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(54) **Piezoelectric key-board units**

(57) A key input unit includes a key board unit element 12 composed of a transparent piezoelectric polymer film 14, and transparent thin film electrodes 16, A-F, deposited on the polymer film. A combination of the first electrode with the second electrode forms a plurality of key input positions or locations of key coordinates. The element 12 is covered at one or both surfaces thereof with substantially transparent dielectric material 22 and 24. When a data sheet is placed under the unit, information on the sheet can be read therethrough so that the key operation can be conducted by merely pressing the location of key coordinates corresponding to the information on the sheet.

FIG. 2

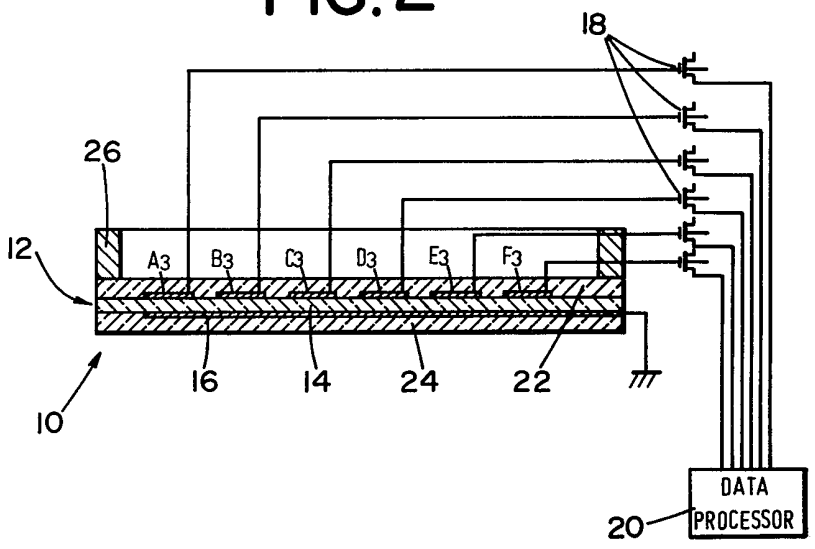

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FIG. 1

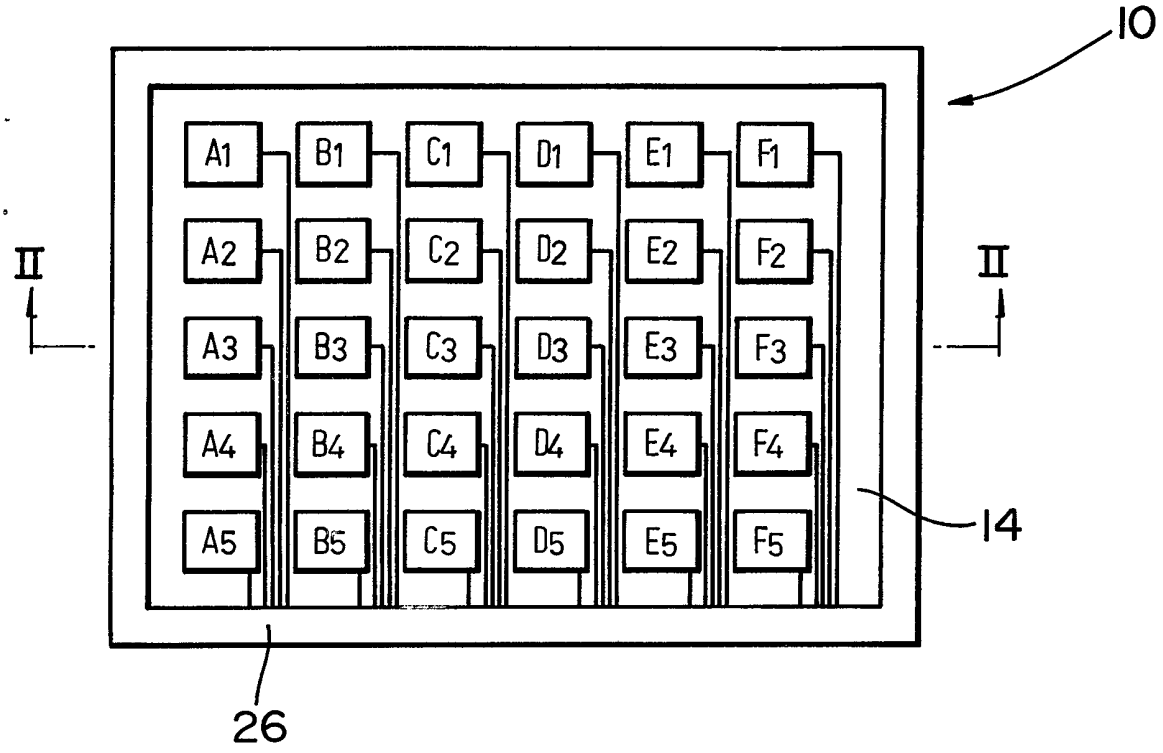

10
A1
B1
C1
D1
E1
F1
A2
B2
C2
D2
E2
F2
A3
B3
C3
D3
E3
F3
A4
B4
C4
D4
E4
F4
A5
B5
C5
D5
E5
F5
II
II
14
26

FIG. 2

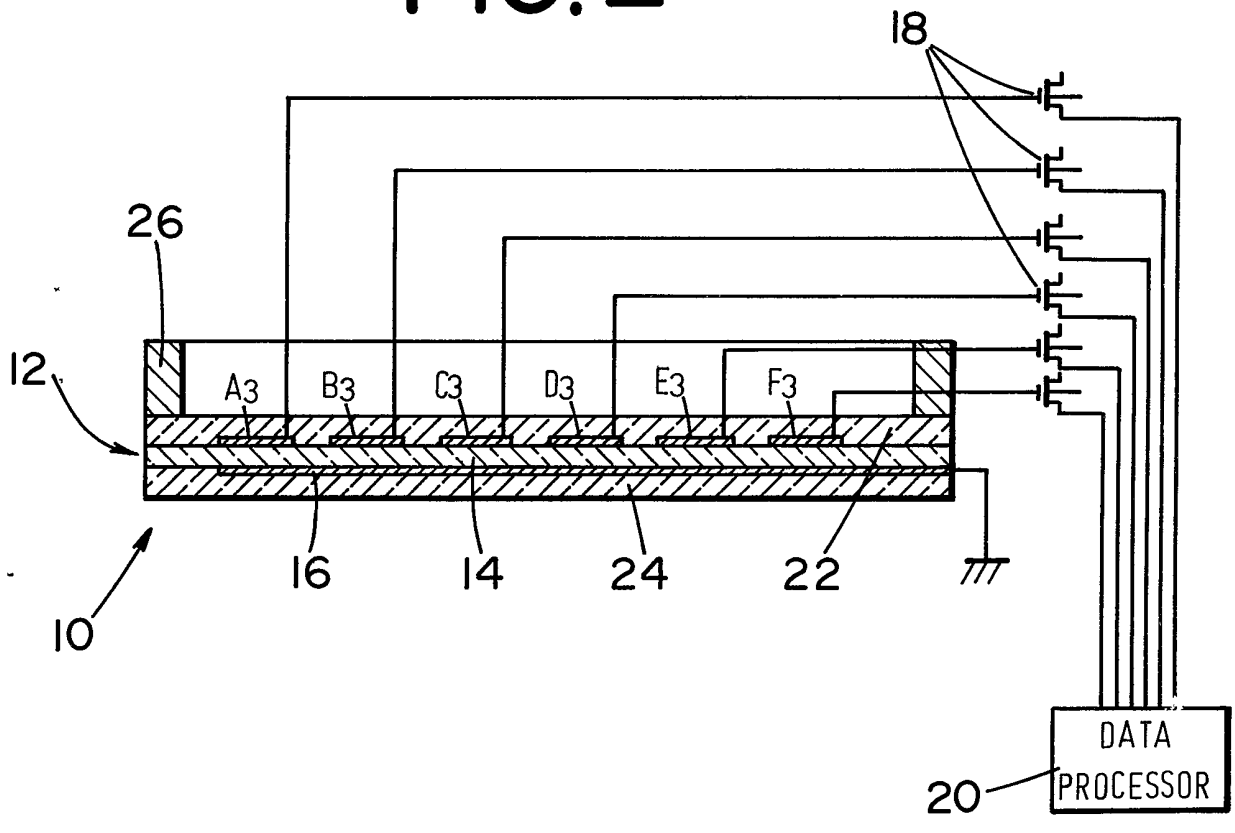

18
26
12
A3
B3
C3
D3
E3
F3
16
14
24
22
10
DATA
PROCESSOR
20

FIG.3

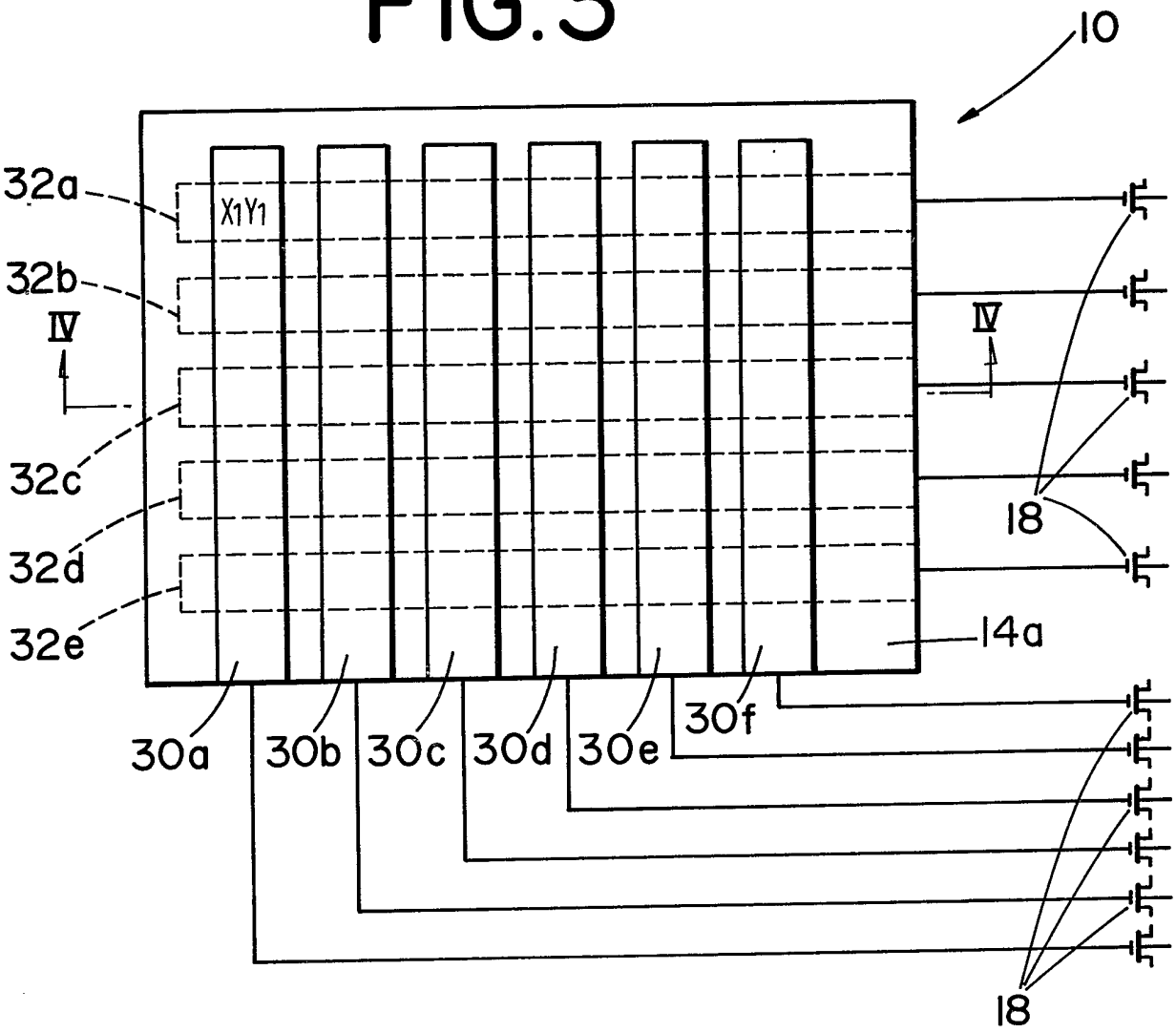


FIG.4

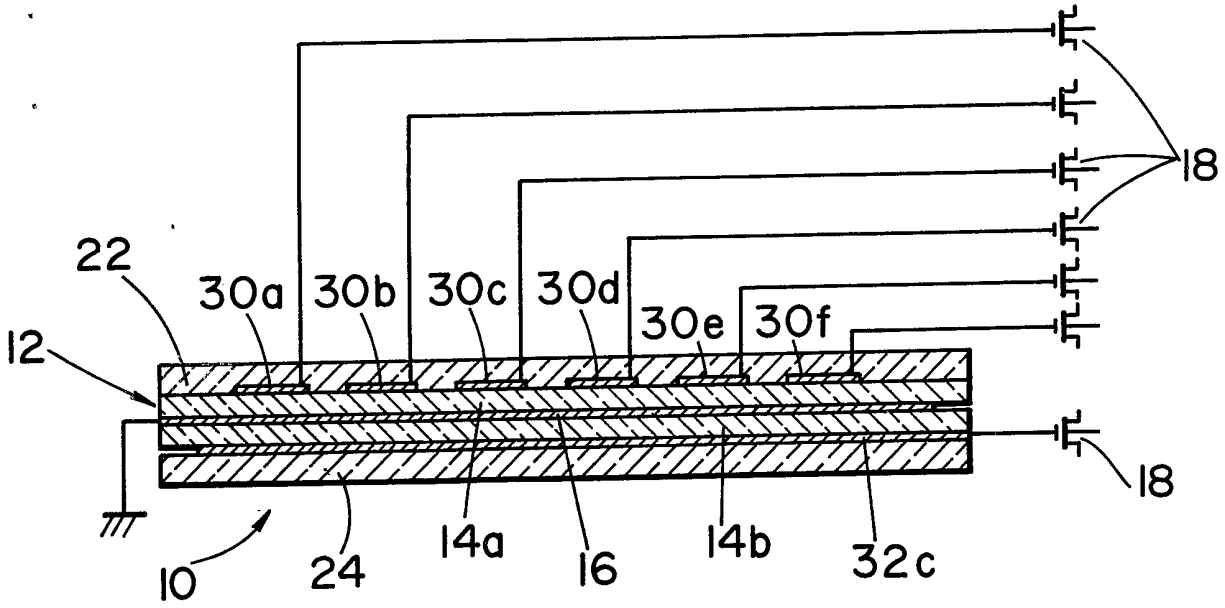


FIG.5

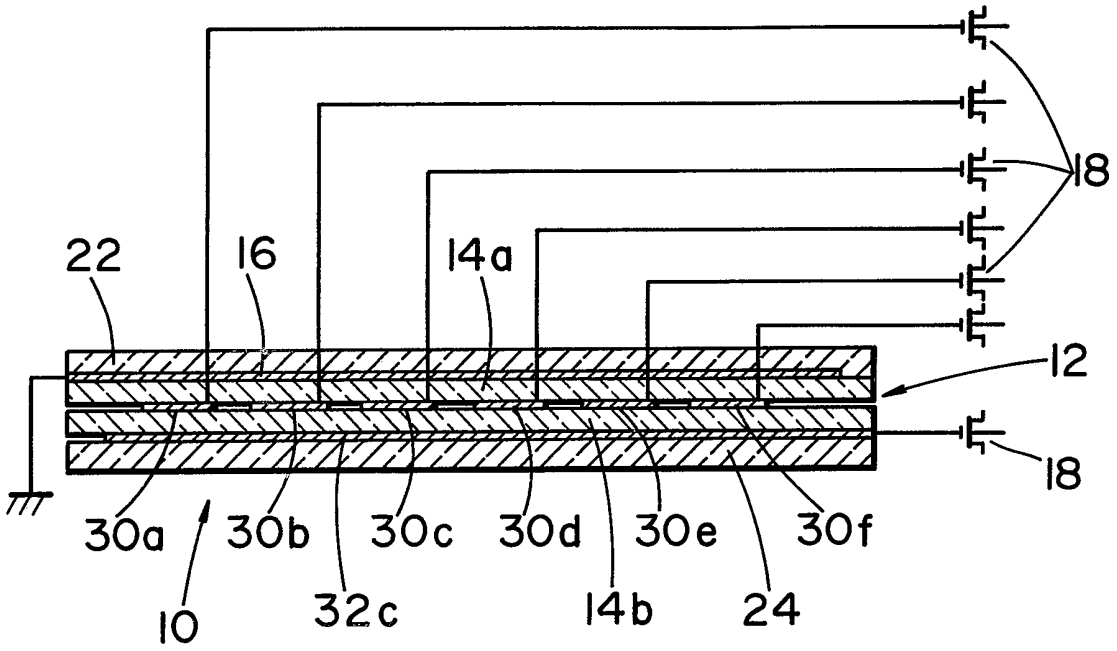

18
22
16
14a
12
18
30a
30b
30c
30d
30e
30f
10
32c
14b
24

FIG.6

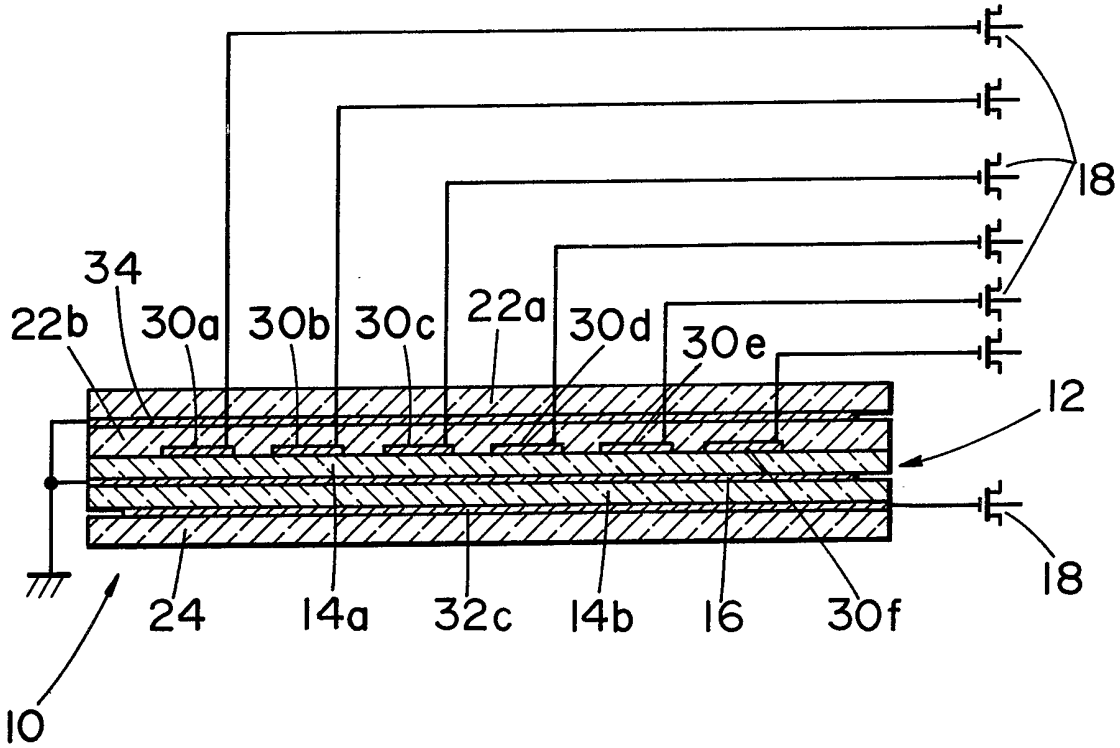

18
34
22b
30a
30b
30c
22a
30d
30e
12
18
24
14a
32c
14b
16
30f
10

FIG.7

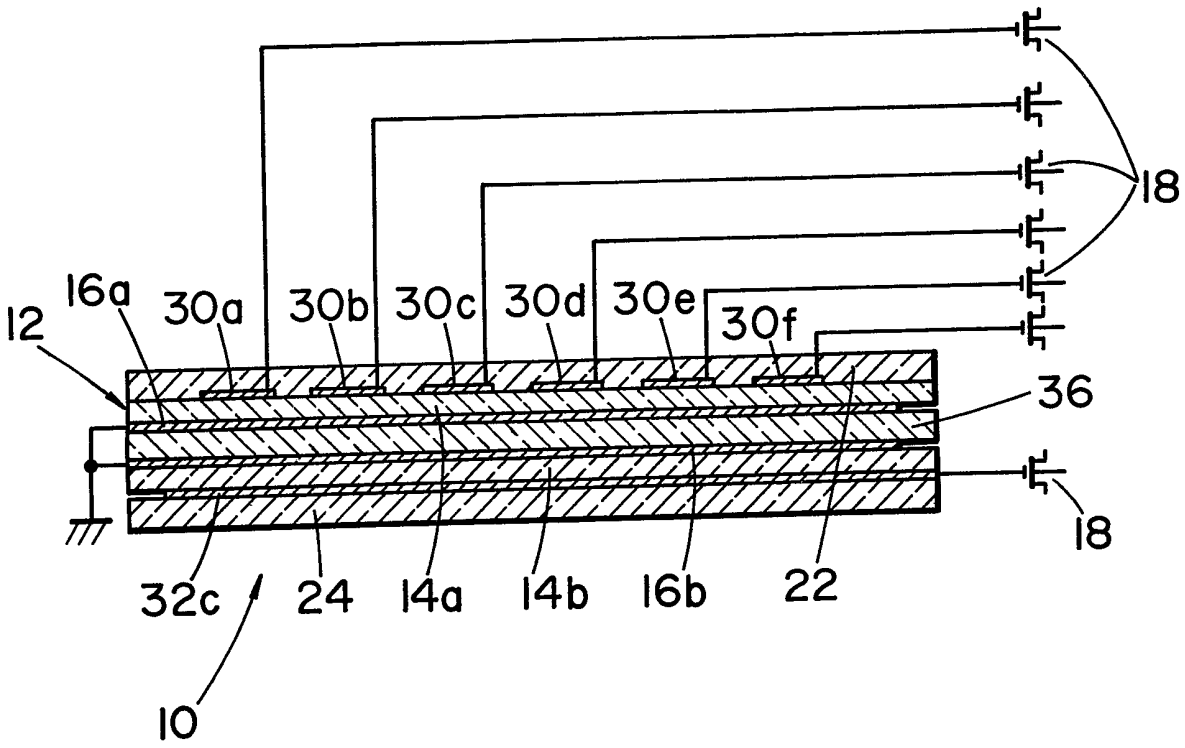
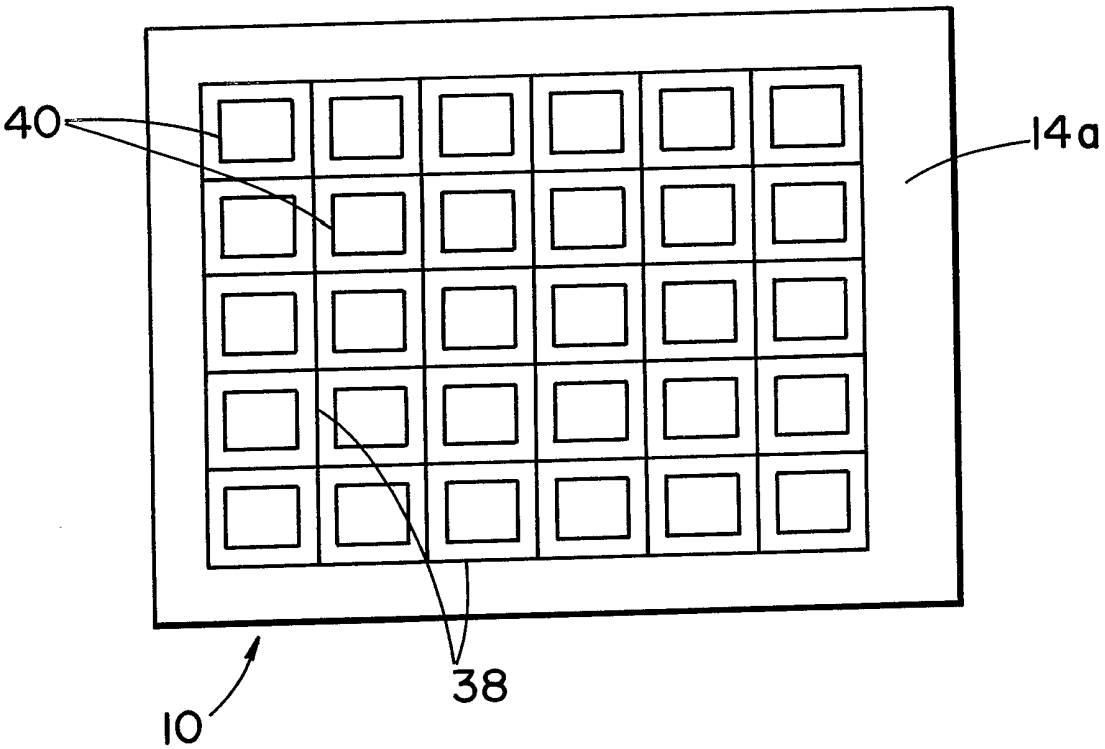

18
16a
30a
30b
30c
30d
30e
30f
12
36
18
32c
24
14a
14b
16b
22
10

FIG.8


40
14a
38
10

SPECIFICATION

Key input unit

The present invention relates to a key input unit and, more particularly, to a key input unit adaptable to and appropriate to input data particularly into computers, office management devices and other information or business data processors.

In office management devices or computers which are used for sales management, inventory management, personnel management, hospital business management and other purposes, data which are frequently employed such as items of goods, names of clients and consumers or personnel, unit costs, salaries or the like are recorded on a card or a roll sheet and data input is carried out by placing such a card or roll sheet over the key board or a key input unit in such a manner that individual data on a data sheet or key word list correspond to the respective keys of the key board one by one.

Key boards of key input units which have heretofore been generally used are made of opaque material and/or in opaque manner. Accordingly, a system is such that a data sheet is placed on the key input division of a key board or key coordinates. In this system, drive energy such as magnetic flux, electric field or supersonic waves which can pass through the data sheet is required because a key is operated through the data sheet. It is also necessary to use a special operating device such as a magnetic pen, a high-frequency pen or a supersonic pen. The use of the drive energy, however, causes a problem that noises tend to be generated because the drive energy passing through the data sheet is also inputted in a key adjacent to the key operated. Another system involves a so-called key mat having openings or windows in a data sheet corresponding to the respective keys. This key mat is arranged so as to have information on data on portions of the data sheet adjacent to the respective openings or windows correspond to the respective keys. Accordingly, in this case, operation is carried out by pressing a key adjacent to the necessary information corresponding to the datum on the key mat or data sheet. A key input unit of this kind is currently of a large size such that it is mainly arranged in office so that no big inconvenience is caused or realized. However, in future, consideration will be claimed over a key input unit of a compact or portable size which can be used by persons while they are sitting before their own desks in office or by salemen on site where they take orders from their clients. In this case, it should be noted that a key input unit cannot be randered of a large size and should be compact enough to amount to no large space in businessmen's own desks or to be carried in a briefcase or the like by people. If the key mat as above mentioned would be employed, such a key input unit will correspondingly become big and it would not be rendered so small and compact as it can be equipped or installed in each of businessmen's own desks or carried over by people as a routine business equipment.

In order to erase or correct information represented on a Braun tube type display device, there has been heretofore used a procedure in which a light pen is brought into contact with a portion of the information to be erased or corrected on the Braun tube thereof. In this case, a light sensing element provided on the tip portion of the light pen senses the light representing the location of the involved information or the location of coordinates and the signal obtained by the sensing of the light is fed from the light pen to the light source scanning unit of the Braun type display device, whereby the information indicated by the light pen on the Braun tube thereof is distinguished over other information.

In a Braun tube type display device of this kind, a long electric code or wire is connected to the light pen in order to feed signals from the light pen to the light source scanning unit of the display device. The wire connected to the light pen causes various problems in operation.

The light pen also presents disadvantages that it is applicable only to Braun tubes or the like in which light is scanned in succession or in turn according to time schedule and it cannot be applied to cases where individual coordinates are turned on and off simultaneously or where no light is generated. Accordingly, the light pen as mentioned hereinabove cannot be generally applied to a display unit of the diode luminescence type or of the liquid crystal type. It may be possible to apply the light pen to the diode luminescence type or the liquid crystal type if it is arranged so as to cause the location of coordinates generate lights in succession or in turn according to time schedule. This technique, however, is not practically applicable because an intensity of instantaneous illumination of each of locations of coordinates is required to be rendered high as a lightening-up time of each of the locations of coordinates is divided according to the total number of locations of coordinates.

According to the present invention there is provided a key input unit which comprises: (a) a key board unit element comprising: a substantially transparent piezoelectric polymer film or films; a first electrode or electrodes disposed on at least one surface of the piezoelectric polymer film or films; a second electrode or electrodes disposed on at least one surface of the piezoelectric polymer film or films other than the surface on which the first electrode or electrodes are disposed, the first and second electrodes being each in the form of a thin film and of a substantially transparent conductive material; and a plurality of locations of key coordinates being formed by a combination of the first electrode or electrodes with the second electrode or electrodes, and (b) a substantially transparent dielectric layer disposed on at least one surface of the key board unit element.

In the drawings:

Figure 1 is a diagrammatical top plan view illustrating one embodiment of the key input unit in accordance with the present invention in which the upper dielectric layer is omitted.

Figure 2 is a cross sectional view taken along the line II-II of Figure 1 in which the upper dielectric layer is not omitted.

Figure 3 is a diagrammatical top plan view illus-

trating another embodiment of the key input unit in accordance with the present invention in which the upper dielectric layer is omitted.

Figure 4 is a cross sectional view taken along the line IV-IV in which the upper dielectric layer is not omitted.

Figure 5 is a diagrammatical longitudinal cross-sectional view illustrating a further embodiment of the key input unit in accordance with the present invention.

Figure 6 is a diagrammatical longitudinal cross-sectional view illustrating a still further embodiment of the key input unit in accordance with the present invention.

Figure 7 is a diagrammatical longitudinal cross-sectional view illustrating a still further embodiment of the key input unit in accordance with the present invention.

Figure 8 is a diagrammatical top plan view illustrating a variation of the upper dielectric layer in use for the key input unit in accordance with the present invention.

The key input unit in accordance with the present invention includes a key board unit element. It should be understood herein that the term "keyboard unit element" referred to throughout the specification unless otherwise noted means to include a piezoelectric polymer film or films, a first electrode or electrodes and a second electrode or electrodes. The first electrode referred to herein may be, for example, a plurality of individual electrodes or strip electrodes. The second electrode referred to herein may be, for example, a common electrode.

Turning now to Figures 1 and 2 illustrating one embodiment of the key input unit in accordance with the present invention, the key input unit 10 includes a key board unit element 12. The key board unit element 12 is composed of a piezoelecric polymer film 14, a first electrode or a plurality of individual electrodes A_n-F_n disposed or deposited on one of the surfaces of the piezoelectric polymer film 14, and a second electrode or a common electrode 16 disposed or deposited on a surface opposite to the surface carrying the individual electrodes A_n-F_n in such a manner that the common electrode 16 opposes all the individual electrodes A_n-F_n and is connected electrically integrally to the latter.

The piezoelectric polymer film 14 should be substantially transparent and may be composed of substantially transparent material such as a fluorine-containing material, e.g., polyvinyl fluoride, copolymer containing vinyl fluoride, polyvinylidene fluoride or a copolymer containing vinylidene fluoride. It may be, for example, from about 10 to 30 microns thick.

The individual electrodes constituting the key input division or locations of key coordinates may be deposited or provided on one of the surfaces of the piezoelectric polymer film 14 in such a manner that they are positioned like a checkerboard, that is, so as to be situated in horizontal and vertical linear arrangements and in regularly equally spaced relationship with each other and to be electrically independent from each other. Referring to Figure 1, the individual electrodes A_n-F_n, i.e., for example $A_{1\text{-}5}$, $B_{1\text{-}5}$, $C_{1\text{-}5}$, $D_{1\text{-}5}$, $E_{1\text{-}5}$ and $F_{1\text{-}5}$, are disposed or deposited on one of the surfaces of the piezoelectric polymer film 14. It should be noted, however, that the number of the individual electrodes is not restricted to a particular number and may be chosen in appropriate manner according to the number of keys necessary for data input and the like.

The individual electrodes may be composed of transparent conductive material such as indium oxide-tin oxide (ITO), tin oxide-antimony oxide or any other conductive material appropriate for this purpose.

The individual electrodes may be of thin film having a thickness of 500 to 2,000 Angstroms and preferably, for example, about 1,000 Angstroms. They may be in a square shape and in any other shape as long as it can be applied so as to achieve the function as the individual electrodes. They may also be in a size such as 5 × 5 mm, 3 × 6 mm, 4 × 5 mm, 2 × 3 mm or the like. However, it should be noted that the size of the individual electrodes are not restricted to a particular size and may be chosen in an appropriate manner. A distance between any two adjacent individual electrodes may not be restricted to a particular figure and may be in the range from about 0.5 to 3 mm and, preferably, for example, 1 mm.

The individual electrodes may be deposited on one of the surfaces of the of the piezoelectric polymer film 14 in any known manner, for example, by means of vapor deposition technique.

The common electrode 16 is disposed or deposited on a surface opposite to the surface of the piezoelectric polymer film 14 on which the individual electrodes are deposited, as shown in Figure 2, in such a manner that it covers the substantially whole area of the film surface in order to allow it to achieve a function as an electrode opposite to the individual electrodes. The common electrode 16 may be of thin film having a thickness of about 500 to 2,000 Angstroms which may be composed of substantially transparent conductive materials such as a metal oxide, e.g., indium oxide-tin oxide (ITO), tin oxide-antimony oxide or the like as in the case of the individual electrodes A_n-F_n. The common electrode may be deposited on the surface of the piezoelectric polymer film in substantially the same manner as with the individual electrodes, for example, by means of vapor deposition technique.

In this case, it may be noted that the number of the common electrode is not limited to one sheet and may be chosen in any number according to the structure of the key board unit element. It should also be noted, however, that the deposition of one sheet of the common electrode 16 on the polymer film is preferred on account of simplicity in structure.

The common electrode 16 is grounded and each of the individual electrodes A_n-F_n are connected through an impedance converter 18 such as a field effect transistor (FET) or the like to a data processor 20 such as a computer or the like.

The key board unit element 12 is covered or coated at its both surfaces and at their substantially whole areas with coatings or films 22 and 24 of substantially transparent dielectric material in order to protect

the unit element, particularly the electrodes. The dielectric materials may include, for example, a soft material such as polyolefins, polyvinyl chloride, fluorine-containing resins, rubbers or the like and have a thickness, for example, of about 2 to 20 microns. The lower dielectric material also may be a hard material such as a glass sheet, an acrylic resin sheet or the like and have a thickness, for example, of about 1 to 10 microns. The key board unit element 12 may be provided at its periphery of the upper conductive layer with a support 26 of, for example, a square or rectangle shape.

When the key input unit 10 having the construction as mentioned hereinabove with reference to Figures 1 and 2 is applied, a conventional and known data sheet (not shown) carrying necessary data corresponding to each of the individual electrodes A_n-F_n is placed or inserted under the lower dielectric layer 24 of the key board unit element 12 of the key input unit 10. Each information of the necessary data on the data sheet is arranged so as to correspond to each individual electrode carrying the respective data one by one. Accordingly, information on a necessary datum carried on the data sheet is read through a substantially transparent set of the key input unit 10 composed of the upper dielectric layer 22, individual electrode A_n-F_n, polymer film 14, common electrode 16 and lower dielectric layer 24. And the individual electrode corresponding to the information on the necessary datum is pressed by the finger or any other appropriate means from the upper surface of the upper dielectric layer 22. By application of a pressure to the individual electrode, polarization of the piezoelectric polymer film 14 is caused at the electrode portion to produce charges which generate a potential or piezoelectric signals. The piezoelectric signals are then fed to the impedance converter 18 for impedance conversion and consequently to the data processor 20.

As a data sheet, there may be used a card having a size as substantially wide as the area of the key board unit element 12 or roll sheet wound upon a pair of rolls. In place of a data sheet in the form of a sheet, the display division of a display device which may be of the Braun tube type, of diode luminescence type or of liquid crystal type may be employed. In this case, the key input unit in accordance with the present invention may be disposed on the display division thereof.

As the electrodes 14 and 16 are composed generally of metal oxides such as indium oxide-tin oxide or tin oxide-antimony oxide which are so brittle in nature that they are less resistant to an exterior force, a repetition of key operation tends to cause them to peel off. It is accordingly noted that the upper dielectric layer 22 plays an important role in protecting particularly the electrodes. On the other hand, the lower dielectric layer 24 is not necessarily required when the key input unit 10 is used in combination with the Braun tube type display device where the key input unit adheres to the display division thereof.

Turning now to Figures 3 and 4 illustrating another embodiment in accordance with the present invention, the key input unit 10 includes a pair of piezoelectric polymer films 14a and 14b between which a second electrode or a common electrode 16 is interposed so as to amount to the substantially whole area of the polymer films on which the first electrodes or two groups of strip electrodes 30a - 30f and 32a - 32e are deposited.

As shown in Figure 3, a group of a plurality of the strip electrodes 30a - 30f is disposed or deposited parallel to each other in a substantially equally spaced relationship and electrically independent from each other on the outer surface of the upper polymer film 14a. Similarly, another group of a plurality of the strip electrodes 32a - 32e is disposed or deposited parallel to each other in a substantially equally spaced relationship and electrically independent from each other on the outer surface of the lower polymer film 14b. Each strip electrode of the two groups is connected through an impedance converter 18 to a data processor (not shown). Either group of the strip electrodes is arranged in an intersecting relationship, preferably at the substantially right angle, with the other group of the strip electrodes so that each strip electrode of one group extends only once across each of the strip electrodes of the other group. The portions constituted by the intersections of the strip electrode of the one group with the strip electrodes of the other can function as the individual electrodes and constitute the key input positions or locations of coordinates as in the embodiment in accordance with Figures 1 and 2.

It is noted herein that both the common electrode 16 and the two groups of the strip electrodes 30a - 30f and 32a - 32e are composed of substantially transparent materials in the same manner as in the embodiment illustrated in Figures 1 and 2. It can be apparently understood that the number of the strip electrodes of the two groups is not restricted to a particular one and may be selected in any arbitrarily appropriate number according to data to be inputted and the like.

It is further to be noted that, as the structure and construction of the key input unit according to the embodiment illustrated in Figures 3 and 4, other than those represented hereinabove, are substantially the same as in the features illustrated in Figures 1 and 2, the common parts and portions between the two embodiments are indicated by the identical reference numerals and therefore a description thereon is omitted herein for brevity of explanation.

An application of the key input unit 10 in accordance with the embodiment illustrated in Figures 3 and 4 can be conducted in substantially the same manner as in the embodiment illustrated in Figures 1 and 2. A data sheet (not shown) or any other appropriate means is likewise placed or disposed under the key input unit 10. The input is carried out by pressing an arbitrary location of key coordinates and consequently applying a pressure to the pair of the piezoelectric polymer films 14a and 14b at the location of key coordinates. When the location of key coordinates pressed by the finger or any other suitable means is, for example, a portion X_1Y_1 intersecting the strip electrode 30a with the strip electrode 32a, the corresponding piezoelectric signals in both the strip electrode 30a and the strip

electrode 32a are generated. It accordingly can be found that a combination of the piezoelectric signals from the strip electrode 30a with those from the other strip electrode 32a can identify or specify the location of key coordinates pressed.

Referring to Figure 5, the key input unit 10 in accordance with another embodiment of the present invention includes a key board unit element 12 which comprises a pair of piezoelectric polymer films 14a and 14b between which a first electrode or a group of strip electrodes 30a - 30f is interposed parallel to each other in a substantially equally spaced relationship as in the embodiment illustrated in Figures 3 and 4 above. Similarly, another first electrode or another group of strip electrodes 32a - 32e is disposed or deposited on the outer surface of the lower polymer film 14b in the same manner as in Figures 3 and 4 above. On the upper and outer surface of the upper polymer film 14a, a second electrode or a common electrode 16 is deposited or disposed by vapor deposition technique in the same manner as in the embodiments stated hereinabove in accordance with the present invention. In this case, the common electrode 16 can function as a shield. The key board unit element 12 having the structure as represented hereinabove and in Figure 5 can generate piezoelectric signals in the same manner as in the embodiment illustrated in Figures 3 and 4. In this structure, two sheets of dielectric layers 22 and 24 are provided on the outer surfaces of the common electrode 16 and the group of the lower strip electrodes 32a - 32e. Any description on any structure and function in common with those stated hereinabove with respect to the key input unit 10 in accordance with the embodiment illustrated in Figures 3 and 4 is also applicable to the key input unit 10 illustrated in Figure 5.

Referring now to Figure 6 illustrating another embodiment of the key input unit according to the present invention, the key input unit 10 includes a key board unit element 12 which comprises the key input unit 10 illustrated in Figure 4 and another substantially transparent dielectric layer 22a which is disposed or deposited on the upper dielectric layer 22 (which will be referred to as 22b hereinbelow with respect to Figure 6 alone), as illustrated in Figure 4, through a substantially transparent conductive shield layer 34 which is interposed between the two dielectric layers 22a and 22b and which is grounded.

Turning further to Figure 7, there is shown another embodiment of the key input unit 10 which may include a key board unit element 12 comprising first electrodes or two groups of strip electrodes 30a - 30f and 32a - 32e, second electrodes or a pair of common electrodes 16a and 16b as well as a pair of piezoelectric polymer films 14a and 14b. In this embodiment, a first group of strip electrodes 30a - 30f is deposited on one surface of one piezoelectric polymer film 14a and one common electrode 16a is deposited on a surface opposite to the upper surface on which the first group of the strip electrodes 30a - 30f is disposed. On the lower and outer surface of the common electrode 16a, there is deposited or disposed one transparent dielectric shield layer 36 which in turn is provided at its outer surface with another common electrode 16b. The common electrode 16b is further deposited at its outer surface with another piezoelectric polymer film 16c which in turn is deposited with a second group of strip electrodes 32a - 32e. The key board unit element 12 having the structure as represented hereinabove and in Figure 7 is covered or coated at its both surfaces with dielectric layers 22 and 24.

In a further embodiment according to the present invention, one or more additional piezoelectric polymer films may be disposed in each case through another dielectric layer to the dielectric layer 24 of the key board and unit element 12 illustrated in Figure 7.

The key input unit in accordance with the present invention having various structures and constructions as illustrated in the embodiments represented hereinabove and in the drawings has a key board portion which is transparent and colorless throughout all the components constituting the key input unit. It is accordingly difficult to register the location of key coordinates corresponding to the respective data by means of a data sheet or the like. There may also be a risk that the location of key coordinates cannot be identified or specified by users due to the way of representing data information on a data sheet or the like.

Figure 8 illustrates one of methods by which the defect as stated immediately hereinabove can be dissolved. In an embodiment as illustrated in Figure 8, any embodiment illustrated in Figures 1 through 7 may be applicable to this method. The method may involve providing marks in black, red, blue, white or any other color or any other suitable indications on any component material of the key input unit by an appropriate means such as printing or adherence. For example, the dielectric layer 22 may be divided into display portions just like a checkerboard in square or rectangular form corresponding to the number of data to be inputted therein by drawing display lines 38 in both horizontal and vertical directions and in a regularly spaced relationship. Each of the display portions formed by the display lines 38 may also be subdivided into a display subdivision to thereby form a display frame 40. Such marks may be provided on each or both of the display portions formed by the display lines 38 and the display frames 40. It also may be possible to draw a line or lines for a mark as indicating or representing the corresponding location of key coordinates. It is preferred that the marks are provided on the display frames 40 and, when the display frames 40 are not provided, they are provided in each of the display portions formed by the display lines 38. The marks also may be provided on any of the dielectric layers other than the upper dielectric layer, the piezoelectric polymer films or the electrodes which may be divided in substantially the same manner as in the case of the upper dielectric layer 22 as represented hereinabove and in Figure 8.

Another method to improve the defect as stated hereinabove may be that the individual electrodes A_n-F_n, the strip electrodes 30a - 30f or 32a - 32f, the piezoelectric polymer film or films or the dielectric layer or layers may be colored in red, orange, blue,

green or any other suitable pale color with respect to at least the locations of key coordinates to such an extent that a substantial transparency of the key input unit is not impaired and that information of data from the data sheet to be placed thereunder can be read through without difficulty. This coloring may be conducted by printing, adherence or any other suitable means.

It may also be possible to provide a slit for inserting a data sheet in the form of a card under the lower dielectric layer 24 in such a manner that information on data carried on the data sheet card can be read through the key input unit from the overhead.

It also may be possible that a portion of the locations of key coordinates may be used for keys allotted for data such as figures, letters or signals or for operation means such as addition, subtraction, multiplication, division, erasure, correction, change of data codes or the like, distributed in advance regardless of the data carried in a data sheet. These key positions may be opaque as in conventional ones and may be provided around or at a side of the transparent portion. In summary, the portions corresponding at least to locations of key coordinates on the piezoelectric polymer film, the dielectric layers and the electrodes are substantially transparent.

In the embodiments illustrated in Figures 1 through 7, the common electrode 16 is provided on the substantially whole area of the piezoelectric polymer film 14. It may be enough, however, that it is provided or positioned on each of locations of key coordinates and it is electrically connected by means of an electric means such as earth wiring.

In the key input unit 10 in accordance with the embodiments illustrated in Figures 1 through 7, although an adhesive layer is omitted, an adhesive layer may be provided, if necessary, between the piezoelectric polymer films, the polymer film and the dielectric layer or the like. Furthermore, it is not necessary that the piezoelectric polymer film has a piezoelectric surface in such a size that its surface covers the substantially whole area and it is sufficiently enough that its surface having a piezoelectricity covers at least locations of coordinates.

While the present invention is illustrated with specific embodiments, it will be recognized or understood by those skilled in the art that any variation thereon and modifications therefrom may be made therein without departing from the scope of the present inventive concepts of the present invention as defined by the following claims.

CLAIMS

1. A key input unit comprising:

(a) a key board unit element comprising:

a substantially transparent piezoelectric polymer film or films;

a first electrode or electrodes disposed on at least one surface of the piezoelectric polymer film or films;

a second electrode or electrodes disposed on at least one surface of the piezoelectric polymer film or films other than the surface on which the first electrode or electrodes are disposed;

the first and second electrodes being each in the form of a thin film and of a substantially transparent conductive material; and

a plurality of locations of key coordinates being formed by a combination of the first electrode or electrodes with the second electrode or electrodes; and

(b) a substantially transparent dielectric layer disposed on at least one surface of the key board unit element.

2. The key input unit according to Claim 1, wherein the first electrode comprises a plurality of individual electrodes or strip electrodes.

3. The key input unit according to Claim 1, wherein the second electrode comprises a common electrode or electrodes.

4. The key input unit according to Claim 1, wherein the key board unit element is provided with a second substantially transparent dielectric layer which is disposed on a surface opposite to the surface on which the first dielectric layer is disposed.

5. The key input unit according to any one of Claims 1 to 4, wherein the piezoelectric polymer film is of a single sheet; the first electrode is composed of plural electrodes and provided in an electrically independent manner on one surface of the piezoelectric polymer film; and the second electrode is provided on a surface opposite to the surface on which the first electrode is disposed in such a manner that the second electrode opposes at least portions of the first electrode and that it is electrically integrated with each other.

6. The key input unit according to Claim 1, 2, 4 or 5, wherein the first electrode is composed of a plurality of strip electrodes which are disposed in horizontal and vertical linear arrangements in a regularly equally spaced relationship.

7. The key input unit according to Claim 1, 2, 3 or 5, wherein the piezoelectric polymer films are composed of a first and second piezoelectric polymer films; the first electrodes are composed of a first and second piezoelectric polymer films; the first electrodes are composed of a first and second groups of strip electrodes which are arranged parallel to and electrically independent from each other, respectively, and the intersections formed by the first and the second group thereof form locations of key coordinates.

8. The key input unit according to Claim 7, wherein the first group of strip electrodes is provided on the outer surface of the first piezoelectric polymer film; the second group of the strip electrodes is provided on the outer surface of the second piezoelectric polymer film; and the second electrode is interposed between the first and second piezoelectric polymer films.

9. The key input unit according to Claim 7, wherein the second electrode is provided on the outer surface of the first piezoelectric polymer film; the first group of the strip electrodes is interposed between the first and second piezoelectric polymer films; and the second group of the strip electrodes is provided on the outer surface of the second

piezoelectric polymer film.

10. The key input unit according to any one of Claims 1 to 9, wherein the dielectric layer provided on one of the surfaces of the key board unit element is provided in two sheets and a substantially transparent conductive shield layer is interposed between the two dielectric layers.

11. The key input unit according to Claim 8, wherein the second electrode is divided into two sheets and a dielectric layer is interposed therebetween.

12. The key input unit according to any one of Claims 7 to 11, wherein the first group of the strip electrodes is intersected at the substantially right angle with the second group of the strip electrodes.

13. The key input unit according to any one of Claims 1 to 12, wherein the second electrode is provided so as to cover the substantially whole area of the surface of the piezoelectric polymer film opposing the surface on which the first electrode is disposed.

14. The key input unit according to any one of Claims 1 to 13, wherein at least one of the piezoelectric polymer film and films, the dielectric layer and layers, and the first and second electrodes is provided with a mark indicating a location of key coordinates.

15. The key input unit according to Claim 14, wherein the mark is provided in a portion formed by drawing lines in horizontal and vertical linear arrangements and in regularly equally spaced relationship so as to correspond to the location of key coordinates; in a frame formed between a subdivision in the above portion and the lines forming the above portion; or as a line provided corresponding to the location of key coordinates.

16. The key input unit according to any one of Claims 1 to 13, wherein at least portions corresponding to locations of key coordinates of the first and/or the second electrode is colored in a pale color.

17. The key input unit according to any one of Claims 1 to 16, wherein the electrode in the form of a thin film is composed of a metal oxide.

18. The key input unit according to Claim 17, wherein the metal oxide is indium oxide-tin oxide or tin oxide-antimony oxide.

19. The key input unit according to any one of Claims 1 to 17, wherein the piezoelectric polymer film is composed of a substantially transparent fluorine-containing material.

20. The key input unit according to Claim 19, wherein the fluorine-containing material is polyvinylidene fluoride, a copolymer containing vinylidene fluoride, polyvinyl fluoride or a copolymer containing vinyl fluoride.

21. The key input unit according to any one of Claims 1 to 20, wherein the dielectric layer is of a substantially transparent soft material.

22. The key input unit according to Claim 21, wherein the soft material is a polyolefin, polyvinyl chloride, a fluorine-containing resin or a rubber.

23. The key input unit according to any one of Claims 5-6, 10, and 13-22 wherein the dielectric layer disposed on the lower surface of the key board unit element is of a hard material.

24. The key input unit according to Claim 23, wherein the hard material is a glass sheet or an acrylic sheet.

25. The key input unit according to any one of Claims 1 to 24, wherein the dielectric layer covering one of the surfaces of the key board unit element is attached at the periphery thereof to a supporting member.

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