

[54] VALUE INPUT MECHANISM FOR
CALCULATING MACHINES

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[56] **References Cited**

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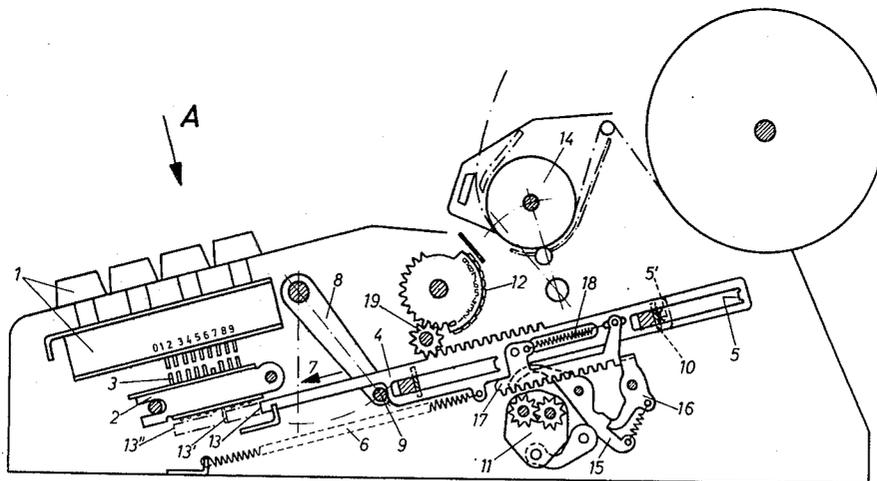
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[57] **ABSTRACT**

A ten-key calculating machine has a value input mechanism comprising a transversely moveable set pin carriage having a plurality of set pins corresponding to the values of 1 to 9 and positioned in individual tens series. A plurality of value selector members are engageable with actuated set pins in descending order from the 9 value so that each value member moves through a number of value divisions corresponding to the complement of 9 as it moves to abut an actuated set pin and indicate the value of the actuated key corresponding to this set pin.

4 Claims, 2 Drawing Figures



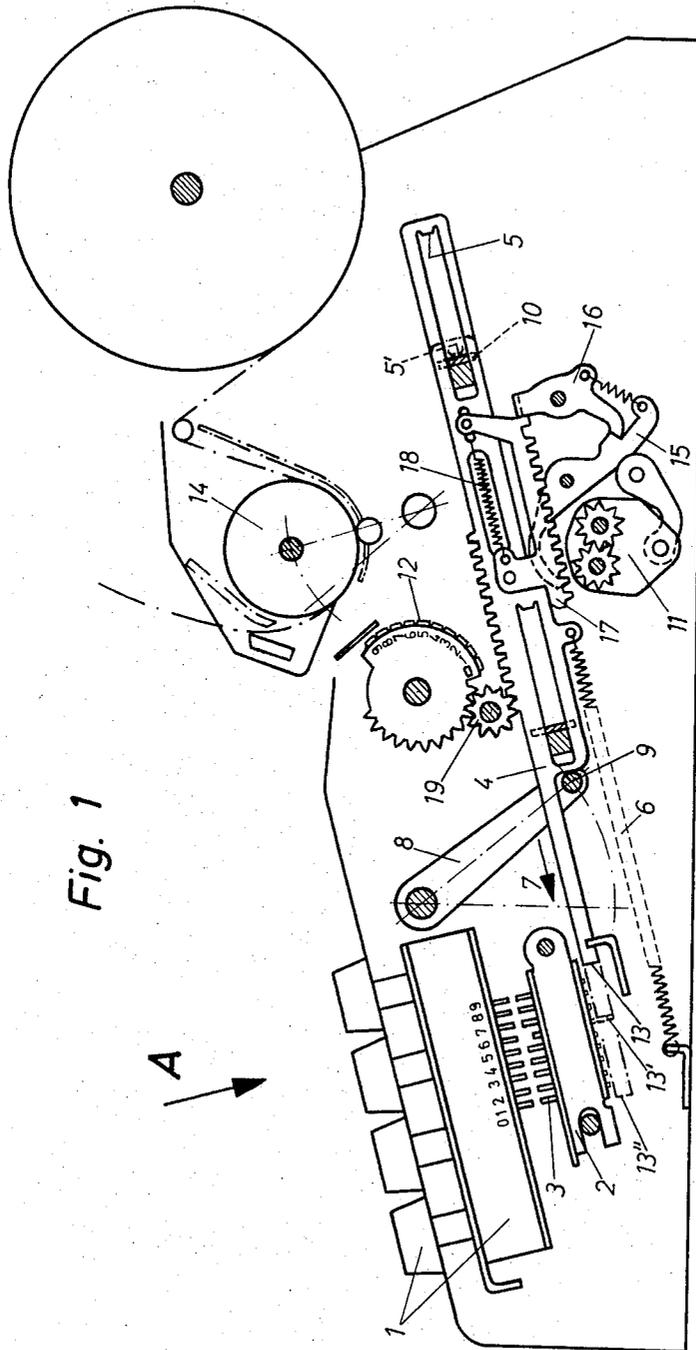
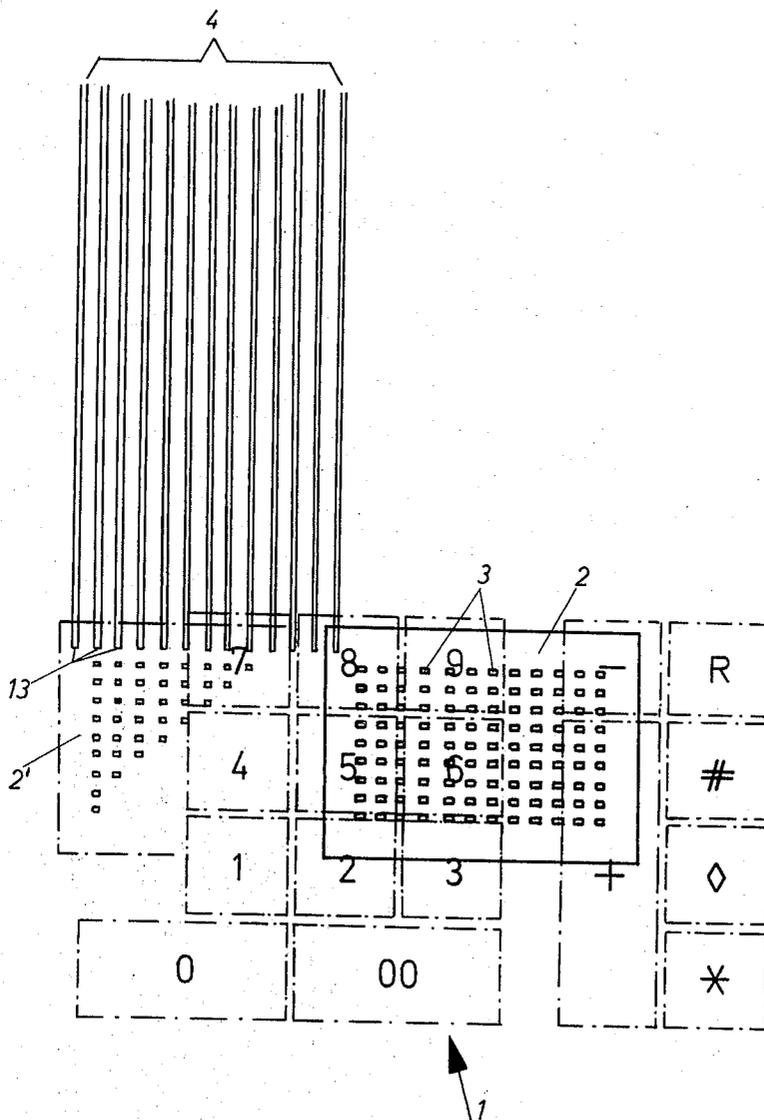


Fig. 2



VALUE INPUT MECHANISM FOR CALCULATING MACHINES

The present invention relates to the value input mechanism of a ten-key calculating machine, more particularly, to the sensing by value selector members of set pins moved in response to an actuated value key on the keyboard.

Ten-key calculating machines have been constructed utilizing a set pin carriage which is moveable transversely stepwise in response to actuation of the value keys on the keyboard. Actuation of these keys introduces a value into the set pin carriage from which the values are then transferred by value selector members sensing actuated set pins into totalizing and printing units.

The set pin carriage of such a calculating machine comprises a plurality of tens series of set pins with each series including pins 0 to 8 with the number of series corresponding to the digital position capacity of the machine. Generally, a stop bar is positioned to the right of the selector members for the nine set pins. The set pin carriage faces the value selector members on such ten-key calculating machines as disclosed in the German patents 1,010,299 and 1,084,997. The principle of operation of such ten-key calculating machines was also described in the second edition of the book by Wilhelm Lind, "Bueromaschinen" [Office Machines] published by Winter'sche Verlagsbuchhandlung part 1, pages 107-117.

In this known construction of a calculating machine, during an operating cycle of the machine when no previous value has been introduced into the machine the movement of every selector member moving past the 0 value in the direction of increasing value must be stopped by a 0 stop bar. This stop bar was either fixedly mounted within the machine or is mounted on the set pin carriage so as to be displaceable thereof and was positioned to the left of and beside the 0 pin series. This 0 stop bar which is then situated to the left of the selector members, as viewed by the operator of the calculating machine, when all digital positions of the machine have been utilized thus determines the structural width of the machine in the direction toward the left. This is a disadvantageous relationship since the calculating machine must be made wider than functionally required with this extra being to accommodate the 0 stop bar.

The selector members which may comprise differential racks can be guided along straight lines upon guide rails or be pivotable about a pivot point when in the form of rack segments. In addition, in order to accommodate the total and subtotal operations of the machine the set pin carriage must be moved from the abutment position of the selector members or the selector members must be guided through a vertical or transverse displacement away from the 0 stop of the set pin carriage. The additional components necessary to accommodate this movement of the set pin carriage or displacement of the selector members requires a considerable volume which in turn also contributes to the unnecessarily increased overall dimensions of the machine.

It is therefore the principal object of the present invention to provide in a calculating machine a novel and improved set pin carriage whose simplified construc-

tion enables the overall dimensions of the carriage to be substantially reduced.

It is another object of the present invention to provide in a calculating machine a set pin carriage constructed to enable the machine to have a relatively narrower lateral dimension and which eliminates the functional components ordinarily required for totaling and subtotaling operations.

The objects of the present invention are attained and the disadvantages of the prior art as described above are eliminated by the present invention.

According to one aspect of the present invention a ten-key calculating machine has a value input mechanism which is responsive to the values introduced by actuating keys of a keyboard. The mechanism comprises a set pin carriage which is transversely moveable stepwise in response to actuation of the keys. A plurality of set pins are provided on the carriage corresponding to the values of 1 to 9 and positioned in individual tens series. A plurality of value selector members are employed for transferring values into a totalizer and a printer and are engageable with actuated set pins in descending order in the direction of the values from 9 to 1. Thus, each value selector member moves through a number of value divisions corresponding to the complement of 9 and this movement of a selector member is indicative of the value of the actuated key.

Other objects and advantages of the present invention will be apparent upon reference to the accompanying description when taken in conjunction with the following drawings, which are exemplary, wherein:

FIG. 1 is a vertical longitudinal sectional view as seen from the right side of a calculating machine with the components thereof being shown in their initial positions; and

FIG. 2 is a top plan view looking in the direction of the arrow A of FIG. 1 and showing the relative positions of the keyboard, the set pin carriage and the value selector members.

Proceeding next to the drawings wherein like reference symbols indicate the same parts throughout the various views a specific embodiment of the present invention will be described in detail.

As may be seen in FIG. 1, values are introduced in a known manner into the calculating machine by means of digital keys 1 to 9, a 0 key, and 00 key on a ten-key keyboard 1. The keyboard also includes several functional keys as known in the art. Positioned below the keyboard is a set pin carriage 2 which is moved transversely within the machine by a suitable mechanism upon actuation of the keys as known in the calculating machine art. The set pin carriage 2 comprises a plurality of set pins 3 which are actuated upon depression of a key. The set pins correspond to the values of 1 to 9 and are positioned in a plurality of individual tens series with each series corresponding to a tens or digital position on the machine. As viewed in FIG. 2, the set pin carriage 2 will move to the left by a tens division after each actuation of a key so that the actuated pins of several series represent a value to be introduced into the machine. Each series of set pins is aligned with the sliding movement of value selector members 4. Each of the selector members 4 carries a relatively moveable toothed rack 17 cooperating with a counter having addition and subtraction wheels. The rack 17 is displaced by an indicated value on its respective selector member 4 by means of a spring 18. The movement of each se-

lector member 4 is determined by the abutment of the selector member with an actuated set pin 3.

The value selector members 4 are released by a collector shaft 9 mounted on a pivotally mounted lever 8. Upon release of the selector members 4 tension spring 6 will pull the selector members toward the left as viewed in FIG. 1 a distance until sensing edge 13 on each end of a selector member engages an actuated set pin. The selector members thus move in the direction of the arrow 7 and that in contrast with the prior art each selector member moves a distance or number of value divisions which is a complement of the value 9. In accordance with the present invention the complementary values which are indicative of the keyed-in values are transferred into a counter 11 which operates as an adding unit for the addition function and also in the subtraction function. These complementary values are introduced into this counter without any manipulations or control actions by the operator of the machine.

As a specific example, in FIG. 1 the set pin corresponding to the keyed-in value of 6 has been actuated and extends in a downward position so as to be engageable by the sensing edge 13 of a selector member 4. This sensing edge will be in the position 13' upon contact with this actuated set pin. The rack 17 of this selector member has thus been displaced only three value divisions from its initial position. For the 0 value, the rack 17 of selector member 4 will be displaced over 9 value divisions until an abutment 5 on selector member 4 contacts a cross-piece 10 which also slideably supports the selector members. In the 0 position the abutment will be as indicated at 5' and the sensing edge of the selector member will be in position 13'' in which position the sensing edge is merely suspended and is not in contact with any set pin or stop bar. This means that 0 pins and the 0 stop bar as known in the prior art described above can be eliminated. This results in a reduction of the lateral dimension of the set pin carriage by about 50 percent and, further, the set pin carriage can be made smaller by one value division in the longitudinal direction of the machine. This reduction also contributes to a reduction in the overall longitudinal dimension of the machine. This will be apparent from the extreme left position 2'' of the set pin carriage as seen in FIG. 2. Further, the elimination of this structure in connection with the set pin carriage will reduce the weight and therefore the mass of the carriage.

A digit type wheel 12 of the printing unit which is not illustrated comprises a toothed sector which meshes with selector rack member 4 by means of an intermediate gear 19. The type wheel 12 is positioned to correspond with the complementary values and in the same manner as selector members 4 moves from the highest value position to the lowest value position or, from 9 to 0 position. In this manner, the type wheel 12 is pivoted through the corresponding number of value divisions in accordance with the displacement of selector rack member 4 and in accordance with the above specific example the value 6 is positioned in the printing position in front of a platen 14. Although the value 6 will be printed, the counter 11 will receive the value 3 which is the complement of 9 corresponding to the value 9 as keyed-into the set pin carriage. The representative value of 3 may be positive or negative in accordance with the actuated function key. At the same time, tens switching is achieved by means of a tens-

switching lever 15 and a supporting lever 16 in a manner known in the art.

As a result of this relationship of the value selector members with the set pins there is eliminated certain control functional components which permits the free passage of the selector members 4 for total and subtotal operations. Up to the present time, these components were required and thus constituted an additional expenditure in both costs and space with respect to the calculating machine. Because of the elimination of the 0 stop bar the 0 value is employed as an end position and the selector members 4 function as simple sensing push rods.

In order to clarify further the operation of the calculating machine disclosed herein there is provided the following example of calculation:

Keyed-in values	Values transferred into computing unit	Printed values
215.50	9999999 784.49	215.50
72.36	9999999 27.63	72.36
190.40	9999999 809.59	190.40
7.18	9999999 2.81	7.18
16.00	9999999 83.99	16.00
20.00	9999999 79.99	20.00
	9999999 312.91	687.08
	These values not printed	Total in computing unit

Thus it can be seen that the present invention has disclosed a value input mechanism for a calculating machine wherein those value selector members corresponding to the tens series of set pins which are not actuated move over a distance of 9 value divisions to the 0 value. This is evidenced by reference to the above example of computation. Since the thin edge of each value selector member functions as the sensing structure no additional structure is employed on the value selector members for the sensing function. Since the set pins are arranged with respect to the sensing edge of the value selector members in descending value the number of value divisions that a selector member moves will correspond to the complement of 9 of the value of the actuated digital key. All of the computations in the machine corresponding to the actuated function key are thus carried out with complement values of the keyed-in values. The result is a simplified and more compact set pin carriage which enables the overall dimensions of the calculating machine to be significantly reduced.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. In a ten-key calculating machine, a value input mechanism responsive to the values introduced by actuating keys of a keyboard, comprising a single set pin carriage transversely moveable stepwise in response to actuation of the keys, a plurality of set pins on said carriage corresponding to the values of 1 to 9 and positioned in individual tens series, and a plurality of moveably mounted value selector members each comprising a movable toothed rack arranged in substantially a straight line and each selector member corresponding to an individual tens series of set pins, said value selector members being released by a collector shaft mounted on a pivotally mounted lever, totalizer and printer

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means operatively actuated by said value selector members to receive values therefrom, each value selector member having a portion thereon engageable with an actuated set pin in a corresponding tens series for actuated values of from 1 to 9, means connected to each value selector member for moving said members in an actuated direction, the set pins of each tens series being arranged in descending order from 9 to 1 in the actuated direction of said value selector members whereby, for all calculating operations each value selector member moves in the actuated direction through a number of value divisions corresponding to the complement of 9 as an indication of the value of the actuated key.

2. In a calculating machine as claimed in claim 1 wherein the value selector member corresponding to the tens series of set pins which are not actuated moves in the actuated direction past all of the set pins in the

corresponding tens series over 9 value divisions to the 0 value.

3. In a calculating machine as claimed in claim 2 and comprising an abutment on each value selector member, and a cross-piece member supporting and guiding the movement of said selector members and engageable by said value selector member abutment to stop the selector member in a position past all of the set pins to indicate a 0 value.

4. In a calculating machine as claimed in claim 1 wherein the engageable portion of each value selector member comprises a thin end edge thereof which is engageable with an actuated set pin of its corresponding tens series so that said selector members can move freely past said set pins for totals and subtotals to positions to indicate 0 values.

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