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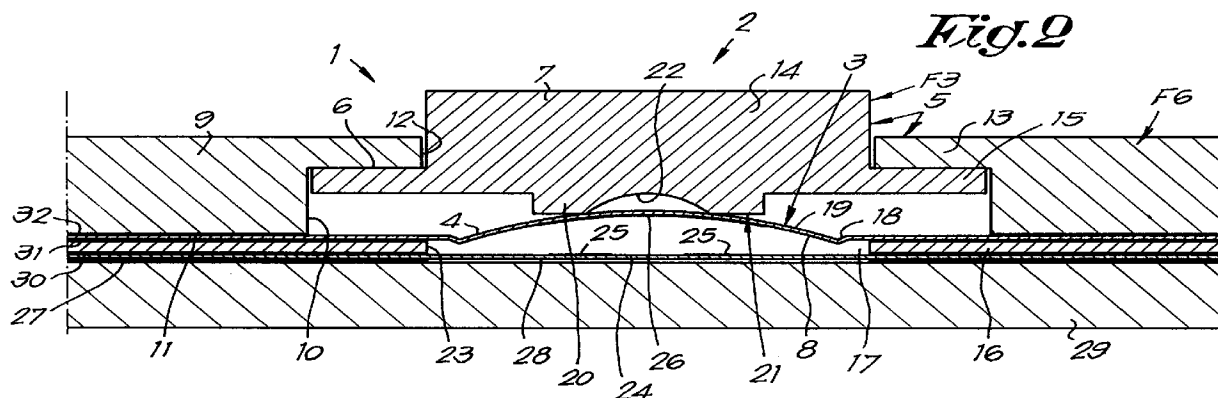
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(54) **Membrane keyboard**

(57) Membrane keyboard, characterized in that it contains at least one key contact (2) which consists of the combination of a membrane pressure contact (3) and

a protection (5) provided before the front side (4) of the membrane pressure contact (3) by means of which the membrane pressure contact (3) can be excited.



Description

The present invention concerns a membrane keyboard.

It is known that standard membrane keyboards are disadvantageous in that they are vulnerable under extreme circumstances, for example in the case of vandalism. The front layer of standard membrane keyboards consists of a layer of polyester or polycarbonate of a few hundred micrometres, which can be easily damaged by scratching it with a knife, by perforating it with sharp objects or by melting it by bringing a lighter or such close by.

In this way, the underlying electronics can also be damaged or influenced.

For most industrial environments, a conventional membrane keyboard is more than sufficient. However, in public environments, such as at pay machines, automations in stations and other public places, it is too vulnerable.

The invention aims to offer a membrane keyboard which is less vulnerable and to a high degree resistant to vandalism, but which still offers the advantages of a conventional membrane keyboard, such as long life, good dust and waterproofness, low cost price, simple construction and possibly, when the keys are being pressed on, producing a click effect.

To this aim, the invention consists of a membrane keyboard which contains at least one key contact which consists of the combination of a membrane pressure contact and a protection provided before the front side of the membrane pressure contact by means of which the membrane pressure contact can be excited.

In order to better explain the characteristics of the invention, the following preferred embodiment is described as an example only, without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 shows the front side of a membrane keyboard according to the invention;

figure 2 shows a section to a larger scale according to line II-II in figure 1;

figure 3 shows a side view of the part which is indicated in figure 2 with arrow F3;

figures 4 and 5 show views according to arrows F4 and F5 in figure 3;

figure 6 shows the backside of the cover plate which is indicated in figure 2 with arrow F6;

figure 7 shows a section according to line VII-VII in figure 6.

As represented in the figures 1 and 2, the invention concerns a membrane keyboard 1, characterized in that it contains at least one key contact 2 which consists of the combination of a membrane pressure contact 3 and a protection 5 provided before the front side 4 of the membrane pressure contact 3 by means of which the membrane pressure contact 3 can be excited. The pro-

tection 5 is hereby preferably integrated in the membrane keyboard 1. In the example shown, the protection 5 to this end mainly consists of a push button 7 provided in a seat 6.

In order to prevent that the push button 7 sits loose, the whole is preferably built such that the push button 7 is pressed on in the seat 6 by the membrane 8 of the membrane pressure contact 3, preferably only with a very light force.

According to the most preferred embodiment, the push button 7 consists of a rigid element, which is preferably also solid.

The above-mentioned protection 5 is preferably integrated in a cover plate 9 and/or is also formed of this cover plate 9. The above-mentioned seat 6 for the respective push buttons 7 is hereby each time formed of a recess 10 in the back side 11 of the cover plate 9 and a smaller, continuing opening 12 leading to this recess 10, such that the cover plate 9 has shoulders 13, whereas the push button 7 consists at least of a knob-shaped body 14 which fits through the continuing opening 12 of the cover plate 9 and which is provided with shoulders 15 which fit in the above-mentioned recess 10 and which make contact with the shoulders 13 of the cover plate 9. For clarity's sake, the push button 7 and the cover plate 9 are represented separately in the figures 3-5, 6-7 respectively.

As represented in the figures, both the membrane pressure contact 3 and the protection 5 consist of a structure of layers, so that a simple, cost-saving construction is possible.

The membrane pressure contact 3 can have different shapes, but preferably, use will be made of a membrane pressure contact 3 which contains a membrane 8, as represented in figure 2, which is provided on a spacer sleeve 16 which is provided with openings 17.

Preferably, use will be made of membranes 8 which consist of a tapered recess 18 along their edges and a segment of a sphere 19 which is suspended in between, directed with its round side towards the push button 7.

Further, the protection 5 preferably contains an actuator part 20 which consists of a protrusion which makes contact with the membrane 8 at least when being pushed in and whose perimeter is situated inside the perimeter of the opening 17 concerned in the spacer sleeve 16. Preferably, this is a round protrusion as represented in figure 5.

The actuator part 20 contains an excavation 22 on the side 21 which is directed towards the membrane 8 of the membrane pressure contact 3 which is situated centrally before the membrane 8, which preferably consists of spherical recess. The bend of the spherical recess is preferably stronger than that of the segment 19, so that a ring-shaped contact is obtained. This excavation 22 aims to provide for the preservation of a good click effect and to make the positioning between the membrane 8 and the push button 7 less critical.

Further, means can also be provided which prevent the push buttons 7 from turning, which is particularly

important when inscriptions are provided on the push buttons 7. In the example represented in the figures, these means consist of the forms of the push button 7 concerned which fit together and the corresponding seat 6, such that turning is made impossible. In particular, the knob-shaped body 14 and the opening 12 are square to this end.

The part of the protection which can be pushed in, in this case the push button 7, will preferably have an end limitation so as to prevent that the membrane 8 and the underlying structures are damaged when a large force is exerted on the push button 7 concerned, for example when it is hit at with a hammer or any other object.

In the example represented in the figures, this end limitation consists of shoulders, in this case the already mentioned shoulders 15, at the part which can be pushed in, i.e. at the push button 7, which extend further sideways than the edge 23 of the above-mentioned opening 12.

The membrane pressure contact 3 usually contains at least two contact parts, namely a basic contact part 24 with contacts 25 on the one hand, and the membrane 8 which is provided with contacts 26 on the other hand.

According to the invention, the membrane keyboard 1 hereby contains means which make it possible to push both contact parts through, whereby these means consist in that both contact parts, i.e. the basic contact part 24 and the membrane 8, are suspended elastically. Moreover, they are preferably suspended in a floating way as is shown in figure 2.

To this end, the basic contact part 24 is provided on a thick layer of glue 27 in which is provided a recess 28 at the height of each membrane 8.

The thick layer of glue 27, as well as the recesses 28 therein are advantageous in that the construction is less critical and in that material compressions in the keyboard can be absorbed.

The height of the actuator part 20 is preferably somewhat greater than the thickness of the spacer sleeve 16. In the embodiment shown, this height must be smaller, however, than the thickness of the spacer sleeve 16, increased with the thickness of the layer of glue 27.

Finally, we can say that the membrane keyboard 1 according to the invention is preferably composed of, in successive order, a support layer 19, a basic contact part 24 formed of a synthetic layer upon which are provided electric contacts 25, a spacer sleeve 16 formed of a plate with openings 17, a second contact part formed of a synthetic layer which also functions as a membrane 8 and a cover plate 9 with seats 6 in which are held push buttons 7 between this front layer 9 and the membrane 8, whereby the different layers and plates are glued together by means of glue layers 27, 30, 31 and 32 or such.

Naturally, the invention also concerns a membrane key board 1 which contains several membrane pressure contacts 3, provided with protections 5, which are integrated in one and the same structure of layers, as is the case in the figures.

The cover plate 9 and/or the push buttons 7 are preferably made of solid material. Aluminium is preferable, but other materials such as for example plastic are not excluded.

In order to prevent the push button 7 from being blocked, the knob-shaped body 14, in other words the knob shaft, has such a height that, when the push button 7 is entirely pushed in, its top side cannot go lower than the bottom side of the shoulders 13.

The cover plate can be provided with a collar 33 which partly or entirely surrounds the underlying structure.

The present invention is by no means limited to the embodiments described as an example and represented in the accompanying drawings; on the contrary, such a membrane keyboard can be made in various forms and dimensions while still remaining within the scope of the invention.

Claims

1. Membrane keyboard, characterized in that it contains at least one key contact (2) which consists of the combination of a membrane pressure contact (3) and a protection (5) provided before the front side (4) of the membrane pressure contact (3) by means of which the membrane pressure contact (3) can be excited.
2. Membrane keyboard according to claim 1, characterized in that the above-mentioned protection (5) is integrated in it.
3. Membrane keyboard according to claim 2, characterized in that the protection (5) mainly consists of a push button (7) provided in a seat (6).
4. Membrane keyboard according to claim 3, characterized in that the push button (7) is pushed on in the seat (6) by the membrane (8) of the membrane pressure contact (3).
5. Membrane keyboard according to claim 3 or 4, characterized in that the push button (7) consists of a rigid element.
6. Membrane keyboard according to any of claims 3 to 5, characterized in that the push button (7) consists of a solid element.
7. Membrane keyboard according to any of the preceding claims, characterized in that the protection (5) is integrated in a cover plate (9) and/or is also formed of a cover plate (9).
8. Membrane keyboard according to any of claims 3 to 6 and 7, characterized in that the seat (6) is formed of a recess (10) in the back side (11) of the cover plate (9) and a smaller, continuing opening (12)

opening in this recess (10), such that the cover plate (9) has shoulders (13), whereas the push button (7) consists at least of a knob-shaped body (14) which fits through the continuing opening (12) of the cover plate (9) and which is provided with shoulders (15) which fit in the above-mentioned recess (10) and which can make contact with the shoulders (13) of the cover plate (9), and an actuator part (20) which makes contact with the membrane (8) of the membrane pressure contact (3) when being pushed in and which is smaller than an opening (17) provided in a spacer sleeve (16) under the membrane (8).

9. Membrane keyboard according to any of claims 3, 4, 5, 6 or 8, characterized in that it is provided with means which prevent the push button (7) from turning.

10. Membrane keyboard according to claim 9, characterized in that the above-mentioned means consist of forms of the push button (7) fitting together and of the seat (6), which are selected such that no mutual turning is possible.

11. Membrane keyboard according to any of the preceding claims, characterized in that both the membrane pressure contact (3) and the protection (5) are formed of a structure of layers.

12. Membrane keyboard according to any of the preceding claims, characterized in that the membrane pressure contact (3) contains a membrane (8) which is provided on a spacer sleeve (16), provided with openings (17), and in that the protection (5) contains an actuator part (20) which consists of a protrusion which makes contact with the membrane (8) at least when being pushed in and whose perimeter is situated inside the perimeter of the opening (17) concerned in the spacer sleeve (18).

13. Membrane keyboard according to any of the preceding claims, characterized in that the protection (5) contains an actuator part (20) which has an excavation (22) on the side (21) which is directed towards the membrane (8) of the membrane pressure contact (3) which is situated centrally before the membrane (8).

14. Membrane keyboard according to any of the preceding claims, characterized in that the recess (22) consists of a spherical recess.

15. Membrane keyboard according to any of the preceding claims, characterized in that the part of the protection (5) which can be pushed in contains an end limitation.

16. Membrane keyboard according to claim 15, characterized in that the membrane pressure contact (3)

has a membrane (8) which is provided on a spacer sleeve (16) provided with openings (17) and in that the end limitation consists of shoulders (15) at the part which can be pushed in which extend further sideways than the edge (23) of the above-mentioned opening (17).

17. Membrane keyboard according to any of the preceding claims, characterized in that the membrane pressure contact (3) contains at least two contact parts and in that the membrane keyboard (1) contains means which make it possible to push both contact parts through.

18. Membrane keyboard according to claim 17, characterized in that both contact parts are suspended elastically.

19. Membrane keyboard according to claim 18, characterized in that both contact parts are suspended in a floating way.

20. Membrane keyboard according to claim 19, characterized in that the basic contact part is provided on a thick layer of glue (27) in which is provided a recess (28) at the height of the key contact (2).

21. Membrane keyboard according to claims 12 and 20, characterized in that the height of the actuator part (20) is greater than the thickness of the spacer sleeve (16), but smaller than the thickness of the spacer sleeve (16) increased with the thickness of the layer of glue (27).

22. Membrane keyboard according to any of the preceding claims, characterized in that the membrane pressure contact (3) has a membrane (8) which is formed of a recess (18) at the edge and a segment of a sphere (19) in the middle.

23. Membrane keyboard according to any of the preceding claims, characterized in that it is composed, in successive order, of a support layer (29), a basic contact part (24) formed of a synthetic layer upon which are provided electric contacts (25), a spacer sleeve (16) formed of a plate with openings (17), a second contact part formed of a synthetic layer which also functions as a membrane (8) and a cover plate (9) with seats (6) in which are held push buttons (7) between this front layer (9) and the membrane (8), whereby the different layers and plates are glued together.

24. Membrane keyboard according to any of the preceding claims, characterized in that several membrane pressure contacts (3) are provided with protections (5) which are integrated in one and the same structure of layers.

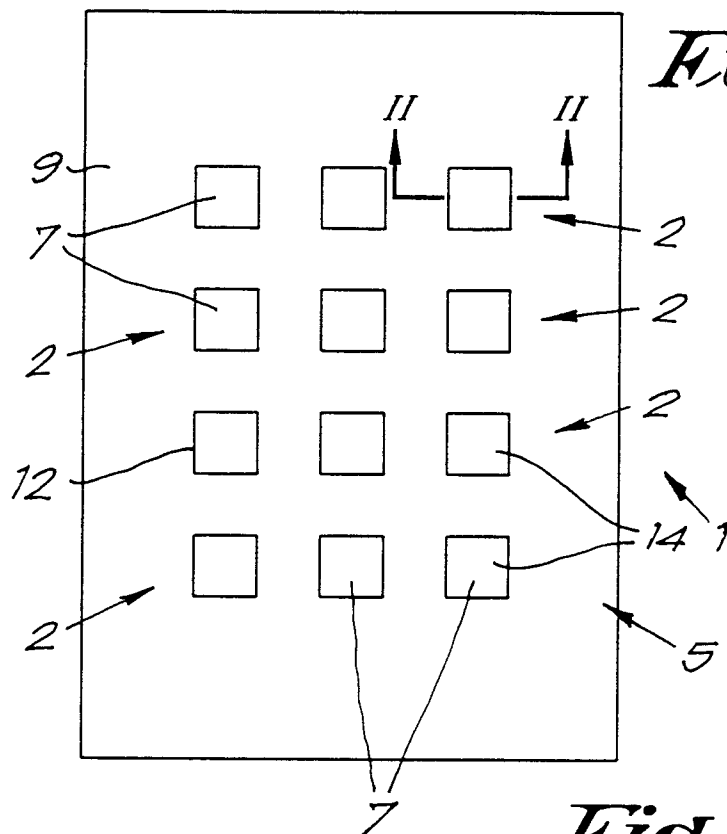


Fig. 1

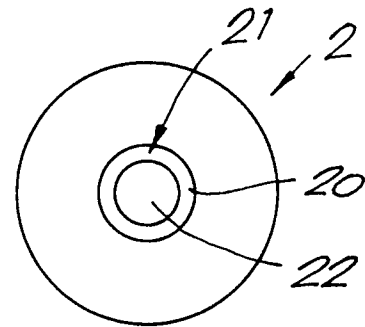


Fig. 5

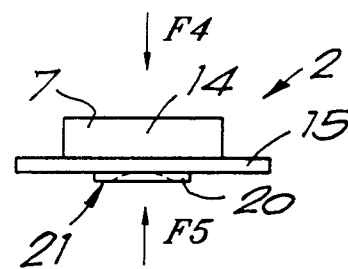


Fig. 3

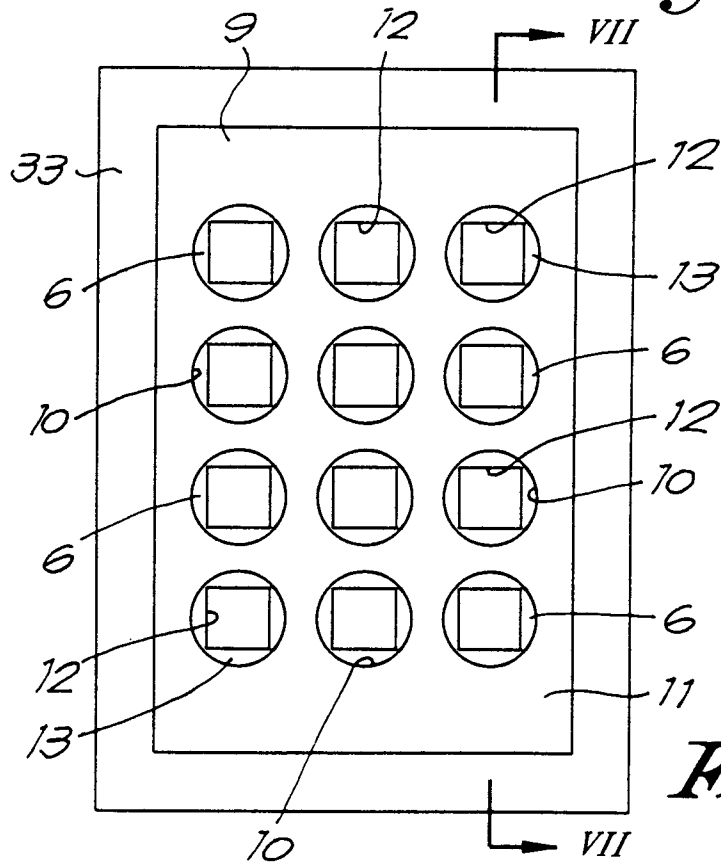


Fig. 6

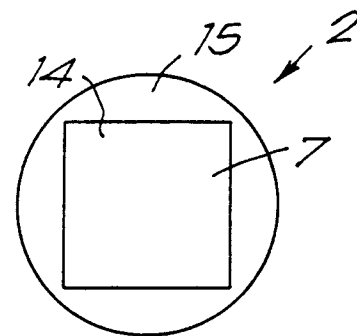
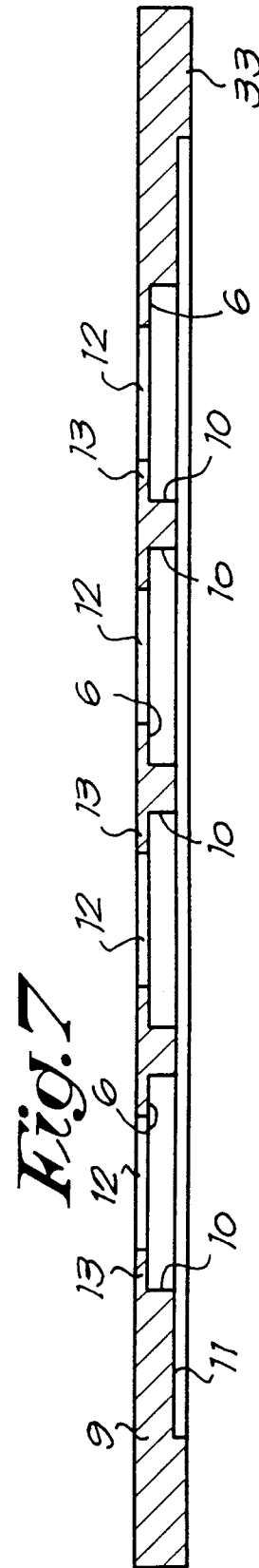
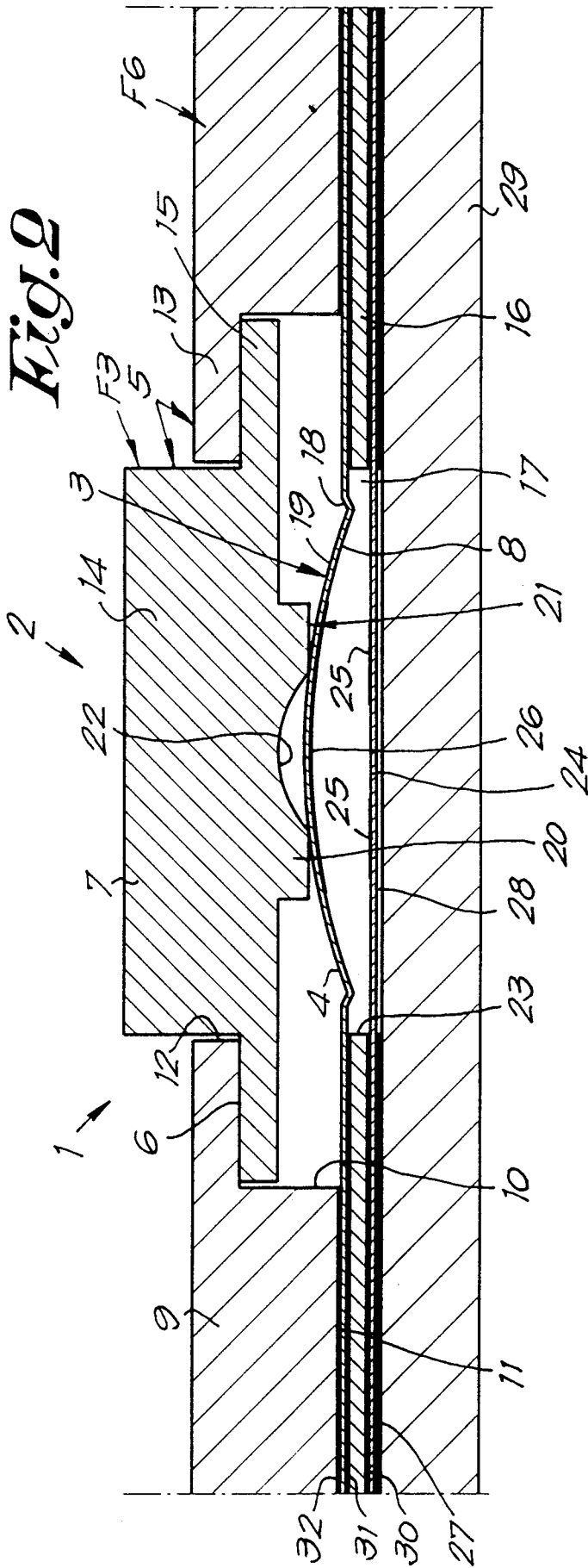


Fig. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 1896

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE-U-92 05 228 (BUCH ELEKTRONIK)	1-16, 24	H01H13/70
Y	* the whole document *	13, 22, 23	
A	---	17-21	
Y	US-A-4 194 105 (HODGES)	13	
A	* column 2, line 7 - line 25; figure 1 *	1	
Y	GB-A-1 399 252 (THE POST OFFICE)	22	
A	* page 2, line 57 - line 81; figures 2, 3 *	1	
Y	DE-A-30 06 592 (LICENTIA)	23	
A	* the whole document *	1	
A	EP-A-0 100 875 (PREH)	1, 17-19, 21	
	* claim 1; figures 1, 5 *		
X	EP-A-0 064 615 (STANDARD ELEKTRIK LORENZ)	1-3, 7, 11, 23, 24	
	* the whole document *		

			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H01H
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
BERLIN		26 September 1995	Nielsen, K
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