Dec. 5, 1961 T. B. BOGERT 3,011,701

DIGIT SPACING DEVICE IN CALCULATING BUSINESS MACHINES

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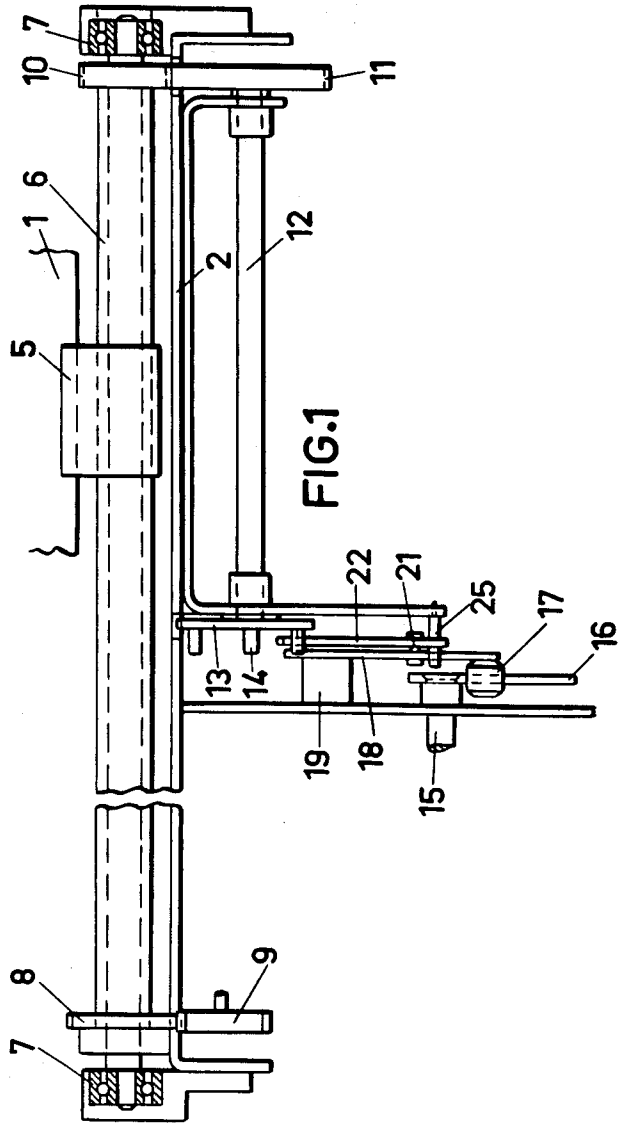


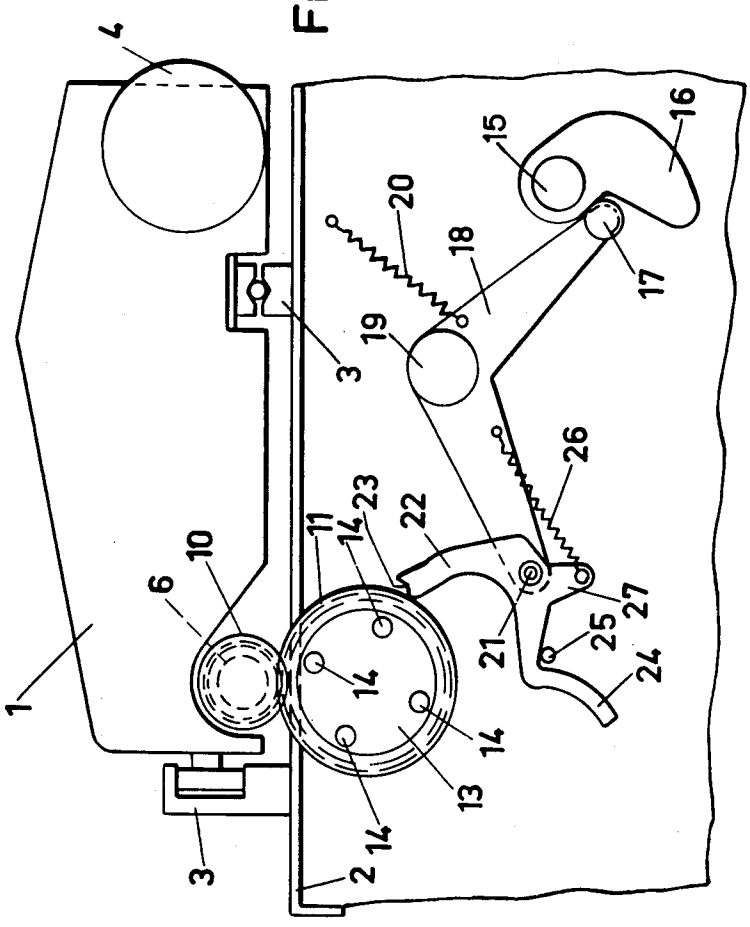
FIG.1

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FIG.2



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DIGIT SPACING DEVICE IN CALCULATING BUSINESS MACHINES

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In listing calculating machines, accounting machines and the like, it is prior art to provide, in addition to an amount entering mechanism, a multiplier mechanism by means of which an amount in the amount entering mechanism can be multiplied in successive operating cycles of the machine by the digits of a multiplier which are entered into the multiplier mechanism in succession from the lowest order to ever higher orders, said multiplier mechanism including a printing mechanism for printing the digits entered into said multiplier mechanism on a paper sheet on a platen one at a time according as said digits are entered into the multiplier mechanism. In order that the multiplier digits thus printed may not be printed on top of each other the paper sheet in the said prior-art machines is spaced a single line for each multiplying operation so that the multiplier digits will be situated below each other. In any case this implies waste of paper and is unsuitable also for other reasons in accounting machines, not to mention that the multiplier will be difficult to read when it contains many digits.

The present invention has for its object to overcome the above disadvantages by providing an arrangement in listing calculating machines, accounting machines and the like having a paper carriage which is reciprocable in columnar steps between different column positions by means of a shaft driven by a motor in order to drive a carriage moving mechanism, an amount entering mechanism and a multiplier mechanism driven by said motor, an amount entered into the amount entering mechanism being multipliable by means of said multiplier mechanism in successive operating cycles of the machine by the digits of a multiplier which are entered into the multiplier mechanism in succession from the lowest order to ever higher orders, said multiplier mechanism including a printing mechanism for printing the digits entered into said multiplier mechanism on a paper sheet on the paper carriage one at a time according as they are entered into the multiplier mechanism, the paper carriage being movable by the carriage moving mechanism, each time a multiplier digit is printed, through a digit step corresponding to a digit spacing and being considerably smaller than a columnar step, in such a direction that the digits printed on the paper sheet by the printing mechanism of the multiplier mechanism will be situated beside each other in the correct reading order, and the characteristic feature of the invention is that the carriage moving mechanism for moving the paper carriage through one digit step is drivable by the motor through the motor-driven multiplier mechanism.

Further objects of the invention and the advantages gained thereby will become apparent from the following description, reference being had to the accompanying drawings diagrammatically illustrating an embodiment of the invention. In the drawings:

FIG. 1 is a rear view of part of an accounting machine equipped with an arrangement according to the invention,

FIG. 2 shows the arrangement as seen from the right in FIG. 1.

In the drawings, 1 designates a paper carriage which is so mounted on the frame 2 of an accounting machine as

to be reciprocable on guides 3. Said carriage has a platen 4 of the ordinary type for receiving account cards and the like to be provided with digits in the machine. Secured to the carriage is a nut 5 permanently engaging a screw 6 which is rotatably but non-displaceably mounted on the machine frame 2 in bearings 7. Said screw 6 carries a gear 8 meshing with a gear 9 which is driven by a motor (not shown) for reciprocating the carriage 1 on the frame 2 in a known manner. For example U.S. Patent No. 2,704,591 shows how a motor may be caused to drive a paper carriage in reciprocating columnar steps. Said screw 6 also carries a pinion 10 meshing with a gear 11 which is secured to a shaft 12 mounted in the frame 2. A feed wheel 13 having four pins 14 is also secured to said shaft 12.

It is assumed that the accounting machine shown is equipped with a prior art multiplier mechanism by means of which an amount entered into the amount entering mechanism of the machine is multipliable in successive operating cycles of the machine by the digits which are entered into the multiplier mechanism in succession from the lowest order to ever higher orders, said multiplier mechanism including a printing mechanism for printing the digits entered into said multiplier mechanism on the account card passed around the platen 4 one at a time according as they are entered into the multiplier mechanism. At each complete multiplying operation with the digit entered into the multiplier mechanism a cyclical operating shaft 15 mounted in said frame 2 is rotated a complete revolution in a known manner. For example, it is old to provide a machine with a multiplier mechanism having parts which perform a single operating cycle at the printing of a multiplier digit, as illustrated by U.S. Patent No. 2,726,037, and such parts could be utilized to provide a cyclical operating shaft such as 15. Secured to said shaft 15 is a cam 16, and a roller 17 on one arm of a bellcrank lever 18 bears against said cam 16. The bellcrank lever 18 is pivotally mounted on the machine frame 2 by means of a pivot 19. A spring 20 is stretched between the bellcrank lever 18 and the machine frame 2 and tends to hold the roller 17 in bearing engagement with the cam 16. Pivotally mounted on the other arm of the bellcrank lever 18 by means of a pivot 21 is a feed pawl 22, one arm of which has a V-shaped recess 23 to engage one of the pins 14 on the feed wheel 13 in the following described manner, and the other arm of which has a curved portion 24 and bears against a pin 25, secured to the machine frame 2, by the action of a spring 26 which is stretched between a projection 27 on the feed pawl 22 and the bellcrank lever 18.

In the initial position of the parts, shown in FIG. 2, the feed pawl 22 is outside the path of motion of the pins 14 on said feed wheel 13 so that the motor of the machine, without interference of the feed pawl 22, can rotate the carriage moving means or screw 6 in one direction or the other for reciprocating the carriage 1 between different columnar positions on the account card passed around the platen 4. When a multiplication is to be performed in a given columnar position of the paper carriage 1 the digit key in the multiplier mechanism for the lowest order digit of the multiplier is depressed, the multiplier mechanism in a known manner multiplying the amount in the amount entering mechanism of the machine by said multiplier digit and printing with its printing mechanism the multiplier digit on the account card and rotating the shaft 15 one revolution anti-clockwise as seen in FIG. 2. During the last portion of this full revolution of the shaft 15, after the multiplier digit has been printed on the account card, the cam 16 swings the bellcrank lever 18 clockwise, the feed pawl 22 pivot-

ing, while sliding against the pin **25** secured to the machine frame **2**, into engagement with the adjacent pin **14** of the feed wheel **13** and carrying said pin along so that the feed wheel **13** is rotated through a quarter of a revolution anti-clockwise whereupon the bellcrank lever is swung back to the initial position shown. The rotation of the feed wheel **13** by the feed pawl **22** is transmitted to the screw **6** by the gear **11** and pinion **10**, and by said rotation of the screw **6** the paper carriage **1** is moved one digit spacing in the return direction (from the left to the right as seen from in front of the machine). When the next multiplier digit is entered into the multiplier mechanism said mechanism will therefore print this digit to the left of the digit first entered so that the digits will be situated beside each other in the same line and in the correct reading order. Also at the multiplication by said other multiplier digit the shaft **15** is rotated through one revolution so that the paper carriage **1** is moved a further step in the return direction in the manner described.

It should be observed that the invention must not be considered as limited to the embodiment described above and shown in the drawings, for many modifications may be resorted to within the scope of the invention defined by the appendant claims. For instance, the rotatable carriage moving means may be otherwise designed than as a screw **6** mounted on the machine frame and a nut **5** secured to the paper carriage. The carriage moving means may be a rack on the paper carriage and a gear meshing therewith, which can be rotated by a feed mechanism corresponding to the feed wheel **13** and a feed pawl **22**. It will also readily be seen that its is possible to employ, instead of the shaft **15**, another means in the multiplier mechanism effecting one and the same movement at each multiplication by a multiplier digit in order to produce the required movement of the carriage moving means.

What I claim and desire to secure by Letters Patent is:

1. In a calculating business machine having a reciprocable paper carriage, a rotatable carriage moving means, means for rotating the carriage moving means in one direction to move the carriage in a first direction, and a cyclical operating shaft rotating one revolution during each operating cycle thereof, a digit spacing device comprising a cam secured to the cyclical operating shaft, a pawl operable by said cam to swing to and fro once during each revolution of said cam, and a feed wheel drivingly connected to the rotatable carriage moving means, said pawl, when swung, engaging said feed wheel and rotating it for rotating the carriage moving means in the other direction and thereby moving the carriage one step in the direction opposite to said first direction.

2. In a calculating business machine having a rotatable carriage moving means, a reciprocal paper carriage moved thereby, driving means for rotating said carriage moving means in one direction to move the carriage in a first direction, and a cyclical operating shaft rotating one revolution during each operating cycle thereof, a digit spacing device comprising a cam rotated by said operating shaft, a lever oscillated by said cam, pawl operated by said lever to swing to and fro one cycle during each revolution of said operating shaft, and a feed wheel rotated a fraction of one revolution by each cycle of said pawl, said feed wheel being connected to said carriage moving means for moving said carriage one step in the direction opposite to said first direction upon the rotation of said feed wheel said fraction of one revolution.

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