

OPERATING DEVICE FOR ELECTRONIC FUNCTIONAL EQUIPMENT

The present invention relates to an operating device for electronic functional equipment
5 having a switch function disposed on the operating device housing.

Today's mobile phones, communication devices and other electronic functional
equipment have gradually acquired a large number of functions and in some cases large
display units (display screens) for purposes such as the adaptation of, for example,
10 mobile phones to the new GSM standard known as WAP. These apparatus contain vast
amounts of data and large menu systems, and therefore it is necessary to have simple and
efficient control of input and navigation. The aim of the present invention is to move
away from the large number of control keys that are found on such devices and
functional equipment so as to provide simple, logical and efficient operation, optionally
15 in interaction with a display unit.

The object of the invention is to provide some simplification of the solutions which, for
instance, are described in the applicant's earlier Norwegian Patent Applications
19985770 and 19995723. Furthermore, this application describes further details of some
20 of the embodiments in the applicant's earlier Norwegian Patent Applications 19996001
and 20004375.

According to a first aspect of the present invention, an operating device for electronic
functional equipment is provided, the operating device has a control element that is
25 depressible for activation of a switch function, the control element being movable in a
stepwise manner either longitudinally or rotatably in relation to the operating device
housing, and where the device has means for detecting the stepwise movement of the
control element, wherein on each side of the movement path of the control element there
is provided respectively a first and second switch; in connection with the control element
30 there is provided a third switch, the control element being arranged to be depressible for
actuation of the third switch; and said first, second and third switches are interrelated to
provide three possible options in the x direction for respective stepwise position of the
control element.

35 According to a second aspect of the present invention, an operating device for electronic
functional equipment is provided, the operating device has a set of function-related
switch buttons disposed on the operating device housing, wherein five switch buttons

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which are depressible in the z direction are provided; a first switch, a second switch and a third switch are arranged in the x direction, a fourth switch, the second switch and a fifth switch forming a switch array in the y direction; said first, second and third switches
5 are interrelated to provide three possible options in the x direction for a selected position in the y direction determined by activating one or the other of said fourth or fifth switches.

According to a third aspect of the present invention, an operating device for electronic
10 functional equipment is provided, the operating device has a control element that is depressible for activation of a switch function, and where the device has means for detecting the stepwise movement of the control element, wherein in the direction of the movement path of the control element there is provided respectively a first, second and third switch that are depressible in the z direction; and said first, second and third
15 switches are interrelated to provide three possible options in the x direction for respective stepwise position of the control element in the y direction.

According to a fourth aspect of the present invention, an operating device for electronic functional equipment is provided, the operating device has a control element in the form
20 of a belt, roller or cylinder that is rotatable relative to the operating device housing, and where the device has opto-electronic means for detecting the stepwise rotational movement of the control element, wherein along a portion of the control element transverse to its direction of movement there is provided respectively a first, second and third switch; a fourth switch detects the stepwise movement of the control element; and
25 said first, second and third switches provide three possible options for the operating device in the respective stepwise position of the control element.

The characteristic features of the invention are disclosed in the attached patent claims, and in the following description with reference to the attached drawings.

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Figure 1 shows the principle of an operating device according to a first embodiment of the invention.

Figure 2 shows a typical screen image on a display unit for use in connection with the
35 use of the operating device.

Figure 3 shows the operating device as disclosed in Fig. 1 in more detail.

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Fig. 4 shows the section IV-IV in Fig. 3.

Fig. 5 is a sectional view of the operating device shown in Fig. 3 with its control element
5 in a second end position.

Fig. 6 shows the section VI-VI in Fig. 3.

Fig. 7 shows a second embodiment of the operating device according to the invention.

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Fig. 8 shows the operating device in Fig. 7 in more detail.

Fig. 9 shows the section IX-IX in Fig. 8.

10 Fig. 10 is a sectional view of the device in Fig. 8 with its control element in a second end position.

Fig. 11 shows the section XI-XI in Fig. 8.

15 Fig. 12 shows a third embodiment that is a variant of the embodiment shown in Figs. 7-11.

Fig. 13 shows the section XIII-XIII in Fig. 12.

20 Figs. 14 and 15 show respectively the original state of a display screen image and an x/y related operating matrix.

Fig. 16 shows a fourth embodiment of the operating device according to the invention.

25 Fig. 17 shows a fifth embodiment of the operating device according to the invention.

Fig. 18 shows a typical screen image that is useful, for example, for use with the operating device according to Fig. 18.

30 Fig. 19 shows a variant of the operating device that is shown in Fig. 17.

Figs. 20-24 show the operating device according to Fig. 17 in more detail, where Fig. 20 shows the section XX-XX in Figs. 17 and 23, Fig. 21 shows the section XXI-XXI in Fig. 17 and Fig. 23, Fig. 22 shows the section XXII-XXII in Fig. 23 and Fig. 23 shows
35 the section XIII-XIII in Fig. 21.

Fig. 24 shows the section XXIV-XXIV in Fig. 18.

Fig. 25 shows a sixth embodiment of the operating device according to the invention.

Fig. 26 shows a horizontal section through the device shown in Fig. 25.

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Fig. 27 shows the section XXVII-XXVII in Fig. 26, and Fig. 28 shows the section XXVIII-XXVIII in Fig. 26.

Fig. 29 shows a seventh embodiment of the operating device according to the invention.

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Fig. 30 shows the section XXX-XXX in Fig. 29.

Fig. 31 shows the section XXXI-XXXI in Fig. 29.

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Fig. 32 shows the section XXXII-XXXII in Fig. 29.

Fig. 33 is a schematic illustration of switch contact points and control element sliding contacts, as indicated by the references XXXIII-XXXIII in Fig. 30.

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Fig. 34 shows the principle of the operating device according to Figs. 29-33.

Fig. 35 shows an eighth embodiment of the operating device according to the invention.

Fig. 1 shows an operating device 1 for electronic functional equipment, optionally in interaction with a display unit 2, as shown in Fig. 2, where the device has a control element 3 that is depressible for activation of a switch function, and is stepwise movable in the longitudinal direction relative to the operating device housing 4 (see Fig. 3), the movement of the control element 3 preferably being indicatable, and where the device has means 5-7 and 8-10 for detecting the stepwise movement of the control element.

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On each side of the movement path of the control element 3 there is provided respectively a first switch 11 and a second switch 12, both of which are depressible in the z direction. The switches 11, 12 have switch buttons 11', 12' for actuating respective switch functions. A third switch, here indicated by means of the reference numeral 13, is provided in connection with the control element 3. The control element 3 is arranged to be capable of depression against spring action in order to actuate the third switch 13. Said first, second and third switches 11-13 are interrelated to provide three possible options in the x direction for respective stepwise adjustment of the

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control element 3 in the y direction. The control element 3 is depressibly arranged in a slide 14, where sliding contacts connected to the switch 13 are provided on the underside of the slide, and where the sliding contacts, here indicated by means of the reference numerals 13' and 13'', form contact with busbars 15, 16. The stepwise movement of the control element 3 is made possible by a pair of spring-loaded lugs 17, 18 which engage successively with toothed portions 17', 18' on the operating device housing 19. The said means for detecting the stepwise movement of the control element 3 may, for example, consist of two light sources that each communicate with their respective pair of light receivers 6, 7 and 9, 10. In a first position of the control element 3, as shown in Fig. 3, all light receivers 6, 7, 9, 10 will be blocked from receiving light.

In a next stepwise position there will be light communication between the light source 5 and the receiver 6; in a next position the light receiver 7 will in addition receive light; in another position there will also be light communication between the light source 8 and the light receiver 9; and in a final position of the control element 3 there will in addition be light communication between the light source 8 and the light receiver 10.

Thus, when the control element 3 moved along its path, a cursor 20 (see Fig. 2) will mark the relevant symbols, letters or numbers that appear on the display screen 2. In the position of the control element 3 in the illustrated example a marking 20 of the numbers 7, 8 and 9 is indicated. Depression of the control element 3 to activate the switch 13 will produce the selection of, for example, the number 8, whilst depression of the switch button 11' will activate the switch 11, thereby selecting the number 7. The same will occur for the selection of the number 9 in connection with the switch 12.

A similar configuration as that shown in Figs. 1 and 3-6 can also be seen from Figs. 7-11. In these figures the control element is indicated by the reference numeral 21, whilst the switch keys for switches 11 and 12 are indicated by reference numerals 11' and 12'. However, it will be understood that the control element 21 itself is pivotally supported in the slide 22 about a shaft 23 and that in this case the third switch 13 is replaced by a rocker switch embodiment that has two active switch positions, as indicated by the reference numerals 24, 25. To be able to detect pivoting of the control element 21 about the shaft 23, so as to detect activation of the one switch 24 or the other switch 25, a number of contact points 26 are provided. In this case, for the sake of simplicity, optical detection of the stepwise positions of the control element is not used, but instead a busbar 27 and a row of conducting points 28 placed on a base 29, for example, a printed circuit board.

When, for example, the control element 21 is turned in an anti-clockwise direction with respect to that shown in Fig. 11, the switch 24 will be activated. Turning in a clockwise direction will cause the switch 25 to be activated. Sliding contacts 30 and 31 on the slide 22 will form contact with the continuous conductor 27 and the stepwise contact points 28 (see Fig. 10) respectively. Thus, it will always be possible to detect the stepwise position of the control element 21 with precision.

As with the embodiment shown in Figs. 3 and 5, the stepwise positions of the control element 21 are secured by means of notches 32, 33 on the operating device housing 34, a pair of spring-loaded pins 35, 36 being provided that have the same function as the pair of pins 17, 18 shown in connection with Figs. 3 and 5.

A variant of the embodiment shown in Figs. 7-11 can be seen in Figs. 12 and 13. The determination of the position of the slide is basically as shown for Figs. 9-11, and therefore the description thereof will not be repeated here. However, it will be understood that the control element, here indicated by the reference numeral 37, consists of two parts 37' and 37''. In this case there will be no turning of the control element 37, but instead a possibility for selective depression of either the control element part 37' to activate the switch 24, or depression of the control element part 37'' to activate the switch 25, or a possible depression of both control elements parts 37', 37'' to activate both switches 24 and 25. Here it will be understood immediately that if, for example, the mounting hole for the shaft 23 shown in Figs. 9 and 11 had been made having an oblong cross-section, as indicated by the reference numeral 23', both switches 24 and 25 could also be activated simultaneously by straight depression of the control element in addition to the possibility of turning control element forwards or backwards. In connection with the embodiments shown in Figs. 12 and 13, it will be understood that selective activation of the switches 11, 12, 24, 25 or a combination of switches 24 and 25 will be capable of producing four or five possible options for the operating device in the respective stepwise position of the slide 22.

As will be seen in Fig. 14, it is possible to start with simple menu where turning the control element or depression of one part or the other will be able to activate certain parts of a menu. However, on studying Fig. 15, it will be understood that the operating device, like that shown and described in connection with Fig. 2, is basically related to x/y movements, where the y movements indicate the stepwise movement of the control

element forwards or backwards and x designates switch activation alternatives in the z direction that are present in each y position of the control element.

Fig. 16 and 17 will now be described in more detail in connection with that apparent
5 from Figs. 20-24.

Fig. 16 shows a control element 38 that is rotatable relative to the operating device housing and where this control element 38 can be depressed in order to activate a switch function. In addition, on each side of the movement path (rotational direction) of the
10 control element there is provided respectively a first switch 39 and a second switch 40 which are respectively actuated by a depressible switch button 39', 40'.

In connection with the control element 38, there is provided in connection with its rotation a detector consisting of a light source 41 and a light receiver 42 which on
15 rotation of the control element detects passage of light or non-passage of light via the successive holes 43 that are found in the control element. If the control element 38 is pressed down, a third switch 44, 45 will be activated, this switch in a preferred embodiment comprising a light source 44 and a light receiver 45, wherein by depressing the control element 38 against the action of springs 46, the path of light between the
20 light source 44 and the light receiver 45 will be broken. Of course, it is also conceivable that instead of the light source 44 and the light receiver 45, an electromechanical switch may be arranged diametrically below the control element 38, i.e., between the light source 41 and the light receiver 42.

25 Depression of the control element is shown in more detail in Fig. 22. To secure the stepwise movement of the control element 38, this element may be provided with a plurality of recesses 47 placed in a ring and with which a spring-loaded ball 48 can successively engage. Thus, the user of the control element will quite definitely feel its stepwise movement. The use of opto-electronic means such as the light sources and the
30 light receivers shown in Figs. 20-23 would be practically advantageous even though other solutions, for example, the use of electromechanical switches is conceivable.

The switch functions represented by the reference numerals 39, 40 and 44, 45 respectively represent first, second and third switches respectively, which together
35 provide three possible options for the operating device in the respective, stepwise position of the control element 38.

In Fig. 17 the control element is shown having a fairly large axial dimension. The control element is indicated in this figure by the reference numeral 49, and the switch buttons that are to operate the first and second switches respectively are indicated by the reference numerals 50', 51'. It will also be seen here that, as in the embodiment shown in Fig. 16, the switch buttons are provided on each side of the control element parallel with its plane of movement. The switch buttons 50' and 51' are adapted to operate respective switches 50, 51 when depressed, as shown in Fig. 24. The control element 49 will otherwise have the same mode of operation as that shown and described in connection with Figs. 20-23, and therefore no further explanation is necessary. It will also be seen that the light transmission holes in the control element 49 are also indicated by the reference numeral 43 in this figure and interact with the detector pair 41, 42. In Fig. 21 it will be seen that the control element 38 is rotatable about a shaft 38', and similarly the control element 49 is rotatable about a shaft 49'. Also in the embodiment shown in Figs. 17 and 24, the switches 50, 51 together with a third switch, like that which comprises the light source 44 and the light receiver 45, will provide three possible options for the operating device in the respective stepwise position of the control element 49.

Fig. 19 shows a variant where the control element is indicated by the numeral 49' for movement in a menu or the like in the y direction. The control element does not necessarily need to have a switch function, as such a switch function can be provided by a switch button 49'' which controls a third switch 49'', whilst the buttons 50''' and 51''' control respective first and second switches 50'', 51''. Thus, the control element 49' will provide y movements, whilst the switch buttons will control the selection in the x position from among four possible options for each stepwise y position.

Figs. 25-28 show another operating device, where the device has a control element 53 that is movable and depressible relative to the operating device housing 52 and is in the form of a continuous belt, the movement of the control element 53 preferably being indicatable, and where the device has means, preferably opto-electronic means for detecting the stepwise movement of the control element. On each side of the control element and parallel to its direction of movement there is provided respectively a first switch 54 and a second switch 55 which can be actuated by means of respective switch keys 54' and 55'.

The depression movement of the control element 53 is designed to be detected by a third switch 56. The belt that constitutes the control element runs continuously around

two rollers 57 and 58. A fourth switch in the form of a light source 59 and a light receiver 60 detects the stepwise movement of the control element 53 that causes rotation of the rollers 57 and 58. The roller 57 around which the belt 53 runs is equipped with a plurality of axially extending holes 61, so that upon rotation of the roller 57 a light path and a broken light path through these holes 61 will be successively detected by the
5 fourth switch 59, 60. A number of recesses or depressions 62 with which a spring-loaded engaging ball 63 can successively engage are preferably provided on one of the rollers 58 in order to be able to secure a stepwise movement of the control element in the form of the belt 53. The rollers 57 and 58 are rotatable about respective shafts 57',
10 58'.

From Fig. 27 it can be seen that the belt 53 slides over a belt support 64. When the belt 53 is pressed downwards, the belt support 64 will be pressed downwards simultaneously, thereby activating the switch 56 that is supported by a base part 65
15 which may optionally be a part of the actual operating device housing 52.

Instead of using the light source 59 and the light receiver 60 to detect the stepwise movement of the belt and thus the stepwise rotation of the roll 57, the spring-loaded ball 63, for example, can form a fourth switch.

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Figs. 29-34 show another embodiment of the operating device where the operating device has a slide 66 having a control element 67 that is longitudinally movable in relation to the operating device housing 68, and where the movement of the slide and the control element is preferably indicatable in that provided on the base part 68' of the
25 operating device are a plurality of contact points 69 and a contact bar 70 that are brought respectively into electrical contact with sliding contacts 69' and 70' on the underside of the slide 66. On each side of the path of movement of the slide there is provided respectively a first switch 71 and a second switch 72 which are actuated by respective switch keys 71'' 72''

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On the slide 66 in connection with the control element 67, there is provided a third switch 73 for actuating this switch on depression of the control element 67. One of the contacts of the switch may be located on said base part 68' and is indicated by the reference numeral 73'. Initially, said first, second and third switches provided three
35 possible options for the operating device.

If the slide 66 is pushed against the action of a first spring 74 to a position as indicated by the reference numeral 75 (see Fig. 34), the sliding contact 69' will form contact with contact point 69'' (see Fig. 33). If, by using the control element 67, the slide 66 is pushed in the opposite direction against the action of a spring 76, the sliding contact 69' will form contact with the contact point 69''', and the slide is then at position 77 as indicated in Fig. 34. In the normal position (the centre position), the sliding contact 69' will form contact with the contact point 69''. Thus, the movement of the slide on contact of the sliding contact 69' with one of the contact points 69'', 69''' or 69'''' will indicate the position of the slide, as the current path is also via busbar 70 and sliding contact 70'. In connection with the switches 71 and 72, contact faces 71'' and 72'' may be on said base part 68'. In yet another embodiment of the operating device, as shown in Fig. 35, a set of function-related switch buttons 78-82 is provided, which buttons are depressible in the z direction in order to actuate a respective switch. The switches 78, 79 and 80 form respectively the first, second and third switches that are arranged in the x direction. The fourth switch 81, the second switch 79 and the fifth switch 82 together form the switch array in the y direction. Said first, second and third switches will be interrelated in order to provide three possible options in the x direction for a selected position in the y direction determined by activating one or the other of said fourth and fifth switches 81, 82. The operating device housing is indicated by the reference numeral 83.

P a t e n t c l a i m s

1. An operating device for electronic functional equipment, where the device has a control element that is depressible for activation of a switch function, the control element being movable in a stepwise manner either longitudinally or rotatably in relation to the operating device housing, and where the device has means for detecting the stepwise movement of the control element, wherein
 on each side of the movement path of the control element there is provided respectively a first and second switch;
 in connection with the control element there is provided a third switch, the control element being arranged to be depressible for actuation of the third switch; and
 said first, second and third switches are interrelated to provide three possible options for respective stepwise position of the control element.
2. An operating device according to claim 1, wherein the movement of the control element is indicatable.
3. An operating device according to claim 1 or 2, wherein the control element is pivotable in order to cause the third switch to act as a rocker switch with two active switch positions and/or as a press-down switch with one active switch position.
4. An operating device according to claim 1, 2 or 3, wherein the control element is divided into two parts and is adapted to actuate a first switch part and a second switch part of the third switch, these switch parts being independent of each other or both being adapted to be able to activate their respective switch function.
5. An operating device according to any one of the preceding claims, wherein
 the device has a slide that is longitudinally movable with said control element;
 sets of light sources and light receivers are provided along the movement path of the slide; and
 the movement of the slide blocks or opens the light path between said light sources and light receivers.

6. An operating device as disclosed in claim 5, wherein sliding contacts which are in contact with a respective contact bar in said housing are provided on the underside of the slide.

7. An operating device according to any one of claims 1 to 4, wherein the device has a slide;
said control element is longitudinally movable relative to the operating device housing;

in the housing along the movement path of the slide there is provided a contact bar and parallel thereto a plurality of contacts points, a respective sliding contact on the slide forming contact with the contact bar and successive contact points on the stepwise movement of the slide;

in connection with the control element there is provided a fourth switch for actuating said fourth switch by activating the control element; and

said first, second, third and fourth switches provide four or five possible options for the operating device in respective stepwise position of the slide.

8. An operating device according to claim 7, wherein
said third and fourth switches can be brought into contact with contact points provided in said housing at respective one of said stepwise positions of the slide; and
said third and fourth switches via one of said sliding contacts also form contact with the contact bar.

9. An operating device according to any one of claims 1 to 4, wherein the device has a slide;
said control element is longitudinally movable relative to the operating device housing;

in the housing along the movement path of the slide there is provided a contact bar and parallel thereto a plurality of contacts points, a respective sliding contact on the slide forming contact with the contact bar and successive contact points on the forward and backward movement of the slide relative to a centre position thereof; and

said first, second and third switches provide three possible options for the operating device in the respective stepwise position of the slide.

10. An operating device according to any one of claims 5 to 9, wherein the movement of the slide is indicatable.

11. An operating device according to any one of claims 1 to 4, wherein
said control element is in the form of a continuous belt that is movable and depressible relative to the operating device housing;

the device has opto-electronic means for detecting the stepwise movement of the belt;

a fourth switch in the form of a light source and a light receiver detects the stepwise movement of the control element, one of a pair of rollers about which the belt runs being equipped with a plurality of axially extending holes, so that on rotation of the roller a light path and broken light path will be successively detected; and

said first, second and third switches provide three possible options for the operating device in the respective stepwise position of the control element.

12. An operating device according to claim 11, wherein one or the other of the rollers about which the belt runs is equipped with a number of recesses for releasable engagement with a spring-loaded ball for indicating the stepwise movement of the belt.

13. A operating device according to any one of claims 1 to 4, wherein
said control element is in the form of a continuous belt that is movable and depressible relative to the operating device housing;

the device has opto-electronic means for detecting the stepwise movement of the belt;

a fourth switch with a spring-loaded ball detects the stepwise movement of the control element, one of a pair of rollers about which the belt runs being equipped with a plurality of recesses which thus actuates the switch position of the switch and at the same time on releasable engagement between the ball and respective recess forms an indication of the stepwise movement of the belt; and

said first, second and third switches provide three possible options for the operating device in the respective stepwise position of the control element.

14. An operating device according to claim 1, wherein

said control element is in the form of a wheel, roller or cylinder that is rotatable and depressible relative to the operating device housing;

the device has opto-electronic means for detecting the stepwise rotational movement of the control element;

the depressed movement of the control element is adapted to be detected by the third switch consisting of a light source and a light receiver, the downward movement of the control element thus blocking a light path between said light source and light receiver;

a fourth switch in the form of a light source and a light receiver detects the stepwise rotational movement of the control element; and

said first, second and third switches provide three possible options for the operating device in the respective stepwise position of the control element.

15. An operating device according to claim 14, wherein the rotational movement of the control element is indicatable.

16. An operating device for electronic functional equipment, where the device has a set of function-related switch buttons disposed on the operating device housing, wherein

five switch buttons which are depressible in the z direction are provided;

a first switch, a second switch and a third switch are arranged in the x direction, a fourth switch, the second switch and a fifth switch forming a switch array in the y direction; and

said first, second and third switches are interrelated to provide three possible options in the x direction for a selected position in the y direction determined by activating one or the other of said fourth of fifth switches.

17. An operating device according to claim 16, wherein operation of one or more of the buttons is indicatable.

18. An operating device for electronic functional equipment, where the device has a control element that is depressible for activation of a switch function, and where the device has means for detecting the stepwise movement of the control element, wherein

in the direction of the movement path of the control element there is provided respectively a first, second and third switch that are depressible in the z direction; and

said first, second and third switches are interrelated to provide three possible options in the x direction for respective stepwise position of the control element.

19. An operating device according to claim 18, wherein the control element is rotatable in relation to the device housing.

20. An operating device according to claim 18 or 19, wherein the movement of the control element is indicatable.

21. An operating device for electronic functional equipment, where the device has a control element in the form of a belt, roller or cylinder that is rotatable relative to the operating device housing, and where the device has opto-electronic means for detecting the stepwise rotational movement of the control element, wherein

along a portion of the control element transverse to its direction of movement there is provided respectively a first, second and third switch;

a fourth switch detects the stepwise movement of the control element; and

said first, second and third switches provide three possible options for the operating device in the respective stepwise position of the control element.

22. An operating device according to claim 21, wherein the control element is depressible in relation to the operating device housing.

23. An operating device according to claim 21 or 22, wherein the rotational movement of the control element is indicatable.

24. An operating device according to claim 21, 22 or 23, where the control element is in the form of a continuous belt, wherein the fourth switch is in the form of a light source and a light receiver that detect the stepwise movement of the control element in that one of the rollers about which the belt runs is equipped with a plurality of axial, extending holes, so that on rotation of the roller a light path and broken light path will be successively detected.

25. An operating device according to claim 24, wherein one or the other of the rollers about which the belt runs is equipped with a number of recesses or releasable engagement with a spring-loaded ball for indicating the stepwise movement of the belt.

26. An operating device according to any one of claims 21 to 25, wherein the fourth switch has a spring-loaded ball for effecting detection of the stepwise movement of the control element, one of the rollers around which the belt runs being equipped with a plurality of depressions which thus actuate the switch position of the switch, and at the same time on releasable engagement between the ball and a respective recess give an indication of the stepwise movement of the belt.
27. An operating device according to any one of claims 1 to 4, wherein
said first and second switches are depressible in the z-direction; and
said first, second and third switches are interrelated to provide three possible options in the x-direction for respective stepwise position of the control element in the y-direction.
28. An operating device according to claim 18, wherein said first, second and third switches are interrelated to provide three possible options in the x-direction for respective stepwise position of the control element in the y-direction.
29. An operating device according to any one of the preceding claims in interaction with a display unit.