May 8, 1928. 1,668,916

W. W. LASKER

PRINTING TABULATOR MECHANISM

Filed July 18, 1924 4 Sheets-Sheet 1

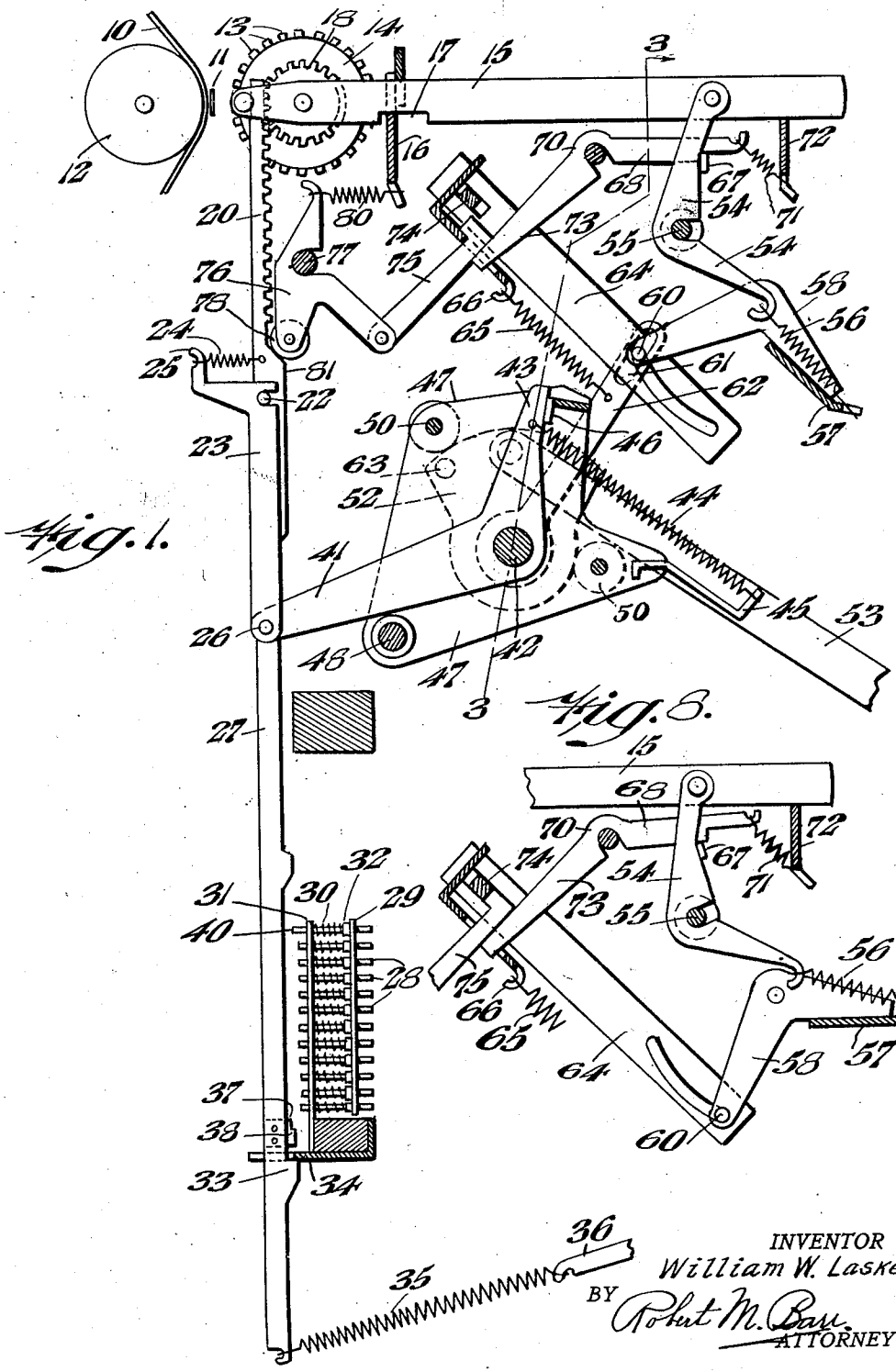


Fig. 1.

Fig. 3.

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Fig. 2.

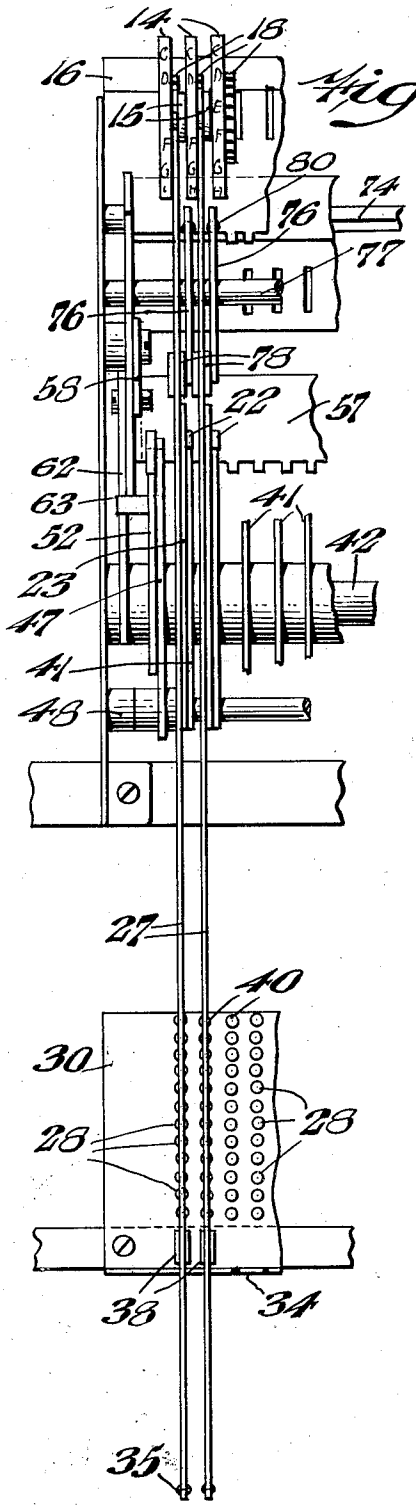
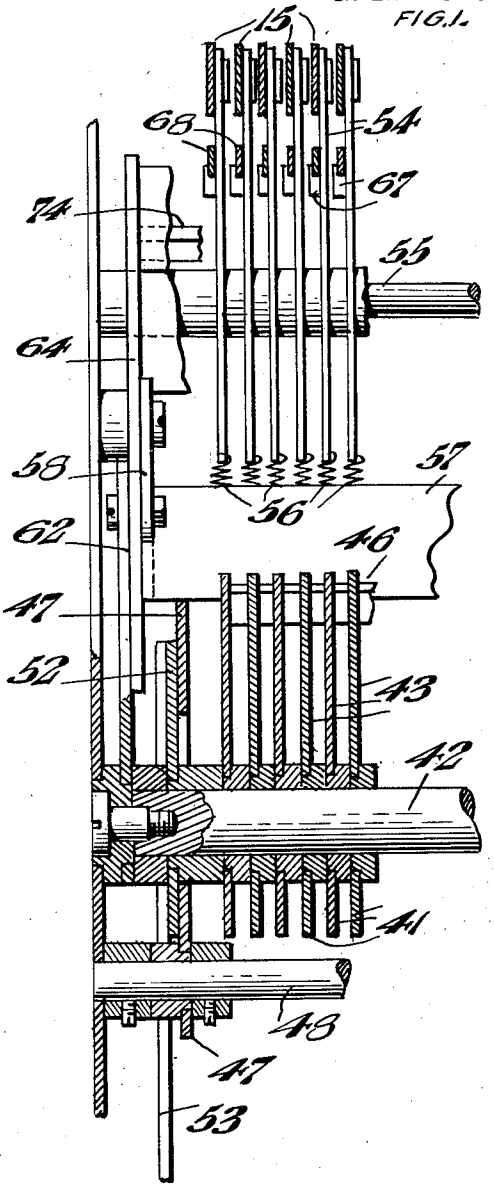


Fig. 3.

ON LINE. 3-3. FIG. 1.



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Fig. 4.

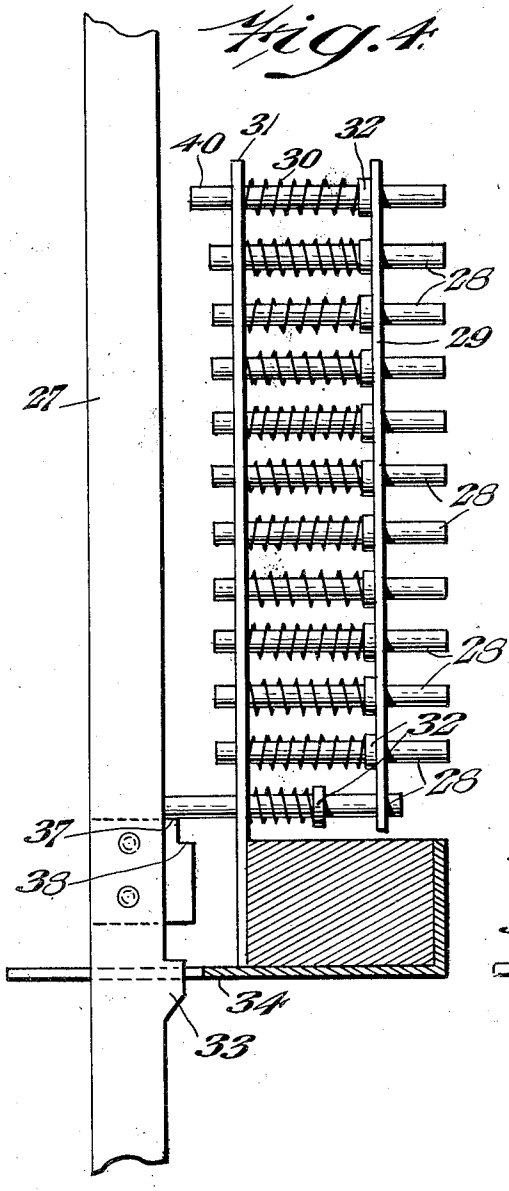
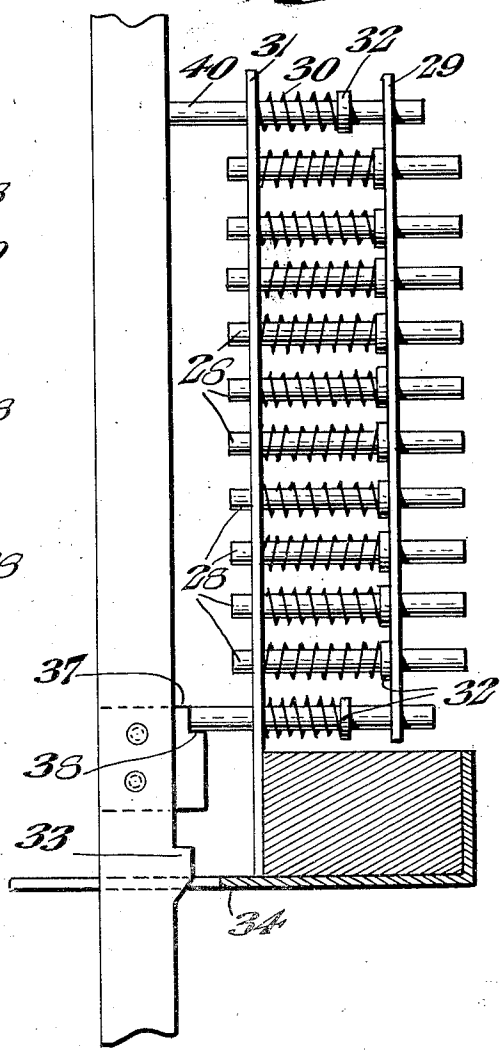


Fig. 5.



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Fig. 6.

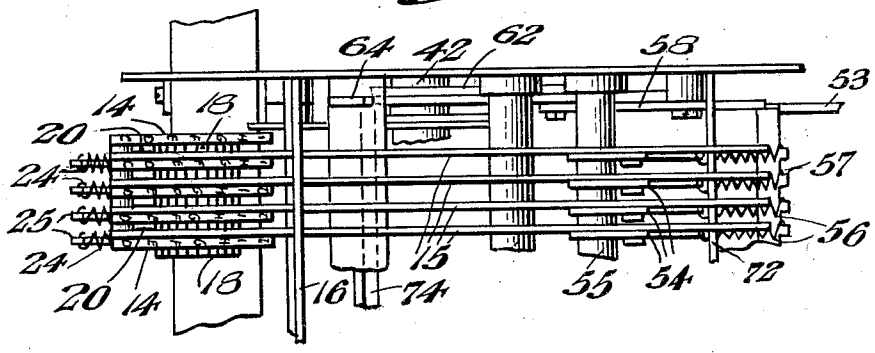
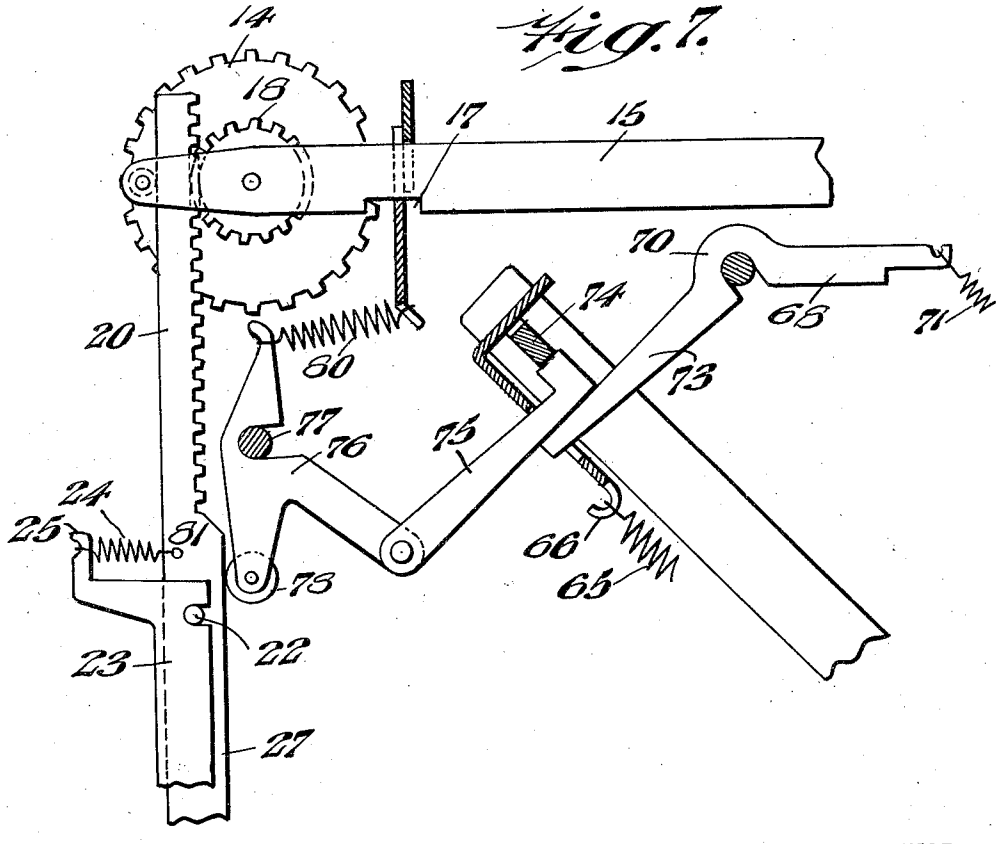


Fig. 7.



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Patented May 8, 1928. 1,668,916

UNITED STATES PATENT OFFICE.

WILLIAM W. LASKER, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO REMINGTON RAND INC., OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

PRINTING TABULATOR MECHANISM.

Application filed July 18, 1924. Serial No. 726,773.

The present invention relates to printing mechanism and more particularly to the printing of data as automatically assembled from punched cards in a calculating, tabulating or other machine.

Some of the objects of the present invention are to provide means for automatically setting type for printing purposes; to provide means for simplifying the selecting mechanism by which the type setting bars are controlled; to provide means for selectively actuating a plurality of type by mechanism including a less number of selecting devices than there are type; to provide a pin selecting mechanism for type setting bars wherein each pin controls the setting of more than one type; to provide a plurality of type characters having selecting means so arranged and constructed that certain selecting pins or other adjuncts function in a dual capacity to control the selection and setting of the type characters; and to provide other improvements as will hereinafter appear.

In the accompanying drawings, Fig. 1 represents a detail in elevation and part section of a printing mechanism embodying one form of the present invention; Fig. 2 represents a front elevation of the same; Fig. 3 represents a section on line 3—3 of Fig. 1; Fig. 4 represents an enlarged detail in side elevation of the selector control mechanism in one operative position; Fig. 5 represents a side elevation of the same in another operative position; Fig. 6 represents a detail in plan of the mechanism; Fig. 7 represents an enlarged detail of the automatic selective release for operating the printing mechanism; Fig. 8 represents a detail of the printing mechanism in released position.

Referring to the drawings, one form of the present invention is shown arranged for operation with an accounting machine for the purpose of printing the results obtained from such machine upon a record sheet 10 which is fed between an impression ribbon 11 and a platen 12 in a well known manner.

For causing the impressions to be made upon the record sheet 10, suitable type 13 are provided having characters thereon such as letters or numbers to conform to the character of the data being tabulated, and in the present instance the type 13 are respectively formed as letters to print alphabetical characters and are also arranged in sets fixed respectively about the peripheries of the impression wheels 14. The spacing of the type on each wheel 14 has a predetermined relation to the selective control mechanism of the accounting or other data assembling machine and since in the present instance the machine is of the type controlled by a perforated card having twelve transverse control points, the wheel 14 is equally sub-divided into twenty-four circumferential divisions, twenty-three of which locate the type and one a blank for the zero or non-printing position of the wheel. This construction eliminates three letters of the alphabet, and preferably the letters J, U and Z are omitted from the wheel, this arrangement being preferred to the mechanical complications where the entire alphabet is used, as it has been found that for tabulating purposes the I can be used for a J, the V for a U, and the X for Z without confusion. Thus in the operation of the machine each control point on the card, except the twelfth, has two letters, either one of which can be selected, as will presently be described.

For rotatably mounting the impression wheels 14 for movement towards and away from the platen 12, each is journalled on a separate striker bar 15, which is slidably supported in a frame plate 16 and rides thereon in a recess 17 which limits the throw of the bar 15 in both directions. Thus in the present instance there are twenty impression wheels 14 mounted side by side respectively on the striker bars 15, and positioned parallel to the face of the platen 12 with which they are arranged to cooperate.

In order to selectively actuate the individual impression wheels 14, each carries a separate concentrically located gear 18 in mesh with a rack bar 20 which is preferably held in meshing position by means of a roller 21 journalled on the end of the cooperating striker bar 15 and properly spaced to bear against the back edge of the rack bar 20. The respective rack bars 20 are joined by a pivot connection, such as a pin and slot construction 22, to separate links 23 which are held in operating position respectively by springs 24, each held in tension between a lug 25 on the link and the rack bar 20 to which the link is pivoted. The free ends of the respective links are pivoted at 26

respectively to setting bars 27 which are arranged to be controlled by selectively actuated stop pins 28. These pins 28 are mounted for endwise sliding movement in a pin box 29, one for each control point in the data card, and are retained normally retracted by coil springs 30 respectively encircling the pins and acting between an end plate 31 of the pin box and collars 32 of the respective pins. The pins 28 are also arranged in rows corresponding to the rows of card points, and in the present instance there are twelve pins to each row, vertically considered, so that each setting bar 27 is opposite to and in direct alinement with a row of twelve pins whereby the set position of any pin in any row determines a predetermined set position for the setting bar controlled by the row in which the pin is set.

For controlling the setting bars 27 so that each is locked in zero position but is releasable under control of the pins 28, each bar 27 is provided at its pin box end with a latch lug 33, normally arranged to catch and be held by a fixed zero position stop 34 until such time as a control pin 28 is brought to setting position, when the bar 27 is swung about its pivot 26 by the action of the setting pin 28 and released from the stop 34. Springs 35 are respectively connected to the setting bars 27 and to a fixed part 36 for returning the bars to engage with the stop 34 in their zero position and for maintaining a yielding tension as desired. From the foregoing it will be seen that the setting bars 27 are held by the springs 35 in relatively close proximity to the ends of the control pins 28 and with their latch lugs 33 held by the zero stop 34. When a control pin 28 is selected and pushed out it engages and carries its setting bar 27 along with it until the latter is released by its latch lug 33 disengaging from the zero stop 34 and it is then free to respond to its actuating mechanism, which will be presently described.

For the purpose of stopping the setting bars 27 in positions corresponding to set control pins 28, each bar 27 is provided with two stops 37 and 38, the former being so located as to cause the printing wheels 14 to be set in twelve different positions, and the latter being so located as to cause the printing wheels 14 to be set in eleven other different positions. That is, the stop 37 is so located with respect to the control pins 28 as to engage any set control pin 28 a predetermined time before the second stop 38 could do so, this time interval representing the distance between the two stops and being calculated so that when the stop 37 is operative the rack bar 20 will turn the impression wheel one twenty-fourth of a revolution before the bar 37 is arrested by the first stop 28, and when the stop 38 is operative the rack bar 20 will turn the impression wheel one twelfth of a revolution before the bar 37 is arrested by the first stop 28. Since in the present construction the characters are letters of the alphabet and the impression wheel carries twenty-three letters and one blank, it is evident, with but twelve control pins 28 that all but one control pin 28 should control two positions of the impression wheel, and by varying the relative position of the setting bar 27 with respect to the ends of the row of control pins either the stop 37 or stop 38 will be operative.

In order to cause the respective pins 28 to function in a dual capacity, the upper pin of each row is provided with an extension 40 which projects a distance beyond the other pins by an amount sufficient to cause the setting bars 27 to be moved away from the ends of the pins far enough to bring the path of the stop 37 beyond the aforesaid pin ends while the stop 38 then moves in a path to intercept the pin ends. Thus for example the bottom pins 28 of the control rows represent both the letters A and B and if the letter A is to be set up for printing the data card will be punched in the A position in the proper row of the card, and the following automatic selecting operation will cause the aforesaid bottom pin to be projected and thus swing its setting bar 27 to release from the zero stop 34 so that the bar 27 springs in the direction to bring the stop 37 against the projecting set pin. This movement is transmitted to the rack 20 which turns the wheel 14 to set up the A type. When the same pin 28 is to set up the letter B the card is punched in the A position as before but an additional punch is made in the card at a point corresponding to the extension pin 40. When this card, punched double for control purposes, comes into selecting position the result is to cause both the bottom pin 28 and the extension pin 40 to be projected, and since the latter is longer it acts upon the setting bar 27 so that the latter is so moved as to cause the stop 38 to engage the set pin 28. Thus the setting bar 27 has a longer travel before coming to set position, and therefore causes the rack 20 to turn the wheel 14 through a greater angle and by a calculated amount to set the B type in position. In connection with the selecting and setting of the control pins 28 it will be understood that any suitable mechanism may be employed, such, for example, as shown in co-pending application, Serial No. 671,891.

As a means for moving the setting bars 27 to set positions, a plurality of rock levers 41 are respectively connected to the pivots 26 and mounted for independent movement upon a shaft 42. The opposite arms 43 of the levers 41 are respectively held under ten-

sion by coil springs 44 which are fastened in stretched condition to a fixed part 45. Since the levers 41 operate in timed relation to the associated steps in the operation of the machine, means are provided in the form of a movable rail 46, for controlling the release of levers 41, and which also serves to return them to normal position. As here shown the rail 46 is supported between end plates 47 which are arranged to oscillate about a pivotal point 48, their movement being controlled by cam rollers 50 and 51 arranged in the path of a side-face cam 52 on the shaft 42. The cam 52 is operated in timed relation by a link 53, connected to a suitable driven part, not here deemed necessary to illustrate. It will therefore be evident, when the rail 46 moves in a clockwise direction, as seen in Fig. 1, that those levers 41 which are free to move, because of the release of connected setting bars 27, will be actuated by the springs 44 to cause the rack bars 20 of the released setting bars 27 to turn the impression wheels 14 in the manner predetermined. When the rail 46 makes its return or counter-clockwise movement the levers 41 will be actuated to reset the setting bars 27 for the next selecting operation.

For firing the striker bars 15 a plurality of arms 54 are respectively connected at one end to the striker bars 15, are fulcrumed upon a common spindle 55, and placed under firing tension by springs 56 stretched between their other ends and a pivotally mounted tension control bar 57. This bar 57 is pivoted on arms 58 which are fulcrumed substantially coincident with the point of connection of the springs 56 with the arms 54, and are arranged to be oscillated by a pin 60 and slot 61 connection with a rock arm 62 arranged in the path of a pin 63 on the cam 52. Motion is also transmitted by the arm 62 and pin 60 to the firing control bars 64 by the provision of a slot therein to receive the pin 60 so that there is the desired lost motion movement of the parts before the pin 60 engages the control bars 64 to cause the firing of the striker bars 15, as required in the cycle of operations. The rock arm 62 is returned by a spring 65 connected to a fixed part 66.

In order to selectively control the release of the striker bars 15, the arms 54 are respectively provided with lugs 67 arranged to be respectively engaged by latches 68 on pivoted latch bars 70. Normally these latch bars 70 are held in latched position by springs 71 stretched to engage a fixed part 72, and release of these latch bars 70 is effected by tripping their free trip arms 73. This is accomplished by the provision of a trip bar 74 extending transversely of the bars 64 and in a plane intersecting all of the trip arms 73, but the arrangement is such that unless one or more trip arms 73 are to be operated the bar 74 is free to reciprocate without causing any trip arm 73 to be actuated. The trip bar 74, which is moved by the control bar 64, is normally so spaced from the trip arms 73 as to be freely reciprocated without engaging any of the aforesaid trips arms. In order, however, to transmit the movement of the bar 74, a plurality of detents 75 is provided corresponding in number to the trip arms 73 and positioned respectively to ride upon the aforesaid trip arms, the arrangement being such that when the detents are in one position the trip bar 74 is free to reciprocate without engaging any of the detents, while if they are in another position the trip bar 74 will engage such detents as have changed position and transmit the movement of the trip bar 74 to the trip arms 73 of the latch release mechanism. The detents 75 are respectively pivoted to rock fingers 76, which are pivotally mounted upon a spindle 77 and carry rollers 78 respectively which are held by springs 80 in the path of movement of cam lugs 81 respectively on the rack bars 20. It will thus be evident, when a rack bar 20 moves to setting position, that its cam lug 81 will engage the roller 78 of the finger 76, thereupon rocking the latter in a direction to cause its detent 75 to slide into position between the trip arm 73 and the bar 74, and consequently, when the latter follows the movement of the control bar 64, it transmits movement through the detent 75 to the trip arm 73 to release the latches 68 of the selected striker bars 15. Only those latches 68 will be released corresponding to the rack bars 20 selected for the particular printing operation, and all other latches will remain locked, and since their detents 75 are out of the path of the trip bar 74 the latter freely reciprocates without striking such trip bars.

Having thus described my invention, I claim:

1. In a printing mechanism, a carrier provided with at least two type, a setting bar arranged to move said carrier to bring either type into printing position, a setting bar stop element arranged to cooperate with said setting bar to establish the printing position of one of said type, and means including said stop element for permitting the movement of said bar to be varied whereby to bring the other of said type into printing position, the operative position of said stop element being the same for both positions of said setting bar.

2. In a printing mechanism, a carrier provided with at least two type, a setting bar arranged to move said carrier to bring either of said type into printing position, a setting bar stop element for limiting the movement of said bar to bring one of the said

type into operative position, and a second element operating in conjunction with said stop element to permit the extent of movement of said bar to be varied, the operative position of said stop element being the same for both positions of said setting bar.

3. In a printing mechanism, a carrier provided with at least two type, a setting bar arranged to cooperate with said carrier to bring either of said type into printing position, a device carried by said bar for controlling the two positions of said bar, a selector stop element arranged to cooperate with said device for limiting the movement of said bar to bring one of said type into operative position, and means including said selector stop element also arranged to cooperate with said device for permitting the movement of said bar to be varied whereby to bring the other of said type into operative position, the operative position of said stop element being the same for both positions of said setting bar.

4. In a printing mechanism, a type carrier having a predetermined number of type, a setting bar for setting said carrier in position to print any one of the aforesaid type, and means including a plurality of selector stop elements for limiting the movement of said bar to bring a predetermined carrier type into printing position, said selector stop elements being less in number than the number of type and each of said elements being arranged to terminate in a common plane when in operative position to limit the movement of said setting bar.

5. In a printing mechanism, a type carrier, means for setting said carrier in any one of a plurality of positions, said positions corresponding to the number of type, means including a plurality of selecting stop elements cooperating with said setting means to limit the movement of said carrier to bring certain of the type into printing position, and means including one of said stop elements for selectively permitting the movement of said carrier setting means to be varied whereby to bring certain other of said type into printing position, each of said elements being arranged to terminate in a common plane when in operative position to limit the movement of said setting bar.

6. In a printing mechanism, a type carrier, means including a pivoted setting bar for bringing said carrier to any one of a number of positions according to the number of type, means for actuating said bar, means normally locking said bar in a predetermined position, a stop on said bar, a plurality of selecting elements arranged in operative position to be located in the path of said stop and arranged to shift said bar to unlocked position, a second stop on said bar also arranged to engage said elements to determine a second position of said type carrier for the set position of each selecting element, and means including one of said selecting elements for controlling the operation of said second stop.

7. In a printing mechanism, a type carrier, means including a bar for setting said carrier in any one of a plurality of positions, two stops projecting from said bar, one of said stops projecting further than the other, a plurality of selecting pins arranged to be selectively operated to extend into the path of one of said stops to determine certain positions of said bar, and a control pin arranged to be actuated with any one of said selecting pins to cause said bar to move the other of said stops to intercept the path of any set selecting pins whereby a less number of selecting pins is required than the number of type on said carrier.

8. In a printing mechanism, a type carrier, means including a bar for setting said carrier in any one of a plurality of positions, two stops projecting from said bar, one of said stops projecting further than the other, means for locking said bar in inoperative position, a plurality of selecting pins arranged to be selectively operated to release said locking means and to extend into the path of one of said stops to determine certain positions of said bar for setting predetermined type, and a control pin also arranged to release said locking means and functioning with any one of said selecting pins to cause said bar to move the other of said stops to intercept the path of any set selecting pins whereby a less number of selecting pins is required than the number of type on said carrier.

9. In a printing mechanism, a plurality of type carriers, means for setting each carrier in any one of a plurality of positions, said positions corresponding to the number of type, means including a plurality of selecting stop elements for limiting the movement of the respective setting means to set said carriers in position to bring predetermined type to printing position, each of said stop elements being arranged to terminate in a common plane when in operative position to limit the movement of said setting bar, means including one of said selecting stop elements of each setting bar means to set said carrier to bring other predetermined type to printing position, and means for actuating said carriers to print the type set.

10. In a printing mechanism, a plurality of type carriers, means for setting each carrier in any one of a plurality of positions, said positions corresponding to the number of type, means including a plurality of selecting stop elements for limiting the movement of the respective setting means to set said carriers in position to bring predeter-

mined type to printing position, each of said stop elements being arranged to terminate in a common plane when in operative position to limit the movement of said setting bar, means including one of said selecting stop elements of each setting bar means to set said carrier to bring other predetermined type to printing position, and means for selectively actuating said carriers to print the type set.

11. In a printing mechanism, a plurality of type carriers, means for setting each carrier in any one of a plurality of positions, said position corresponding to the number of type, means including a plurality of selecting elements for causing the respective setting means to set said carriers in position to bring predetermined type to printing position, means including one of said selecting elements of each setting bar means to set said carrier to bring other predetermined type to printing position, and means to actuate only such carriers as have type set.

12. In a printing mechanism, a plurality of type carriers, means for setting each carrier in any one of a plurality of positions, said position corresponding to the number of type, means including a plurality of selecting elements for causing the respective setting means to set said carriers in position to bring predetermined type to printing position, means including one of said selecting elements of each setting bar means to set said carrier to bring other predetermined type to printing position, and means automatically operable at a predetermined time in the cycle of operations to actuate the carriers having type set.

13. In a printing mechanism, a plurality of type carriers, means for setting each carrier in any one of a plurality of positions, said position corresponding to the number of type, means including a plurality of selecting elements for causing the respective setting means to set said carriers in position to bring predetermined type to printing position, means including one of said selecting elements of each setting bar means to set said carrier to bring other predetermined type to printing position, and means including a lost motion connection for actuating the carriers having type set.

14. In a printing mechanism, a plurality of type carriers, means for setting each carrier in any one of a plurality of positions, said position corresponding to the number of type, means including a plurality of selecting elements for causing the respective setting means to set said carriers in position to bring predetermined type to printing position, means including one of said selecting elements of each setting bar means to set said carrier to bring other predetermined type to printing position, and means including a plurality of selectively operated detents for actuating the carriers having type set.

15. In a printing mechanism, a plurality of type carriers, means for setting each carrier in any one of a plurality of positions, said position corresponding to the number of type, means including a plurality of selecting elements for causing the respective setting means to set said carriers in position to bring predetermined type to printing position, means including one of said selecting elements of each setting bar means to set said carrier to bring other predetermined type to printing position, and means including a plurality of selectively operated latches for actuating the carriers having type set.

Signed at Philadelphia, county of Philadelphia, State of Pennsylvania, this 30th day of June, 1924.

WILLIAM W. LASKER.