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MULTIPLIER PRINTING MECHANISM

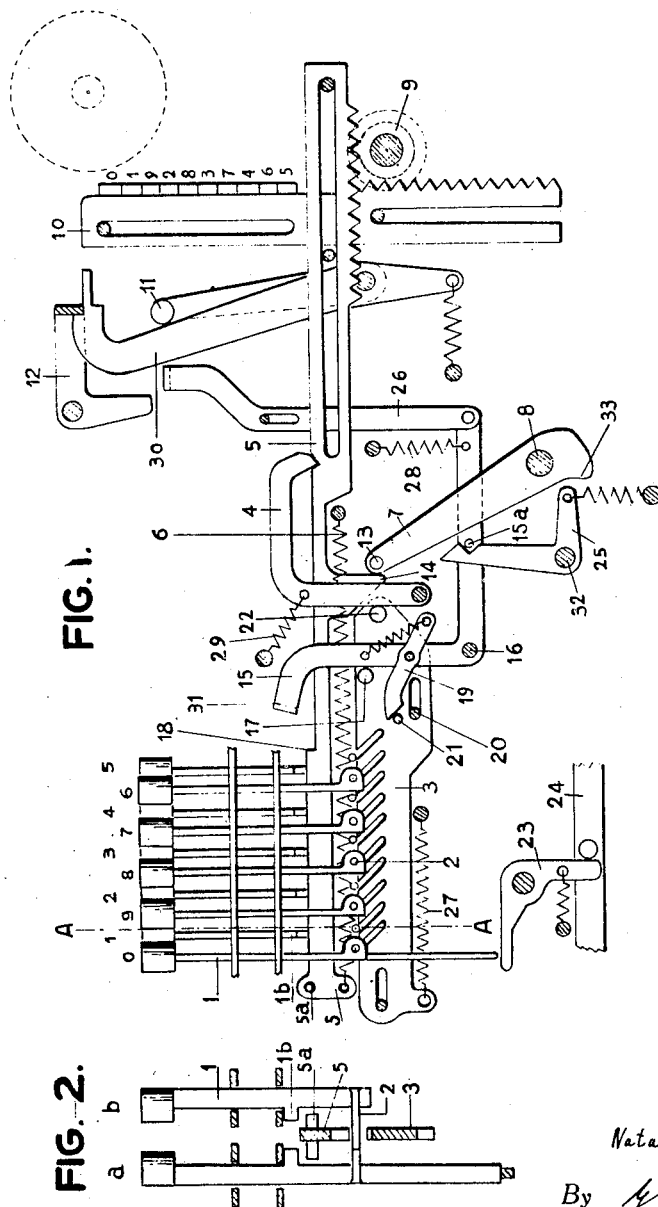
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FIG. 3:

1 1,225,00
5 122,50
9 12,25
9.297,75

FIG. 4:

9 12,25
5 122,50
1 1-225,00
9.297,75



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MULTIPLIER PRINTING MECHANISM

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The present invention relates to improvements in adding machines equipped with an automatic multiplying mechanism and provided with a setting mechanism for the multiplier, and more particularly to device of such an adding machine for printing the multiplier. In the device provided for printing the multiplier, according to the present invention, the mechanism which operates the special printing type-bar of the multiplier is connected to the multiplier setting means in such a manner that it will be actuated upon each setting of a digit of the multiplier, thus causing the displacement of the type-bar and the subsequent printing of the set digit, said mechanism being restored and thereafter prevented from moving until a new figure of the multiplier is set. Therefore, the printing of each digit of the multiplier occurs immediately after it has been set regardless of the number of machine strokes made during the performance of a multiplication.

In a machine according to the invention, the digits of the multiplier are printed in a vertical sequence on the tape, which makes the reading of the multiplier rather difficult, if the figures of the multiplier are printed in conventional vertical position. Moreover, since the device according to the present invention for printing the multiplier may be applied either to machines performing the multiplication from the first left hand digit of the multiplier or to machines performing the multiplication from the first right hand digit of the multiplier, the operator could be in doubt whether the multiplier printed on the tape should be read downwardly from the top or upwardly from the bottom.

In order to avoid any difficulties in reading the multiplier, the digits of the multiplier are printed in a special manner according to another feature of the invention. More particularly, the digits of the multiplier are printed on the tape in such a manner that they appear in an inclined position with respect to the conventional digits of the multiplicand and the addenda, thus clearly showing how the figure has to be read.

For example, digits inclined to the right are to be read downwardly from the top and digits inclined to the left are to be read upwardly from the bottom. The inclined digits may be arranged at any desired angle up to 90°; preferably they are arranged at an angle of 45°. In any case, the inclination of the digits is chosen according to the mode of operation of the machine and the types for printing the digits are fixed in the inclined position thus chosen.

In a construction according to the present in-

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vention, wherein the multiplier is set by means of a key-board, the type-bar of the multiplier is operated in the conventional way by a rack, which is urged by a spring in a rearward direction. When the printing device of the multiplier is in its rest position, the said rack is prevented from moving by a mechanism actuated by a locking member controlled by the stems of the keys of the multiplier key-board, so that, upon depression of any key of said key-board the rack is allowed to move rearwardly under the tension of its spring, until it will be stopped by means provided on the stem of the depressed key.

Upon the printing of the set digit of the multiplier the rack is returned to its rest position by a lever secured to the main shaft of the machine and it is held in said position until completion of the multiplication by detents which are actuated by said lever and which also actuate the "non-print" mechanism. After the performance of the multiplication, the previously depressed key is released in a conventional manner, for example by a mechanism of the type disclosed in the Swiss Patent No. 250,105 to Olivetti; or in the U. S. Patent 1,120,746 to Rinsche, and the locking-member controlled by the stem of the thus released key is returned into its rest position, thus restoring said detents into inactive position and reengaging the rack so as to prevent same from moving until another digit of the multiplier will be set.

Other objects and structural details of the invention will be apparent from the following description when read in conjunction with the accompanying drawings forming part of this specification, wherein:

Fig. 1 is an elevational view of the multiplier printing device according to the invention;

Fig. 2 is a partial sectional view of the device shown in Fig. 1 along the line A—A;

Fig. 3 shows the digits of the multiplier in an inclined position for reading downwardly from the top; and

Fig. 4 shows the digits of the multiplier in an inclined position for reading upwardly from the bottom.

As shown in Fig. 1, the keys of the multiplier key-board are located along two rows *a* and *b*. A pin 2 is secured to the lower end of the stem of each key. Each pin 2 is arranged for slidable engagement with an associated slot of a locking-member 3, so that the latter may be moved to the left upon depression of a key. A lever 4 which is normally prevented from displacement by the pin 22 on the locking member

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3 and which engages in this position a notch the rack 5, is thus permitted to rotate in a counter-clockwise direction under the action of a spring 29, so that the rack 5 is disengaged. As soon as the lever 7 secured to the main shaft 8 of the machine rotates in a clockwise direction the rack 5 is free to move to the right, being urged by the spring 6, until its left hand pin 5a engages the projection 1b of the stem 1 of the depressed key.

A type bar or type carrier 10 connected to the rack 5 through a pinion 9 is arranged, for lifting the type corresponding to the depressed key into printing position. The printing of the digit by the lifted type on the tape is performed in a customary manner by the stroke of a lever 30, upon release of the latter from the lever 11 and the bail 12.

When the lever 7 rotates in counterclockwise direction with the main shaft 8, a pin 13 mounted on said lever 7 comes into engagement with the lug 14 of the rack 5, whereby the latter is returned into its left hand end position.

Since the multiplier key remains depressed as long as the machine continues to cycle for performing the multiplication, the rack 5 would be permitted to move to the right at each stroke of the machine, thus causing the same digit to be reprinted each time. In order to prevent such an undesired reprinting of the same digit, a "non-print" lever 26 is pivoted at its lower end to the horizontal arm of a bell-crank lever 15, pivoted at 16 and subject to the action of a spring 28 tending to urge said bell-crank lever 15 in counter-clockwise direction. The upper arm of a latch 25, pivoted at 32, is normally held in engagement with a pin 15a arranged on the horizontal arm, of the bell-crank lever 15. As soon as the lever 7 is rotated in a clockwise direction its cam portion 33 engages the lower arm of the latch 25 causing the latter to rotate, whereby the upper arm of the latch 25 is disengaged from the pin 15a on the lever 15. Since, at this time the locking member 3 with its pin 17, which normally is in engagement with the lever 15, and thus prevents the latter from rotating, is moved to the left upon depression of the key, the lever 15 now is free to rotate in counter clockwise direction by the action of its spring 28. Said rotation of the lever 15 causes an upward displacement of the "non-print" lever 26 from its ineffective position shown in Fig. 1 into a non-print position wherein its upper end is placed in the path of the vertical arm of the bail 12. Thus, the bail 12 is prevented from a rotation in counter-clockwise direction and, consequently, the levers 30 remain locked as shown in Fig. 1, thus preventing a reprinting of the digit. Said upward displacement of the "non-print" lever 26 is, however, prevented during the first machine stroke, as the rack 5 is already displaced into its right hand position at the time when the lever 15 is released by the latch 25 so that the upper edge of rack 5 to the left of a shoulder 18 of said rack is in the path of an offset lug 31 arranged at the upper end of the vertical arm of the bell-crank lever 15, whereby the latter is prevented from rotation.

As soon as the rack 5 is restored to its original position by the counter-clockwise rotation of the lever 7 at the end of the first machine stroke, the lever 15 is free to rotate in a counterclockwise direction under the tension of its spring 28, while the lever 19, pivoted to the lever 15, engages the pin 20 secured to the framework of the machine. The lug 31 engages the shoulder 18 of the rack 5 thus preventing same from moving during all sub-

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sequent machine strokes, while the lever 26 is moved by said rotation of lever 15 into its upper non-print position, as described above.

As soon as the multiplication has been performed and the depressed key has been restored to its normal position in a conventional way, the locking-member 3 is moved to its right hand end position. The pin 21 on the locking-member 3 causes a disengagement of the lever 19 from the pin 20 so that the lever 15 is free to be restored to its normal position by the pin 17 on the locking-member 3. The lever 4 is restored by the pin 22 on the locking-member 3, whereby it is re-engaged with the notch of the rack 5 preventing the latter from moving during all of those operations of the machine which are not performed by the multiplication device.

In order to obtain printing of a cipher which may be contained in a multiplier, the cipher key of the multiplier key-board causes the machine to perform a full stroke. Since this stroke has to be made in non-add position, the stem of the cipher key operates the "non-add" link 24 through the bell-crank 23 (see Fig. 1). Link 24 is a part of a "non-add" mechanism known per se. For example, the U. S. Patent 1,386,021 issued to H. C. Peters for an "Adding Machine" discloses such a "non-add" mechanism. On page 12 lines 97-107 of said U. S. patent the use of a "non-add" lever 135 is described. According to the disclosure on page 6 lines 63-96 of said patent the lever 135, when operated, lifts the link 136, thus preventing the register wheels from coming into engagement with the actuators during the rearward movement of the cycling mechanism, so that a number registered on the key-board will not be accumulated. A rearward movement of the "non-add" link 24 by the bell-crank 23 in the machine according to my invention has the same effect as the lifting of the link 136 of said U. S. Patent 1,386,021.

Fig. 3 and Fig. 4 show two ways of printing the figures of the multiplier. Both refer to a multiplication of the multiplicand 12.25 with the multiplier 759. The embodiment according to Fig. 3 is for use in machines performing the multiplication from the first left hand digit and in this instance the figures will be read downwardly from the top. The embodiment according to Fig. 4 is for use in machines performing the multiplication from the first right hand digit and in the latter instance the figures will be read upwardly from the bottom.

What I claim is:

1. In an adding machine equipped with a rockable main shaft, a multiplier indexing mechanism, and a printing mechanism, in combination: a series of selective setting means included in said multiplier indexing mechanism, a settable type carrier included in said printing mechanism, said type carrier being provided with a series of types for printing digits of a multiplier, actuating means associated with said setting means and adapted for selectively setting said type carrier from an initial position into an advanced position, locking means arranged for normally locking said actuating means in its initial position, a member associated with said setting means and movable from an initial position into an actuated position upon actuation of one of said setting means, a releasing means controlled by said member for releasing said locking means in response to an actuation of a setting means, restoring means associated with said main operating shaft for restoring said actuating means from its ad-

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vanced position into its initial position during the return stroke of said shaft, disabling means for disabling said printing mechanism, second locking means for locking said actuating means in an ineffective position, holding means associated with said member for holding said disabling and said second locking means in an ineffective position when said member is in its initial position and for releasing said disabling and said locking means upon movement of said member into an actuated position, latching means normally latching said disabling and said second locking means in an ineffective position and controlled by said main operating shaft for unlatching same, retarding means controlled by said main operating shaft for retarding the release of said disabling and said second locking means substantially until the end of the return stroke of said shaft, whereupon said disabling and second locking means may reach their effective position disabling said printing mechanism and locking said actuating means in its initial position.

2. In an adding machine as claimed in claim 1, retaining means associated with said disabling means and said second locking means for retaining same in their effective position, and means associated with said member for releasing said retaining means upon return of said member from an actuated position into its initial position.

3. In an adding machine as claimed in claim 2, the types carried by said type carrier being in an inclined position at an angle up to 90°.

4. In an adding machine as claimed in claim 1, the types carried by said type-carrier being in an inclined position at an angle up to 90°.

5. In an adding machine equipped with a rockable main shaft, a multiplier indexing mechanism, and a printing mechanism, in combination: a series of selective setting means included in said multiplier indexing mechanism, a settable type carrier included in said printing mechanism, said type carrier being provided with a series of types for printing digits of a multiplier, actuating means associated with said setting means and adapted for selectively setting said type carrier from an initial position into an advanced position, locking means arranged for normally locking said actuating means in its initial position, a member associated with said setting means and movable from an initial position into an actuated position upon actuation of one of said setting means, a releasing means controlled by said member for releasing said locking means in response to an actuation of a setting means, restoring means associated with said main operating shaft for restoring said actuating means from its advanced position into its initial position during the return stroke of said shaft, disabling means for disabling printing mechanism, second locking means for locking said actuating means in an ineffective position, holding means associated with said member for holding said disabling and said second locking means in an ineffective position when said member is in its initial position and for releasing said disabling and said second locking means upon movement of said member into an actuated position, latching means normally latching said disabling and said second locking means in an ineffective position and controlled by said main operating shaft for unlatching same substantially during the forward stroke of said shaft, obstructing means controlled by said actuating means for obstructing the path of the released disabling and said second locking means during the movement of the actuating means into

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its advanced position and for unobstructing the path of same during the return of said actuating means into its initial position, whereupon said disabling and said second locking means may reach their effective position disabling said printing mechanism and locking said actuating means in its initial position.

6. In an adding machine as claimed in claim 5, retaining means associated with said disabling means and said second locking means for retaining same in their effective position, and means associated with said member for releasing said retaining means upon return of said member from an actuated position into its initial position.

7. In an adding machine as claimed in claim 6, the types carried by said type carrier being in an inclined position at an angle up to 90°.

8. In an adding machine as claimed in claim 5, the types carried by said type carrier being in an inclined position at an angle up to 90°.

9. In an adding machine of the class equipped with a rockable main operating shaft, a multiplier indexing mechanism, a non-add mechanism, and a printing mechanism, the combination with said mechanisms of an adding machine of: a series of selective digits setting means comprising a zero-digit setting means included in said multiplier indexing mechanism, a settable type-carrier included in said printing mechanism, said type-carrier being provided with a series of types for printing digits of a multiplier, actuating means associated with said setting means and adapted for selectively setting said type carrier from an initial position into an advanced position, locking means arranged for normally locking said actuating means in its initial position, a member associated with said setting means and movable from an initial position into an actuated position upon actuation of one of said setting means, a releasing means controlled by said member for releasing said locking means in response to an actuation of a setting means, restoring means associated with said main operating shaft for restoring said actuating means from its advanced position into its initial position during the return stroke of said shaft, disabling means for disabling said printing mechanism, second locking means for locking said actuating means in an ineffective position, holding means associated with said member for holding said disabling and said second locking means in an ineffective position when said member is in its initial position and for releasing said disabling and said locking means upon movement of said member into an actuated position, latching means normally latching said disabling and said second locking means in an ineffective position and controlled by said main operating shaft for unlatching same, retarding means controlled by said main operating shaft for retarding the release of said disabling and said second locking means substantially until the end of the return stroke of said shaft, whereupon said disabling and said second locking means may reach their effective position disabling said printing mechanism and locking said actuating means in its initial position, and link-means, responsive to an actuation of the zero-digit setting means, arranged for operating the non-add mechanism of the machine so as to cause the machine to make one stroke in non-add position.

10. In an adding machine as claimed in claim 9, retaining means associated with said disabling

means and said second locking means for retaining same in their effective position, and means associated with said member for releasing said retaining means upon return of said member from an actuated position into its initial position.

11. In an adding machine as claimed in claim 10, the types carried by said type carrier being in an inclined position at an angle up to 90°.

12. In an adding machine as claimed in claim 9, the types carried by said type carrier being in an inclined position at an angle up to 90°.

13. In an adding machine of the class equipped with a rockable main operating shaft, a multiplier indexing mechanism, a non-add mechanism, and a printing mechanism, the combination with said mechanisms of an adding machine of: a series of selective digits setting means comprising a zero-digit setting means included in said multiplier indexing mechanism, a settable type-carrier included in said printing mechanism, said type-carrier being provided with a series of types for printing digits of a multiplier, actuating means associated with said setting means, and adapted for selectively setting said type carrier from an initial position into an advanced position, locking means arranged for normally locking said actuating means in its initial position, a member associated with said setting means and movable from an initial position into an actuated position upon actuation of one of said setting means, a releasing means controlled by said member for releasing said locking means in response to an actuation of a setting means, restoring means associated with said main operating shaft for restoring said actuating means from its advanced position into its initial position during the return stroke of said shaft, disabling means for disabling said printing mechanism, second locking means for locking said actuating means in an ineffective position, holding means associated with said member for holding said disabling and said second locking means in an ineffective position when said member is in its initial position and for releasing said disabling and said second locking means upon movement of said member into an actuated position, latching means normally latching said disabling and said second locking means in an in-

effective position and controlled by said main operating shaft for unlatching same substantially during the forward stroke of said shaft, obstructing means controlled by said actuating means for obstructing the path of the released disabling and second locking means during the movement of the actuating means into its advanced position and for unobstructing the path of same during the return of said actuating means into its initial position, whereupon said disabling and said second locking means may reach their effective position disabling said printing mechanism and locking said actuating means in its initial position, and link-means, responsive to an actuation of the zero-digit setting means, arranged for operating the non-add mechanism of the machine so as to cause the machine to make one stroke in non-add position.

14. In an adding machine as claimed in claim 13, retaining means associated with said disabling means and said second locking means for retaining same in their effective position, and means associated with said member for releasing said retaining means upon return of said member from an actuated position into its initial position.

15. In an adding machine as claimed in claim 14, the types carried by said type-carrier being in an inclined position at an angle up to 90°.

16. In an adding machine as claimed in claim 13, the types carried by said type-carrier being in an inclined position at an angle up to 90°.

NATALE CAPELLARO.

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