

Description

The present invention relates to the technical field of production of electric or electronic components, namely a method of producing a keyboard switch.

Within the above technical field, numerous methods of producing electric or electronic components are known as well as numerous keyboard switches. Reference is made to the following patent specifications: EP 0030473, DE 2740746, DE 3542953, DE 3545798, EP 0164799, SE 440836, US 4331851, US 4690484 (corresponding to DE 3542953), US 4659881, US 4352964, and US 4102039.

The most relevant prior art is believed to be the method illustrated in Fig. 19 of EP-A-0030473. According to this known method push-bottom switches being produced are arranged between a pair of metallic carrier strips, which are interconnected by sets of metallic connecting members from which the terminal components of the switches are formed. According to the known method the switches produced are separated from the carrier strips at the same time as the switches are mounted in a keyboard panel. This means that testing of the switches cannot take place until the switches have been mounted in the keyboard panel.

An object of the present invention is to provide a method rendering it possible to produce a keyboard switch in a few and simple production steps from a few components.

A further object of the present invention is to provide a novel technique of producing a keyboard switch, which may be used in accordance with so-called SMT-technique (SMT: Surface Mounting Technique), i.e. which may stand exposure to solder metal material, such as tin heated to a temperature of e.g. 240 °C, for approx. 60 sec.

A still further object of the present invention is to provide a novel technique of producing a keyboard switch, produced in a sequential process and tested prior to its delivery from the production line.

A still further object of the present invention is to provide a keyboard switch and to provide a method of producing such keyboard switch, which keyboard switch is of a compact, modular structure which allows the keyboard switch to be used in connection with accessory components, such as modular display units, keyboard pads, etc.

The above and other objects and advantages obtained in accordance with the teachings of the present invention will be evident from the description below.

Thus, in accordance with a first aspect the present invention provides a method of producing a plurality of keyboard switches, each switch comprising a housing of an insulating material, at least

two metallic terminal components, each having an outer terminal end extending outwards from an outer side wall of the housing as well as an electric contact member being enclosed in said housing and integrally connected to the terminal at an end opposite to the outer terminal end, and a switching element being switchable between a first state in which it is out of electrically conductive contact with at least one of the electric contact members, and a second state in which the switching element is establishing electrically conductive contact between the electric contact members, said method comprising

(a) providing a continuous track of the metal of said metallic terminal components,

(b) processing the continuous track so as to form a plurality of sets of metallic terminal components and at least one carrier strip, the metallic terminal components being integrally connected to the carrier strip through their outer terminal ends,

(c) casting a base housing component of said insulating material around each set of the metallic terminal components, the base housing component defining at least part of said outer side walls of the housing, a recess therein exposing the electrical contact members being formed in said housing

(d) arranging the switching element in each recess so as to be switchable between said first and second states,

(e) mounting a top housing component having an aperture on each base housing component,

(f) arranging a stem member in the aperture of each top housing component so that the switching element may be actuated and switched between its first and said second states, and

(g) separating the metallic terminal components from the carrier strip by separating the outer terminal ends therefrom,

characterized in casting as an integral part of the base housing component at least one tag to said at least one carrier strip so as to establish an electrically insulating, breakable mechanical connection between the base housing component and the carrier strip prior to separating the outer terminal ends from the carrier strip,

testing each of the keyboard switches produced at a test stand while the switch is connected to the carrier strip by said at least one tag, but after separating the outer terminal ends from the carrier strip, the testing being performed by actuating the stem member in order to test whether the switching element is switchable between said first and second states, and in order to determine whether said at least two metallic terminal components are electrically insulated relative to each other when said switching element is in its first state, and

whether said at least two metallic terminal components are in electrically conductive connection with each other when the switching element is in its second state,

separating the base housing component from the tag when the respective keyboard switch has been successfully tested.

In accordance with the method according to the present invention, the keyboard switch is manufactured from only five components, viz. the continuous track, the base housing component, the switching element, the stem means, and the top housing component. Since the base housing component is mechanically connected to the carrier strip through the tag, the keyboard switch is, during its manufacturing process, advanced through a number of production stations corresponding to the above steps by moving the carrier strip. In accordance with a particular feature of the above method according to the present invention, the keyboard switches are very easily tested as the keyboard switches produced by the method according to the invention are simply presented to the test stand integrally connected to the carrier strip through the tag.

In accordance with a preferred embodiment of the method according to the present invention, two carrier strips are processed from said continuous track, the metallic terminal components being arranged between and having their outer terminal ends integrally connected to said carrier strips, one tag being cast between each of the carrier strips and the base housing component. By the provision of two carrier strips and two tags cast to a respective carrier strip, the keyboard switch is to a high degree mechanically supported in its fixation to the two carrier strips when the keyboard switch is advanced through the above steps.

A further increase in the mechanical fixation and support of the keyboard switch when advanced through the above steps, is obtained in accordance with an alternative of the above preferred embodiment of the method according to the present invention in that each metallic terminal component constitutes a link between said two carrier strips, and each of said metallic components has two outer terminals defining outer terminal ends integrally connected to a respective carrier strip.

In accordance with the presently preferred embodiment of the method according to the present invention, said switching element is a domed metal disc, which disc is arranged with its dome protruding outwards from said recess, and which disc in its normally domed shape is in said first state and is deformable from its domed shape into a deflected shape constituting said second state, and said stem member arranged in said aperture of said top housing component being actuatably act-

ing on said metal disc for deforming it from said domed shape to said deflected shape by activation.

An elastically compressible body member is preferably arranged between the stem member and said metal disc and, as will be explained below, the elastically compressible body means serves more purposes, viz. to increase the travel or stroke of the metal disc when deformed and optionally to protect the metal disc by sealing along the circumferential edge of the disc and consequently protecting the metal disc and the electric contact means from corrosive gases and exposure to high temperatures in a surface mounting process, when the keyboard switch is soldered to a supporting circuit board, e.g. in a wave soldering machine.

It has been realised that a domed metal disc produces an unpleasant and harsh click, when it is deformed. In accordance with a particular aspect of the present invention, it has further been realised that the click may be damped resulting in a more pleasant sound by providing an acoustically damping material coating or layer on the one side surface of the domed metal disc, which side surface constitutes the outer or convex side surface of the domed metal disc. Consequently, in accordance with a further embodiment of the method according to the present invention, the metal disc is preferably punched from a metal foil, which is provided with a coating of an acoustically damping material on one side surface, which side surface in said domed metal disc constitutes the outer or convex side surface of said domed metal disc.

Furthermore, the keyboard switch produced in accordance with the method according to the present invention is preferably a keyboard switch which may stand exposure to elevated temperatures, such as 240 °C, during e.g. 60 sec, e.g. in a surface mounting process, e.g. in a wave soldering machine, as the base and top housing components of the keyboard switch are preferably cast from a high-temperature resistant plastics material.

In accordance with a second aspect the present invention provides a keyboard switch comprising

a housing of an insulating material and including a base housing component defining a recess therein and a top housing component defining an aperture therein,

at least two metallic terminal components embedded in the insulating material of the base housing component, each including an outer terminal extending outwards from an outer side wall of the housing and defining an outer terminal end, and an electric contact member exposed in the recess,

a domed metal disc, which is coated with an acoustically damping material on one of its side surfaces being arranged within the recess and being switchable between a domed state, in which it

is out of electrically conductive contact with at least one of the electric contact members, and a deflected state in which the metal disc is establishing electrically conductive contact between the electric contact members,

a stem member for actuating the metal disc extending through the aperture of the top housing component, so as to switch the metal disc between said domed and deflected states by actuating the stem member, and the switch according to the invention is characterized in that the stem member is made of a silicon rubber material, said stem member comprising a hollow, elastic and compressible stem part extending through the aperture of the top housing component, and a membrane part which is formed integrally with the stem part said membrane part extending radially across the recess, wherein said domed metal disc is arranged, said membrane part having a circumferential bead being in sealing engagement with the housing. Because the stem part and the domed metal disc are elastically compressible, the metal disc may be switched between its domed and deflected states, the stroke of movement of the outer free end of the stem part being partly absorbed by the elastically compressible material, so that the movement of the free end of the stem part substantially exceeds the movement of the metal disc.

US patent No. 4.207.448 discloses a push-bottom switch of the type described above comprising a stem member for actuating a domed metal disc and a membrane-like conductive layer extending between the stem member and the metal disc. The inner end of the stem member or the adjacent side surface of the conductive layer may be provided with a compressible damper boss or damper sheet, respectively. However, the stem member or push-bottom is otherwise made from a stiff material, and the stem member and the membrane-like conductive layer are separated individual parts.

In the switch according to the invention the domed metal disc is protected against exposure to gases, such as corrosive gases, and to elevated temperatures, e.g. in the above mentioned surface mounting process by the membrane part, which may have a circular shape. The stem member and the domed metal disc may then be arranged coaxially relative to each other. The domed metal disc is advantageously made from a CuBe foil of a thickness of e.g. 0.075 mm.

In the preferred embodiment of the keyboard switch according to the present invention, the keyboard switch is a keyboard switch which may stand exposure to high temperatures, such as 240 °C, for e.g. 60 sec, as the keyboard switch is exposed to e.g. solder in a surface mounting process. The base and top housing components are made from

a high temperature resistant plastics material, such as high-crystalline copolymers, epoxy resins, olefin-carbon-monoxide copolymers, polycarbonates, polyolefin sulphonates, e.g. polyethylene sulphonate, PES, or polyethylene-terephthalates, e.g. PETP or PET.

The invention will now be further described with reference to the drawings, in which

Fig. 1 is a schematical and perspective view of a production line in which a keyboard switch is produced in accordance with the methods according to the present invention,

Fig. 2 is a partly vertical sectional view of the keyboard switch shown in Fig. 1,

Fig. 3 is a schematical and perspective view illustrating the production of an accessory component of the keyboard switch shown in Figs. 1 and 2 in accordance with the method of the present invention,

Fig. 4 is a schematical, perspective and partly exploded view of a combination of a keyboard switch according to the present invention, and an accessory component including two light emitting diodes and produced in accordance with the method according to the present invention, and a manually operable keyboard switch housing component,

Fig. 5 is a schematical, perspective and partly exploded view of the combination shown in Fig. 4, turned upside down, and

Fig. 6 is a schematical and perspective view of a combination of a keyboard switch according to the present invention and a light emitting diode support constituting an accessory top housing component of the key.

In Fig. 1, a method according to the present invention of producing a keyboard switch according to the present invention is illustrated comprising five individual production steps schematically illustrated by positions designated the reference numerals 1-5.

In position 1, a metal plate is provided constituting a continuous track of a metal foil 10.

In position 2, the metal foil track 10 is machined in a punching tool, not shown in Fig. 1, and processed into two carrier strips 11 and 12 between which two terminal assemblies 13 and 14 extend. As will be evident from the description below, each of the terminal assemblies 13 and 14 is in a subsequent production step machined into two terminals. Thus, the terminal assemblies 13 and 14 are integrally connected to the carrier strips 11 and 12 through ends of the terminal assemblies, which ends are intended to constitute the outer terminal ends of the above mentioned terminals. As is evident from Fig. 1, the terminal assembly 13 is machined into a shape defining a centrally indented bar 15, from which a contact bar 17 ex-

tends towards the adjacent terminal assembly 14. The outer end of the contact bar 17 remote from the indented bar 15 is further machined into a domed contact pad 19. As is also evident from Fig. 1, the terminal assembly 14 is also machined into a shape defining a centrally indented part 16, from which two connector bars 18 extend towards the adjacent terminal assembly 13. The contact bars 18 are further provided with raised, outer contact parts 20.

In position 3, a base housing component 22 is cast around the above described components 15-20 of the terminal assemblies 13 and 14. The base housing component 22 is cast with a central recess 23 defining a circumferential inner surface 24 and a bottom surface 25, in which the contact pad 19 and the raised, outer contact parts 20 are exposed and protrude upwards. The base housing component 22 further defines a top surface 26, a bottom surface, not shown in Fig. 1, a first outer side surface 27, which faces the carrier strip 12, and a second outer side surface 28. The surfaces 26, 27 and 28 are perpendicular to each other. The base housing component 22 further has a bottom surface, not shown in Fig. 1, parallel with the top surface 26, and two outer side surfaces, not shown in Fig. 1, parallel with the first and a second outer side surfaces 27 and 28, respectively. From the first outer side surface 27 and further from the outer side surface not shown in Fig. 1 parallel therewith carrier tags 29 protrude. The carrier tags 29 are cast integrally with the base housing component 22 and are cast to the respective carrier strips 11 and 12.

As is evident from Fig. 1, the base housing component 22 is further at its top surface 26 and its outer side surfaces 27 and 28 provided with indents mating with a top housing component 30 and accessory components to be described below, respectively.

In the above described base housing component 22, a domed metal disc 31 is arranged, which metal disc has its dome facing upwards, i.e. outwards from the recess 23 of the base housing component 22. The domed metal disc 31 is in its normally domed shape in contact with the contact parts 20, however, out of contact with the central contact pad 19, and does consequently not in its normally domed shape establish electrically conductive connection between the contact pad 19 and the outer contact parts 20 and further between the terminal assemblies 14 and 13. The domed metal disc 31 is at its upper or convex side surface provided with a central coating 32 of an acoustically damping material, e.g. of silicone, serving the purpose of altering the unpleasant and harsh noise generated by an undamped domed metal disc, when the metal disc is deformed from its

domed shape to a deformed shape and vice versa into a more pleasant, damped noise. On top of the domed metal disc 31, a rubber component 33 is arranged, which comprises two integrally connected parts, a membrane part 34 and a stem part 35. The membrane part 34 has, as is evident from Fig. 1, a larger outer diameter than the domed metal disc 31 and is further at its lower side surface, shown in Fig. 2, provided with a circumferential bead 36. The bead 36 serves the purpose of sealing along the outer circumferential edge of the domed metal disc 31.

The stem part 35 is a hollow part, which is elastically deformable and serves the purpose of transmitting a mechanical force from a button 37 to which said mechanical force is applied to the domed metal disc and further the purpose of increasing the stroke of travel of the button 37 relative to the stroke of travel of the domed metal disc, as the metal disc is deformed or allowed to revert to its normally domed shape from its deformed shape, by the elastic deformation of the stem part 35.

As is evident from Fig. 2, the membrane part 34 is at its lower side surface provided with a protruding part 38 serving the purpose of contacting the central part of the domed metal disc 31, when the stem part 35 is actuated and forced downwards by the button 37. As the domed metal disc 31 and the rubber component 33 are arranged in the recess 23 of the base housing component 22, the top housing component 30 is, with the button 37 arranged in a central aperture of the top housing component 30, arranged on top of the base housing component 22 and fixed thereto. The top housing component 30 is, as is evident from Fig. 1, provided with a central cylindrical bottom part fitting into the recess 23 in a snap fitting, as is evident from Fig. 2, and further provided with downwards protruding fins for co-operating with the above mentioned indents of the top surface 26 of the base housing component 22. The travel of the button 37 within the aperture 39 of the top housing component 30 is controlled by fins 40 protruding outwards from the circumferential outer side surface of the button 37 at the lower edge thereof, as is evident from Fig. 1, which fins 40 are adapted to co-operate with indents of the inner wall of the aperture 39 of the top housing component 30.

In position 4 of Fig. 1, the above described keyboard switch assembly is assembled from the base housing component 22, the top housing component 30, the button 37, the domed metal disc 31, and the rubber component 33 enclosed in the housing of the keyboard switch assembly. From the first outer side surface 27 and the opposite, parallel side surface, the terminal assemblies 13 and 14 protrude. As the keyboard switch assembly leaves position 4, the terminal assemblies 13 and

14 are separated from the carrier strips 11 and 12 at the outer ends thereof. Consequently, the keyboard switch assembly is connected to the carrier strips 11 and 12 through the tags 29, exclusively. As the keyboard switch assembly leaves position 4, the outer terminals defined by the parts of the terminal assemblies 13 and 14 extending outwards from the base housing component 22 are, furthermore, bent downwards, as is evident from the keyboard switch assembly disclosed in position 5 of Fig. 1. By the separation of the terminal assemblies 13 and 14 from the carrier strips 11 and 12, the short circuiting connection between the terminal assemblies 13 and 14 through the carrier strips 11 and 12 is eliminated.

When still mechanically supported by the carrier strips 11 and 12 through the tags 29 connecting the base housing component 22 to the carrier strips 11 and 12 the keyboard switch assembly may in position 5 be tested in an automatic electric test stand. The test stand is illustrated schematically by a test block 41, which is moved from the position shown in Fig. 1 upwards so as to receive the outer ends of the terminals defined by the terminal assemblies 13 and 14 in apertures 42 of the block 41. In the apertures 42, metal contact means are provided for establishing electrically conductive contact to the terminals 13 and 14 and are connected to a test circuit, not shown in Fig. 1, which is capable of determining the presence or absence of a short-circuiting condition. By further actuating the button 37 and consequently deforming the domed metal disc 31 from its normally domed shape into its deformed shape by the interaction of the rubber component 33, and still monitoring the presence or absence of a short-circuiting condition between the terminals 13 and 14, the keyboard switch assembly is easily tested. The object is to determine if the keyboard switch assembly is a properly functioning keyboard switch, which in its unactuated state does not establish electrically conductive connection between the terminals 13 and the terminals 14, and which in its actuated state establishes electrically conductive connection between the terminals 13 and 14. Provided the keyboard switch assembly has been identified as a properly working keyboard switch assembly, it is separated from the carrier strips 11 and 12 by cutting or breaking the keyboard switch assembly loose from the tags 29.

In Fig. 1, the carrier strips 11 and 12 are provided with through-going holes 43 and 44. The above described process of producing a keyboard switch assembly according to the present invention is indicated above and carried out by moving the track 10 from position 1 to position 5 by well-known computer controlled mechanical advancing means. The holes 43 and 44 consequently serve the pur-

pose of co-operating with gripping means for advancing the track 10 and further, or alternatively, with e.g. optical or proximity detector means to inform the process controlling computer about the position of the track or the carrier strips 11 and 12 relative to an intended position in one of the positions 1-5 shown in Fig. 1.

In Fig. 2 a vertical sectional view of the keyboard switch assembly described above is shown disclosing the above described components and further in greater detail the sealing of the domed metal disc 31 relative to the environment by the bead 36 of the membrane part 34 of the rubber component 33.

In a production line for the production of the keyboard switch described above with reference to Fig. 1, the metal plate 10 from which the keyboard switch is produced may be advanced through a number of processing stations. Alternatively, the metal plate 10 may be stationary and the production stations may be moved in relation to the metal plate. Furthermore, the production line may constitute any appropriate combination of the above possibilities, viz. the advancing of the metal plate 10 in relation to the stations and the movement of the stations in relation to the metal plate. However, a very important aspect of the present invention is the permanent fixation of the keyboard switch in relation to the metal plate 10 or to the carrier strips 11 and 12 until the keyboard switch has been tested and positively identified as a properly functioning key. Thus, the keyboard switch is not to be transferred from its production line to a test stand as the keyboard switch is permanently fixed to the carrier strips 11 and 12 and consequently in a fixed position in relation to the tools of the individual stations 2-5, particularly in a fixed position in relation to the block 41 constituting part of a test stand shown in position 5 of Fig. 1.

As mentioned above, the keyboard switch assembly described with reference to Figs. 1 and 2 is adapted to co-operate with accessory components, such as a display assembly 50 shown in Fig. 4. The display assembly 50 is in Fig. 4 mechanically connected to a keyboard switch assembly according to the present invention, which keyboard switch assembly is designated the reference numeral 48 in its entirety, through outwardly protruding dovetail shaped locking means co-operating with the above mentioned indents of the outer side surface 28 shown in Fig. 1. By these interlocking dovetail shaped male and female locking means, the display assembly 50 is connected and mechanically fixed to the keyboard switch assembly 48. The keyboard switch assembly 48 differs from the keyboard switch assembly described with reference to Figs. 1 and 2 in that the button 37 is substituted by a button 47 and in that the top housing component

30 is substituted by a top housing component 60, the top surface of which is at the same level as the button 47.

The display assembly 50 comprises two light emitting diodes 51 and 52, which are received in the housing of the display assembly 50 and connected to terminals thereof, which terminals are designated the reference numerals 113 and 114 and, like the terminals 13 and 14 of the keyboard switch assembly 48, of a configuration allowing the mounting of the keyboard switch assembly 48 and the display assembly 50 in a surface mounting process, which terminals are known in the art as terminal type "J" SMD. Obviously, the accessory assembly 50 may comprise alternative components. Thus, the two light emitting diodes 51 and 52 only constitute examples of components of the display assembly 50 and may in an alternative embodiment be replaced by e.g. a single light emitting diode, one or more incandescent lamps etc. Furthermore or alternatively, the accessory assembly 50 may comprise one or more active or passive components, such as an integrated circuit, a transistor, a resistor, a capacitor, or a relay. Apart from the accessory component or display assembly 50, the keyboard switch assembly 48 co-operates in Fig. 4 with a push button assembly 54, which comprises two parts, viz. a fixed housing part 55, which is mounted and fixed relative to the assemblies 48 and 50, and a movable or pivotable part 56. The top housing component 60 also differs from the above described top housing component 30 shown in Figs. 1 and 2 in that the top housing component 60 is provided with a further component 61 defining an outer groove 62 for co-operating with an axial part of the pivotable part 56 of the push button assembly 54.

In Fig. 5, the above assemblies 48, 50 and 54 are shown turned upside down. Thus, in Fig. 5 the above mentioned axial part co-operating with the groove 62 is shown designated the reference numeral 63. In Fig. 5, two protruding parts 64 of the fixed housing part 55 of the push button assembly 54 is further shown serving the purpose of co-operating with the indents mentioned above with reference to Fig. 1 of the outer side surface 27 and further of the opposite outer side surface of the base housing component 22. The fixed housing part 55 is further provided with snap-locking means 65 serving the purpose of gripping around the keyboard switch assembly 48 and fixing the housing part 55 thereto. As is evident from Fig. 5, the housing part 55 is further provided with two protruding journalling means 67 co-operating with mating journalling means 68 of the pivotable part 56 of the push button assembly 54, which is further provided with a protruding stem means 66 for transferring a mechanical pressure applied to the

pivotable part 56 to the push button 47 and further to the internal contact element of the keyboard switch constituted by the domed metal disc 31, shown in Figs. 1 and 2.

The keyboard switch assembly 48 and the display assembly 50 shown in Fig. 5, however, differ from the keyboard switch assembly 48 and the display assembly 50 shown in Fig. 4 in that the terminals 13, 14 and 113, 114 are of a different configuration, viz. the SMD terminal configuration known in the art as "Gull Wing".

In Fig. 3, three positions 6, 7 and 8 of a sequential process according to the present invention of producing the component or display assembly 50 described above with reference to Figs. 4 and 5 are shown. From a metal track similar to the above described metal track 10 shown in Fig. 1, two carrier strips 111 and 112 are punched and brought to the first position designated 6 in Fig. 3. As is evident from Fig. 3, two terminal assemblies 113 and 114 are further punched from the above mentioned metal track. The terminal assemblies 113 and 114, however, differ from the terminal assemblies 13 and 14 shown in Fig. 1 in that the terminal assemblies 113 and 114 do not constitute links between the carrier strips 111 and 112. Thus, the terminal assembly 113 is connected to the carrier strip 111, exclusively, whereas the terminal assembly 114 is connected to the carrier strip 112, exclusively. In position 7, the terminal assemblies 113 and 114 are further processed and each separated into two individual terminal assemblies. Thus, the terminal assembly 113 is divided into two terminal assemblies 113a and 113b, while the terminal assembly 114 is separated into two terminal assemblies 114a and 114b. The parts of the terminal assemblies 113a,b and 114a,b remote from the carrier strips 111 and 112, respectively, are further indented and bent into the shape shown in Fig. 3. In position 8, a housing part 122 is cast around the terminals 113a,b and 114a,b. After the casting step shown in position 8, the component constituting the housing of the display assembly 50 shown in Figs. 4 and 5 is separated from the carrier strips 111 and 112. As is evident from Fig. 3, the carrier strips 111 and 112 are provided with through-going holes 143 corresponding to the holes 43 and 44 of the carrier strips 11 and 12 shown in Fig. 1.

It is to be realised that the above described keyboard switch or keyboard switch assembly according to the present invention is of a modular configuration, as the keyboard switch assembly may co-operate with an accessory component such as the above described display assembly and the above described push button assembly, which as will be evident to the skilled art worker is translucent or is provided with a translucent part. Thus, the pivotable part 56 of the push button 54 may

advantageously be made from a translucent material, which is illuminated by the light emitting diodes 51 and 52 of the display assembly 50. Furthermore, as will be evident from the description of Fig. 4, the push button or the top housing component of the keyboard switch assembly 48 may be modified in order to meet special requirements.

In Fig. 6, a keyboard switch assembly for the present invention is shown, which keyboard switch assembly is modified relative to the above described keyboard switch assembly 48 shown in Figs. 4 and 5, in that a push button extender 70 is arranged on top of the push button 47 shown in Fig. 4, which push-button extender 70 is of a cylindrical configuration. The push button extender 70 defines an inner space 71, in which a light emitting diode 72 is arranged, which diode is mounted in a socket 73 received in the inner space 71. The light emitting diode 72 has its pins extending through slits 75 and 76 of the push button extender 70 and further through apertures of the top housing component 60 of the keyboard switch assembly. In Fig. 6, one of the apertures of the top housing component 60 of the keyboard switch assembly is designated the reference numeral 74. One of the pins of the light emitting diode 72 is also shown in Fig. 6 and designated the reference numeral 77. In Fig. 6, the terminals 13 and 14 of the keyboard switch assembly and further the pin 77 of the light emitting diode 72 are of a configuration different from the terminal configurations shown in Figs. 4 and 5. Thus, it is to be realised that the terminals 13 and 14 and further any pins or terminals of accessory components such as the pin 77 or the terminals 113 and 114 may be of any appropriate configuration.

EXAMPLE 1

In a prototype implementation of the method of producing the keyboard switch assembly shown in Figs. 1 and 2, the carrier strips 11 and 12 and the terminal assemblies 13 and 14 were machined from 0.3 mm silver-plated tin-bronze. The carrier strips 11 and 12 had a width of 3 mm, and the distance between the centre lines of the carrier strips 11 and 12 was 23.96 mm. The distance between the terminal assemblies 13 and 14 was 7.6 mm, the diameter of the holes 44 was 1.2 mm, which holes were arranged at the centre lines of the carrier strips 11 and 12 and further at intermediate positions relative to the terminal assemblies 13 and 14, the diameter of the holes 43 was 1.8 mm. The width of the indented part 16 was 4.4 mm, the raised contact parts 20 were raised 0.5 mm relative to the indented part 16. The raised contact parts 20 and the contact pad 19 were

positioned centrally or at the intermediate line of the terminal assemblies 13 and 14. The contact pad 19 was raised 0.45 mm relative to the indented bar 15, and was constituted by a dome with a radius of 1.35 mm defining a circular contact pad of a diameter of 1.224 mm.

The base housing component 22, the top housing component 30 and the button 37 were cast from polycarbonate (or in alternative implementations from PES or PETP). The shrinkage of the components was less than approx. 0.5 per cent. The push button 37 was of a diameter of 6.5 mm and a height of 2.8 mm. The fins 40 had a height of 0.8 mm, and oppositely positioned fins defined a maximum outer diameter of 7.65 mm. The button 37 further had a central, inwardly protruding part shown in Fig. 2, which part defined a height of 0.95 mm from the lower side surface of the bottom.

The assembly comprising the base housing component 22 and the top housing component 30 defined a height of 5 mm, while the maximum height of the keyboard switch assembly from the lower side surface of the base housing component 22 to the top surface of the keyboard switch 37 was 6.4 mm. The outer dimensions of the bottom and top housing parts were 10 mm x 10 mm.

The rubber component 33 was made from silicone rubber of a hardness of 38 Shore +2. The outer diameter of the membrane part 34 was 8.83 mm, the inner diameter defined within the bead 36 was 6.8 mm, the thickness of the membrane part 34 was 0.3 mm, and the overall thickness of the bead was 0.63 mm. The central protruding part 38 defined a circular surface of a diameter of 1.4 mm protruding 0.4 mm from the lower side surface of the membrane part 34. The stem part 35 was a hollow, cylindrical part of a height of 3.16 mm, which stem part defined an upper outer diameter of 2.8 mm, an angle of taper of the outer cylindrical side surface of the stem part 35 of 7°, an inner recess of a depth of 2.5 mm and of an inner diameter of 1 mm and defining by its inner cylindrical surface an angle of taper of 5°.

The domed metal disc 31 was made from 0.075 mm copper beryllium alloy. The outer diameter of the metal disc 31 was 6.4 mm and the maximum diameter of the acoustically damping coating 32 was 5 mm. The arch or dome radius of the disc was 39.1 mm, and the height of the dome was 0.25 mm. The domed metal disc was deformed from its normally domed shape by the application of a pressure of 155-165 g and reverted from its deformed shape to its normally domed shape when the pressure applied to the domed metal disc was less than 115-125 g.

Together the rubbered component 33 and the domed metal disc 31 provided an increase of the stroke of the domed metal disc 31 of approximately

0.25 mm-0.3 mm to a total stroke or travel of the push button 37 of approximately 0.8 mm-1 mm.

EXAMPLE 2

The accessory component or display assembly 50 shown in Fig. 4 was in a prototype implementation made from a terminal plate constituted by a silver-plated tin-bronze plate and a housing cast from polycarbonate (or, alternatively, PES or PETP), like the keyboard switch described above in example 1.

Although the invention has been described above with reference to specific embodiments and implementations, it is to be understood that the present invention is not limited to the above embodiments and implementations, thus, numerous modifications and amendments are obvious to a person having ordinary skill in the art within the scope of the present invention as defined in the appending claims.

Claims

1. A method of producing a plurality of keyboard switches, each switch comprising a housing (22, 30) of an insulating material, at least two metallic terminal components (13, 14), each having an outer terminal end extending outwards from an outer side wall of the housing as well as an electric contact member (19, 20) being enclosed in said housing and integrally connected to the terminal at an end opposite to the outer terminal end, and a switching element (31) being switchable between a first state in which it is out of electrically conductive contact with at least one of the electric contact members, and a second state in which the switching element is establishing electrically conductive contact between the electric contact members, said method comprising
 - (a) providing a continuous track (10) of the metal of said metallic terminal components (13, 14),
 - (b) processing the continuous track so as to form a plurality of sets of the metallic terminal components (13, 14) and at least one carrier strip (11, 12), the metallic terminal components being integrally connected to the carrier strip through their outer terminal ends,
 - (c) casting a base housing component (22) of said insulating material around each set of the metallic terminal components (13, 14), the base housing component defining at least part of said outer side walls of the housing, a recess (23) therein exposing the

electrical contact members being formed in said housing

(d) arranging the switching element (31) in each recess (23) of each base housing component so as to be switchable between said first and second states,

(e) mounting a top housing component (30) having an aperture on each base housing component (22),

(f) arranging a stem member (35) in the aperture (39) of each top housing component (22) so that the switching element (31) may be actuated and switched between its first and said second states, and

(g) separating the metallic terminal components (13, 14) from the carrier strip (11, 12) by separating the outer terminal ends therefrom,

characterized in casting as an integral part of each base housing component (22) at least one tag (29) connected to said at least one carrier strip (11, 12) so as to establish an electrically insulating, breakable mechanical connection between each base housing component and the carrier strip prior to separating the outer terminal ends from the carrier strip (11, 12),

testing each of the keyboard switches produced at a test stand (41) while the switch is connected to the carrier strip (11, 12) by said at least one tag (29), but after separating the outer terminal ends from the carrier strip (11, 12), the testing being performed by actuating the stem member (35) in order to test whether the switching element (31) is switchable between said first and second states, and in order to determine whether said at least two metallic terminal components (13, 14) are electrically insulated relative to each other when said switching element is in its first state, and whether said at least two metallic terminal components are in electrically conductive connection with each other when the switching element is in its second state, and

separating the base housing component (22) from the tag (29) when the respective keyboard switch has been successfully tested.

2. A method according to claim 1, wherein two carrier strips (11, 12) are processed from said continuous track (10), the metallic terminal components being arranged between and having their outer terminal ends integrally connected to the carrier strips, one tag (29) being cast between each of the carrier strips and the base housing component (22).

0.25 mm-0.3 mm to a total stroke or travel of the push button 37 of approximately 0.8 mm-1 mm.

EXAMPLE 2

The accessory component or display assembly 50 shown in Fig. 4 was in a prototype implementation made from a terminal plate constituted by a silver-plated tin-bronze plate and a housing cast from polycarbonate (or, alternatively, PES or PETP), like the keyboard switch described above in example 1.

Although the invention has been described above with reference to specific embodiments and implementations, it is to be understood that the present invention is not limited to the above embodiments and implementations, thus, numerous modifications and amendments are obvious to a person having ordinary skill in the art within the scope of the present invention as defined in the appending claims.

Claims

1. A method of producing a plurality of keyboard switches, each switch comprising a housing (22, 30) of an insulating material, at least two metallic terminal components (13, 14), each having an outer terminal end extending outwards from an outer side wall of the housing as well as an electric contact member (19, 20) being enclosed in said housing and integrally connected to the terminal at an end opposite to the outer terminal end, and a switching element (31) being switchable between a first state in which it is out of electrically conductive contact with at least one of the electric contact members, and a second state in which the switching element is establishing electrically conductive contact between the electric contact members, said method comprising

(a) providing a continuous track (10) of the metal of said metallic terminal components (13, 14),

(b) processing the continuous track so as to form a plurality of sets of the metallic terminal components (13, 14) and at least one carrier strip (11,12), the metallic terminal components being integrally connected to the carrier strip through their outer terminal ends,

(c) casting a base housing component (22) of said insulating material around each set of the metallic terminal components (13, 14), the base housing component defining at least part of said outer side walls of the housing, a recess (23) therein exposing the

electrical contact members being formed in said housing

(d) arranging the switching element (31) in each recess (23) of each base housing component so as to be switchable between said first and second states,

(e) mounting a top housing component (30) having an aperture on each base housing component (22),

(f) arranging a stem member (35) in the aperture (39) of each top housing component (22) so that the switching element (31) may be actuated and switched between its first and said second states, and

(g) separating the metallic terminal components (13, 14) from the carrier strip (11, 12) by separating the outer terminal ends therefrom,

characterized in casting as an integral part of each base housing component (22) at least one tag (29) connected to said at least one carrier strip (11, 12) so as to establish an electrically insulating, breakable mechanical connection between each base housing component and the carrier strip prior to separating the outer terminal ends from the carrier strip (11, 12),

testing each of the keyboard switches produced at a test stand (41) while the switch is connected to the carrier strip (11, 12) by said at least one tag (29), but after separating the outer terminal ends from the carrier strip (11, 12), the testing being performed by actuating the stem member (35) in order to test whether the switching element (31) is switchable between said first and second states, and in order to determine whether said at least two metallic terminal components (13, 14) are electrically insulated relative to each other when said switching element is in its first state, and whether said at least two metallic terminal components are in electrically conductive connection with each other when the switching element is in its second state, and

separating the base housing component (22) from the tag (29) when the respective keyboard switch has been successfully tested.

2. A method according to claim 1, wherein two carrier strips (11, 12) are processed from said continuous track (10), the metallic terminal components being arranged between and having their outer terminal ends integrally connected to the carrier strips, one tag (29) being cast between each of the carrier strips and the base housing component (22).



3. A method according to claim 2, wherein each of the terminal components (13, 14) defines two outer terminal ends integrally connected to a respective carrier strip (11, 12).

4. A method according to any of the claims 1-3, wherein the switching element is a domed metal disc (31), which is arranged with its dome protruding outwards from the recess (23), and which in its normally domed shape is in said first state and deformable from its domed shape into a deflected shape constituting said second state, and wherein the stem member (35) is cooperating with the metal disc for deforming it from said domed shape to its deflected shape by activation of the stem member (35).

5. A method according to claim 4, wherein an elastically compressible body member (34) is arranged between the stem member (35) and the metal disc (31).

6. A method according to claim 5, wherein the metal disc (31) is punched from a metal foil, which is provided with a coating of an acoustically damping material on one side surface, which side surface constitutes the outer or convex side surface of the domed metal disc.

7. A method according to any of the claims 4-6, wherein the base and top housing components (22 and 23) are cast from a high temperature resistant plastics material.

8. A keyboard switch comprising:
a housing (22, 30) of an insulating material and including a base housing component (22) defining a recess (23) therein and a top housing component (30) defining an aperture therein,

at least two metallic terminal components (13, 14) embedded in the insulating material of the base housing component, each including an outer terminal extending outwards from an outer side wall of the housing and defining an outer terminal end, and an electric contact member (19, 20) exposed in the recess (23),

a domed metal disc (31), which is coated with an acoustically damping material (32) on one of its side surfaces being arranged within the recess and being switchable between a domed state, in which it is out of electrically conductive contact with at least one of the electric contact members (19, 20), and a deflected state in which the metal disc is establishing electrically conductive contact between the electric contact members,

a stem member (33) for actuating the metal disc (31) extending through the aperture of the top housing component, so as to switch the metal disc between said domed and deflected states by actuating the stem member (33), characterized in that the stem member (33) is made of a silicon rubber material, said stem member (33) comprising a hollow, elastic and compressible stem part (35) extending through the aperture (39) of the top housing component (30), and a membrane part (34) which is formed integrally with the stem part (35) said membrane part (34) extending radially across the recess (23), wherein said domed metal disc (31) is arranged, said membrane part (34) having a circumferential bead (36) being in sealing engagement with the housing (22, 30).

9. A keyboard switch according to claim 8, wherein the housing components (22 and 30) are made from a high temperature resistant plastics material.

10. A keyboard switch according to claim 8 or 9, wherein the stem part (35) and the membrane part (34) are made from silicone rubber, while the domed metal disc (31) is made from a CuBe alloy foil.

Patentansprüche

1. Verfahren zur Herstellung einer Vielzahl von Schaltern für Tastaturen, wobei Jeder Schalter umfaßt
ein Gehäuse (22,30) aus einem isolierenden Material, wenigstens zwei metallische Anschluß-Komponenten (13,14), wobei Jede sowohl ein äußeres Anschlußende, welches von einer äußeren Seitenwand des Gehäuses vorragt, als auch ein elektrisches Kontaktglied (19,20) aufweist, welches in das Gehäuse eingebettet ist und mit dem Anschluß an einem dem äußeren Anschlußende gegenüberliegenden Ende einstückig verbunden ist, und ein Schalterelement (31), welches zwischen einem ersten Zustand, in welchem es außer elektrisch leitendem Kontakt mit wenigstens einem der elektrischen Kontaktglieder ist, und einem zweiten Zustand umschaltbar ist, in welchem das Schalterelement einen elektrisch leitenden Kontakt zwischen den elektrischen Kontaktgliedern aufbaut, wobei das Verfahren umfaßt
(a) Vorsehen einer durchgehenden Bahn (10) des Metalls der metallischen Anschluß-Komponenten (13,14)
(b) Bearbeiten der durchgehenden Bahn, so daß eine Mehrzahl von Gruppen von den



metallischen Anschluß-Komponenten (13,14) und wenigstens ein Träger-Streifen (11,12) gebildet werden, wobei die metallischen Anschluß-Komponenten einstückig mit dem Träger-Streifen über ihre äußeren Anschlußenden verbunden sind,

(c) Gießen einer Basis-Gehäuse-Komponente (22) aus dem isolierenden Material um jede Gruppe von metallischen Anschluß-Komponenten (13,14) herum, wobei die Basis-Gehäuse-Komponente wenigstens ein Teil der äußeren Seitenwände des Gehäuses definiert, wobei eine darin vorgesehene Vertiefung (23) die in dem Gehäuse ausgeformten, elektrischen Kontaktglieder freilegt, (d) Anordnen des Schalterelements (31) in jeder Vertiefung (23) jeder Basis-Gehäuse-Komponente, um zwischen dem ersten und dem zweiten Zustand umschaltbar zu sein,

(e) Anbringen einer oberen Gehäuse-Komponente (30) mit einer Öffnung auf jeder Basis-Gehäuse-Komponente (22)

(f) Anordnen eines Stabelements (35) in der Öffnung (39) einer jeden oberen Gehäuse-Komponente (22), so daß das Schalterelement (31) aktivierbar und zwischen seinem ersten und seinem zweiten Zustand umschaltbar ist, und

(g) Abtrennen der metallischen Anschluß-Komponenten (13,14) vom Träger-Streifen (11,12) durch Abtrennen der äußeren Anschlußenden hiervon,

gekennzeichnet durch

Gießen wenigstens eines Fortsatzes (29) als integraler Bestandteil jeder Basis-Gehäuse-Komponente (22), welcher Fortsatz mit wenigstens einem der Träger-Streifen (11,12) verbunden wird, um eine elektrisch isolierende, zerstörbare mechanische Verbindung zwischen jeder Basis-Gehäuse-Komponente und dem Träger-Streifen vor dem Abtrennen der äußeren Anschlußenden vom Träger-Streifen (11,12) auszubilden,

Testen jedes hergestellten Schalters für Tastaturen in einem Teststand (41), während der Schalter mit dem Träger-Streifen (11,12) über den wenigstens einen Fortsatz (29) verbunden ist, jedoch nachdem die äußeren Anschlußenden von dem Träger-Streifen (11,12) getrennt wurden, wobei das Testen durch Betätigen des Stabelementes (35) durchgeführt wird, um zu testen, ob das Schalterelement (31) zwischen dem ersten und zweiten Zustand umschaltbar ist, und um zu bestimmen, ob die wenigstens zwei metallischen Anschluß-Komponenten (13,14) relativ zueinander elektrisch isoliert sind, wenn sich das Schalterelement in seinem ersten Zustand befindet, und ob die

wenigstens zwei metallischen Anschluß-Komponenten in elektrisch leitender Verbindung miteinander stehen, wenn sich das Schalterelement in seinem zweiten Zustand befindet,

Abtrennen der Basis-Gehäuse-Komponente (22) von dem Fortsatz (29), wenn der entsprechende Schalter für Tastaturen erfolgreich getestet wurde.

2. Verfahren nach Anspruch 1, wobei zwei Träger-Streifen (11,12) von der durchgehenden Bahn (10) gebildet werden, wobei die metallischen Anschluß-Komponenten dazwischen angeordnet werden und ihre äußeren Anschlußenden einstückig mit den Träger-Streifen verbunden werden, wobei ein Fortsatz (29) zwischen jedem der Träger-Streifen und der Basis-Gehäuse-Komponente (22) ausgeformt wird.
3. Verfahren nach Anspruch 2, wobei jede der Anschluß-Komponenten (13,14) zwei äußere Anschlußenden definiert, welche einstückig mit einem entsprechenden Träger-Streifen (11,12) verbunden werden.
4. Verfahren nach einem der Ansprüche 1 bis 3, wobei das Schalterelement eine gewölbte metallische Scheibe (31) ist, welche mit ihrem gewölbten Teil aus der Vertiefung (23) nach außen vorragend angeordnet ist und welche sich in ihrer normal gewölbten Form in dem ersten Zustand befindet und in eine aus der gewölbten Form eingedrückte Form deformierbar ist, welche den zweiten Zustand darstellt, und wobei das Stabelement (35) mit der metallischen Scheibe für ein Deformieren derselben aus ihrer gewölbten Form in ihre eingedruckte Form durch Betätigung des Stabelementes (35) zusammenwirkt.
5. Verfahren nach Anspruch 4, wobei ein elastisch komprimierbares Glied (34) zwischen dem Stabelement (35) und der metallischen Scheibe (31) angeordnet ist.
6. Verfahren nach Anspruch 5, wobei die metallische Scheibe (31) aus einer Metallfolie gestanzt wird, welche mit einer Beschichtung aus einem schalldämpfenden Material auf einer Seitenfläche ausgebildet ist, wobei diese Seitenfläche die äußere oder konvexe Seitenfläche der gewölbten metallischen Scheibe ausbildet.
7. Verfahren nach einem der Ansprüche 4 bis 6, wobei die Basis-Gehäuse-Komponente und die obere Gehäuse-Komponente (22 und 23) aus



einem hochtemperaturbeständigen Kunststoff gegossen werden.

8. Schalter für Tastaturen umfassend:

ein Gehäuse (22,30) aus einem isolierenden Material und umfassend eine Basis-Gehäuse-Komponente (22), welche eine Vertiefung (23) darin definiert, und eine obere Gehäuse-Komponente (30), welche eine Öffnung darin definiert,

wenigstens zwei metallische Anschluß-Komponenten (13,14), welche in dem isolierenden Material der Basis-Gehäuse-Komponente eingebettet sind, wobei jede einen äußeren Anschluß, welcher von einer äußeren Seitenwand des Gehäuses vorragt und ein äußeres Anschlußende definiert, als auch ein elektrisches, in der Vertiefung (23) freigelegtes Kontaktglied (19,20) aufweist,

eine gewölbte metallische Scheibe (31), welche mit einem schalldämpfenden Material (32) auf einer ihrer Seitenflächen beschichtet ist und welche in der Vertiefung angeordnet ist und zwischen einem gewölbten Zustand, in welchem sie außer elektrisch leitendem Kontakt mit wenigstens einem der elektrischen Kontaktglieder (19,20) steht, und einem eingedruckten Zustand umschaltbar ist, in welchem sie einen elektrisch leitenden Kontakt zwischen den elektrischen Kontaktgliedern aufbaut,

ein Stabelement (33) zur Betätigung der metallischen Scheibe (31), welches sich durch die Öffnung der oberen Gehäuse-Komponente erstreckt, um die metallische Scheibe zwischen dem gewölbten und dem eingedrückten Zustand durch Betätigung des Stabelementes (33) umzuschalten,

dadurch gekennzeichnet, daß das Stabelement (33) aus einem Silikonkautschuk hergestellt ist, wobei das Stabelement (33) ein hohles, elastisches und komprimierbares Stabteil (35), welches sich durch die Öffnung (39) der oberen Gehäuse-Komponente (30) erstreckt, und ein Membranteil (34) umfaßt, welches einstückig mit dem Stabteil (35) ausgebildet ist, wobei sich das Membranteil (34) radial über die Vertiefung (23) erstreckt, in welcher die gewölbte metallische Scheibe (31) angeordnet ist, wobei das Membranteil (34) einen am Umfang verlaufenden Wulst (36) aufweist, welcher dichtend mit dem Gehäuse (22,30) zusammenwirkt.

9. Schalter für Tastaturen nach Anspruch 8, wobei die Gehäuse-Komponenten (22 und 23) aus einem hochtemperaturbeständigen Kunststoff gebildet sind.

10. Schalter für Tastaturen nach Anspruch 8 oder 9, wobei das Stabteil (35) und das Membranteil (34) aus einem Silikonkautschuk gebildet sind, während die gewölbte metallische Scheibe (31) aus einer Folie aus einer CuBe-Legierung gebildet ist.

Revendications

1. Procédé de production d'une pluralité de touches de clavier, chaque touche comprenant un corps (22, 30) en un matériau isolant, au moins deux composants métalliques de borne (13, 14) possédant chacun une extrémité externe de borne s'étendant vers l'extérieur à partir d'une paroi latérale externe du corps ainsi qu'une pièce de contact électrique (19, 20) logée dans ledit corps et raccordée de façon intégrale à la borne sur une extrémité opposée à l'extrémité externe de borne et un élément de commutation (31) pouvant être commuté entre un premier état dans lequel il est hors contact électrique avec au moins une des pièces de contact électrique et un second état dans lequel l'élément de commutation établit un contact électrique entre les pièces de contact électrique,

ledit procédé comprenant :

- la constitution d'une piste continue (10) dans le métal desdits composants métalliques de borne (13, 14);
- le traitement de la piste continue de façon à former une pluralité d'ensembles des composants métalliques de borne (13, 14) et au moins une bande de support (11, 12), les composants métalliques de borne étant intégralement raccordés à la bande de support via leurs extrémités externes de borne;
- la coulée d'un composant de base de corps (22) dans ledit matériau isolant autour de chaque ensemble des composants métalliques de borne (13, 14), le composant de base de corps définissant au moins une partie desdites parois latérales externes du corps, un creux (23) exposant les pièces de contact électrique étant formé dans ledit corps;
- le placement de l'élément de commutation (31) dans chaque creux (23) de chaque composant de base du corps de façon à pouvoir être commuté entre lesdits premier et second états;
- le montage d'un composant supérieur de corps (30) possédant une ouverture dans chaque composant de base du corps (22);



- le placement d'une pièce de tige (35) dans l'ouverture (39) de chaque composant supérieur de corps (22) de façon à ce que l'élément de commutation (31) puisse être actionné et commuté entre ses premier et second états; et
- la séparation des composants métalliques de borne (13, 14) de la bande de support (11, 12) par séparation des extrémités externes de borne;

procédé caractérisé par la coulée, comme partie intégrale de chaque composant de base de corps (22), d'au moins une patte (29) raccordée à au moins ladite bande de support (11, 12) de façon à établir une connexion mécanique cassable à isolation électrique entre chaque composant de base du corps et la bande du support avant la séparation des extrémités externes de borne de la bande de support (11, 12);

par le test de chacune des touches de clavier produites sur un poste de test (41) pendant que la touche est raccordée à la bande de support (11, 12) par au moins ladite patte (29) mais, après séparation des extrémités externes de borne de la bande de support (11, 12), le test étant effectué par actionnement de la pièce de tige (35) de façon à tester si l'élément de commutation (31) peut être commuté entre lesdits premier et second états et de façon à déterminer si au moins lesdits deux composants métalliques de borne (13, 14) sont électriquement isolés l'un de l'autre lorsque ledit élément de commutation est dans son premier état, et si au moins lesdits deux composants métalliques de borne sont électriquement raccordés l'un à l'autre lorsque l'élément de commutation est dans son second état; et

par la séparation du composant de base de corps (22) de la patte (29) lorsque la touche respective de clavier a été testée avec succès.

2. Procédé selon la revendication 1, selon lequel deux bandes de support (11, 12) sont traitées à partir de ladite piste continue (10), les composants métalliques de borne étant agencés entre les bandes de support et ayant leurs extrémités externes de borne raccordées, de façon intégrale, aux bandes de support, une patte (29) étant coulée entre chacune des bandes de support et le composant de base du corps (22).
3. Procédé selon la revendication 2, selon lequel chacun des composants de borne (13, 14) définit deux extrémités externes de borne raccordées, de façon intégrale, à une bande de

support respective (11, 12).

4. Procédé selon l'une quelconque des revendications 1 à 3, selon lequel l'élément de commutation est un disque métallique bombé (31) dont le renflement dépasse vers l'extérieur à partir du creux (23) et qui, dans son état normal de renflement, se trouve dans ledit premier état et peut se déformer, à partir de sa forme bombée, en une forme fléchie constituant ledit second état et selon lequel la pièce de tige (35) coopère avec le disque métallique pour le déformer de ladite forme bombée vers sa forme fléchie par actionnement de la pièce de tige (35).
5. Procédé selon la revendication 4, selon lequel une pièce de corps élastiquement compressible (34) est placée entre la pièce de tige (35) et le disque de métal (31).
6. Procédé selon la revendication 5, selon lequel le disque de métal (31) est poinçonné à partir d'une feuille métallique munie d'un revêtement d'un matériau amortisseur d'un point de vue acoustique sur une surface latérale constituant la surface latérale externe ou convexe du disque métallique bombé.
7. Procédé selon l'une quelconque des revendications 4 à 6, selon lequel les composants de base et supérieur de corps (22 et 23) sont coulés à partir d'une matière plastique résistante aux hautes températures.
8. Touche de clavier comprenant :
 - un corps (22, 30) en un matériau isolant et comprenant un composant de base de corps (22) y définissant un creux (23) et un composant supérieur de corps (30) y définissant une ouverture;
 - au moins deux composants métalliques de borne (13, 14) noyés dans le matériau isolant du composant de base de corps, comprenant chacun une borne externe s'étendant vers l'extérieur à partir d'une paroi latérale externe du corps et définissant une extrémité externe de borne, et une pièce de contact électrique (19, 20) exposée dans le creux (23);
 - un disque métallique bombé (31) revêtu d'un matériau amortisseur d'un point de vue acoustique (32) sur une de ses surfaces latérales, disque placé dans le creux et pouvant être commuté entre un état bombé dans lequel il est hors contact électrique avec au moins une des pièces de contact électrique (19, 20)



et un état fléchi dans lequel le disque de métal établit un contact électrique entre les pièces de contact électrique;

- une pièce de tige (33) pour l'actionnement du disque de métal (31) traversant l'ouverture du composant supérieur de corps de façon à commuter le disque de métal entre lesdits états bombé et fléchi par actionnement de la pièce de tige (33);

10 touche de clavier caractérisée en ce que la pièce de tige (33) est réalisée en un matériau de caoutchouc de silicone, ladite pièce de tige (33) comprenant une partie creuse de tige (35), élastique et compressible, traversant l'ouverture (39) du composant supérieur de corps (30) et une partie de membrane (34) formée, de façon intégrale, à la partie de tige (35), ladite partie de membrane (34) s'étendant radialement en travers du creux (23) dans lequel ledit disque métallique bombé (31) est placé, ladite partie de membrane (34) possédant un rebord circonférenciel (36) coopérant, de façon étanche, avec le corps (22, 30).

9. Touche de clavier selon la revendication 8, dans laquelle les composants de corps (22 et 30) sont constitués d'une matière plastique résistante aux hautes températures.

10. Touche de clavier selon la revendication 8 ou 9, dans laquelle la partie de tige (35) et la partie de membrane (34) sont constituées d'un caoutchouc de silicone tandis que le disque métallique bombé (31) est constitué d'une feuille d'alliage de CuBe.

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