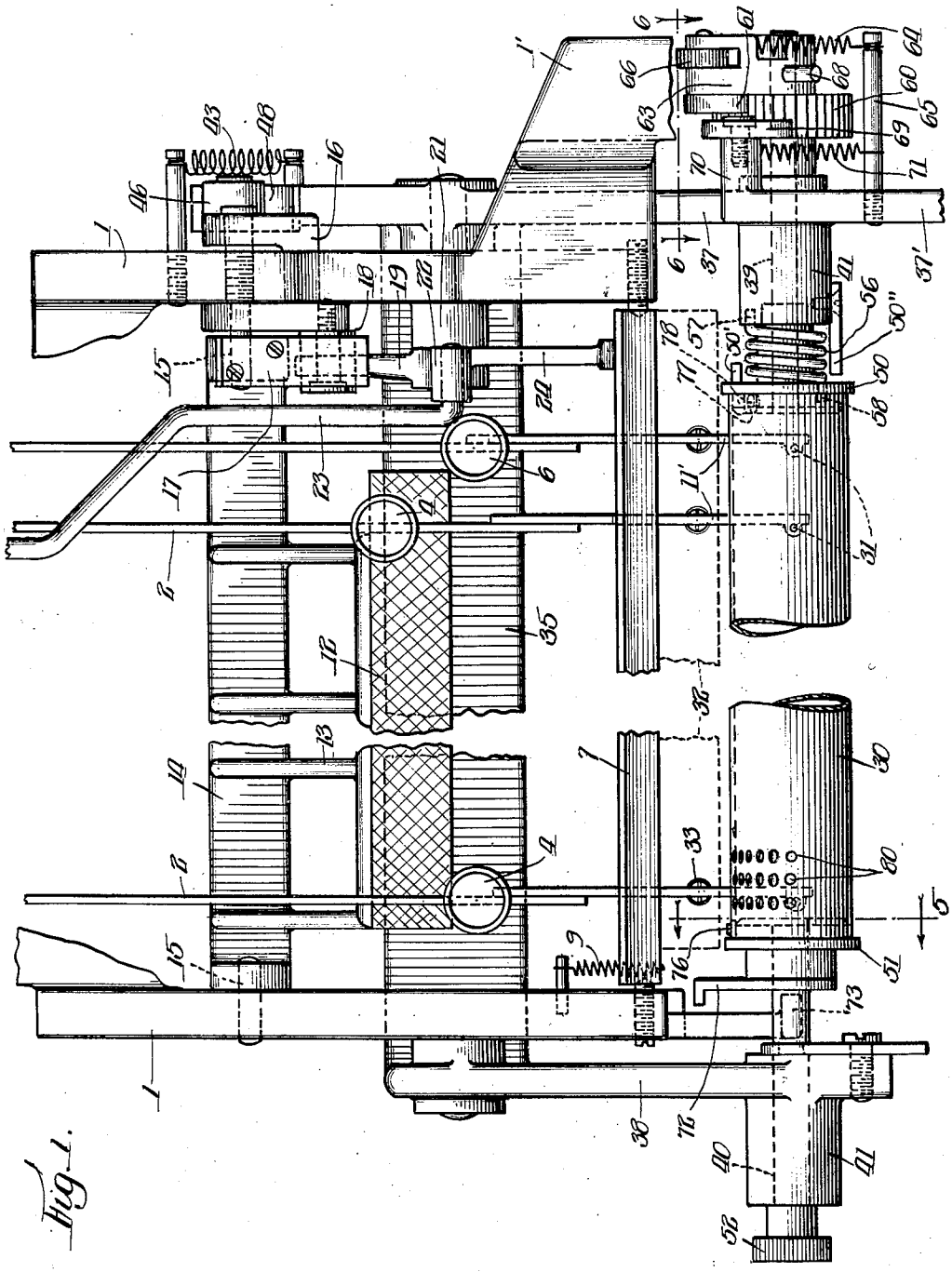


Fig. 1.

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Fig. 2.

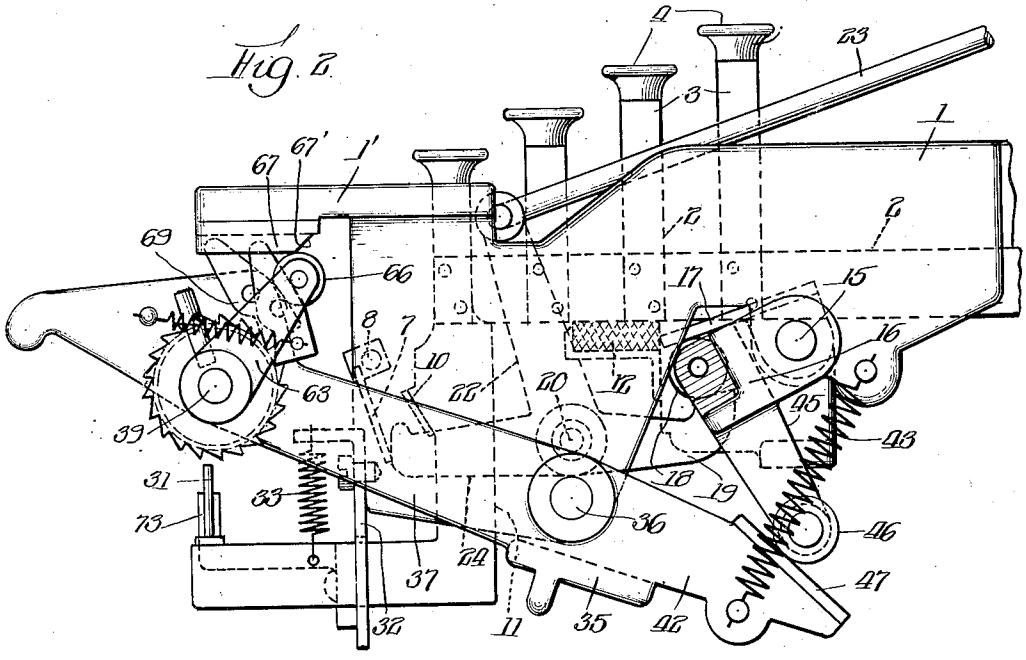
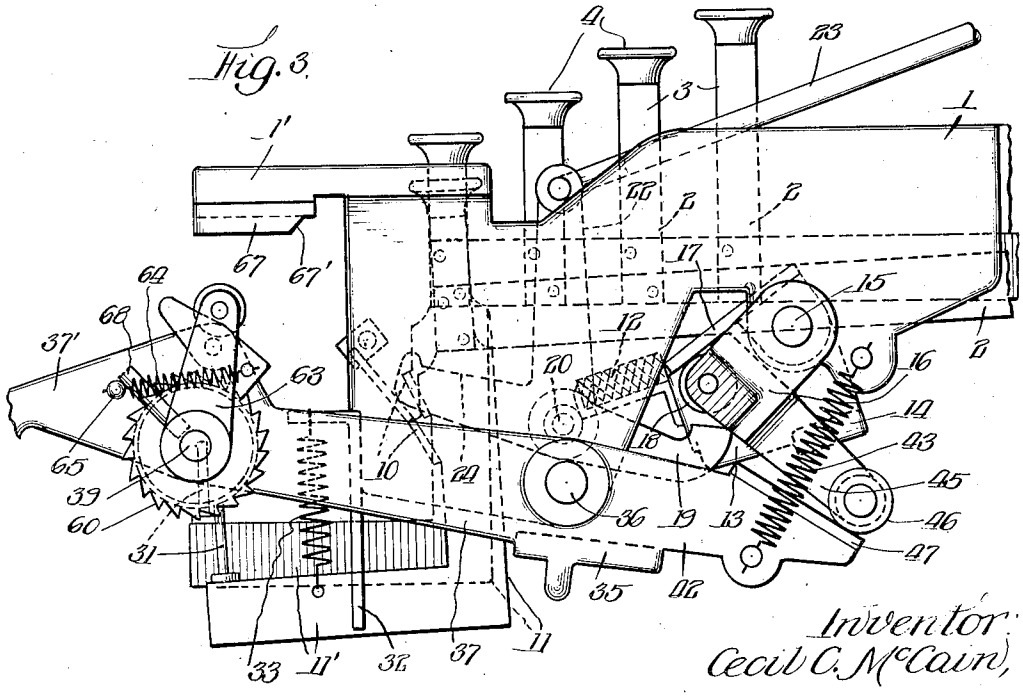


Fig. 3.



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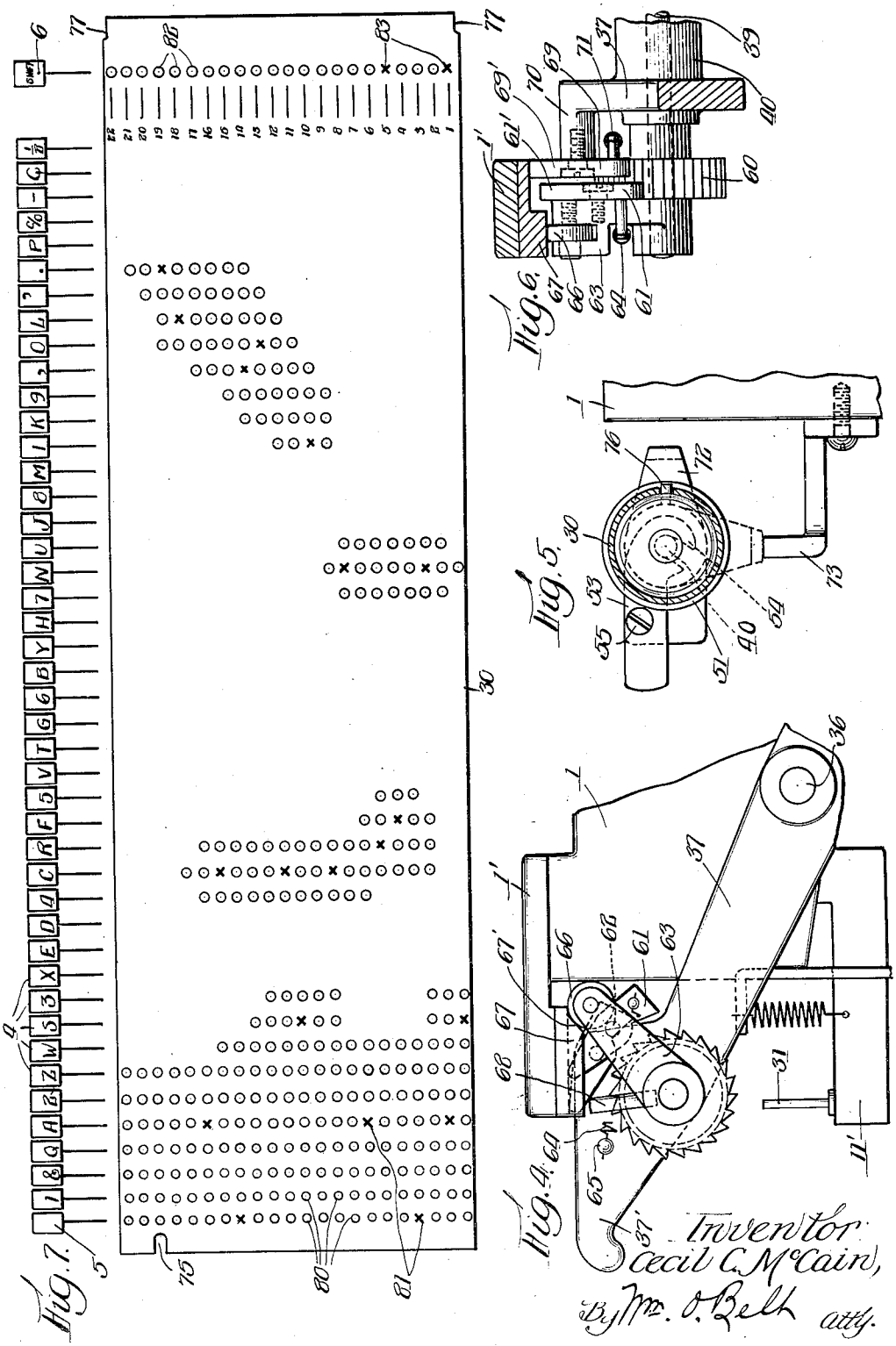


Fig. 7.

Fig. 6.

Fig. 5.

Fig. 4.

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Patented Oct. 10, 1933

1,930,058

UNITED STATES PATENT OFFICE

1,930,058

AUTOMATIC KEY OPERATING MECHANISM FOR EMBOSSING MACHINES AND THE LIKE

Cecil C. McCain, Glen Ellyn, Ill., assignor to Addressograph Company, Wilmington, Del., a corporation of Delaware

Application September 26, 1929
Serial No. 395,281

17 Claims. (Cl. 197—20)

This invention relates to improvements in machines having a group or bank of manually operable keys the operation of which brings about the impression of characters represented by said keys on printing plates, sheets and the like.

The principal object of the invention is to provide means which will automatically operate the keys in predetermined sequence without the necessity of manually repeating said sequence of operations each time said impressions are wanted.

A further object is to supplement the manual operation of the keys with mechanism by which the keys of a predetermined group can be automatically operated repeatedly in the same sequence.

Another object is to provide an improved automatic key operating device which can be made a part of the key operated machine and used or not used as desired without interference with the manual operation of the keys.

Another object is to provide an improved matrix for controlling the operation of a predetermined group of keys, which matrix can be readily placed in or removed from operative relation to the keys.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings

Fig. 1 is a top plan view of the keyboard portion of a printing plate embossing machine, showing the structure associated therewith embodying the invention.

Fig. 2 is a right hand end elevation of the structure shown in Fig. 1, showing the parts in normal or restored position.

Fig. 3 is a view similar to Fig. 2 showing the parts in changed position assumed when a key is depressed thereby.

Fig. 4 is an end view showing the position of the parts when starting the operation of the mechanism.

Fig. 5 is a detail section on the line 5—5 of Fig. 1.

Fig. 6 is a detail section on the line 6—6 of Fig. 1; and

Fig. 7 is a diagram of the matrix laid out in relation to the keys.

My invention is particularly applicable to printing plate embossing machines or typewriters used in making individual address printing plates or printing individual addresses on sheets by the manual operation of the keys in the keyboard of such machines. An embossing machine of this type for making individual address printing plates is shown in the patent to Joseph S. Duncan, No. 1,518,904, issued December 9, 1924, and in my co-pending application Serial No. 377,248, filed July 10, 1929.

These machines have a keyboard the keys of which when depressed control the operation of dies for stamping or embossing characters on printing plates which are used as individual printing devices in addressing machines. Each printing plate is generally embossed with a name, a street address and a city or locality in which the address is located. Usually large numbers of addresses are located in the same city or locality, and it is necessary for the operator to repeat for each individual printing plate the manual operation of the same group of keys representing the name of the city or locality. The same condition exists when envelopes or sheets are addressed with a typewriter. The operator must manually repeat the name of the city or locality for each address in that locality.

In accordance with this invention I provide means for automatically operating a predetermined group of keys representing the name of a city or locality which is to be repeated for each address. The invention is embodied in a structure which is adaptable to embossing machines of the type shown in the aforesaid patent and co-pending application.

The front portion of the machine frame has two frame members 1 which extend forwardly and are spaced apart. The key levers or key bars 2 are positioned in a substantially horizontal plane and are positioned between the two side members of the frame. The key bars are arranged parallel with each other and have upstanding end portions 3 of varying lengths upon the upper ends of which the usual key buttons 4 are mounted. The key bars with their buttons on which the characters are designated are grouped in accordance with any suitable or standard keyboard arrangement for typewriters or other machines of this character. In Fig. 7, however, the keys are shown arranged in a single row for the purpose of illustrating their relation to the matrix operating mechanism. At the left side of the keyboard, Fig. 7, is shown a blank key 5 which controls blanking dies in the die carrier of the embossing machine for the purpose of blanking out embossed characters which have been made by mistake or otherwise. In the present case I utilize the blank key as a spacer key between letters or characters. At the right hand side of the keyboard a shift key 6 is positioned which is generally used for shifting the mechanism for upper and lower case

characters. So far as the present invention is concerned both of these keys are operated by the matrix in the same manner as any of the other keys.

Each key, as it is depressed, is locked in its depressed or operated position during the embossing operation, by means of the latch bar 7, Figs. 1, 2 and 3. This latch bar is pivoted at 8 in the frame members 1 and extends across the frame beneath the key bars. It is yieldingly urged toward the key bars by means of the spring 9 connected to said latch bar and anchored to a pin on the frame member. The lower edge of the bar is engaged by latch shoulders 10 on downward extensions 11 of the key bars. As each key is depressed, Fig. 3, it is locked in depressed position by the latch bar until the embossing operation is completed, whereupon it is released and restored to normal position as hereinafter described. The latch shoulders 10 of each key engages the latch bar and swings it to release the previously depressed key, so that only one character key is locked down at a time.

The restoring mechanism for the key bars includes a restoring bar 12 extending crosswise of the frame beneath the key bars and mounted, by means of the webs 13, on a swinging yoke 14 which is pivoted on the pins 15 at both sides of the frame. This restoring bar swings downwardly whenever a key bar is depressed and is adapted, when swung upwardly by the restoring mechanism of the machine, to engage the depressed key bar and raise it to normal position.

A short yoke 16 is also arranged at the right hand side of the frame, Fig. 1, beneath the frame member with its two arms straddling the frame member 1. These arms are pivoted on the pin 15 which supports the restoring bar yoke so that both yokes swing about the same pivotal axis. The restoring bar yoke has a wear plate 17 at the end adjacent the short yoke 16, which is adapted to be engaged by a roller 18 on the short yoke. This roller in turn is engaged by the upturned end of one arm 19 of a three-arm restoring lever which is pivoted at 20 on an instanding boss 21 of the frame. A second arm 22 of the three-arm lever extends upwardly and is connected to an operating link 23 which extends to and is actuated by the restoring mechanism of the embossing machine. Thus when the three-arm lever is swung about its pivot to the left by the restoring mechanism, as indicated in dotted lines in Fig. 2, its arm 19 engages the roller 18 and swings the short yoke about its pivot. This swings the restoring bar yoke upwardly to return the depressed key to its normal position. The three-arm lever also has a third arm 24, the end of which engages the latch bar 7 and swings this latch bar to unlock or release the depressed key at the same time. The mechanism so far described is disclosed in the aforesaid patent and co-pending application and is representative of the manual key controlled mechanism of any embossing or printing machines having manually operated keys arranged in a keyboard or group.

The depending extensions 11 of the key bars have forwardly projecting arms or members 11' which reach to a point beneath the matrix roll 30, and these forward extensions have upstanding selector pins 31, Figs. 2, 3 and 4, which are adapted to be engaged by the matrix to depress the keys. The pins of all of the key bars are arranged in a row which is transverse of the frame of the machine but which is longitudinally parallel with the axis of the matrix roll. The arms 11' of the key bars are guided by vertical slots in a suitable comb member 32 positioned across the front of the frame, to prevent relative lateral movement of the key bars. The upper edge of the comb is turned horizontally to provide anchorage for a plurality of springs 33. One of these springs 33 is provided for each key bar and its lower end is anchored to the respective arm 11' thereof. These springs are of just sufficient strength to yieldingly hold the key bars in their upper or normal position but not sufficient to provide any undue resistance to the manual depression of the keys by the operator.

The matrix roll 30 is carried in a yoke 35 which extends crosswise beneath the frame members 1 and is pivoted at 36 outside of the frame members 1. The arms 37 and 38 of this yoke extend diagonally forwardly to position the matrix above the selector pins 31 of the key bars. The ends of the yoke arms have horizontal aligned shafts 39 and 40 which support the matrix roll, suitable bosses 41 being provided on the yoke arms as bearings for said shafts. At one side the yoke 35 is a rearwardly extending arm 42, and a spring 43 is connected to this arm and to the frame member 1 of the machine. The tendency of this spring is to swing the yoke about its pivots in the direction to carry the matrix roll bodily downward in relation to the selector pins 31 of the keys, whereby to depress the selected keys. The tension of the spring is sufficient to overcome the tension of the springs 33 of the particular keys being depressed. In other words the spring 43 exerts a pressure on the key bars substantially the equivalent of that which an operator would exert in manually depressing a key. The short yoke 16 previously described has a downwardly extending arm 45 carrying a roller 46 at its lower end. This roller bears against the flattened cam surface 47 on the rear end of the yoke arm 42 so that when the three-arm lever is swung counter clockwise, as viewed in Figs. 2 and 3, to swing the restoring bar upwardly, as previously described, the arm 45 depresses the arm 42 of the matrix yoke and swings the yoke in the reverse direction for bodily raising the matrix roll out of engagement with the selector pins.

The matrix roll is preferably in the form of an open ended tube which is supported between the heads 50 and 51 mounted on the inner ends of the shafts 39 and 40. These heads are arranged to extend a short distance into the ends of the tube to center the tube in position, and they have flanges forming shoulders which abut the ends of the tube to prevent endwise movement of the tube. The shaft 40 is movable longitudinally in its bearing 41 to move the head 51 toward and from the end of the tube for the purpose of permitting the matrix to be readily and conveniently removed and replaced. A button 52 is provided on the outer end of the shaft 40 for the convenience of the operator in shifting the shaft when placing or removing the matrix. This shaft, however, is locked in position by the latch 53, Figs. 1 and 5, which has a forked end 54 engaging a groove in the shaft 40. The latch thus prevents longitudinal displacement of the shaft but permits its rotation with the matrix roll. The latch is pivoted at 55 to the frame whereby it may be swung into and out of engagement with the shaft.

The other head 50 is fastened to the end of the shaft 39. A coil spring 56 surrounds the hub of the head, and one end 57 of the spring

is anchored to the boss 41 and the other end 58 is fastened to the head 50. This spring is arranged to be wound up and placed under tension as the matrix roll is rotated step by step in its selecting or operating direction. When the matrix roll is released, however, the spring rotates it in the reverse direction to restore it to its normal or starting position. The head 50 has a pin 50' adapted to engage a stop pin 50'' fastened on the boss 41 in a position corresponding to the starting position of the matrix roll.

The shaft 39 extends beyond the arm 37 of the yoke and carries a ratchet wheel 60, the teeth of which are engaged by a pawl 61 which is pivoted at 62 on an arm 63. The pawl is yieldingly held in engagement with the teeth of the ratchet wheel, by a spring which is fastened to the pawl and to a pin 65 on the arm 37 of the yoke. This arm 63 is loosely mounted on the end of the shaft 39 and its outer end carries a roller 66 which is adapted to engage a cam 67 on the underside of an overhanging portion 1' of the frame. The hub of the arm 63 also has a pin 68 which engages the pin 65 to form a limit stop for the return movement of the arm 63.

As shown in Figs. 2 and 3 the arm 63 is held by its pin 68 in position to engage the cam 67 as the yoke and matrix swings upwardly. The rollered end 66 engages the cam surface and swings the arm 63 about its pivot causing the pawl 61 to rotate the ratchet and advance the matrix one step, which in this case is equivalent of one tooth of the ratchet. This brings the matrix into position ready for the next downward movement of the matrix. As the yoke moves it carries the arm 63 away from cam 67 and the spring 64 returns the arm 63 to position against stop pin 65, and the pawl engages the next ratchet tooth ready to again rotate the ratchet when the yoke rises. A holding pawl 69 is pivotally mounted on a boss 70 on the yoke arm 37 and is yieldingly held in engagement with the teeth of the ratchet by a spring 71, Fig. 1, to hold the ratchet against reverse rotation during its step by step movement.

The head 51 carries a stop arm 72, Figs. 1 and 5, which rotates with the matrix and which has a horizontally turned end adapted during its rotation to reach the position above the fixed stop 73 mounted on the frame. The stop 73 is preferably positioned substantially directly below the axis of the matrix roll, and serves as an obstruction to prevent the downward movement of the yoke and the matrix, thus stopping the matrix operation of the keys. The arm 72 is adapted to be brought into alignment with the stop 73 at a point in the step by step movement of the matrix which corresponds to the last of the keys in the series or group to be operated. In order that the stop arm 72 may always be properly related to the matrix, the end of the matrix tube has a notch 75, Figs. 5 and 7, which is adapted to be registered with a pin 76 on the periphery of the head 51. The notch 75 is placed in a position on the matrix tube corresponding to the last of the series of keys to be operated. The operator, in placing a matrix in the machine, engages the notch 75 and pin 76, and thus automatically registers the stop arm and matrix. A similar notch 77 is made in the other end of the matrix tube for engagement with a pin 78 on the head 50 to properly register starting position of the matrix tube with the head 50. These pins and notches also provide positive driving connections between the heads and the matrix tube.

When the stop arm 72 has reached the position, shown in dotted lines in Fig. 5, corresponding to the last of the series of keys to be operated, and stops the operations of the matrix, the parts remain in position until released by the operator for the purpose of repeating the operation of the series of keys. In this stopped or normal position the spring 56 is under tension ready to instantly rotate the matrix roll reversely and restore it to starting position.

In order to release the ratchet from the pawls 61 and 69 to permit spring 56 to act, both pawls are provided with tail pieces 61' and 69'. The arm 37 of the yoke has an extension 37' which forms a convenient handle by which the operator may swing the yoke upwardly a slight distance, Fig. 4, beyond its normal position. In thus raising the yoke the tail pieces 61' and 69' of the pawls are brought into engagement with the underside of the frame extension 1', which swings the pawls about their pivots and disengages both of the pawls from the ratchet. This releases the ratchet and permits the spring 56 to quickly rotate the matrix roll to its starting position. The cam 67 has a beveled end 67' which permits the roll 66 to ride off of the cam and maintain the arm in the same relative position during this releasing operation.

The matrix tube is provided with a plurality of perforations 80. These perforations are arranged in parallel circumferential rows or series extending around the periphery of the tube. There are as many of these circumferential rows as there are keys in the keyboard having selector pins 31. This is diagrammatically shown in Fig. 7 wherein the surface of the roll is laid out in a flat plane for the convenience of illustration. Each row or series are aligned with the selector pin 31 of the key corresponding to the row. The perforations in a row are equally spaced apart corresponding to the teeth of the operating ratchet 60. The corresponding perforations of all circumferential rows are also aligned longitudinally of the tube so that each rotary step of the tube brings a longitudinal row of perforations in register with the row of selector pins on the key bars. Thus when the matrix is bodily lowered the selector pins will enter the perforations, as indicated in Fig. 3, and the keys will not be depressed. When a key is to be depressed by the matrix, however, the perforation in the row corresponding to that key is omitted thereby providing a blank space, indicated by crosses 81, Fig. 7. Since there is no perforation at this point the corresponding selector pin will be engaged by the blank portion of the matrix roll and the key will be depressed. Thus by omitting the perforations in the matrix according to a predetermined selection of keys to be operated and arranging the blanks in the rows according to the required sequence of operation, the matrix will depress the keys accordingly.

In the present structure I have designed the matrix with as many longitudinal rows of perforations as there are letters, including spacing and punctuation marks, in the city name "San Francisco, Cal.", for the reason that this name contains about a maximum group of characters. This name, including the punctuation marks, spacing, etc. requires 19 successive steps in the rotation of the matrix roll. The matrix is laid out for 22 rotary movements in the event that one or two additional key operations are necessary. In the present instant the notch 75 is placed in

a position corresponding to the twentieth step, at which point the operation of the matrix is stopped. It will be noted that, beginning with the No. 1 longitudinal row of perforations, a perforation is omitted in each row corresponding to the sequence of the letters and punctuation marks in the name "San Francisco, Cal." At the end of the matrix tube corresponding to the shift key I provide a single circumferential series of perforations 82, the perforations in this series being also aligned longitudinally with the perforations for the other keys. The perforations are omitted, as indicated by the crosses 83, at points corresponding to capital letters in the group of characters so that the shift key will be operated during the same downward movement of the platen in which the corresponding character key is operated.

Briefly the operation is as follows: Assume that the parts are in the normal position shown in Fig. 2. The operator by means of the handle 37' raises the yoke and releases the pawls 61 and 69. The spring 56 instantly rotates the matrix in the reverse direction to the starting position with the first longitudinal row of perforations in register with the selector pins on the key bars. The instant the operator lets go of the handle 37' the spring 43 will swing the yoke downwardly and all of the selector pins, with the exception of the —S— key and the shift key, will enter the perforations. The —S— key and the shift key, however, will be depressed, as shown in Fig. 3, and the embossing machine will stamp a capital letter —S—. These two depressed keys will be locked down by the latch pawl 7 until the embossing operation is completed whereupon the three-arm lever will be swung about its pivot to swing the restoring bar upwardly and restore these two keys to normal position. The three-arm lever also swings the matrix yoke upwardly, and the arm 63 and pawl 61 will rotate the matrix one step corresponding to one tooth on the ratchet, thereby registering the No. 2 longitudinal row of perforations with the selector pins. The spring 43 will again swing the yoke and matrix downwardly and the key for the lower case character —a— will be depressed. This cycle of operation is repeated, until the stop arm 72 reaches a position, shown in dotted lines in Fig. 5, over the stop 73 thus stopping the downward movement of the matrix yoke and thus preventing the depression of any of the keys. This leaves the mechanism in the position shown in Fig. 2 ready for the operator to again start the automatic repetition of the sequence of keys represented by the matrix.

The matrix tube is simple in construction and is comparatively inexpensive to manufacture, hence the expense for making a matrix for each group of characters is comparatively nominal. The advantage of this mechanism is that the operator is relieved of the necessity of repeatedly operating manually the same series of keys for each address.

I am aware that changes can be made in the construction, operation and arrangement of parts without departing from the spirit of the invention and I reserve the right to make such changes as fairly fall within the scope of the appended claims.

I claim:

1. In a machine of the class described, the combination of a plurality of keys, means for restoring the keys after each operation, a matrix having means representing a pre-determined sequence of keys to be operated, means responsive to said matrix for operating the keys accordingly, means for advancing said matrix upon the restoration of each operated key, and common means for operating the key-restoring means and the matrix advancing means.

2. In a machine of the class described having key operated mechanism and means for restoring operated keys to normal position, the combination of a matrix representing a pre-selected group of characters to be reproduced by said key operated mechanism, means controlled by said matrix for operating the keys corresponding to said group, means for advancing said matrix upon the restoration of each operated key, and common means for operating the key-restoring means and the matrix advancing means.

3. The combination of a plurality of keys, means for restoring an operated key to normal position, a matrix for operating said keys according to a pre-selected sequence, a support for the matrix for bodily moving it into operative position, and means for advancing the matrix when said support moves the matrix from operating position.

4. The combination of a plurality of keys, means for restoring an operated key to normal position, a matrix having a plurality of controlling positions, operating means for said keys controlled by the matrix, a support for the matrix, means for operating said support to bodily move the matrix into engagement with the operating means, and means for advancing the matrix to successively dispose the controlling positions thereon in operating position upon restoration of each operated key.

5. The combination of a plurality of keys, means for restoring an operated key to normal position, a matrix for operating said keys according to a predetermined sequence, a support for the matrix, common means for operating said support to bodily move the matrix into operating position and for operating the key restoring means, and means for stopping the movement of said support when the last of the keys in the sequence have been operated.

6. The combination of a plurality of keys, means for restoring the operated keys, a rotary matrix for operating the keys in pre-determined sequence, means for bodily moving the matrix to actuate the keys, and means operable upon the restoration of each operated key for rotating said matrix to bring succeeding portions thereof into operative position.

7. The combination of a plurality of keys, means for restoring the operated keys, a rotary matrix for operating the keys in pre-determined sequence, means for bodily moving the matrix to actuate the keys, means operable upon the restoration of each operated key for rotating said matrix to bring succeeding portions thereof into operative position, and means for stopping the matrix when the last of said sequentially operated keys has been operated.

8. The combination of a plurality of operating keys, restoring means for the keys, a matrix roll, means controlled by the matrix for operating keys in pre-determined sequence, means for rotating the roll step by step to position succeeding portions thereof relatively to the operating means, means for bodily moving the matrix roll to effect the operation of the keys, and means operable by the key restoring means for controlling the bodily movement of the matrix roll.

9. The combination of a plurality of operating keys, restoring means for the keys, a matrix roll,

means controlled by the matrix for operating keys in pre-determined sequence, means for rotating the roll step by step to position succeeding portions thereof relatively to the operating means, means for bodily moving the matrix roll to effect the operation of the keys, means operable by the key restoring means for controlling the bodily movement of the matrix roll, and means for reversely rotating the matrix roll to restore it to normal condition for repeating its key operations.

10. The combination of a plurality of keys, restoring means for the keys, a matrix roll having a plurality of perforations, and having the spacing between some of said perforations increased to provide unperforated blank portions distributed around its periphery in accordance with a pre-selection of keys to be operated, pins on the keys adapted to register with perforations and to be engaged by said unperforated blank portions for operating said pre-selected keys, means for bodily moving the matrix roll, and means for rotating the roll step by step to register the unperforated blank portions with the keys to be operated thereby.

11. The combination of a plurality of keys, restoring means for the keys, a matrix roll having a plurality of perforations and having the spacing between some of said perforations increased to provide unperforated blank portions distributed around its periphery in accordance with a pre-selection of keys to be operated, pins on the keys adapted to register with the perforations and to be engaged by said unperforated blank portions for operating said pre-selected keys, means for bodily moving the matrix roll, means for rotating the roll step by step to register said unperforated blank portions with the keys to be operated thereby, means coincident with the last of the operated keys in said sequence for preventing the bodily movement of the roll, and means for reversely rotating the roll to its original position.

12. The combination of a plurality of key bars each having a selector pin, a roll having a plurality of perforations adapted to be registered with said pins, and having the spacing between some of said perforations increased to provide a series of unperforated portions adapted to engage the pins of key bars corresponding to the relative position of said unperforated portions of said roll, means for bodily moving the roll to operate the key bars whose pins engage said unperforated portions of the roll, means for restoring the roll after each key has been operated, and means for rotating the roll step by step to successively present said unperforated portions in position relatively to the key bar pins.

13. The combination of a plurality of key bars each having a selector pin, a roll having a plurality of perforations adapted to be registered with said pins and having the spacing between some of said perforations increased to provide a series of unperforated portions adapted to engage the pins of key bars corresponding to the position of said unperforated portions of said roll, means for bodily moving the roll to operate the key bars whose pins engage said unperforated portions of the roll, means for restoring the roll after each key has been operated, means for rotating the roll step by step to successively present said unperforated portions in position relatively to the key bar pins, means adapted to be brought into position coincident with the operation of the last key of the series to prevent the bodily movement of the roll, and means for rotating the roll to its original position coincident with the first of the key operations.

14. The combination of a plurality of keys, a selector roll for selectively operating said keys, means for intermittently rotating the roll to successively present portions thereof in operative position, and means for bodily oscillating the roll to operate the key corresponding to the positioned portions thereof.

15. The combination of a plurality of keys, restoring means for said keys, a selector device common to said keys for operating the keys according to the selection thereof, and means under the control of the key restoring means for operating said selector device to position it in operative position.

16. The combination of a plurality of keys, restoring means for said keys, a selector device common to said keys for operating the keys according to the selection thereof, means controlled by the key restoring means for successively operating said selector device to position successive portions in operating position, and means for restoring the selector device.

17. In a mechanism for repeatedly operating a preselected series of key devices, the combination of a plurality of keys, means for restoring each operated key, a selector device for operating the keys of the series in succession, means for moving the selector device through an operating position, and means in the machine for automatically restoring the selector device after completion of the operation of the series of keys to position the selector device for another movement through operating position.

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