

Jan. 31, 1950

R. E. BOYDEN

2,495,832

KEYBOARD FOR CALCULATING MACHINES

Original Filed March 13, 1945

2 Sheets-Sheet 1

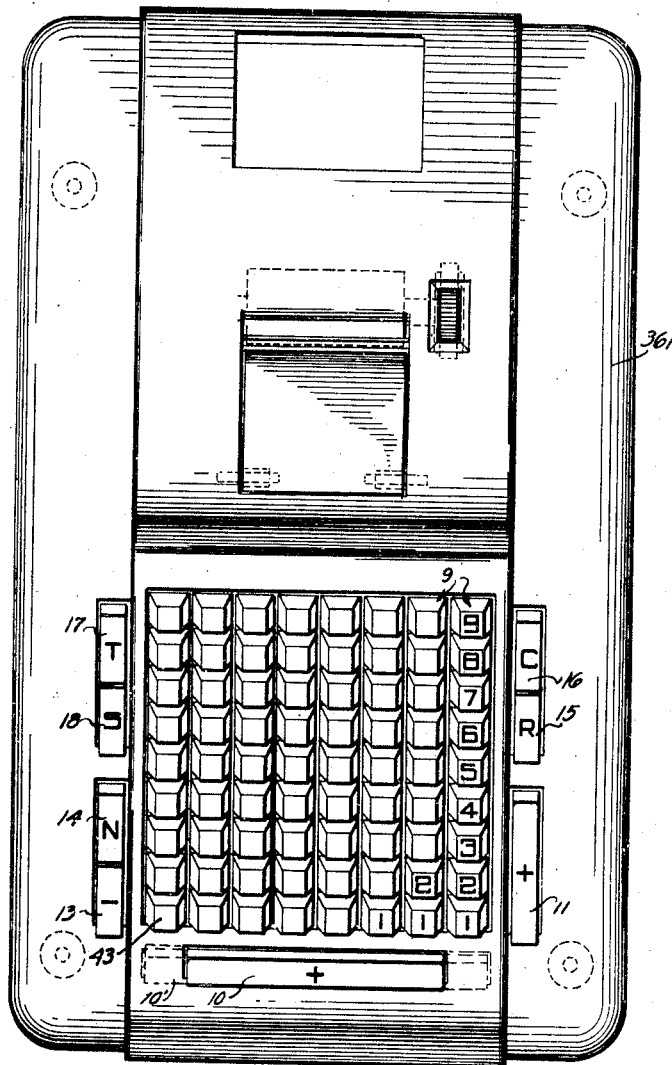


FIG. 1.

INVENTOR.

ROBERT E. BOYDEN

BY

Fred N. Schwend
ATTORNEY

Jan. 31, 1950

R. E. BOYDEN

2,495,832

KEYBOARD FOR CALCULATING MACHINES

Original Filed March 13, 1945

2 Sheets-Sheet 2

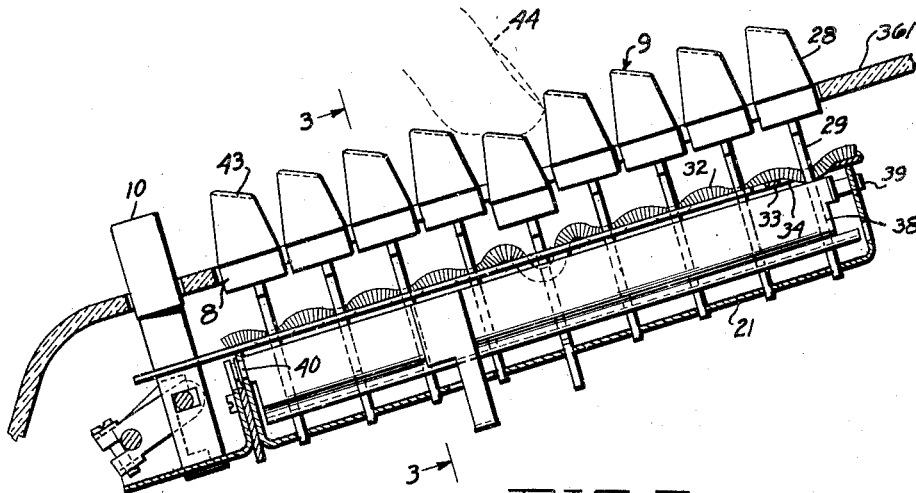


FIG. 2.

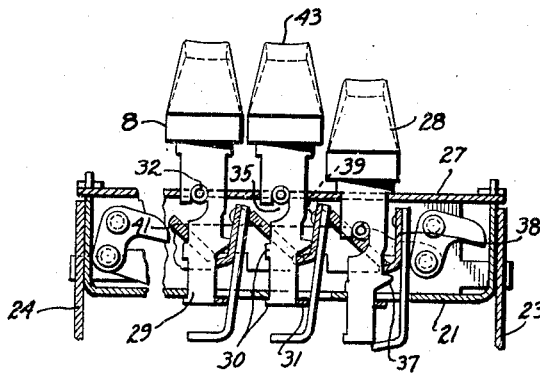


FIG. 3.

INVENTOR.
ROBERT E. BOYDEN

BY

Fred M. Schwend
ATTORNEY

UNITED STATES PATENT OFFICE

2,495,832

KEYBOARD FOR CALCULATING MACHINES

Robert E. Boyden, Los Angeles, Calif., assignor to
Clary Multiplier Corporation, Los Angeles,
Calif., a corporation of California

Original application March 13, 1945, Serial No.
582,553. Divided and this application Decem-
ber 30, 1946, Serial No. 719,244

2 Claims. (Cl. 235-145)

1

This invention relates to calculating machines and the like and has particular reference to key-boards for entering amounts and for controlling functions of such machines.

A principal object of the present invention is to facilitate control of a machine of the above type and consequently reduce the strain upon an operator when operating the machine over a long period of time.

Another object is to reduce the spacing between keys of a keyboard beyond the normal spacing generally accepted as a standard while minimizing the possibility of an operator's fingers striking two adjacent keys at once.

Another object is to provide a keyboard which is easy to clean of dust and dirt.

Another object is to obviate the necessity of providing the usual plate which is coextensive with the casing of the machine and through which the keys are extended to prevent the interior of the machine from being visible to the operator and to restrict dust and dirt from falling into the interior of the machine.

Another object is to facilitate simultaneous depression of any amount entering key in a keyboard and a control bar for effecting operation of the machine.

The manner in which the above and other objects of the invention are accomplished will be readily understood on reference to the following specification when read in conjunction with the accompanying drawings, wherein:

Fig. 1 is a plan view of an adding machine embodying a preferred form of the invention.

Fig. 2 is a longitudinal sectional view through the keyboard.

Fig. 3 is a transverse sectional view through the keyboard and is taken along the line 3-3 of Fig. 2.

The present invention is disclosed in connection with the well known Clary adding machine which is disclosed and claimed in the copending application of Robert E. Boyden, Serial Number 582,553, filed March 13, 1945, and entitled "Calculating machine." The present application is a division of said copending application and reference is hereby made thereto for an understanding of details of the machine not specifically disclosed herein.

However, it is to be understood that at least certain phases of the present invention may be equally well applied to machines other than the above, such as check writing machines, bookkeeping machines, etc.

Referring to Fig. 1, the adding machine is of the motor operated type and is encased in a cover

2

361 of plastic or similar material. Apertures are formed in said casing through which project the various control keys and bars for controlling the functions of the machine.

An amount to be added or subtracted is set up by depressing appropriate "amount" keys 9 in accordance with the value and denominational relationship of the digits of the amount. In order to add this amount into the machine, one or the other of two add bars 10 and 11 is depressed. Depression of such bars initiates operation of the motor, causing the amount set up on the keys 9 to be added into an accumulator (not shown) and to be printed in a manner not shown upon a paper strip. If the amount set up on the keys 9 is to be subtracted from an amount stored in the accumulator, a "minus" bar 13 is depressed.

If it is desired to print an amount set up on the keys 9, but not to add the same in the accumulator, a "non-add" bar 14 would be depressed. If it is desired to add the same amount in the accumulator two or more times a "repeat" bar 15 is depressed and held down until the requisite number of additions are made by the machine. If a wrong amount is set up on the keys 9, the amount keys may be released from depressed position by depressing a "correction" bar 16.

When it is desired to obtain a total of a number of additions or the net total value of additions and subtractions entered into the accumulator, a "total" bar 17 is depressed. In the event it is desired to obtain a sub-total, a "sub-total" bar 18 is depressed.

It will be noted that the various control bars 10, 11, and 13 to 18, inclusive, are closely grouped around the amount keys 9 so that an operator, when using the well known "touch" system, may easily span whichever control bar he intends to press along with one or more amount keys to be depressed by the same finger stroke.

The add bar 10 in the front of the machine extends substantially the width of the keyboard and may, if desired, be extended the full width of the various banks of amount keys 9 as indicate by the dotted lines 10' whereby an operator may easily strike the bar with his thumb or other finger regardless of the position of his hand relative to the keyboard. Also, the location of the add bar 10 enables convenient depression thereof by the thumb of the operator regardless of which hand he naturally uses in setting up a factor on the keyboard.

Referring particularly to Fig. 1, it will be seen that the spacing of the amount keys longitudinal-

ly of the machine is condensed relative to the spacing thereof laterally. Preferably, the longitudinal spacing between key centers is approximately $\frac{3}{8}$ of an inch while the lateral spacing is approximately $\frac{5}{8}$ of an inch, said lateral spacing being a standard dimension for keyboards of this type. Thus, using a normal arrangement in which nine keys, ranging in value from 1 to 9, are located in each key row. The above longitudinal spacing insures that an operator with normal sized fingers and hands may easily span both the add bar 10 and any one of the amount keys in the keyboard so as to simultaneously depress the same.

Also, the provision of the two add bars 10 and 11 insures that one or the other may be easily reached by any digit of the operator's hand, depending upon his liking or the convenience of one of the other bars to the particular position of his hand when entering different sets of values.

The amount key keyboard is of the flexible type in which depression of any key serves to release any other depressed key in the same row. Also, the depressed key is itself locked when it reaches a fully depressed position.

The keyboard comprises a frame 21 having side walls suitably secured in a manner not shown to the stationary machine side frames, portions of which are shown at 23 and 24 (Fig. 3). A top plate 27 is securely mounted on the side walls of the key frame 21.

Each of the keys 9 comprises a keytop 28 of plastic or similar material integral with a key-stem 29 guided in aligned slots formed in the plate 27 and the key frame 21.

The keystem of each key has a pair of spaced shoulders 30 which limit against the top and bottom surfaces of the key frame 21, while a retainer strip 31 extending along each row of keys, and suitably secured to the bottom of the key frame, retains the key within the slots.

The keys in each bank are yieldably pressed upward by a tension spring 32 extending the length of the keyboard and suitably attached at opposite ends to the plate 27. Said spring rests upon cross-ribs 33 formed across slots 34 in the plate 27 and extends within slots 35 in the key stem. Upon depression of a key, the adjacent portions of the spring are stretched to extend downwardly through the associated slot 34.

Means are provided for locking any of the keys 9 in their depressed positions as shown by the right hand key in Fig. 3. For this purpose, each key stem has a cam lobe 37 formed on the edge thereof opposite the shoulders 30 which, when the key is pressed downward, cams a locking bail 38 pivoted at opposite ends thereof to the front and rear side walls of the key frame 21 by trunnion bearings 39 and 40. A spring 41 yieldably urges the bail against the series of key stems in any one bank, and when a key is depressed, the cam lobe 37 thereon cams the bail outwardly to release any previously depressed key in the same bank. At the end of the key stroke, the cam lobe 37 passes below the bail, enabling the latter to retract partially into a position wherein it latches the key depressed.

The key top of each of the amount keys 9 is pyramidal in shape and the base thereof is rectangular in plan. Also, it will be noted that the bases of the various key tops are so proportioned that each base lies closely adjacent the base of a neighboring key. The sides of each key top converge upwardly from the base as shown in Figs. 2 and 3 to a top surface 43 having considerably

smaller area than the base. This reduction in the area of the top surface reduces the tendency of an operator's finger to span two adjacent keys if his finger were not correctly positioned over the desired key.

The arrangement of the bases of the key tops in juxtaposition with each other reduces the amount of dust and dirt which may fall between the same and also obviates the necessity of providing the usual perforated plate coextensive with the casing 361 through which the keytops would be extended in order to render the interior of the machine invisible to the operator.

It will be noted that the lines of intersection between the base of each key top and its converging sides lie substantially in the plane of the surface of the machine casing 361 so that such lines of intersection appear coextensive with the plane of the adjacent portions of the cover. Also, it will be noted that each of the key tops is provided with a short vertical skirt 8 forming the base of the key top which effectively blocks from view the interior of the machine when a juxtaposed key is depressed.

If desired, the skirt 8 of each key may be arranged in a color or color tone which contrasts with the color of the remaining portion of the key tops so that when a key is depressed, as shown in Fig. 2, the surrounding skirts of the various adjacent keys will become readily apparent whereby to quickly indicate to the operator the location of the particular depressed key.

Further, the top surfaces 43 of the key tops are formed at an angle to the general plane of the key board when viewing the same from the side of the machine and are preferably formed so that each is in a substantially horizontal plane. This construction reduces the tendency of an operator's fingers to span two adjacent longitudinally disposed keys since none of the surfaces 43 is in a plane common to that of an adjacent key when viewed from the side. Thus, when an operator's finger strikes a key, as indicated by the dotted lines 44 of Fig. 2, the key in the rear thereof presents a substantially vertical wall to the finger while the key in front thereof will have its rear top edge substantially below the front surface of the key being depressed, and as a result, the tendency of the operator's finger to depress this latter key is considerably reduced until the key being depressed is well through its stroke.

In view of the juxtaposed position of the various key top bases, the need for the usual key top plate through which the various key tops usually extend, is eliminated along with the attendant glare caused by the flat reflective surface of the plate. The curved upper surfaces 43 of the key tops further attribute to the reduction of glare by eliminating any flat light reflecting planes or surfaces which might reflect light into the operator's eyes.

A further feature tending to reduce eye-strain is the pyramidal form of the key tops which reduces shadows formed by the key tops and the consequent confusion of tonal values presented to the operator's eyes.

Having thus described the invention what I desire to secure by United States Letters Patent is:

1. A keyboard comprising a plurality of juxtaposed keys arranged one behind the other, means whereby each of said keys may be depressed a predetermined distance, each of said keys comprising a base, the sides of said base extending

5

parallel and closely adjacent the sides of the bases of adjacent keys, a finger contacting surface having an area smaller than the cross sectional area of said base, and flat sides converging from said base to said finger contacting surface, said sides being of a length greater than said predetermined distance whereby an operator's finger, when depressing one of said keys, will not tend to strike the base of an adjoining one of said keys, and said finger contacting surface extending rearwardly and downwardly relative to the general plane of said keyboard at such an angle that when said key is depressed said surface thereof will extend in substantially the same plane as the said surface of a forward adjacent undepressed one of said keys.

2. In a calculating machine having a machine cover; an opening in said cover, a plurality of juxtaposed amount keys extending through and substantially filling said opening, means whereby each of said keys may be depressed a predetermined distance, each of said keys comprising a base, the sides of said base extending parallel and closely adjacent the sides of the bases of adjacent keys and extending vertically a distance at least equal to said distance of key depression, a finger contacting surface having an area smaller than the cross sectional area of said base, and sides converging from said base

6

to said finger contacting surface, said sides being of a length greater than said predetermined distance whereby an operator's finger, when depressing one of said keys, will not tend to strike the base of an adjoining one of said keys, the lines of intersections between said sides of said bases and said converging sides being normally located substantially in the plane of the portion of the upper surface of said cover extending adjacent said opening.

ROBERT E. BOYDEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
D. 135,442	Crosman	Apr. 6, 1943
718,486	Lotterhand	Jan. 13, 1903
1,773,026	Chase	Aug. 12, 1930
2,092,852	Payne	Sept. 14, 1937
2,173,636	Pott	Sept. 19, 1939
2,293,127	Fishback et al.	Aug. 18, 1942

FOREIGN PATENTS

Number	Country	Date
218,681	Switzerland	Apr. 16, 1942