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bent away from the electric connection assembly (1), and by both the starting portion (7) and the middle portion (9), and the middle portion (9) and the end portion (11) enclosing an acute angle (38).

Electric connection assembly with overbent soldering pin

The invention relates to an electric connection assembly for surface mounting on a circuit board, comprising at least one soldering pin for electrically contacting the circuit board, wherein the at least one soldering pin comprises an assembly-sided starting portion, a middle portion and an end portion provided at the end facing away from the connection assembly for electrically contacting the circuit board.

Electric connection assemblies, for example in the form of SMD housings or SMD components, are known from the prior art. The SMD housings or components have bent soldering pins, by means of which electric devices, which can be located for example in the SMD housing, can be electrically connected to a circuit board. The soldering pins of the prior art can be substantially classified into two types. Firstly, the soldering pins can have a S-shape, wherein a soldering pin having an S-shape has a starting portion, a middle portion and an end portion and wherein an angle smaller than or at most equal to 90° is enclosed both between the starting portion and the middle portion, and between the middle portion and the end portion. In this case, the sense of direction of the bendings is opposed, i.e. the soldering pin has a convex bending and a concave bending.

The S-shape of the soldering pins of the prior art makes it possible to verify solder joints very easily, but very long soldering pins are required which, in addition, due to their shape, significantly enlarge the dimensions of a SMD housing or of a SMD component.

Another form of soldering pins of the prior art is the J-shape which, likewise, has starting, middle and end portions of the soldering pin, wherein substantially an angle of 90° is enclosed both between the starting portion and the middle portion, and between the middle portion and the end portion. In the J-shape the sense of direction of the bendings is identical, i.e. the soldering pin has two convex or two concave bendings, so that the starting portion and the end portion substantially point in the same direction.

The advantage of the J-shape of soldering pins from the prior art is that shorter soldering pins can be used and the SMD housings or SMD components can have smaller geometric dimensions.

The disadvantage of the J-shape, on the other hand, is the difficulty of verifying the solder joints, since these are substantially located between the SMD housing or the SMD component and the circuit board and are difficult to view and verify visually.

The object of the present invention is therefore to create an electric connection assembly which combines the advantage of smaller geometric dimensions with the advantage of being able to visually verify the solder joints.

Furthermore, the advantage of making the electric connection assembly smaller in this way is that components built from these can have a smaller configuration, the printed circuit boards having the electric connection assembly or electric connection assemblies can likewise be made smaller and, consequently, the manufacturing costs can be reduced and the required installation space can be minimized.

The possibility of verifying solder joints makes it possible to carry out an effective and simple quality control and to optimise processes, which can likewise result in a reduction in costs.

Another object of the present invention is to provide a certain tolerance compensation which can, for example, become important if two different soldering pins have differing bendings and would therefore result in the electric connection assembly being located at a different distance from the circuit board.

The inventive electric connection assembly of the type mentioned at the beginning solves the above disadvantages in that the middle portion is bent back to the electric connection assembly and the end portion is bent away from the electric connection assembly, and in that both the starting portion and the middle portion, and the middle portion and the end portion enclose an acute angle.

The inventive at least one soldering pin therefore has a Z-shape.

Such an embodiment of the at least one soldering pin can be advantageous if heat is applied to the electric connection assembly as, in the event of a linear expansion of the soldering pin caused by heat, the position of the electric connection assembly with respect to the plane of the circuit board can be unchanging. In the event of a linear expansion of the soldering pin, this can simply result in a slight raising of the electric connection assembly from the circuit board, without the electric connection assembly, however, being displaced laterally parallel to the circuit board.

The term 'acute angle' denotes an angle smaller than 90° , wherein the angle between the starting portion and the middle portion with respect to the original orientation of the starting portion denotes the smaller of the two resulting supplementary angles. Consequently, the angle by which the starting portion of the soldering pin is bent from its original extension direction is greater than 90° . The middle portion is therefore bent towards the electric connection assembly.

The acute angle between the starting portion and the middle portion opens towards the connection assembly, whereas the acute angle between the middle portion and the end portion opens away from the connection assembly.

The electric connection assembly is to be understood to be an assembly which comprises at least two elements or subassemblies and which configures at least one element of the connection assembly such that it can be electrically contacted by means of the at least one soldering pin with a circuit board.

Surface mounting or SMD (surface mounted device) mounting is the term used to describe the technology for fixing components, which is substantially effected by means of soldering, wherein, in contrast to through-hole technology, the soldering pin is soldered onto the surface of the circuit board, without connecting said soldering pin to the circuit board by inserting it into holes in the circuit board and subsequently soldering it.

The soldering pin can have any cross section, but is preferably rectangular. The soldering pin can have at least one flattened lead-in bevel on the assembly-sided starting portion, which makes it easier to insert the assembly-sided starting portion into the electric connection assembly or to receive it therein. The free end of the soldering pin which is distally located from the assembly-sided starting portion can be processed in a way which facilitates an additional work step, for example fixing the electric connection assembly on a circuit board. One possible way of processing the said free end is, for example, tin plating, which facilitates subsequent soldering.

The end portion can be aligned substantially parallel to the starting portion, wherein the portions between the starting portion and the middle portion, and between the middle portion and the end portion are substantially located in the same plane as the three portions of the soldering pin. In other words, the bending of the end portion to the middle portion is opposite to the bending of the middle portion to the starting portion.

With respect to the orientation of the starting portion, the middle portion can be bent away by approximately 130° from said starting portion. Likewise, the end portion can be bent away by approximately 130° from the middle portion and towards the starting portion.

The inventive solution can be supplemented and further improved at will by the following additional embodiments, each of which are advantageous by themselves.

In a first embodiment of the electric connection assembly, the end portion extends at least in sections beyond the starting portion. The advantage of such an arrangement is that it can be

ensured that the end portion, which is provided for electrically contacting with the circuit board, can be visually verified.

In this case, it is to be understood that the end portion extends beyond the starting portion along a direction which runs parallel to the orientation of the starting portion. The end portion of the soldering pin can consequently extend beyond all of the other portions of the soldering pin.

In a second embodiment of the inventive electric connection assembly, a first bending portion is formed between the starting portion and the middle portion, and a second bending portion is formed between the middle portion and the end portion, wherein the first bending portion turns into the second bending portion. The advantage of a direct transition of the bending portions into each other is that the geometric expansion of the soldering pin can be minimised in a direction perpendicular to the extension direction of the starting portion.

Consequently, the middle portion can simply consist of a convex bending and a concave bending, without having straight parts.

In a third embodiment of the inventive electric connection assembly, a bending radius of at least one of the first and the second bending portions is greater than a double material thickness of the soldering pin. The advantage of such a limitation of the bending radius is that the stressing of the material of the soldering pin is kept as low as possible. This, in turn, prevents surface damage occurring due to stretching and compressions caused by bending the soldering pin out of shape.

However, smaller bending radii are, in principle, also possible, although these require low material thicknesses of the soldering pin.

In a further embodiment of the inventive electric connection assembly, a free end of the end portion is bent towards the starting portion. The advantage of this is that a contact point of the end portion with the circuit board can be precisely defined and adjusted. In addition, the advantage of such a bent free end is that damage to the circuit board can be avoided. Such damage can, for example, arise as a result of a burr, which can occur during cutting of the soldering pin at the free end of the end portion. Such a burr can damage a surface coating or sealing of the circuit board or conducting tracks mounted on the circuit board and can, in addition, result in the end portion of the soldering pin simply lying in contact with the circuit board by means of the burr.

If the extension of the soldering pin is observed in a direction perpendicular to the orientation of the starting portion, the second bending portion between the middle and the end portions is located further away from the starting portion than the free end of the end portion.

The free end of the end portion which is bent in the direction of the starting portion can result from the second bending portion between the middle portion and the end portion, or it can be produced by means of a third bending portion. A straight portion of the end portion can be located between the possible third bending portion and the second bending portion. The bending radius of the bent free end can preferably be greater than the bending radius of the first and/or of the second bending portions.

In a further embodiment of the inventive electric connection assembly, there is present a housing with a supporting surface which is arranged below the middle portion towards the end portion. A housing can, firstly, increase the stability of the electric connection assembly and protect said electric connection assembly from, amongst other things, external influences, purely by way of example from touching electric component parts.

The term 'supporting surface' is used to denote that surface of the housing which, when surface mounted on a circuit board, points in the direction of the circuit board. The housing can rest on the supporting surface on the circuit board or, because of the soldering pins, can be located at a distance from the circuit board. The supporting surface is in this case preferably oriented substantially parallel to the circuit board.

The supporting surface of the housing can be located in a plane, in or on which the end portion of the soldering pin is also preferably located. The at least one soldering pin preferably does not extend beyond the plane of the supporting surface. That means that when the housing is placed with the supporting surface on a level circuit board, the at least one soldering pin can likewise mechanically contact the circuit board, without the at least one soldering pin constituting the support point of the electric connection assembly on the circuit board.

In another embodiment of the electric connection assembly, the housing has a pocket in which the at least one soldering pin is received at least in sections. The advantage of such a pocket is that portions of the at least one soldering pin can be received within the cubature of the housing, so that said portions do not enlarge the geometric dimensions of the electric connection assembly.

The pocket of the electric connection assembly can be understood to be a recess in the housing, wherein the pocket can open in the direction of the supporting surface and can be concealed by a side of the electric connection assembly opposite the supporting surface.

The pocket can just be delimited by a side opposite the supporting surface, or can be delimited by further side walls, which can extend substantially perpendicular to the supporting surface.

In another embodiment of the electric connection assembly, a transition between the middle portion and the end portion dips into the pocket. The transition between the middle and the end portions can be the second bending portion which does not increase the dimensions of the electric connection assembly due to the dipping into the pocket, but which can be arranged in a space-saving manner within the cubature of the housing.

Furthermore, an advantage of the pocket can be that the overbent soldering pin lies in contact with an inner wall of the pocket, and therefore the insertion depth of the soldering pin into the housing can be delimited. It is additionally possible that the pocket can be configured in a complementary manner to the overbent soldering pin, so that the soldering pin clings to the contours of the pocket, increasing the stability of the soldering pin with respect to being bent out of shape or being displaced.

If the electric connection assembly is observed along a direction parallel to the surface normal of the supporting surface, the pocket can be concealed by the housing. If the viewing direction is rotated about a middle axis of the first bending radius, the pocket and portions of the soldering pin received therein can be viewed again.

In another embodiment of the inventive electric connection assembly, the end portion of the at least one soldering pin is substantially located on a plane with the supporting surface of the housing. The advantage of such an arrangement of the end portion towards the supporting surface of the housing is that on placing the housing with the supporting surface on a circuit board, the end portion can also be brought into mechanical contact with the circuit board.

When the housing rests with the supporting surface on a circuit board, the end portion of the soldering pin can hereby be located at a distance of up to approximately half or all of its material thickness from the circuit board, without thereby diminishing the quality of a solder connection of the end portion with the circuit board. A solder connection between the end portion of the soldering pin and the circuit board is in principle also possible if the end portion is located further than a material thickness away from the circuit board, but in this case the consumption of soldering material (tin) increases, which can be accompanied by increased production costs. Pref-

erably, the electric connection assembly rests with the supporting surface on the circuit board, and the end portion of the soldering pin does not touch the circuit board.

In another embodiment of the inventive electric connection assembly, the end portion of the at least one soldering pin has a contacting region for permanently electrically contacting the at least one soldering pin with the circuit board, wherein less than 50% of the contacting region is received in the pocket of the housing. The advantage of a predetermined contacting region, which can be configured purely by way of example by tin plating, is that the electric contacting of the end portion with the circuit board can take place quickly, easily and cost-effectively. Delimiting the receiving of the contact region in the pocket of the housing is advantageous, since during a visual examination of an electric contacting, effected for example by soldering, between the end portion of the soldering pin and the circuit board, it should be possible to detect at least 50% of the electric contacting carried out visually.

The contact region can simply be partially located in the end portion of the at least one soldering pin, or extend over the complete end portion. The contact region can simply be configured on that side of the end portion which points in the same direction as the supporting surface of the housing. In other words, the contact region can be configured in the form of a tin plating of the end portion of the soldering pin on the side of the end portion pointing towards the circuit board.

In another embodiment of the inventive electric connection assembly, the housing has a transition recess in which the portion between the starting portion and the middle portion of the at least one soldering pin is received at least in sections, and which turns into the pocket. The advantage of such a transition recess is that the position of the soldering pin can be fixed and defined and it also makes it possible, if multiple soldering pins are provided, to protect neighbouring soldering pins from electric contacting (a short-circuit).

The transition recess can have a convex stopping surface, to which a bending portion can cling at least in sections. In addition, the transition recess can turn into a receiving aperture of the housing and/or into the pocket.

The transition recess can make it possible for the soldering pin to be received in the housing in the direction of the assembly-sided end. This can, in turn, lead to a minimizing of the dimensions of the electric connection assembly.

In another embodiment of the electric connection assembly, this comprises at least one electric device, wherein the starting portion of the at least one soldering pin is connected to the at least one electric device.

The electric connection assembly can simply consist of the electric device and the at least one soldering pin. In addition, the electric connection assembly can comprise a housing which receives the at least one electric device and can partially or fully enclose said at least one electric device, wherein the at least one soldering pin is connected on the inside of the housing with the at least one electric device, is guided out of the same through the housing and can be configured in order to contact the at least one electric device with the circuit board.

The present invention will be explained in greater detail below with reference to the attached drawings. For the sake of clarity, technical features or features having the same technical effect are labelled with the same reference numerals, wherein:

Fig. 1 shows an electric connection assembly from the prior art having a soldering pin in an S-shape;

Fig. 2 shows an electric connection assembly from the prior art having a soldering pin in a J-shape;

Fig. 3 shows an inventive electric connection assembly having an overbent soldering pin in a Z-shape; and

Fig. 4 shows an inventive electric connection assembly in a perspective representation.

Fig. 1 shows an electric connection assembly 1 from the prior art in a sectional side view.

The electric connection assembly 1 comprises a housing 3 and a soldering pin 5 which comprises a starting portion 7, a middle portion 9 and an end portion 11.

An electric device 4, which is drawn schematically, is received in the housing 3. The electric device 4 is not shown in the other figures.

The soldering pin 5 shown in Fig. 1 has an S-shape 5a and a material thickness d.

The electric connection assembly 1 additionally comprises a supporting element 13 which constitutes an element which is separately mounted on the housing 3 in the embodiment of the electric connection assembly 1 shown in Fig. 1, but which can also be formed by a wall 15 of the housing 3 in other embodiments.

The supporting element 13 has a supporting surface 17 which rests on a circuit board 19, more precisely on a contacting side 21 of the circuit board 19, in Fig. 1.

The end portion 11 of the soldering pin 5 rests with a contacting region 23 on the contacting side 21 of the circuit board 19.

Fig. 1 shows the electric connection assembly 1 of the prior art in the unsoldered condition 25, i.e. there is not yet any soldering material between the contacting region 23 and the contacting side 21 of the circuit board 19.

The housing 3 of the electric connection assembly 1 receives the starting portion 7 of the soldering pin 5 by means of a receiving aperture 27 which has lead-in bevels 29. An assembly-sided end 31 of the soldering pin 5 likewise has lead-in bevels 29. The lead-in bevels 29 of the housing 3 and of the soldering pin 5 facilitate leading in of the starting portion 7 into the receiving aperture 27 of the housing 3.

Located between the starting portion 7 and the middle portion 9 is a first bending portion 33 which is defined by a bending radius 35 and by a deflection angle 37.

Located between the middle portion 9 and the end portion 11 is a second bending portion 39 which, like the first bending portion 33, is defined by a bending radius 35 (this is not shown for the second bending portion 39) and by a deflection angle 37.

As shown in Figure 1, the deflection angles 37 of the first bending portion 33 and of the second bending portion 39 are different, which is why Fig. 1 shows a first deflection angle 37a and a second deflection angle 37b.

An excess length 43 of the soldering pin 5 is measured from a side face 41 of the housing 3. The excess length 43 of the soldering pin 5 corresponds to a length L, by which the housing length L_0 is enlarged as a result of the insertion of the soldering pin 5 into the housing 3.

Fig. 1 likewise shows an inspection direction 45 along which, for example, an electric contacting 49, i.e. for example a solder joint 51, can be observed or examined by means of a camera 47.

Fig. 2 also shows an electric connection assembly 1 from the prior art in the unsoldered condition 25, but the soldering pin 5 shown in Fig. 2 has a J-shape 5b.

The J-shape 5b of the soldering pin 5 has a first deflection angle 37a which substantially corresponds to a right angle 37c. This means that the J-shape 5b of the soldering pin 5 has a larger first deflection angle 37a than the S-shape 5a shown in Fig. 1. The embodiment of the soldering pin 5 shown in Fig. 1 has a first deflection angle 37a of approx. 80°.

The second deflection angle 37b which is located between the middle portion 9 and the end portion 11 is an obtuse angle 37d.

If the respective first deflection angle 37a and the respective second deflection angle 37b of Figs. 1 and 2 are compared, it can be established that in the S-shape 5a of the soldering pin 5 shown in Fig. 1, the mathematical sense of direction of the angle measurement of the first deflection angle 37a is opposite to the sense of direction of the angle measurement of the second deflection angle 37b, whereas in the J-shape 5b of the soldering pin 5 shown in Fig. 2 the mathematical sense of direction of the angle measurement of the first deflection angle 37a corresponds to that of the second deflection angle 37b.

Starting from the starting portion 7, the middle section 9 is bent in the clockwise direction both in the S-shape 5a and in the J-shape 5b. The end portion 11 of the S-shape 5a is, however, bent counter-clockwise, while the end portion 11 of the J-shape 5b is again bent in the clockwise direction with respect to the respective middle portion 9.

The end portion 11 of the J-shape 5b of the soldering pin 5 likewise has a contacting region 23 which points in the direction of the circuit board 19.

If the contacting region 23 of the end portion 11 of the J-shape 5b is electrically connected (not shown) to the circuit board 19, the electric contacting 49 effected, i.e. the solder joint 51, cannot be viewed when observed by means of a camera 47 along the inspection direction 45, since said solder joint is located under the housing 3 or in a pocket 53 configured on the housing.

The excess length 43 of the J-shape 5b of the soldering pin 5 is significantly reduced compared with the excess length 43 of the S-shape 5a of the soldering pin 5 shown in Fig. 1.

Even on observing the electric contacting 49 along an inclined inspection direction 45a, the electric contacting 49 is at least partially concealed by the soldering pin 5.

Fig. 3 shows an inventive electric connection assembly 1. This is also in the unsoldered condition 25.

The housing 3 of the electric connection assembly 1 is shown in an embodiment which differs from the housings 3 shown in Figs. 1 and 2.

The pocket 53 of the housing 3 shown in Fig. 3 has an inclined pocket inner side 55, wherein the first bending portion 33 of the soldering pin 5 initially still clings to the inclined pocket inner

side 55, but detaches from this at the transition of the first bending portion 33 into the middle portion 9.

The middle portion 9 and the second bending portion 39 of the soldering pin 5 shown in Fig. 3 are completely received in the pocket 53. The soldering pin 5 shown has a Z-shape 5c. The Z-shape 5 is characterised in that both the first deflection angle 37a and the second deflection angle 37b are obtuse angles 37d, so that complementary angles 37e between the starting portion 7 and the middle portion 9, and between the middle portion 9 and the end portion 11 are acute angles 38.

The end portion 11 protrudes from the pocket 53 and projects beyond the starting portion 7 and the first bending portion 33.

The first bending portion 33 is, in addition, partially located in a transition recess 57 which connects the receiving aperture 27 to the pocket 53. The transition recess 57 is delimited in the direction of the starting portion 7 by a convex supporting or stopping surface 59, to which the first bending portion 33 clings at least in sections.

Fig. 3 shows that the first bending portion 33 turns into the second bending portion 39 so that the middle portion 9 simply consists of parts of the two bending portions 33, 39.

The end portion 11 has a free end 61 which is bent in the direction of the starting portion 7, i.e. away from the circuit board 19. The advantage of this is that the end portion 11 touches the circuit board 19 at a defined contact point 63 and not with a possible burr 65 which may occur at the free end 61 as a result of cutting the soldering pin 5 to size. This is shown symbolically in the enlargement 77 in which the burr 65 does not touch the circuit board 19.

The contacting region 23 of the Z-shape 5c of the soldering pin 5 protrudes from the pocket 53 so that the electric contacting 49, i.e. the solder joint 51, can easily be viewed and also examined with the aid of the camera 47 along the inspection direction 45.

The excess length 43 of the soldering pin 5 of the Z-shape 5c is considerably smaller than the excess length 43 of the S-shape 5a of the soldering pin 5 shown in Fig. 1 and corresponds approximately to the excess length 43 of the J-shape 5b of the soldering pin 5 shown in Fig. 2.

In order to be able to assess the quality of a solder joint 51, it is necessary to be able to view 50% of said solder joint 51. This can still be achieved with the inventive electric connection assembly 1 shown in Fig. 3, even if the contacting region 23 is located partially within the pocket 53.

If it is possible to use an inclined inspection direction 45a, the complete solder joint 51 can still be viewed even if it is located largely in the pocket 53.

Fig. 4 shows the inventive electric connection assembly 1 in the unsoldered condition 25 and without a circuit board 19 in a perspective view.

- 5 The housing 3 has recesses 79 which will not be dealt with in greater detail here. The embodiment of the electric connection assembly 1 shown in Fig. 4 comprises seven soldering pins 5 in a Z-shape 5c, the middle portion 9 of which and the respective second bending portion 39 of which are received in the pocket 53. The middle portion 9 and the second bending portion 39 are shown for only one soldering pin 5 in Fig. 4.
- 10 The pocket 53 of the electric connection assembly 1 shown in Fig. 4 is configured such that all seven soldering pins 5 are each partially, but jointly received in the pocket 53.

- In order to prevent a mechanical and in particular an electric contact of the individual soldering pins 5 with one another, each of the seven soldering pins 5 has a corresponding transition recess 57, wherein the individual transition recesses 57 are separated from one another by means of separating walls 81. For the sake of clarity, just one separating wall 81 is drawn in Fig.
- 15 4.

List of reference numerals

	1	Electric connection assembly
	3	Housing
	4	Electric device
5	5	Soldering pin
	5a	S-shape
	5b	J-shape
	5c	Z-shape
	7	Starting portion
10	9	Middle portion
	11	End portion
	13	Supporting element
	15	Wall
	17	Supporting surface
15	19	Circuit board
	21	Contacting side
	23	Contacting region
	25	Unsoldered condition
	27	Receiving aperture
20	29	Lead-in bevel
	31	Assembly-sided end
	33	First bending portion
	35	Bending radius
	37	Deflection angle
25	37a	First deflection angle
	37b	Second deflection angle
	37c	Right angle
	37d	Obtuse angle
	37e	Complementary angle
30	38	Acute angle
	39	Second bending portion
	41	Side face
	43	Excess length
	45	Inspection direction
35	45a	Inclined inspection direction

	47	Camera
	49	Electric contacting
	51	Solder joint
	53	Pocket
5	55	Inclined pocket inner side
	57	Transition recess
	59	Supporting or stopping surface
	61	Free end
	63	Contact point
10	65	Burr
	77	Enlargement
	79	Recess
	81	Separating wall
15	d-	Material thickness
	L	Length

Claims

1. An electric connection assembly (1) for surface mounting on a circuit board (19), comprising at least one soldering pin (5) for electrically contacting the circuit board (19), wherein the at least one soldering pin (5) comprises an assembly-sided starting portion (7), a middle portion (9) and an end portion (11) provided at the end (61) facing away from the connection assembly (1) for electrically contacting (49) the circuit board (19), **characterised in that** the middle portion (9) is bent back to the electric connection assembly (1) and the end portion (11) is bent away from the electric connection assembly (1), and in that both the starting portion (7) and the middle portion (9), and the middle portion (9) and the end portion (11) enclose an acute angle (38).
2. The electric connection assembly (1) according to Claim 1, **characterised in that** the end portion (11) extends at least in sections beyond the starting portion (7).
3. The electric connection assembly (1) according to Claim 1 or 2, **characterised in that** a first bending portion (33) is formed between the starting portion (7) and the middle portion (9), and a second bending portion (39) is formed between the middle portion (9) and the end portion (11), and in that the first bending portion (33) turns into the second bending portion (39).
4. The electric connection assembly (1) according to Claim 3, **characterised in that** a bending radius (35) of at least one of the first (33) and of the second bending portions (39) is greater than a double material thickness (d) of the soldering pin (5).
5. The electric connection assembly (1) according to any one of Claims 1 to 4, **characterised in that** the end portion (11) is bent towards the starting portion (7).
6. The electric connection assembly (1) according to any one of Claims 1 to 5, **characterised in that** there is present a housing (3) with a supporting surface (17) which is arranged below the middle portion (9) towards the end portion (11).
7. The electric connection assembly (1) according to Claim 6, **characterised in that** the housing (3) has a pocket (53) in which the at least one soldering pin (5) is received at least in sections.
8. The electric connection assembly (1) according to Claim 7, **characterised in that** a transition between the middle portion (9) and the end portion (11) dips into the pocket (53).

9. The electric connection assembly (1) according to any one of Claims 6 to 8, **characterised in that** the end portion (11) of the at least one soldering pin (5) is substantially located on a plane with the supporting surface (17) of the housing (3).
- 5 10. The electric connection assembly (1) according to any one of Claims 7 to 9, **characterised in that** the end portion (11) of the at least one soldering pin (5) has a contacting region (23) for permanently electrically contacting (49) the at least one soldering pin (5) with the circuit board (19), wherein less than 50% of the contacting region (23) is received in the pocket (53) of the housing (3).
- 10 11. The electric connection assembly (1) according to any one of Claims 7 to 10, **characterised in that** the housing (3) has a transition recess (57), in which the portion between the starting portion (7) and the middle portion (9) of the at least one soldering pin (5) is received at least in sections, and which turns into the pocket (53).
- 15 12. The electric connection assembly (1) according to any one of Claims 1 to 10, comprising at least one electric device (4), wherein the starting portion (7) of the at least one soldering pin (5) is connected to the at least one electric device (4).

1/2

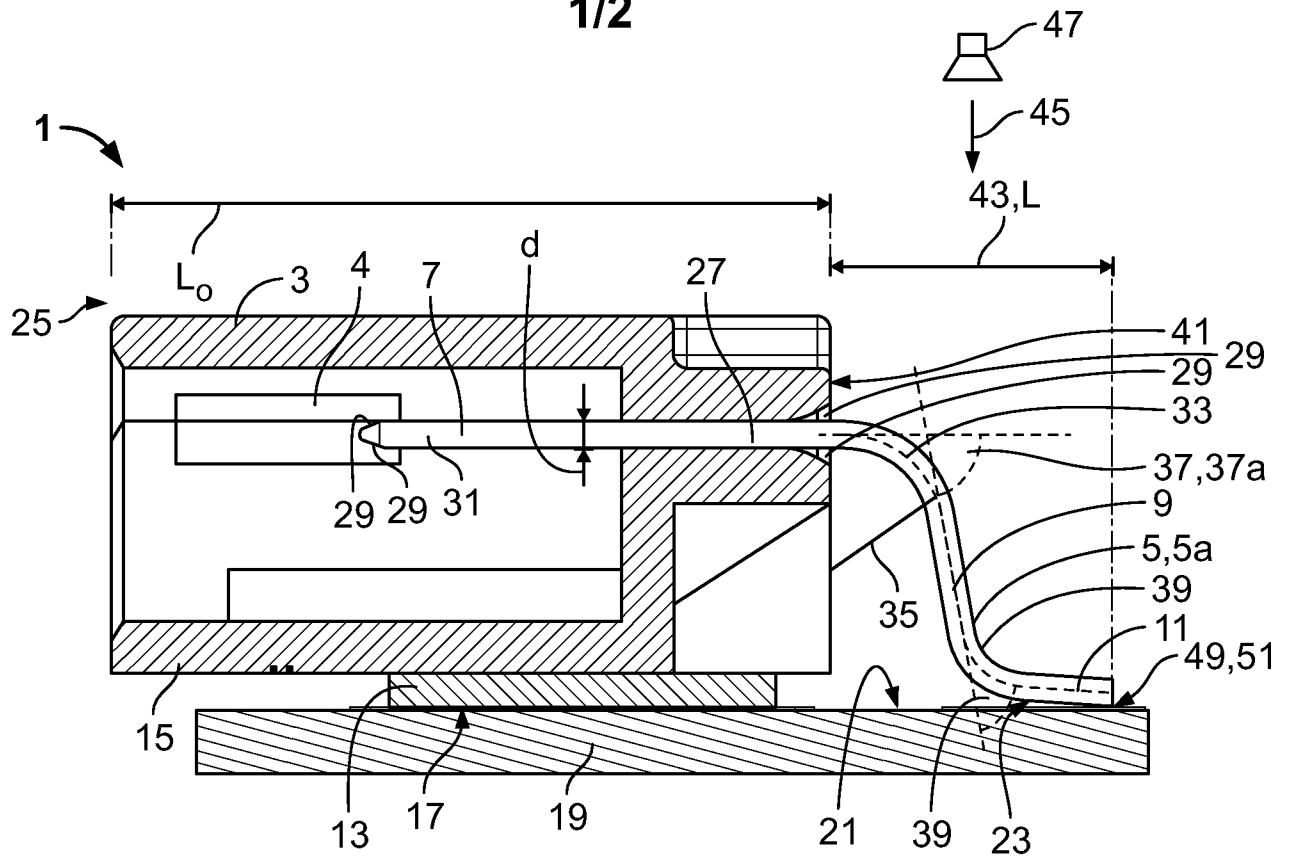


Fig. 1

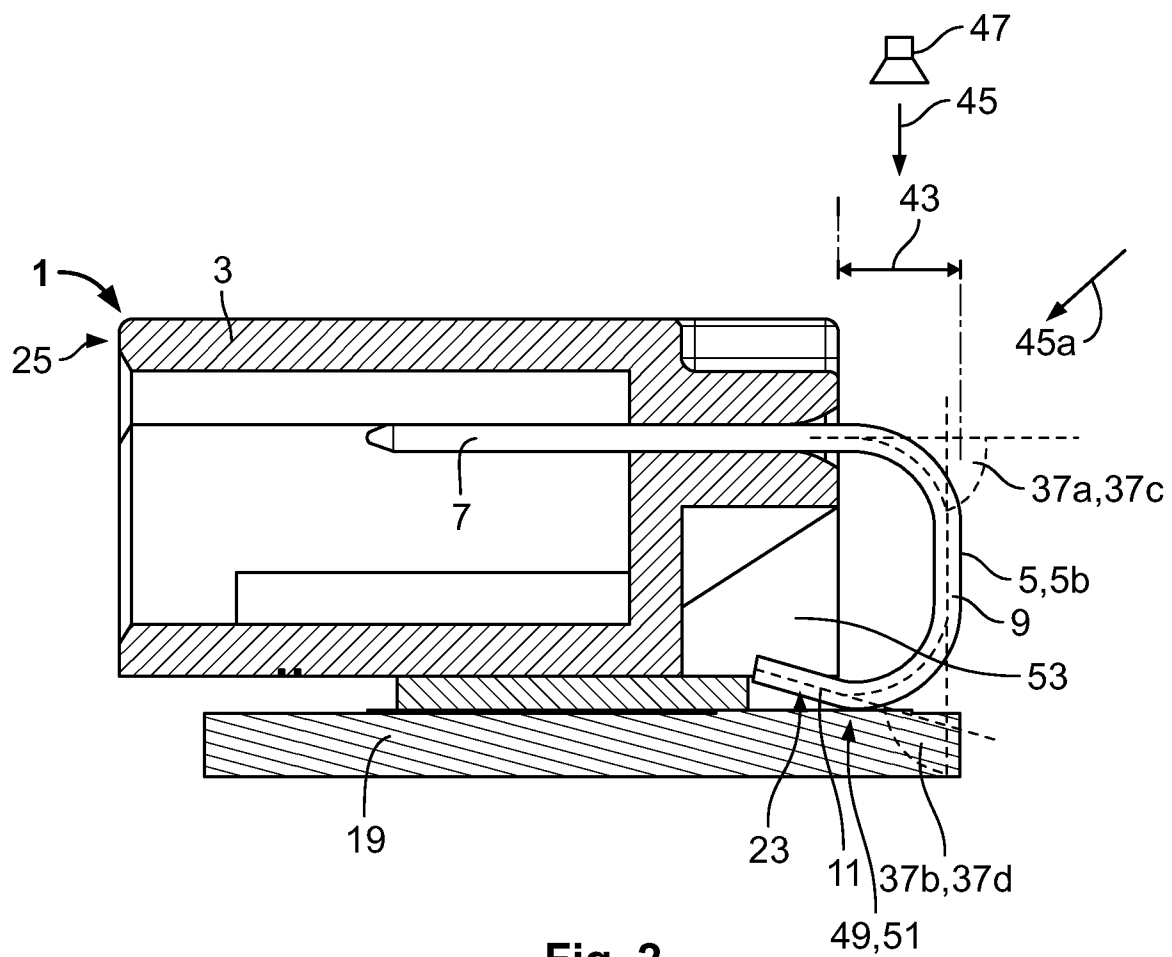


Fig. 2

2/2

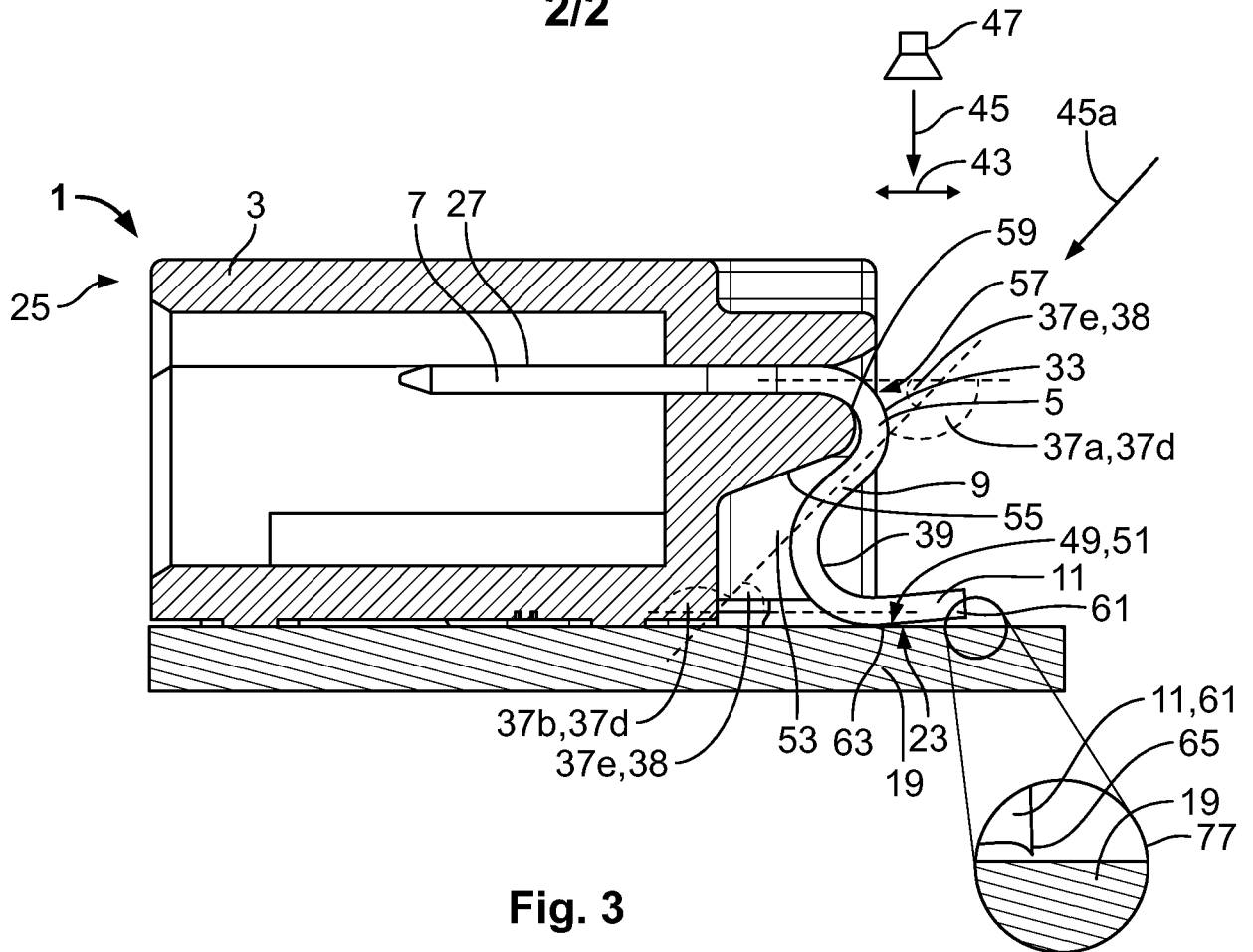


Fig. 3

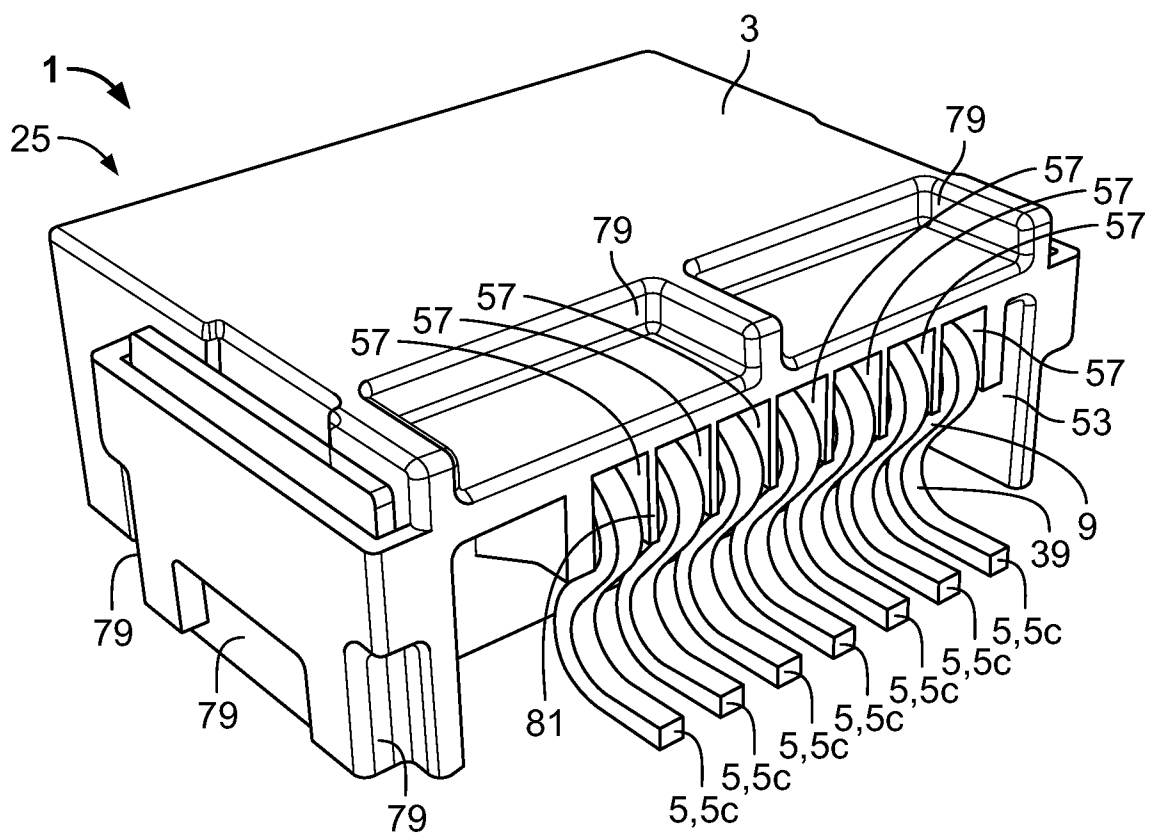


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2017/063040

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01R12/57 H01R12/72
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01R H05K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/063344 A1 (SHIN HEE SEOK [KR]) 1 April 2004 (2004-04-01) paragraphs [0026] - [0028]; figures 1, 4, 5 -----	1-3, 6-10,12
X	US 4 802 859 A (GOULDY THOMAS E [US] ET AL) 7 February 1989 (1989-02-07) column 3, lines 8-62; figure 1 -----	1-5
X	US 4 850 902 A (REED CARL G [US]) 25 July 1989 (1989-07-25) column 3, lines 33.60, column 4, lines 51-60; figures 1-3 -----	1-9,11, 12



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

16 August 2017

Date of mailing of the international search report

25/08/2017

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/063040

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004063344	A1	01-04-2004	NONE

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		EP 0335249 A2	04-10-1989
		JP H01286273 A	17-11-1989
		US 4802859 A	07-02-1989

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		DE 68918621 T2	18-05-1995
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