

[72] Inventor William A. Allen
Berkeley, Calif.
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[73] Assignee SCM Corporation
New York, N.Y.

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Primary Examiner—Robert K. Schaefer
Assistant Examiner—Robert A. Vanderhye
Attorney—Robert B. Kennedy

[54] CALCULATOR KEYBOARD COVER INTERLOCK
WITH A DISPLAY COVER AND SWITCH
16 Claims, 7 Drawing Figs.

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200/61.58, 200/61.62, 312/309
[51] Int. Cl..... H01h 9/22,
H01h 3/16
[50] Field of Search..... 200/50 A,
61.58, 61.62, 61.75, 61.71; 312/223, 309; 74/483
R

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ABSTRACT: An electronic calculator comprising an input keyboard panel, an output display panel, and first and second cover means mounted for movement between positions covering and positions uncovering the panels. The calculator further comprises a calculator power switch mounted for movement between power-on and power-off positions. Means are provided for setting the power switch in the power-on position when the cover means are moved to their uncovering positions, and for setting the power switch in the power-off position when the cover means are moved to their covering positions. Means are also provide to permit manual movement of the power switch between its power-on and its power-off positions when the cover means are located in their uncovering positions. means are further provided for inhibiting manual movement of the power switch from its power-off to its power-on position when the cover means are located in their covering positions.

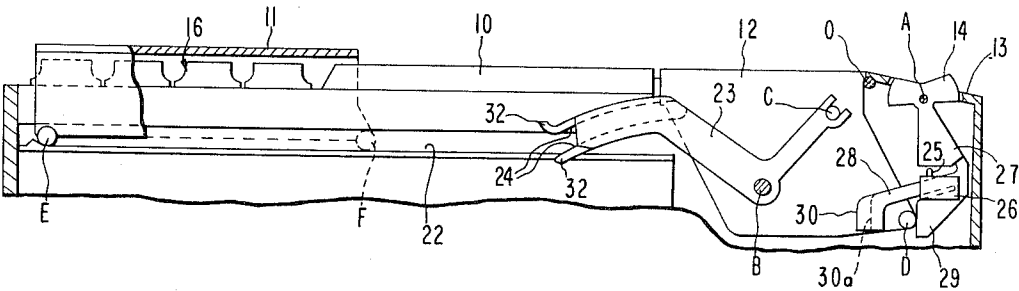


FIG. 1

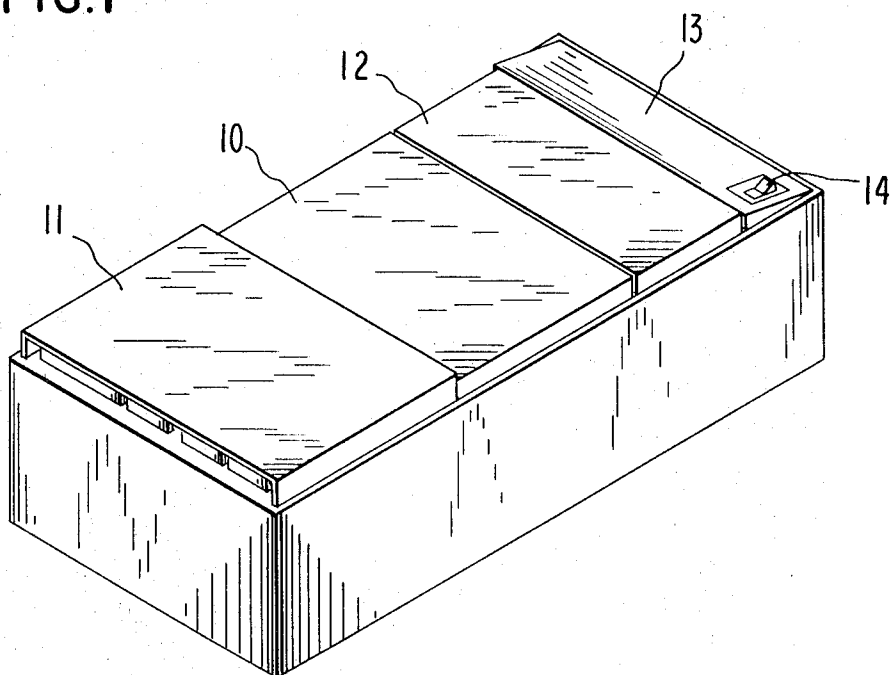
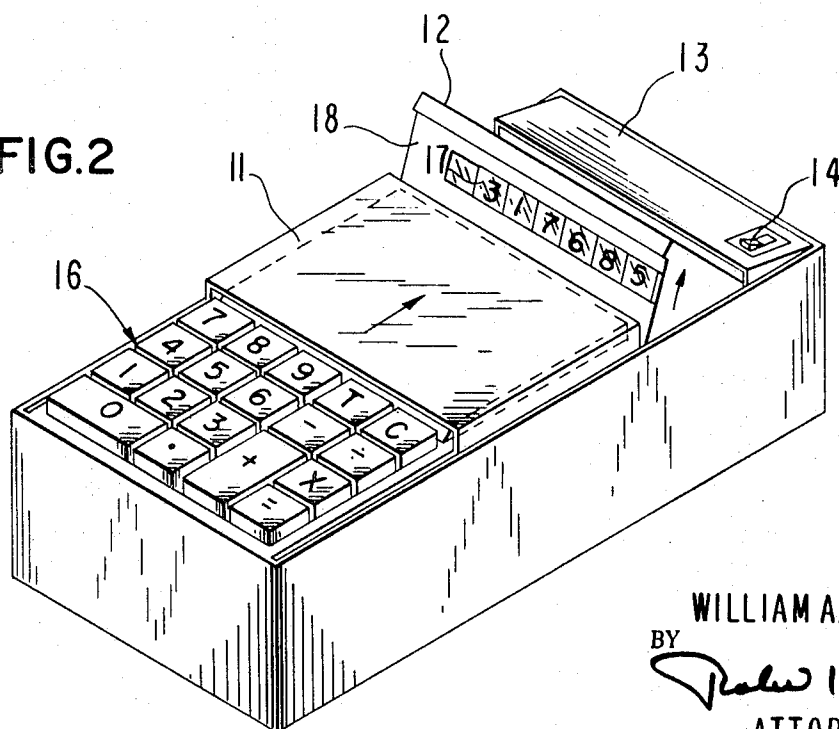


FIG. 2



INVENTOR.

WILLIAM A. ALLEN

BY

Robert J. Kennedy

ATTORNEY

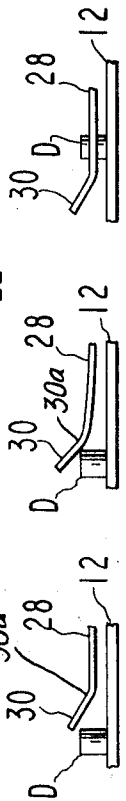
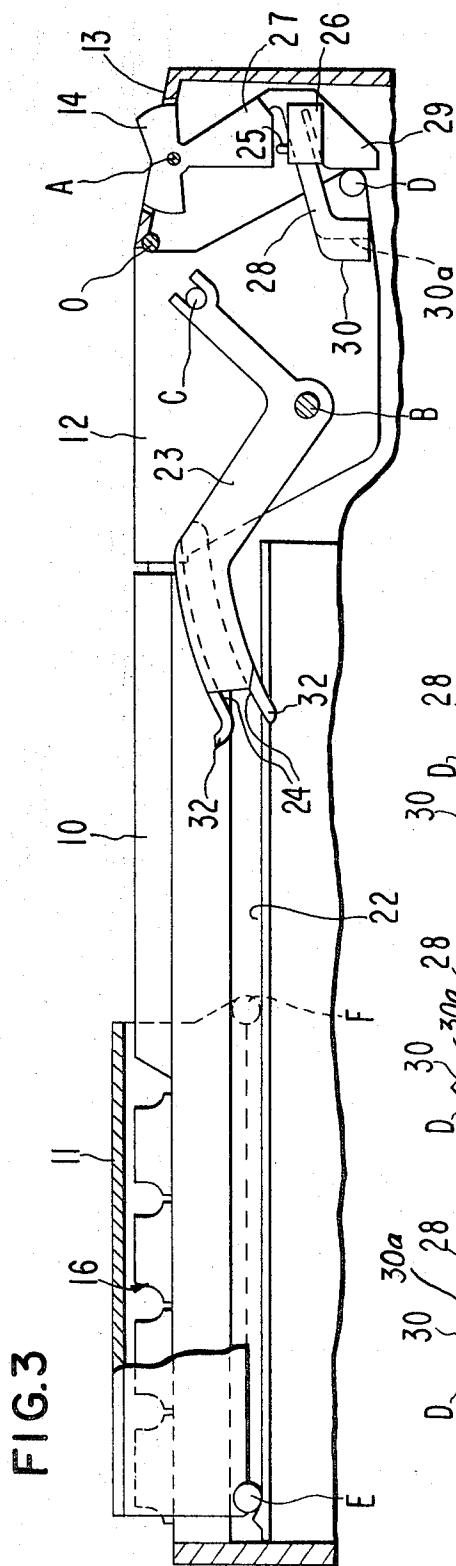
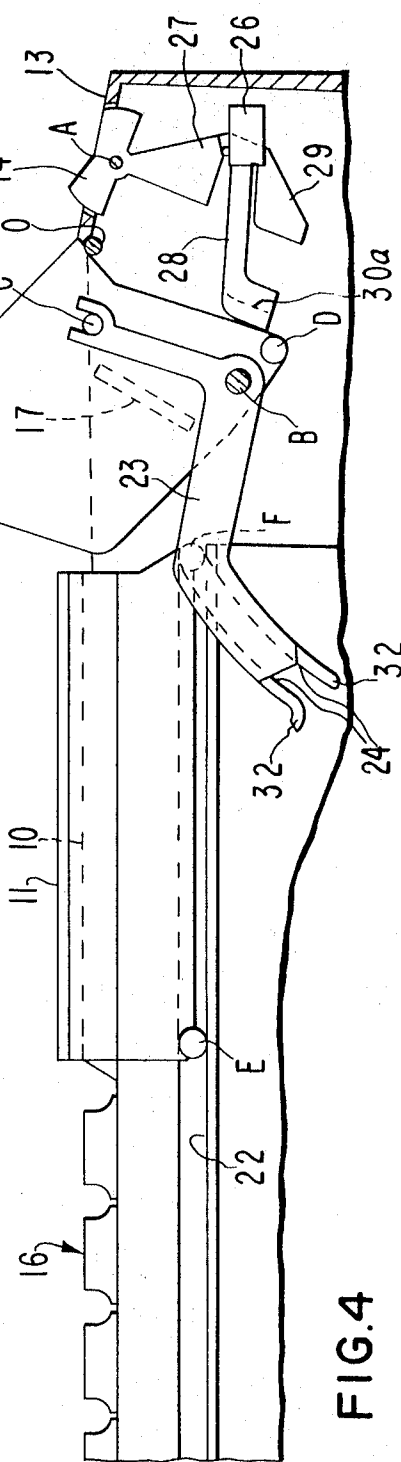


FIG.5B

FIG.5C



INVENTOR

WILLIAM A. ALLEN

BY

Robert J. [Signature]

ATTORNEY

CALCULATOR KEYBOARD COVER INTERLOCK WITH A DISPLAY COVER AND SWITCH

BACKGROUND OF THE INVENTION

This invention relates generally to electronic calculators, and particularly to relatively small, lightweight electronic calculators or "minicalculators" which may easily be carried about from place to place by individual users.

Electronic calculators, whether or not portable, ordinarily have both an externally accessible keyboard for manual inputs and an externally accessible and visible display panel for readout of calculated results. Calculators designed to be stationed and operated for long periods of time in one location frequently have a protective cover which fits over the keyboard and display panel. When such a calculator is to be used the cover is removed and set aside. Not all stationary electronic calculators have covers though since the risk of damage to the keyboard and display panel may be slight in view of their permanence of location and disposition. Indeed, some calculators are built right into instrument panels, walls and the like. In such cases covers mainly function as dust shields.

Minicalculators, on the other hand, are designed to be carried about from place to place in the hands, pockets and hand luggage of individual users. In such portable dispositions substantial risk exists of damage to externally accessible operative components of the calculator. Thus, the need for protective covers on minicalculators is great. At the same time however such calculators should preferably remain compact and retain esthetic appeal both with and without their covers. In addition, for manual simplicity and for loss prevention, the cover should remain attached to the calculator in some manner even when positioned to provide accessibility to the components it protects.

Accordingly, it is a general object of the present invention to provide an electronic calculator having an improved cover interlock mechanism.

More specifically, it is an object of the present invention to provide an electronic calculator having an externally accessible keyboard and display panel with protective covers attached to the calculator which may be manually positioned so as to cover or expose the keyboard and display panel.

Another object of the invention is to provide an electronic calculator having an externally accessible keyboard and luminous display panel with protective covers which may be manually located so as to completely cover the keyboard and luminous display panel in one position, and which may also be manually located in another position so as to completely expose the keyboard and luminous display panel, and to expose the latter in such a manner that it remains, while so exposed and electrically illuminated, sufficiently shielded from ambient light as to provide good viewing contrast.

Another object of the invention is to provide an electronic calculator having an externally accessible keyboard and display panel with a protective cover thereover which may be moved so as to expose the keyboard and display panel and in so moving switch on electrical power to the calculator.

Yet another object of the invention is to provide an electronic calculator having a manually operated power on-off switch, an externally accessible keyboard and display panel, and protective cover means which may be moved from a position covering the keyboard and display panel to a position exposing them and in so moving switch an electric power to the calculator; and which cover means may also be moved from a position exposing the keyboard and display panel to a position covering them and in so moving switch off electric power to the calculator and also render the power on-off switch incapable of switching on the power to the calculator when the keyboard and display panel are so covered.

SUMMARY OF THE INVENTION

Briefly described, the present invention is an electronic calculator comprising an input keyboard panel, an output display

panel, and first and second cover means mounted for movement between positions covering and positions uncovering the panels. The calculator further comprises a calculator power switch mounted for movement between power-on and power-off positions. Means are provided for setting the power switch in the power-on position when the cover means are moved to their uncovering positions, and for setting the power switch in the power-off position when the cover means are moved to their covering positions. Means are also provided to permit manual movement of the power switch between its power-on and its power-off positions when the cover means are located in their uncovering positions. Means are further provided for inhibiting manual movement of the power switch from its power-off to its power-on position when the cover means are located in their covering positions.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of an electronic calculator having a cover interlock mechanism in accordance with principles of the present invention and in which protective covers are positioned so as to cover the calculator keyboard and display panel.

FIG. 2 is another perspective view of the calculator shown in FIG. 1 in which protective covers are positioned so as to uncover and expose the calculator keyboard and display panel.

FIG. 3 is an elevational view, partly in cross section, of a preferred embodiment of the cover interlock mechanism having its components located in the relative positions they occupy when the calculator covers are positioned in their covering positions as shown in FIG. 1.

FIG. 4 is an elevational view, partly in cross section, of the cover interlock mechanism shown in FIG. 3 but with its components located in the relative positions they occupy when the calculator covers are positioned in their uncovering positions as shown in FIG. 2.

FIG. 5A, 5B and 5C are three sequentially positioned fragmentary plan views of selected components of the cover interlock mechanism shown in FIGS. 3 and 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in more detail to the drawing there is shown in FIG. 1 a relatively small, portable, electronic calculator having a top panel 10, a keyboard cover 11 adapted to slide over top panel 10, a rotatable covering hood 12, a fixed battery cover 13, an on-off power switch rocking member 14. Keyboard cover 11 may be manually slid over panel 10 to the position shown in FIG. 2 to expose keyboard 16 which comprises a set of individual keys bearing information indicia as shown. On sliding keyboard cover 11 forward over panel 10 hood 12 is caused to be rotated clockwise by linking means hereinafter described. As an alternative to rotary movement hood 12 could be mounted for linear movement through the use of a standard rack and pinion gear assembly.

In the rotated position shown in FIG. 2 hood 12 is so raised as to reveal luminous display panel 17. The display panel comprises a set of Nixie tubes each of which may be energized to radiate a digital light image out from hood 12 above the keyboard where it may be observed by the calculator operator. The presence of hood sideplates 18 restricts the entrance of ambient light to the display panel as does the hood itself in this position in order to shade the panel to provide good luminous contrast for ease of viewing.

In sliding keyboard cover 11 from the close position of FIG. 1 to the open position of FIG. 2 rocking member 14 is moved to the power on position. Thus, with one manual movement the calculator keyboard is uncovered, the luminous display panel is also uncovered, and the calculator power is turned on. In sliding keyboard cover 11 from the open position of FIG. 2 back to the closed position of FIG. 1 the keyboard and display panel are covered, the display panel is cleared, and the calculator power turned off. In the open position of FIG. 2 on-off power switch rocking member 14 may be manually moved to

shut off power to the calculator. However, the reverse is inhibited when the cover is in the closed position of FIG. 1 in order to prevent accidental consumption of power when the calculator is not in a manually operative position.

FIG. 3 illustrates a cover interlock mechanism which may be housed within the calculator and utilized in achieving the above-described functions in accordance with principles of the present invention. Keyboard cover 11 has two outwardly projecting pins E and F which lie within a recess in the calculator side frame which recess forms guide track 22. A similar pair may be present on the opposite side of the cover, but the description will be given with respect to one side only, for brevity.

Display covering hood 12 is mounted to the calculator frame to rotate about pivot point 0. Bellcrank 23, which is rotatably mounted to the calculator frame by pivot pin B, has a recess at one end thereof in which resides pin C which projects from hood 12. The opposite end of bellcrank 23 has an elongated recess forming camlike surfaces 24 of the bellcrank. Pin F is clear of lips 32 of surfaces 24 when keyboard cover 11 is located in the position shown in FIG. 1 which corresponds to the relative position of the components of the mechanism shown in FIG. 3. When the keyboard cover is slid along guide track 22 to the position shown in FIG. 2 pin F will first engage and then move deeper into the elongated recess formed by surfaces 24 of the bellcrank 23 thereby causing the bellcrank to rotate counterclockwise about pivot pin B and bring the interlock mechanism to the position shown in FIG. 4. This action will in turn cause hood 12 to rotate clockwise about pivot point 0 since bellcrank 23 engages pin C which projects from the hood. When keyboard cover 11 is returned to the closed position of FIGS. 1 and 3 by manual movement to the left from its position in FIG. 4, hood 12 will be likewise closed by counterclockwise rotation about pivot point 0.

With continued reference to FIG. 3 the calculator power switch is seen to comprise rocking member 14 which may be rocked on pin A to opposite detented positions and, in doing so, alternately depress and release actuator 25 of microswitch 26. To the base of rocking member 14 there is attached a switch arm member 27. From the lower portion of the switch arm member extend upper finger 28 and lower finger 29. Lower finger 29 is rigid; however, upper finger 28 is flexible in the direction normal to the drawing.

In the calculator closed condition of FIG. 3 pin D, mounted on hood 12, is seen to reside in a recess between fingers 28 and 29. Rocking member 14 is here positioned so as not to depress microswitch actuator 25 which would serve to turn on the power onto the electronic calculator. In this condition rocking member 14 cannot be rotated counterclockwise to turn power on since finger 29 would engage pin D, and the leverage is such that normal forces will not be sufficient to overcome frictional resistance. For greater resistance, a cover detent spring could be added.

When keyboard cover 11 is moved to expose the keyboard, and hood 12 is thereby rotated to expose the display panel, pin D, which is affixed to hood 12 as noted above, engages upper finger 28 causing it and rocking member 14 to rotate clockwise to depress microswitch actuator 25 and thereby turn calculator power on. At that point pin D escapes the recess between fingers 28 and 29 as hood 12 continues to rotate until it has reached its fully open position. With pin D thus departed, rocking member 14 may be manually rotated back to the power off position by depressing the left-hand side, as seen in the drawing, of its upper surface. When keyboard cover 11 is returned to its closed position hood 12 rotates counterclockwise and, if rocking member 14 is still in the power-on position, pin D engages the end of rigid lower finger 29 causing counterclockwise rotation of the rocking member to the power-off position. Should power have been manually turned off while the calculator covers were in the open position of FIG. 2 flexible upper finger 28 will be so located as to intercept pin D. However, as the upper finger is beveled from leading edge 30 to junction 30a, as indicated by

the dotted line in the drawing, such movement by pin D against the upper finger causes it to flex in a direction normal to the drawing thereby permitting pin D to reenter the recess between the switch fingers as sequentially shown by FIGS. 5A, 5B and 5C.

It should be understood that the above-described embodiment is merely illustrative of applications of the principle of the invention, and that many modifications may be made thereto without departure from the spirit and scope of the invention as set forth in the following claims.

I claim:

1. An electronic calculator comprising an input keyboard panel, an output display panel, first and second cover means mounted for movement between positions covering and positions uncovering said panels, a calculator power switch mounted to said calculator for movement between power-on and power-off positions, means for setting said switch in said power-on position when said cover means are moved to said uncovering positions and for setting said power switch in said power-off position when said cover means are moved to said covering positions, means for permitting manual movement of said power switch between said power-on and power-off positions when said cover means are located in said uncovering positions and for inhibiting manual movement of said power switch from said power-off to said power-on position when said cover means are located in said covering positions.

2. An electronic calculator in accordance with claim 1 comprising linking means connecting said first and second cover means.

3. An electronic calculator in accordance with claim 2 wherein said linking means comprises a bellcrank.

4. An electronic calculator in accordance with claim 1 wherein said first cover is mounted for substantially planar movement and said second cover is mounted for rotational movement.

5. An electronic calculator in accordance with claim 1 wherein said second cover means is mounted for rotation about a first axis and wherein said setting means includes a rocking structure pivotably mounted to the calculator for rotation about a second axis disposed substantially parallel to said first axis.

6. An electronic calculator in accordance with claim 5 wherein said permitting and inhibiting means includes a flexible member affixed to said pivotably mounted rocking structure.

7. An electronic calculator in accordance with claim 1 wherein said second cover means is mounted for rotation about a first axis and wherein said permitting and inhibiting means includes a member disposed for rotational movement about a second axis disposed substantially parallel to said first axis.

8. An electronic calculator comprising a rotatably mounted cover having a projection affixed thereto and an externally accessible power on-off switch, said power on-off switch comprising a rocking member mounted for movement in a discrete plane of motion, said switch rocking member having a flexible member affixed thereto located adjacent said projection with said flexible member being yieldable in directions substantially normal to said discrete plane of motion beyond an end of said projection, said flexible member having a leading surface beveled with respect to said discrete plane of motion and to a surface of said projection located adjacent said flexible member.

9. An electronic calculator in accordance with claim 8 wherein said power on-off switch further comprises a switch actuator located adjacent said rocking member in said discrete plane of motion whereby said actuator may be depressed and released as said rocking member is moved in said discrete plane of motion into and out of contact with said switch actuator.

10. An electronic calculator in accordance with claim 8 wherein said rocking member has a planar surface disposed substantially normal said discrete plane of motion and said

flexible member has a planar surface also disposed substantially normal said discrete plane of motion, said two planar surfaces being spaced from one another and located substantially opposed to and parallel with one another in juxtaposed relation with said cover projection locatable between said two planar surfaces by movement of said rotatably mounted cover. 5

11. An electronic calculator in accordance with claim 8 comprising a second cover mounted for planar movement and linking means pivotably mounted to the calculator in contact with said rotatably mounted cover and said second cover 10 whereby planar movement of said second cover may cause rotational movement of said rotatably mounted cover.

12. An electronic calculator in accordance with claim 11 wherein said linking means comprises a bellcrank.

13. An electronic calculator comprising a keyboard, a 15 keyboard cover, a visual display panel, a visual display panel cover, linking means between said keyboard cover and said visual display panel cover to cause movement of said visual display panel cover with respect to said visual display panel

upon movement of said keyboard cover with respect to said keyboard, and a power on-off switch comprising a pivotable member having a surface disposed for external, manual accessibility and a flexible finger member located adjacent said visual display panel and affixed to said pivotable member.

14. An electronic calculator in accordance with claim 13 wherein said visual display cover and said pivotable member are respectively mounted to said calculator for pivotable movement about two-spaced, substantially parallel axes.

15. An electronic calculator in accordance with claim 14 wherein said visual display cover has a projection located adjacent said flexible finger member at a distance from the axis about which said visual display cover pivots greater than the distance from which said flexible finger member is located from the axis about which said pivotable member pivots.

16. An electronic calculator in accordance with claim 13 wherein said linking means is a bellcrank.

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