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[54] **VALUE INPUT MECHANISM FOR TEN KEY CALCULATING MACHINES**

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[58] **Field of Search**....235/60 R, 60 TK, 145 R, 58 R

[56] **References Cited**

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[57] **ABSTRACT**

The value entering device for a calculating machine has a carriage transversely slideable beneath a key board having nine digit keys arranged in three rows of three keys each. There is a key rod for each key with the rods being positioned in groups of three corresponding to the key rows. There are ten longitudinally moveable slide members mounted in the carriage with each slide member having three stops corresponding to the three groups of key rods so that pressing a key in the key board positions a key rod in the path of its corresponding stop to position the slide member responsive to the value of the depressed key.

9 Claims, 2 Drawing Figures

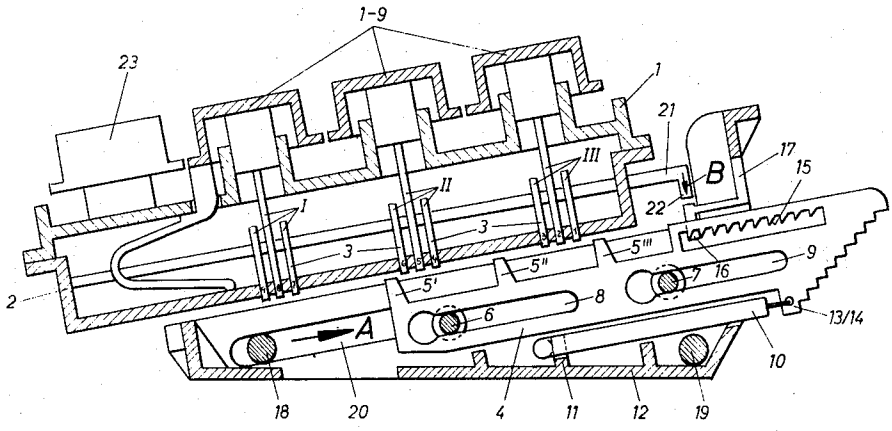


Fig. 1

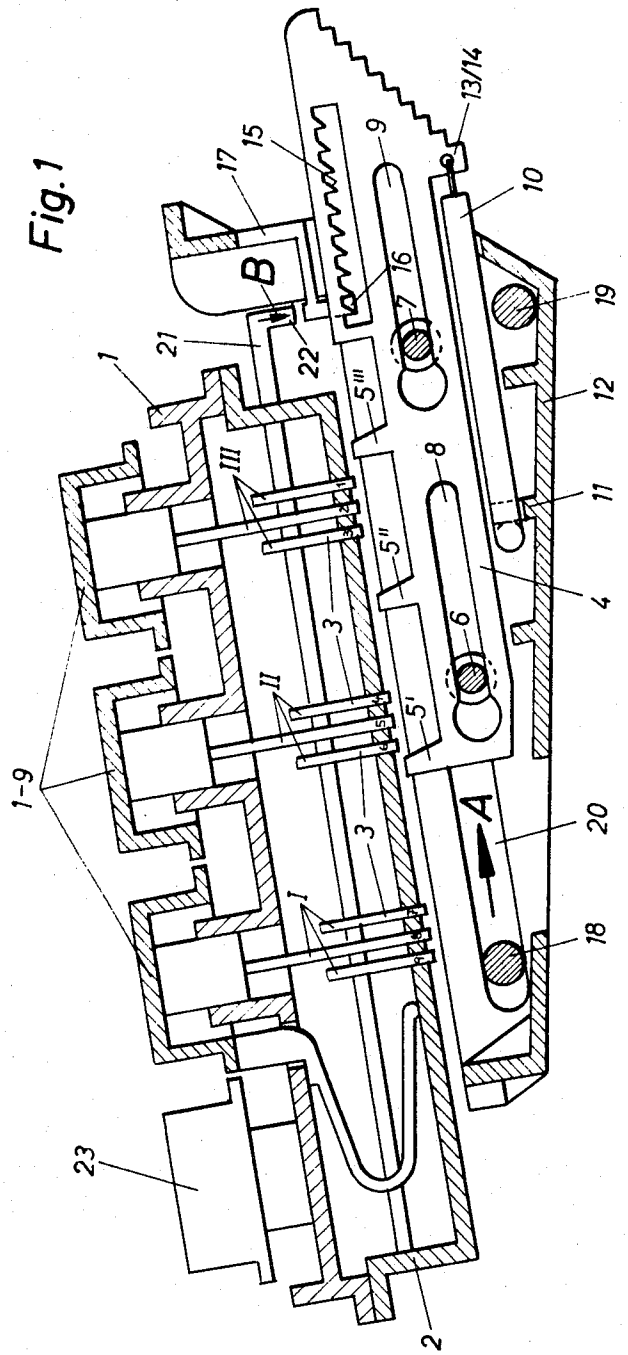
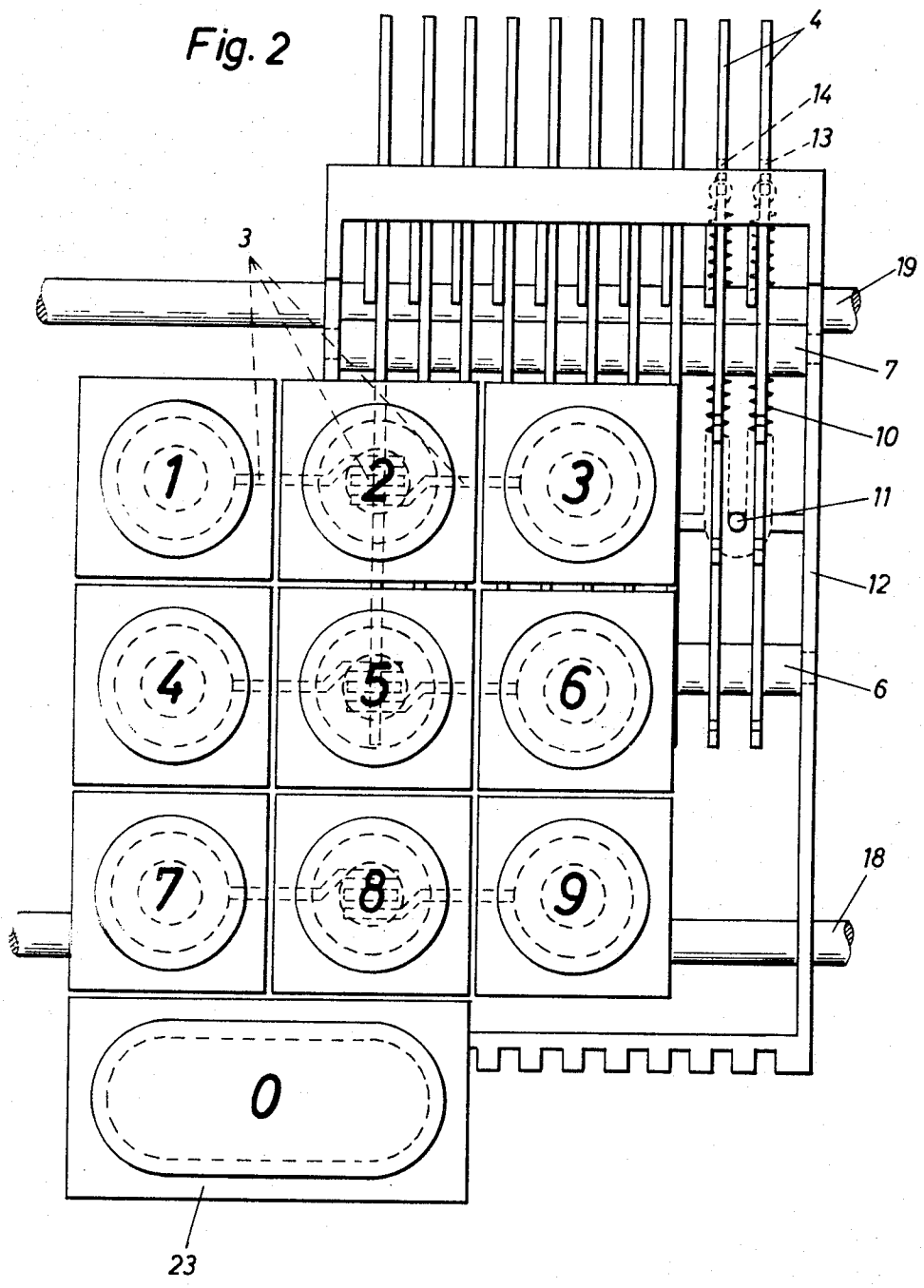


Fig. 2



VALUE INPUT MECHANISM FOR TEN KEY CALCULATING MACHINES

The present invention relates to a ten key calculating and adding machine, more particularly, to the device for entering values into the actuating mechanism of such a calculating machine.

It has been known to construct calculating and adding machines wherein values are entered into a storage mechanism by means of a set pin carriage. The set pin carriage is transversely moveable below the keys and has a plurality of pins generally comprising a series of nine pins for each of the ten keys. Depression of a key thus depresses a corresponding set pin which in turn actuates a longitudinally moveable slide member or differential member. The distance which the slide member moves is usually determined by a set pin or a mechanism actuated by the set pin engaging a toothed rack in the slide member to position the slide member in response to the value of the depressed key. In this manner, the various values, data or other information which is introduced into the machine by depressing proper keys on the key board is transmitted to the various mechanisms of the calculating machine which may include the totalizer, the storage register and the operated or printing device.

Calculating machines have also been constructed which eliminated the use of the above described set pin carriage. In such machines the depression of the keys in the key board to enter values into the machine actuated various rods linked with a driving mechanism which in turn positioned toothed segments to correspond to the values of the depressed keys. These toothed segments also operated in connection with the totalizer, storage registers or recording mechanisms of the calculating machines, as, for example, in German Patents 673,501 and 1,030,073.

While such previously known mechanisms for entering values in calculating machines have been generally satisfactory from the operating view point, they have been generally characterized as being extremely complicated in construction, they required expensive and specially trained techniques for the construction and assembly and contributed greatly to the high production costs of manufacturing such calculating machines. Thus, such calculating machines even though intended as general purpose machines had to be included in the higher priced machines because of their extremely expensive methods of production. The trained personnel and experts in the construction of such calculating machines have thus long sought more simplified and less expensive structure for entering values into calculating machines.

It is therefore the principal object of the present invention to provide a novel and improved ten key calculating and adding machine.

It is another object of the present invention to provide a novel and improved device for entering values into a calculating and adding machine.

It is a further object of the present invention is to provide in a calculating and adding machine a device for entering values therein which is simple in construction and operation, and reduces significantly the size and space occupied by such a device so that a relatively inexpensive calculating machine can be constructed which can effectively and efficiently perform the functions of much more expensive and complicated calculating machines.

The objects of the present invention are achieved and the disadvantages as described above are overcome by the value entering mechanism for a ten key calculating and adding machine as disclosed herein. This mechanism essentially comprises a carriage which is transversely slideable stepwise in response to actuation of the digit keys positioned in a key board above the carriage. The key board comprises nine depressible digit keys arranged in three rows of three keys each and a zero key. A corresponding plurality of key rods are positioned in groups of three corresponding to the key rows with each rod being actuated by a corresponding depressed key. A corresponding plurality of slide members are positioned in the carriage for longitudinal movement and are engagable by the key rods. Each slide member has three projecting abutment stops which correspond to the three groups of key rods. Each key rod of a group is positioned in the path of the corresponding abutment stop upon depression of a key to stop the slide member in a position which is responsive to the value of the depressed 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 sectional view of the value entering mechanism according to the present invention with the components of the mechanism being shown in their original or unactuated positions; and

FIG. 2 is a top plan view of the key board and value entering mechanism as shown in FIG. 1.

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

As may be seen in both FIGS. 1 and 2, the casing or housing for the key board comprises an upper section 1 and a lower section, 2. A plurality of digit keys having the digits "1-9" thereon and a "0" key 23 are positioned in the key board for vertical movement therein. A key rod 3 corresponds to each of the digit keys with these key rods being positioned essentially transversely of the key board as may be seen in FIG. 2.

The digit keys are arranged on the key board in three rows or groups I, II and III of three keys each. The disposition of specific digit keys in their groups or rows may be seen from the drawings.

Ten slide members corresponding to the digit keys "1-9" and to the zero key 23 are slideably mounted within a carriage 12 for longitudinal movement therein. The slides 4 are each provided with longitudinally extending slots 8 and 9 through which pass supporting shafts 6 and 7, respectively. Each adjacent pair of slides 4 is connected by a spring 10 to a rib 11 formed on the bottom surface of the carriage 12. The free ends of each spring 10 are attached in openings 13 and 14 of each pair of slides as may be seen in the drawings. The upper surface of each slide 4 is provided with three projecting abutment stops 5', 5'' and 5''' with these abutment stops corresponding to the three groups I, II and III of the digit keys.

Both the carriage 12 and the slides 4 are made of suitable synthetic thermoplastic material.

Each of the slides is also formed with an internal toothed rack **15** formed in a longitudinally extending slot as may be seen in FIG. **1**. The rack **15** has ten teeth corresponding to the digit values of the keys of the key board. The slides are retained in their unactuated positions as shown in FIG. **1** by means of a locking arm **17** which has a detent **16** engagable with the teeth of the rack **15**. The arm **17** may be integral with the frame of the carriage **12** and also formed of a suitable plastic material so as to be resilient.

The carriage **12** which is positioned under the key board **1**, **2** is moved transversely by a suitable mechanism upon actuation of the keys as known in the calculating machine art. The carriage **12** is supported upon a pair of parallel supporting rods **18** and **19**. The supporting rod **18** is positioned within a guide slot **20** and is moveable transversely in the direction of the arrow A. Since the supporting rod **18** is positioned rearwardly of the slides **4**, movement of the rod **18** in the direction of the arrow A will cause this rod to return or reset the slides to their normal unactuated positions.

Pivotally mounted in the key board casing **1**, **2** is a switch lever **21** whose free end is provided with a bent nose portion **22** which is engagable with the end of the resilient arm **17** upon which the detent **16** is located. Movement of the free end of the lever arm **21** in the direction of the arrow B will cause the nose **22** to engage the arm **17** and disengage the detent **16** from the toothed rack **15**.

The switch lever **21** moves upon actuation of each of the digit keys "1–9" but does not move upon actuation of the zero key **23**. Actuation of the zero key will cause only a transverse movement of the carriage **12** through one graduate step in the manner known in the art.

In operation, depression of the digit key "1" will actuate the corresponding key rod "1" and cause this key rod to be positioned in the path of the abutment stop **5'''** on the slide **4**. At the same time of the downward movement of the key rod "1" into the path of stop **5'''**, the key rod "1" will depress the switch lever **21** to cause the switch lever to disengage detent **16** from the toothed rack **15**. The slide member **4** is now disengaged from its locked position and will be displaced under the action of spring **10** a distance until its abutment stop **5'''** engages the depressed key rod "1".

The key rods **3** are so positioned that the distance between them represents one division of value. This means that the distance between abutment **5'''** on a slide **4** and the key "3" is equal to three value divisions, the distance between abutment **5''** and key "6" is equal to six value divisions and that the distance between abutment **5'** and key "9" is equal to nine value divisions.

When the pressure by the operator's finger is released from a depressed key, the key will immediately rise to its normal position as shown in FIG. **1** and the resilient switch lever **21** will also rise to its normal position as shown in FIG. **1**. As a result, the locking detent **16** will again become lockingly engaged into the toothed rack **15** before the key rod **3** moves outside the range of the abutment **5'''**. The slide **4** will then be locked into a position by means of a detent engaging the toothed rack **15** which corresponds to or is responsive to the value of the depressed key. Immediately following depression of a key, the transport carriage **12** is moved transversely one step by the switching mechanism which is known in the art to be used with such carriages.

Depression of a subsequent digital key will thus cause the next slide member **4** to be positioned in response to this value of the key. This procedure is followed until a complete value has been entered into the mechanism by depression of the proper keys.

Upon completion of entering of the value the return shaft **18** is displaced in the direction indicated by the arrow A in a manner as known in the art and all of the positioned slides **4** will be returned to their initial unactuated positions. This resetting or returning of the slide members to their normal positions is also known in the art and it is not necessary to explain in further detail this operation.

Thus it can be seen that the present invention has disclosed a mechanism for entering values into a calculating or adding machine. The mechanism is extremely simple in structure and reliable in operation. The cost of production of such a mechanism is significantly reduced by the use of synthetic plastic materials for several of the components and by the simplicity of the overall structure.

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, the combination of a carriage transversely slideable stepwise in response to actuation of the keys, a keyboard above said carriage and having nine depressible digit keys positioned in three rows of three keys each, a corresponding plurality of key rods positioned in groups of three corresponding to said key rows with each rod being actuated by a corresponding depressed digit key, a corresponding plurality of slide members longitudinally moveable in said carriage and engagable by said key rods, each slide member having three projecting stops thereon corresponding to said three groups of key rods, each key rod of a group being positionable in the path of its corresponding stop to position the slide member responsive to the digit of the depressed key.

2. In a calculating machine as claimed in claim **1** wherein each slide member has a toothed rack thereon, and means on said carriage engagable with said toothed rack for locking the slide member in a position responsive to the depressed key.

3. In a calculating machine as claimed in claim **2** wherein said locking means comprises a resilient arm extending from said carriage, said arm having a detent thereon engagable with said rack.

4. In a calculating machine as claimed in claim **3** wherein said carriage is of a synthetic plastic material, said arm is integral with said carriage.

5. In a calculating machine as claimed in claim **3** and comprising a pivotally mounted switch lever engagable by an actuated key rod, said switch lever having one end engagable with said arm to release said arm detent from locking engagement with said toothed rack so that the slide member is free to move.

6. In a calculating machine as claimed in claim **4** wherein said slide members are of a synthetic plastic material.

7. In a calculating machine as claimed in claim 1 and comprising a spring connected to each pair of slide members to urge said slide members into their unactuated positions.

8. In a calculating machine as claimed in claim 1 and comprising a pair of parallel supporting rods upon which said carriage is slideably mounted.

9. In a calculating machine as claimed in claim 8 wherein one of said supporting rods is positioned rearwardly of said slide members and is moveable laterally to engage actuated slide members and return said slide members to their unactuated positions.

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