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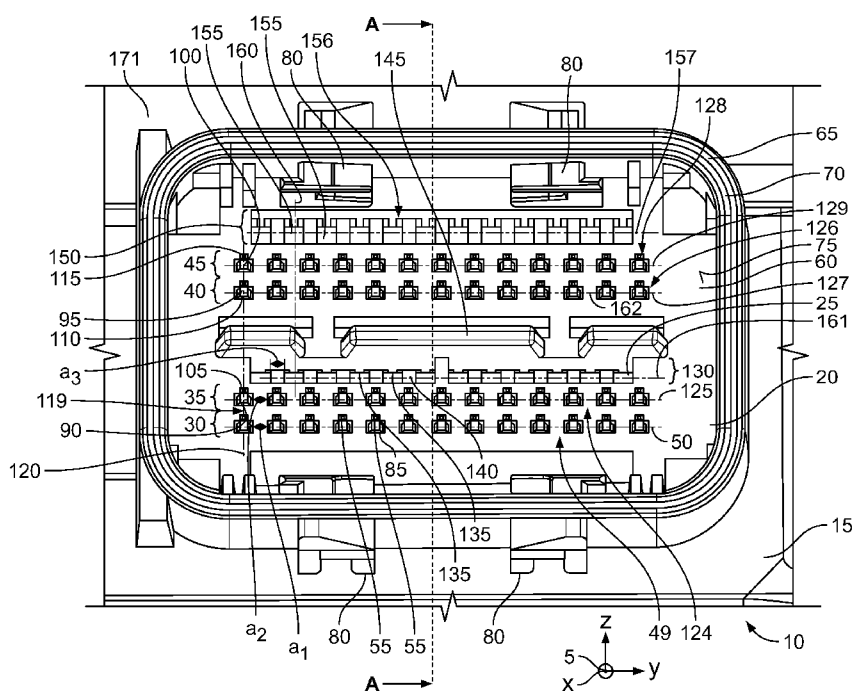


Fig. 1

(57) Abstract: The invention relates to a contact unit and to a method for producing such a contact unit (10), having at least a contact row (30, 35, 40, 45) and a contact housing (15) with a first connecting side (20), wherein the contact row (30, 35, 40, 45) comprises a plurality of identically configured contact elements (55, 90, 95, 100) arranged spaced apart from one another, wherein the contact elements (55, 90, 95, 100) reach through a housing wall (60) of the contact housing (15) and have a contact section (85, 105, 110, 115) at the first connecting side (20) respectively, wherein the first connecting side (20) has at least one recess (135), wherein the recess (135) is arranged spaced apart from the contact section (85, 105, 110, 115).



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Description

Contact unit and method for producing such a contact unit

5 The invention relates to a contact unit according to Claim 1 and a method for producing such a contact unit according to Claim 13.

10 A contact unit with a plurality of contact rows is known, wherein the contact rows each have contact elements which are configured identical to one another and which are arranged spaced apart from one another in a row. In order to position the contact rows, they are injection-moulded around in a first injection-moulding stage with a substrate, so that the position of the individual contact elements relative to one another is fixed. The substrate, together with the contact rows, is introduced into an injection mould for a contact housing and ultimately injection-moulded around with a substance for the contact housing. As a result a plurality of injection-moulding processes are required which are both
15 20 costly and time-intensive.

The problem of the invention is to provide an improved contact unit and an improved production method for producing such a contact unit.
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This problem is solved by means of a contact unit according to Claim 1 and by means of a method according to Claim 13. Advantageous embodiments are specified in the dependent
30 claims.

It has been recognised that an improved contact unit can be provided by the contact unit comprising at least one contact row and a contact housing with a first connecting side. The contact row has a plurality of identically configured contact elements arranged spaced apart from one another. The contact elements reach through a housing wall of the contact housing
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and each have a contact section on the first connecting side. The first connecting side has at least one recess, said recess being arranged spaced apart from the contact section.

5 As a result, on the one hand a weight of the contact unit can be reduced, and on the other hand it is possible to avoid a material transition inside the contact housing and the contact unit can be produced particularly quickly and simply.

10 In a further embodiment, the recess is free. The recess is preferably configured as a through-opening and connects the first connecting side to a housing interior of the contact housing. Alternatively, the recess is preferably filled at least in sections with a substance of the contact housing.

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In a further embodiment, the contact element has a first connection section and at least a second connection section arranged on a side of the first connection section which faces away from the contact section. The first connection
20 section is arranged inclined relative to the second connection section.

In a further embodiment, the contact element has a first widening section laterally arranged at the second connection
25 section, wherein the recess is arranged between the first widening section and the first connection section.

In a further embodiment, the first widening section has a first bearing surface on a side facing the first connection
30 section, the first bearing surface being arranged preferably parallel to the recess and/or to the first connection section.

In a further embodiment, the first widening section is
35 arranged on a side of the second connection section which faces away from the first connection section.

In a further embodiment, the contact element has a second widening section, the second widening section being arranged on a side of the second connection section which faces the first connection section. The second widening section is arranged offset from the first widening section. As a result of this, it is possible to ensure particularly good stabilisation, in particular a tilting of the contact element during a process of injection-moulding the contact unit in which the widening section is at least partially injection-moulded around.

In a further embodiment, the recess is arranged in a first direction, preferably in a transverse direction, between two contact elements, arranged adjacently alongside one another, of the contact row, wherein the first direction is oriented perpendicular to the first contact section, the recess being preferably arranged in a second direction, preferably a vertical direction, perpendicular to the first direction offset from the contact row.

In a further embodiment, the first connecting side has a plurality of recesses, wherein the recesses are preferably configured identically, wherein the recesses are arranged spaced apart from one another alongside one another in a recess row.

In a further embodiment, the recess row is arranged in a plane. The first connection section of the contact elements of the contact row is arranged in a further plane, this plane being arranged parallel to the further plane.

In a further embodiment, the contact housing has a second connecting side, wherein the contact elements each have a further contact section on a second connecting side, wherein the further contact section is connected to the second connection section, wherein the further contact section and the second connection section are preferably in alignment.

In a further embodiment, the housing wall is arranged between the recess and the first contact section, and the housing wall separates the recess from the first contact section.

5 Furthermore, it has been recognised that an improved method for producing such a contact unit can be provided in that that the method has the following steps, wherein the steps are carried out in the order described below: providing an injection mould, an injection-mouldable substance and a
10 contact row with a plurality of identically configured contact elements arranged spaced apart alongside one another, and a stabilising core and a holding means, inserting an engaging element of the stabilising core between two adjacently arranged contact elements into a predefined
15 position, positioning the contact row in the injection mould, introducing the substance into the injection mould and at least partially injection-moulding around the contact elements, supporting at least one force which acts on the contact row on the stabilising core, hardening the substance,
20 and removing the stabilising core and configuring the first recess on a first connecting side of the contact housing.

In a further embodiment, the stabilising core is removed temporally after a first proportion of the substance has
25 hardened, wherein, temporally after the removal of the stabilising core, a second proportion of the substance flows into the first recess and at least partially fills the first recess, wherein the second proportion of the substance is hardened.

30 In a further embodiment, an engaging element of a further stabilising core is inserted between two adjacently arranged contact elements into a further predefined position, wherein the contact elements are secured, by the engaging element,
35 against tilting by lying against the engaging element.

In a further embodiment, a catching core is introduced into the injection mould, wherein the catching core fixes an end position of the stabilising core in at least one direction.

5 The invention will be explained in more detail hereafter with the aid of figures. In the drawings:

Figure 1 shows a perspective view onto a contact unit;

10 Figure 2 shows a perspective depiction of a contact row, shown in Figure 1, of the contact unit;

Figure 3 shows a cut-out from a plan view onto a first stabilising core;

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Figure 4 shows a flow chart of a production method for producing the contact unit;

Figure 5 shows a perspective depiction onto the contact unit
20 10 after a third method step;

Figure 6 shows a sectional view along a cutting plane A-A, shown in Figure 1, through the contact unit after a fifth method step; and

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Figure 7 shows a cut-out from a sectional view through the contact unit after a seventh method step.

Hereafter, a coordinate system 5 is referred to in the
30 figures, wherein the coordinate system 5 is configured, by way of example, as a right-handed system. The coordinate system 5 comprises an x-axis (longitudinal direction), a y-axis (transverse direction) and a z-axis (vertical direction). Of course, the coordinate system 5 can also be
35 configured differently.

Figure 1 shows a perspective view onto a contact unit 10.

The contact unit 10 has a contact housing 15 with a first connecting side 20. The contact housing 15 delimits a housing interior 25 (arranged below the drawing plane in Figure 1), wherein the first connecting side 20 is arranged, by way of example, on a side facing away from the housing interior 25.

The contact housing 15 has a contact receptacle 65. The contact receptacle 65 is delimited by a receiving bar 70, for example, in the transverse direction and in the vertical direction. In the longitudinal direction, the contact receptacle 65 is delimited by the housing wall 60, with the housing wall 60 having a receiving base 75 on a side facing the first connecting side 20.

A further contact unit (not depicted), which is laterally fastened by the receiving bar 70, can be inserted into the contact receptacle 65. In addition, the contact unit 10 may have a fastening means 80 which fastens the further contact unit to the contact housing 15.

The contact unit 10 comprises, by way of example, a first contact row 30. In addition, the contact unit 10 comprises by way of example, alongside the first contact row 30, a second contact row 35, a third contact row 40 and a fourth contact row 45. The contact rows 30, 35, 40, 45 are arranged above one another spaced apart relative to one another.

The first contact row 30 has a plurality of identically configured, first contact elements 55 arranged by way of example in a first row 49 on a first straight line 50 at regular spacing from one another. The first contact elements 55 reach through the housing wall 60 of the contact housing 15, wherein the housing wall 60 separates the first connecting side 20 from the housing interior 25. Here, a first contact section 85 of the contact element 55 in each case has a first grid spacing a_1 to the next first contact section 85 respectively.

Each of the first contact elements 55 has the first contact section 85. Each of the first contact sections 85 of the first contact elements 55 projects beyond the receiving base 75 into the contact receptacle 65. In the embodiment, the first contact section 85 is configured as a pin contact. The first contact section 85 can obviously also be configured as a bushing contact or can be configured differently. The first contact section 85 extends, by way of example, in the x-direction.

The first contact section 85 is, by way of example, arranged running perpendicular to the receiving base 75 and extends in the longitudinal direction. The first contact sections 85 are arranged parallel, at regular spacing relative to each other in the transverse direction. The first contact sections 85 are, by way of example, arranged in a first plane 162 (which is configured as an xy-plane). The first straight line 50 is oriented perpendicular to the first contact section 85 and is likewise arranged in the xy-plane.

In the embodiment, by way of example the second contact row 35 has a number of second contact elements 90 configured identical to one another and the third contact row 40 has a number of third contact elements 95 configured identical to one another. The fourth contact row 45 has a number of fourth contact elements 100 configured identical to one another.

The second, third and fourth contact elements 90, 95, 100 are each configured substantially - with the exception of slight deviations - identical to the first contact element 55.

The second contact element 90 also has a second contact section 105, the third contact element 95 also has a third contact section 110 and the fourth contact element 100 also has a fourth contact section 115, with the first to fourth contact sections 85, 105, 110, 115 each being configured identical to one another.

A first to fourth contact element 55, 90, 95, 100 respectively is arranged in a second row 119, by way of example on a second straight line 120 which runs in an xz-plane. The second straight line 120 is arranged, by way of example, perpendicular to the first straight line 50.

Furthermore, the second contact sections 105 are each arranged in a third row 124, at regular spacing relative to one another, for example on a third straight line 125 arranged in an xy-plane.

The second contact sections 105 are each arranged at a second grid spacing a_2 to the next second contact section 105. The second grid spacing a_2 is identical to the first grid spacing a_1 .

Furthermore, the third contact sections 110 are each arranged in a fourth row 126, at regular spacing relative to one another, for example on a fourth straight line 127 arranged in an xy-plane. Furthermore, the fourth contact sections 115 are each arranged in a fifth row 128, at regular spacing relative to one another, for example on a fifth straight line 129 arranged in an xy-plane.

In the embodiment, by way of example, a first recess row 130 is arranged in the housing wall 60 between the second contact row 35 and the third contact row 40 in the vertical direction.

The first recess row 130 is arranged in a second plane 161 which is configured, by way of example, as an xy-plane. The second plane 161 is arranged parallel to the first plane 162. The first recess row 130 has a plurality of first recesses 135 which are each configured identical to one another. The first recesses 135 have a third grid spacing a_3 relative to one another. Each of the first recesses 135 has, by way of example, a rectangular cross-section. Each of the first

recesses 135 extends in the longitudinal direction and is arranged running parallel to the contact section 85, 105, 110, 115. By way of example, a first recess 135 of the first recess row 130 is in each case arranged in the transverse direction between two adjacently arranged contact sections 85, 105, 110, 115 but arranged offset in the vertical direction from the contact sections 85, 105, 110, 115, so that the first recess 135 is arranged offset obliquely above in Figure 1 from the second contact section 105. Each of the first recesses 135 is preferably arranged centrally above between two contact sections 85, 105, 110, 115 of the contact rows 30, 35, 40, 45. In the vertical direction, the first recess 135 is delimited by the housing wall 60.

The first recesses 135 are each delimited, by way of example, in the transverse direction by a delimiting bar 140 of the contact housing 15. The delimiting bar 140 is arranged above the contact section 85, 105, 110, 115 on the second straight line 120. If the delimiting bar 140 and the contact section 85, 105, 110, 115 are projected in the z-direction in an xy-projection plane, then the delimiting bar 140 and the contact section 85, 105, 110, 115 overlap in the xy-projection plane.

Above the first recess row 130, a guiding bar 145, by way of example, which projects into the contact receptacle 65 and which serves to guide the further contact unit when it is being introduced into the contact receptacle 65 and to prevent the further contact unit from tilting, can be arranged between the third contact row 40 and the first recess row 130.

Above the guiding bar 145, the third contact sections 110 of the third contact row 40 project beyond the receiving base 75. The fourth contact row 45 is arranged above the third contact row 40. Above the fourth contact row 45, by way of example, between the fourth contact row 45 and the receiving bar 70, there is arranged a second recess row 150 with a

plurality of second recesses 155 which are configured identical to one another. The second recesses 155 are arranged in a sixth row 156 on a sixth straight line 157. The sixth row 156 is preferably arranged parallel to the first to
5 fifth row 49, 119, 124, 126, 128. The second recess row 150 is, by way of example, arranged to a side of the fourth contact row 45 which faces away from the first recess row 130.

10 The second recess 155 can be configured to be identical to the first recess 135. The second recess 155 can also be configured differently from the first recess 135.

The second recess 155 extends in the longitudinal direction
15 parallel to the x-axis through the housing wall 60 and has, by way of example, a rectangular cross-section. By way of example, an extension of the second recess 155 in the vertical direction is greater than an extension of the first recess 135 in the vertical direction.

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A first recess 135 and a second recess 155 are each arranged in a common third plane 160. The third plane 160 is, by way of example, configured as an xz-plane. As a result, a second recess 155, which is arranged offset upwards in the vertical
25 direction towards the fourth contact sections 115, by way of example, offset on a side facing away from the third contact row 40, is also arranged between two fourth contact sections 115 respectively in the transverse direction.

30 In the embodiment, the first recess 135 and the second recess 155 are, by way of example, free and configured as a through-opening. Here, free is understood to mean that no further component is arranged in the first recess 135 or in the second recess 155, which means that a channel which fluidly
35 connects a surrounding area 170 to the housing interior 25 is formed via the first recess 135 and the second recess 155.

The first recess 135 and/or the second recess 155 can also be at least partially filled with a substance 171.

By providing the recess 135, 155, a weight of the contact unit 10 can be minimised. It is furthermore ensured that, in one production method, the number of method steps for producing the contact unit 10 is particularly small.

Furthermore, by providing the recesses 135, 155, the contact housing 15 can be produced with a uniform substance 171, for example plastic, in particular a thermoplastic plastic, in a single injection-moulding process.

In Figure 1, both the contact sections 85, 105, 110, 115 and the recess rows 130, 150 are respectively arranged on straight lines 50, 120, 125, 127. Of course, the recess row 130, 150 can also be arranged on another profile, for example in a curve shape.

Figure 2 shows a perspective depiction of the contact rows 30, 35, 40, 45 shown in Figure 1.

Hereafter, by way of example, the first contact element 55 of the first contact row 30 is explained. The second to fourth contact elements 90, 95, 100 are configured substantially identical to the first contact element 55, wherein the extensions of the respective second to fourth contact elements 90, 95, 100 are configured differently from the first contact element 55.

The first contact element 55 has, alongside the first contact section 85, a first connection section 175 and a second connection section 180. Furthermore, the first contact element 55 comprises a fifth contact section 185 which is arranged at an end opposite the first contact section 85.

The second connection section 180 is arranged inclined relative to the first connection section 175. The second

connection section 180 is preferably arranged at a right angle to the first connection section 175. The first contact section 85 and the first connection section 175 are in alignment, meaning that the first connection section 175 is also arranged in the first plane 162. The fifth contact section 185 is also in alignment with the second connection section 180. In the embodiment, the second connection section 180 is, by way of example, configured longer than the first connection section 175.

A first widening section 190 is laterally arranged on the second connection section 180. The first widening section 190 is, by way of example, directly adjacent to the fifth contact section 185.

The first widening section 190 has a first bearing surface 195 on a side facing the first connection section 175. The first bearing surface 195 is arranged parallel to the first connection section 175. Furthermore, the first bearing surface 195 extends, by way of example, in an xy-plane. Furthermore, the first widening section 190 is arranged on a side of the second connection section 180 facing away from the first connection section 175. The first widening section 190 can also be arranged on both sides of the second connection section 180. It is also possible for only one first widening section 190 to be provided at the first connection section 175.

As an alternative to the above-described planar configuration of the first bearing surface 195, the first bearing surface 195 can also be configured as a curve, for example in a semi-circular shape.

A side surface 200 of the second connection section 180 extends planarly both over the second connection section 180 and over the first widening section 190.

A second widening section 205 is additionally provided at the second connection section 180 of the first and second contact elements 55, 90. The second widening section 205 is preferably configured substantially identical to the first widening section 190. The second widening section 205 has a second bearing surface 210 on a side facing the first connection section 175. The second bearing surface 210 is, by way of example, configured as an xy-plane and oriented parallel to the first bearing surface 195. The second connection section 180 is configured slimmer between the first widening section 190 and the second widening section 205 than at the widening sections 190, 205.

In the case of a longer configuration of the second connection section 180 of the first and/or second contact element 55, 90 in the z-direction, further widening sections 190, 205 can be provided at the contact element 55, 90. It could also be conceivable for the widening section 190, 205 to be configured as a lateral indentation in the second connection section 180.

The second contact element 90 is configured substantially identical to the first contact element 55. The geometric configuration of the second contact element 90 differs here to the extent that the second connection section 180 is configured shorter in the z-direction than the second connection section 180 of the first contact element 55. The widening sections 190, 205 of the first contact element 55 and of the second contact element 90 are configured identically in the embodiment. The widening sections 190, 205 of the first and second contact elements 55, 90 could also be configured to be different. However, it is important here that the widening sections 190, 205 of two second connection sections 180 arranged behind one another in the x-direction are each configured identical to one another with regard to the arrangement, configuration and positioning of the bearing surface 195, 210. The widening sections 190, 205 of contact

elements 55, 90, 95, 100 can vary in the y-direction in the contact row 30, 35, 40, 45 of contact elements 55, 90, 95, 100 arranged alongside one another.

5 The third contact element 95 and the fourth contact element 100 deviate from the first contact element 55 and second contact element 90 to the extent that the second connection section 180 is configured significantly shorter in the z-direction than the second connection section 180 of the first
10 and second contact elements 55, 90. Furthermore, the second widening section 205 is dispensed with.

Figure 3 shows a cut-out from a plan view onto a stabilising core 215, 250.

15 The stabilising core 215, 250 has a first core section 220 and a second core section 225. The second core section 225 is configured like a rake and has, by way of example, engaging elements 230 which are arranged at regular third grid
20 spacings a_3 and which are each delimited from one another by a gap 235. The engaging elements 230 extend in the longitudinal direction. Each engaging element 230 has, in cross-section, a rectangular configuration corresponding to the recess 135, 155. The first core section 220 is configured
25 substantially like a plate, wherein, in the longitudinal direction adjacent to the first core section 220, the engaging elements 230 are each connected by a fixed end 240 to the first core section 220. It is also conceivable for the engaging element 230 to have a different cross-section, for
30 example a polygonal, a circular or an elliptical cross-section. The bearing surface 195, 210 is correspondingly configured corresponding to the upper-side configuration of the engaging element 230.

35 Figure 4 shows a flow chart of a production method for producing the contact unit 10. Figure 5 shows a perspective depiction onto the contact unit 10 after a third method step

310 and Figure 6 shows a sectional view along a cutting plane A-A, shown in Figure 1, through the contact unit 10 after a fourth method step 315. Figure 7 shows a cut-out from a sectional view through the contact unit 10 during a seventh
5 method step 330.

In a first method step 300, an injection mould 245 (schematically depicted in Figure 6 by means of dot-dashed lines), the first stabilising core 215 and advantageously a
10 second stabilising core 250 and at least one contact row 30, 35, 40, 45 are provided.

In a second method step 305, by means of a holding means 260 (indicated in Figures 5 and 6 by means of dashed lines), at
15 least the first contact row 30, in the embodiment the four contact rows 30, 35, 40, 45 by way of example, is positioned in a predefined first position in an interior 265 of the injection mould 245 and held by the holding means 260. The holding means 260 can grip around and fix the individual
20 contact elements 55, 90, 95, 100 of the contact row 30, 35, 40, 45 in sections, for example at the fifth contact section 185. The holding means 260 can be configured as a gripper, for example. The gripper can have, for each fifth contact section 185, a recess in which there is respectively arranged
25 a fifth contact section 185. The holding means 260 holds all four contact rows 30, 35, 40, 45.

In a third method step 310 (cf. Figure 5), the catching core 255 is positioned in the interior 265 in a second predefined position. Furthermore, in the third method step 310 the first
30 stabilising core 215 and the second stabilising core 250 are positioned in a third and fourth predefined position respectively.

In the embodiment, by way of example, both stabilising cores
35 215, 250 are inserted in the longitudinal direction so far into the interior 265 that a free end 270 of the engaging element 230 of the stabilising core 215, 250 strikes a

catching core side surface 280 of the catching core 255. The free end 270 can be arranged spaced apart from the catching core side surface 280 or only one of the two stabilising cores 215, 250 may, by the free end 270, lie against the stabilising core 215, 250.

It could also be conceivable for a receiving aperture, arranged on a side facing the stabilising core 215, 250, to be provided in the catching core 255. One receiving aperture respectively is preferably provided for each stabilising core 215, 250. The receiving aperture is configured corresponding to the stabilising core 215, 250 at the free end 270. The receiving aperture can be configured in a groove-like manner extending in the y-direction in its main extension direction. One receiving aperture can also be respectively provided for each engaging element 230, said receiving apertures being arranged alongside one another in a row in the y-direction. Through the dipping of the stabilising core 215, 250 into the receiving aperture, the stabilising core 215, 250 is additionally supported at the free end.

In this case, the stabilising core 215, 250 is inserted into the interior 265 in such a manner that the stabilising core 215, 250 engages the engaging element 230 in each case between two adjacently arranged second connection sections 180 of the contact rows 30, 35, 40, 45 and bears the contact rows 30, 35, 40, 45 (cf. Figure 5). The first widening section 190 is arranged above an upper side 275 of the engaging element 230 of the first stabilising core 215. The second widening section 205 is arranged between the engaging element 230 of the first stabilising core 215 and the engaging element 230 of the second stabilising core 250 and thus above the second stabilising core 250. As a result of the contact row 30, 35, 40, 45 being held by the stabilising core 215, 250, the holding means 260 can be removed. In this case, the stabilising core 215, 250 supports at least one force (for example a gravitational force, but also

acceleration forces) from the contact element 55, 90, 95, 100. As a result of the first and second contact rows 30, 35 being reached through by engaging sections 230 of the two stabilising cores 215, 250, tilting of the first and second contact elements 55, 90 of first and second contact rows 30, 35 can be reliably avoided.

If the widening section 190, 205 is configured as a lateral indentation in the second connection section 180, the engaging element 230 can reach through the indentation, in order to bear the contact element 55, 90, 95, 100.

In addition, there can be provided a stabilising means 290 (indicated in Figure 5 by means of dot-dash lines), which, for example, is arranged above and/or below one of the first to fourth contact sections 85, 105, 110, 115. The stabilising means 290 can be configured in the shape of a bar and its main extension direction runs in the transverse direction. The stabilising means 290 secures the contact row 30, 35, 40, 45 against tilting around the y-axis when the engaging elements 230 are inserted between the contact elements 55, 90, 95, 100. The stabilising means 290 can be removed, if, for example, the engaging elements 230 partially engage between the contact rows 30, 35, 40, 45.

In a fourth method step 315 (cf. Figure 6), the injection-mouldable substance 171 of the contact housing 15 is injected into the injection mould 245. The fluid substance 171 surrounds the first and second connection sections 175, 180 of the contact elements 55, 90, 95, 100 and forms a materially engaged connection to the contact elements 55, 90, 95, 100. The injection mould 245 is configured such that the fifth contact section 185 of the contact row 30, 35, 40, 45 remains free and is not injection-moulded around with the substance 171, in order to form a second connecting side 281 of the contact unit 10 on the inside of the contact housing 20. The substance 171 can be a thermoplastic plastic, for

example. The substance 171 is injected into the injection mould 245 at a temperature (in the processing temperature range) above its melting temperature.

5 In a fifth method step 320, a first proportion 282 of the substance 171 is hardened in a first region 296 for example. The hardening of the first proportion 282 can take place by cooling the substance 171 to below its melting temperature (and a glass transition temperature), for example in the
10 first region 296. The first region 296 joins onto a side surface 297 of the injection mould 245. The first proportion 282 can be, for example, 30 to 60 percent by mass of the substance 171. The first proportion 282 stabilises the position of the contact row 30, 35, 40, 45. Furthermore,
15 during the hardening of the first proportion 282 of the substance 171, the first predefined position of the contact row 30, 35, 40, 45 and the contact elements 55, 90, 95, 100 thereof is secured by the stabilising cores 215, 250. In particular, for example when the injection mould 245 is
20 moved, a possible sagging of the contact element 55, 90, 95, 100 is ensured through the bearing surface 195, 210 bearing on the respectively facing upper side 275 of the stabilising core 215, 250. In this case, at least one force, for example resulting from an acceleration or a gravitational force, can
25 be supported. Furthermore, the two stabilising cores 215, 250 prevent tilting, in particular of the first contact row 30 and the second contact row 35. The contact elements 55, 90, 95, 100 are also prevented from twisting around the y-axis due to the second connection section 180 coming to a stop on
30 the engaging element 230.

In a sixth method step 325, the stabilising core 215, 250 is removed after the first proportion 282 of the substance 171 has hardened.

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In the seventh method step 330 (cf. Figure 7), at least in a second region 298 that is arranged in the interior 265 spaced

apart from the side surface 297 of the injection mould 245, a second proportion 283 of the substance 171 is not hardened, which means that the substance 171 is fluid in the second region 283. In the second region 283, a temperature of the substance 171 is locally still above the glass transition temperature and/or the melting temperature.

Through the withdrawal of the stabilising core 215, 250, the fluid second proportion 283 of the substance 171 flows into the recess 135, 155 and partially, preferably fully, fills the recess 135, 155. In particular, through the hardening of the first proportion 282 of the substance 171, a skin 285 is formed during the lying against the engaging element 230. The skin 285 can be interrupted at points by the second proportion 283 and can also be determined after the second proportion 283 of the substance 171 has flowed into the recess 135, 155. The recess 135, 155 is sealed as a result of the flowing of the second proportion 283. It is furthermore ensured that the contact housing 15 is particularly light.

In addition, to increase a volume of the second proportion 283 of the substance 171, additional fluid substance 171 can be fed into the injection mould 245 after the first proportion 282 has hardened, in order to accelerate a flow of the second proportion 283 into the recess 135, 155 and/or to compensate for shrinkage of the first proportion during hardening/cooling.

In an eighth method step 335, the second proportion 283 of the substance 171 is hardened further until the substance 171 is fully hardened and consistently has a temperature below the glass transition temperature and/or the melting temperature.

In a ninth method step 340, the catching core 255 is removed and the contact unit 10 is taken out of the injection mould 245.

As an alternative to the above-described fifth to seventh method steps 320 - 330, the stabilising core 215, 250 can remain in the injection mould 245 until such time as the substance 171 is substantially fully hardened and the substance 171 does not flow into the recess 135, 155 when the stabilising core 215, 250 is removed.

As an alternative to the fitting, described in the above-described second and third method steps 305, 310, of the stabilising core 215, 250 with the contact row 30, 35, 40, 45 in the injection mould 245, the first position in the second method step 305, in which the contact row 30, 35, 40, 45 is positioned by means of the holding means 260, can also be outside of the injection mould 245.

In the alternative third method step 310, the stabilising core 215, 250 is positioned relative to the contact row 30, 35, 40, 45 such that the stabilising core 215, 250 is introduced in a straight-line movement with the engaging element 230 between two contact elements 55, 90, 95, 100.

The stabilising core 215, 250 is driven into a relative end position compared to the contact row 30, 35, 40, 45. In the relative predefined end position, the stabilising core 215, 250 and the contact row 30, 35, 40, 45 are positioned relatively correctly with respect to one another for the subsequent injection-moulding around with the substance 171 (cf. fourth method step 315). In this case, in the relative end position, a gap base 295 of the gap 235 of the first stabilising core 215 can, at the face side, lie against the side surface 200 of the second connection section 180 of the fourth contact element 105. Likewise, a gap base 295 of the gap 235 of the second stabilising core 250 can, at the face side, lie against the side surface 200 of the second connection section 180 of the second contact element 90. Furthermore, in the relative end position, the gap base 295 of the gap 235 of the first stabilising core 215 may have at

the face side a predefined first spacing from the side surface 200 of the second connection section 180 of the third contact element 95 and the gap base 295 of the gap 235 of the second stabilising core 250 can have a predefined second
5 spacing from the side surface 200 of the second connection section 180 of the first contact element 55.

In an additional method step 311, which follows the third relative method step 310, the holding means 265 is removed
10 and the contact row 30, 35, 40, 45 is held by the stabilising core 215, 250. Furthermore, the contact row 30, 35, 40, 45, together with the stabilising core 215, 250, is driven into the interior 265 of the injection mould 245 until the first stabilising core 215 is situated in the second predefined
15 position and the second stabilising core 250 is situated in the third predefined position and preferably come to a stop on the catching core 255 or dip in as described above.

The subsequent method steps are identical to the method steps
20 described above.

This configuration has the advantage that, on the one hand, it is possible to ensure a pressure equalisation between the housing interior 25 and the surrounding area 170 and that, on
25 the other hand, this configuration has a particularly high degree of form stability.

List of reference numbers

	5	coordinate system
	10	contact unit
5	15	contact housing
	20	first connecting side
	25	housing interior
	30	first contact row
	35	second contact row
10	40	third contact row
	45	fourth contact row
	49	first row
	50	first straight line
	55	first contact element
15	60	housing wall
	65	contact receptacle
	70	receiving bar
	75	receiving base
	80	fastening means
20	85	first contact section
	90	second contact element
	95	third contact element
	100	fourth contact element
	105	second contact section
25	110	third contact section
	115	fourth contact section
	119	second row
	120	second straight line
	124	third row
30	125	third straight line
	126	fourth row
	127	fourth straight line
	128	fifth row
	129	fifth straight line
35	130	first recess row
	135	first recess
	140	delimiting bar

145 guiding bar
150 second recess row
155 second recess
156 sixth row
5 157 sixth straight line
160 first plane
161 second plane
162 first plane
165 fifth straight line
10 170 surrounding area
171 substance
175 first connection section
180 second connection section
185 fifth contact section
15 190 first widening section
195 first bearing surface
200 side surface
205 second widening section
210 second bearing surface
20 215 first stabilising core
220 first core section
225 second core section
230 engaging element
235 recess
25 240 fixed end
245 injection mould
250 second stabilising core
255 catching core
260 holding means
30 265 interior
270 free end
275 upper side
280 catching core side surface
281 second connecting side
35 282 first proportion
283 second proportion
285 skin

290 stabilising means

295 recess base

300 first method step

5 305 second method step

310 third method step

315 fourth method step

320 fifth method step

325 sixth method step

10 330 seventh method step

335 eighth method step

340 ninth method step

Claims

1. A contact unit (10),

- having at least a contact row (30, 35, 40, 45) and a contact housing (15) with a first connecting side (20),
- wherein the contact row (30, 35, 40, 45) comprises a plurality of identically configured contact elements (55, 90, 95, 100) arranged spaced apart from one another,
- wherein the contact elements (55, 90, 95, 100) reach through a housing wall (60) of the contact housing (15) and have a contact section (85, 105, 110, 115) at the first connecting side (20) respectively,
- wherein the first connecting side (20) has at least one recess (135),
- wherein the recess (135) is arranged spaced apart from the contact section (85, 105, 110, 115).

2. The contact unit (10) according to Claim 1,

- wherein the recess (135) is free,
- wherein the recess (135) is preferably configured as a through-opening and connects the first connecting side (20) to a housing interior (25) of the contact housing (15),
- or
- wherein the recess (135) is preferably filled at least in sections with a substance (171) of the contact housing (15).

3. The contact unit (10) according to Claim 1 or 2,

- wherein the contact element (55, 90, 95, 100) comprises a first connection section (175) and at least a second connection section (180) arranged on a side of the first connection section (175) which faces away from the contact section (85, 105, 110, 115),

- wherein the first connection section (175) is arranged inclined relative to the second connection section (180),
- wherein the first contact section (85, 105, 110, 115) is connected to the first connection section (175).

4. The contact unit (10) according to Claim 3,

- wherein the contact element (55, 90, 95, 100) has a first widening section (190) laterally arranged at the second connection section (180),
- wherein the recess (135) is arranged between the first widening section (190) and the first connection section (175).

5. The contact unit (10) according to Claim 4,

- wherein the first widening section (190) comprises a first bearing surface (195) on a side facing the first connection section (175),
- wherein the first bearing surface (195) is arranged preferably parallel to the recess (135) and/or to the first connection section (175).

6. The contact unit (10) according to Claim 4 or 5,

- wherein the first widening section (190) is arranged on a side of the second connection section (180) facing away from the first connection section (175).

7. The contact unit (10) according to any one of Claims 4 to 6,

- wherein the contact element (55, 90, 95, 100) comprises a second widening section (205),
- wherein the second widening section (205) is arranged on a side of the second connection section (180) facing the first connection section (205),
- wherein the second widening section (205) is arranged offset from the first widening section (190).

8. The contact unit (10) according to any one of the preceding claims,

- wherein the recess (135) is arranged in a first direction, preferably in a transverse direction, between two contact elements (55, 90, 95, 100) of the contact row (30, 35, 40, 45) arranged adjacently alongside one another,
- wherein the first direction is oriented perpendicular to the first contact section (85, 105, 110, 115),
- wherein the recess (135) is preferably arranged in a second direction, preferably a vertical direction, perpendicular to the first direction offset from the contact row (30, 35, 40, 45).

9. The contact unit (10) according to any one of the preceding claims,

- wherein the first connecting side (20) has a plurality of recesses (135),
- wherein the recesses (135) are preferably configured identically,
- wherein the recesses (135) are arranged spaced apart alongside one another in a recess row (130).

10. The contact unit (10) according to Claim 9,

- wherein the recess row (130) is arranged in a plane (161),
- wherein the first connection section (175) of the contact elements (55, 90, 95, 100) of the contact row (30, 35, 40, 45) is arranged in a further plane (162),
- wherein the plane (161) is arranged parallel to the further plane (162).

11. The contact unit (10) according to any one of the preceding claims,

- wherein the contact housing (15) has a second connecting side (281),
- wherein the contact elements (55, 90, 95, 100) respectively have a further contact section (185) at the second connecting side (281),
- wherein the further contact section (185) is connected to the second connection section (180),
- wherein the further contact section (185) and the second connection section (180) are preferably in alignment,

12. The contact unit (10) according to any one of the preceding claims,

- wherein the housing wall (60) is arranged between the recess (135) and the first contact section (85, 105, 110, 115) and the housing wall (60) separates the recess (135) from the first contact section (85, 105, 110, 115).

13. A method for producing a contact unit (10), preferably according to any one of the preceding claims,

- having the following steps:
- providing an injection mould (245), an injection-mouldable substance and a contact row (30, 35, 40, 45) with a plurality of identically configured contact elements (55, 90, 95, 100) arranged spaced apart alongside one another, and a stabilising core (215, 250) and a holding means (260),
- inserting an engaging element (230) of the stabilising core (215, 250) between two adjacently arranged contact elements (55, 90, 95, 100) into a predefined position,
- positioning the contact row (30, 35, 40, 45) in the injection mould (245),
- introducing the substance into the injection mould (245) and at least partially injection-moulding around the contact elements (55, 90, 95, 100),

- supporting at least one force which acts on the contact row (30, 35, 40, 45) on the stabilising core (215, 250),
- hardening the substance, and
- 5 - removing the stabilising core (215, 250) and configuring the recess (135) on a first connecting side (20) of the contact housing (15).

14. The method according to Claim 13,

- 10 - wherein the stabilising core (215, 250) is removed temporally after the hardening of a first proportion of the substance,
- wherein, temporally after the removal of the stabilising core (215, 250), a second proportion of
15 the substance flows into the recess (135) and at least partially fills the recess (135),
- wherein the second proportion of the substance is hardened.

20 15. The method according to Claim 13 or 14,

- wherein an engaging element (230) of a further stabilising core (250) is inserted between the two adjacently arranged contact elements (55, 90) into a further predefined position,
- 25 - wherein the contact elements (55, 90) are secured, by the engaging elements (230), against tilting by lying against the engaging elements (230),
- wherein preferably a catching core (255) is introduced into the injection mould (245),
- 30 - wherein the catching core (255) fixes an end position of the stabilising core (215, 250) in at least one direction.

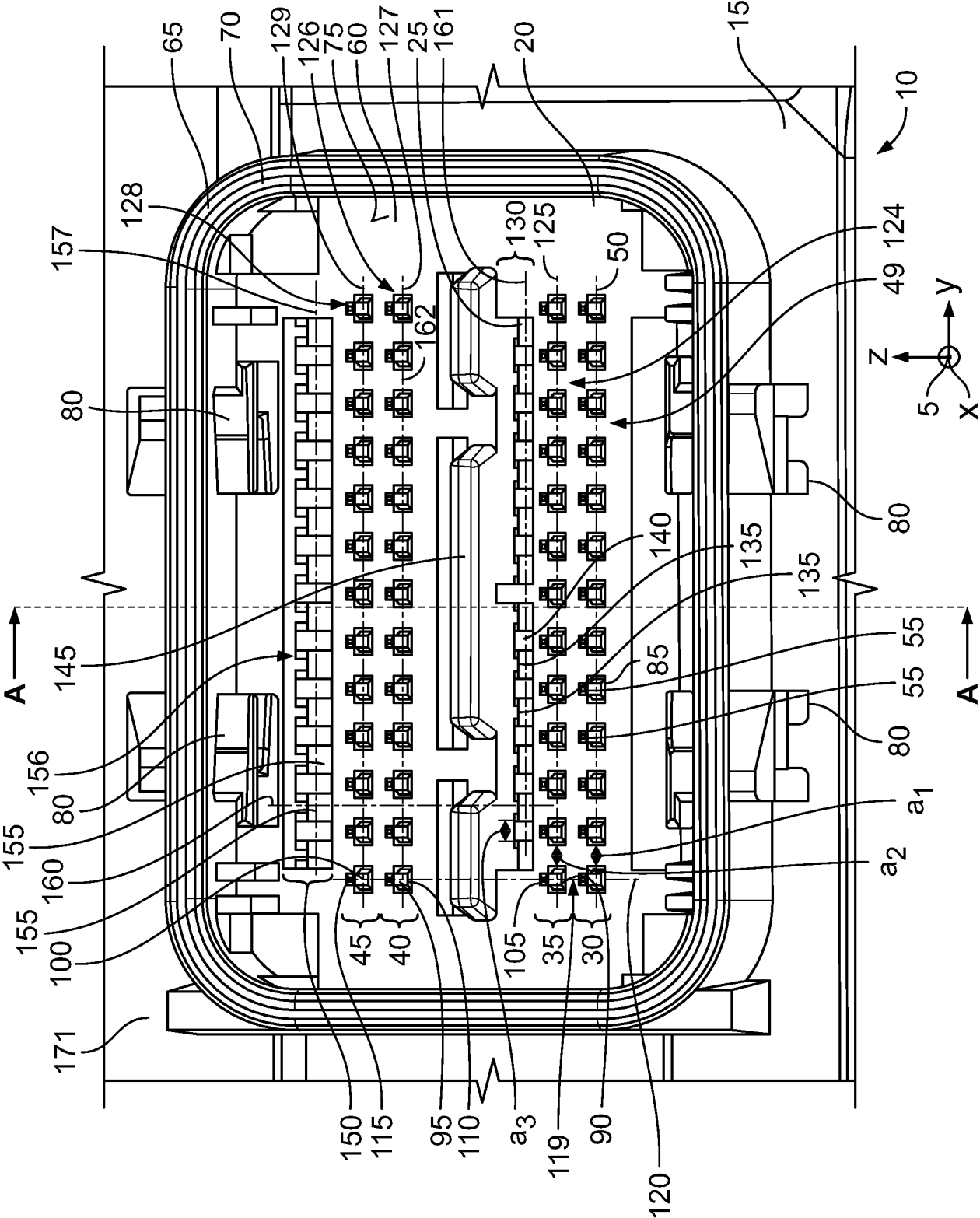


Fig. 1

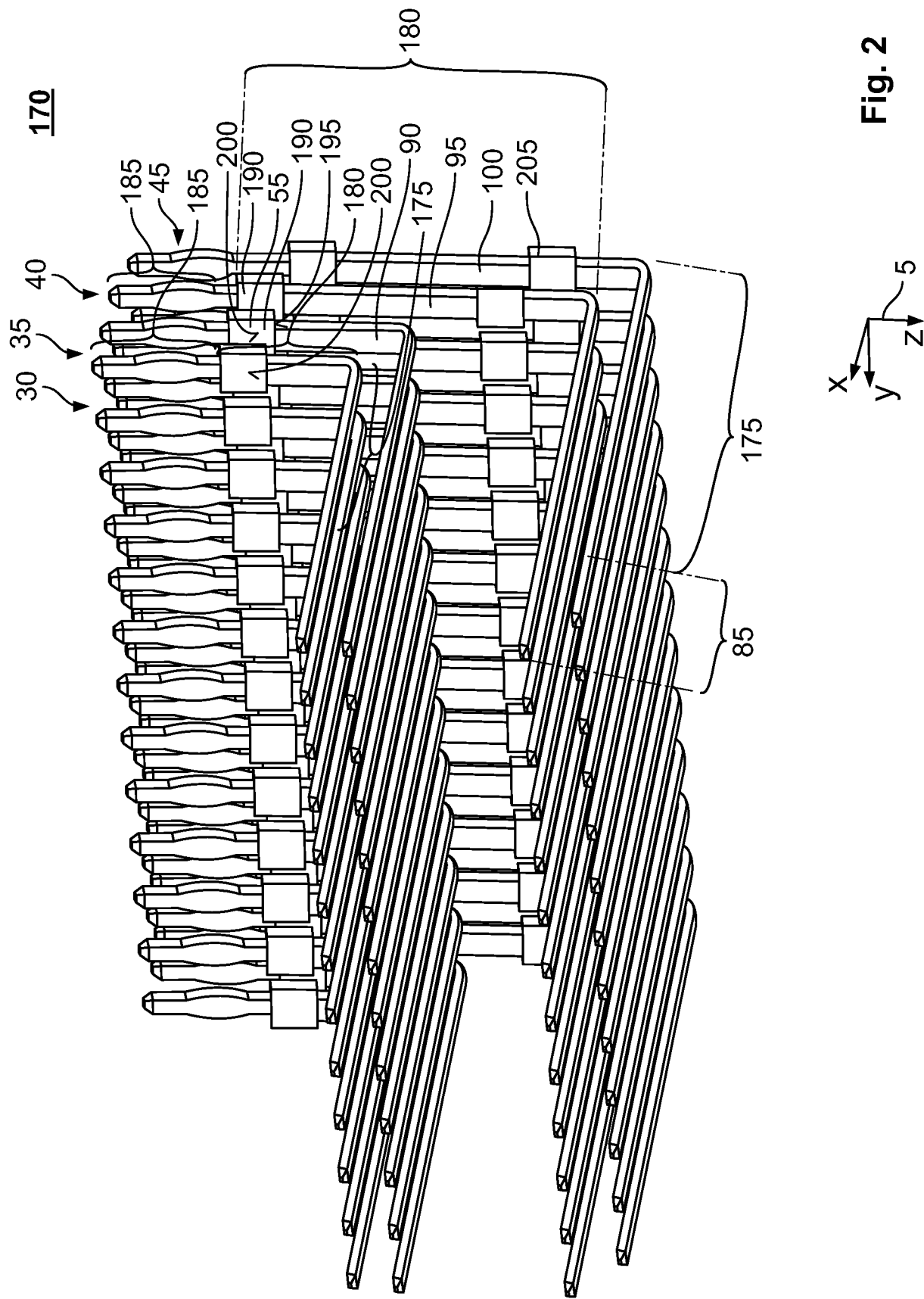


Fig. 2

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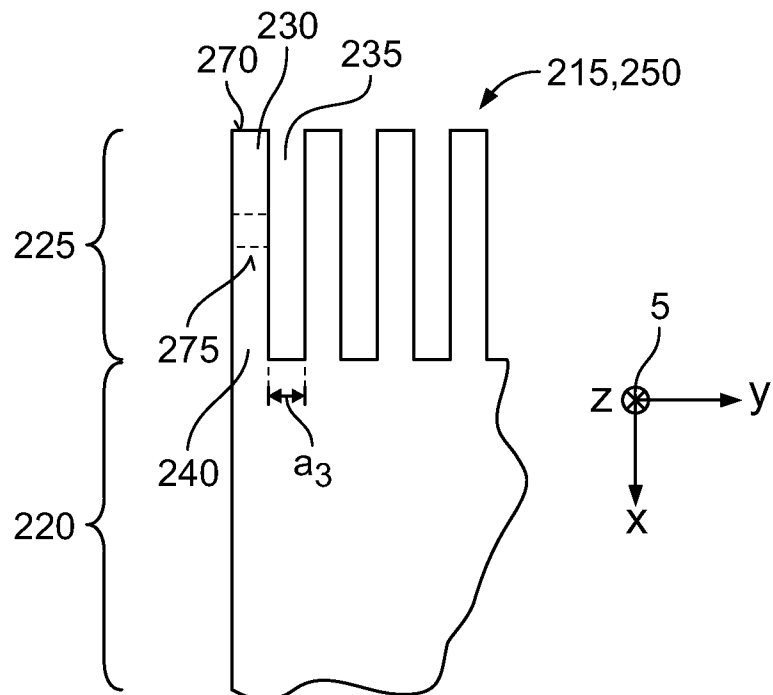


Fig. 3

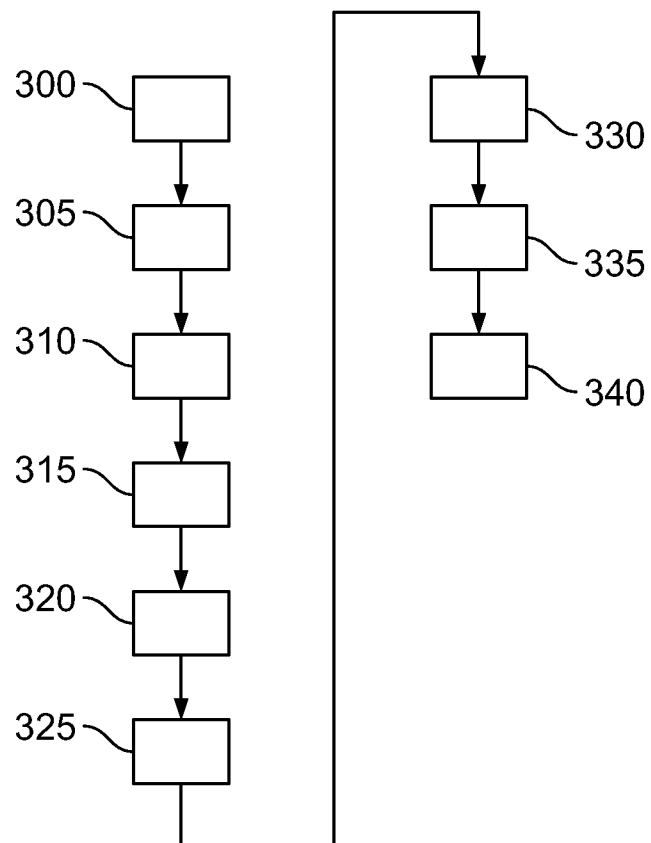


Fig. 4

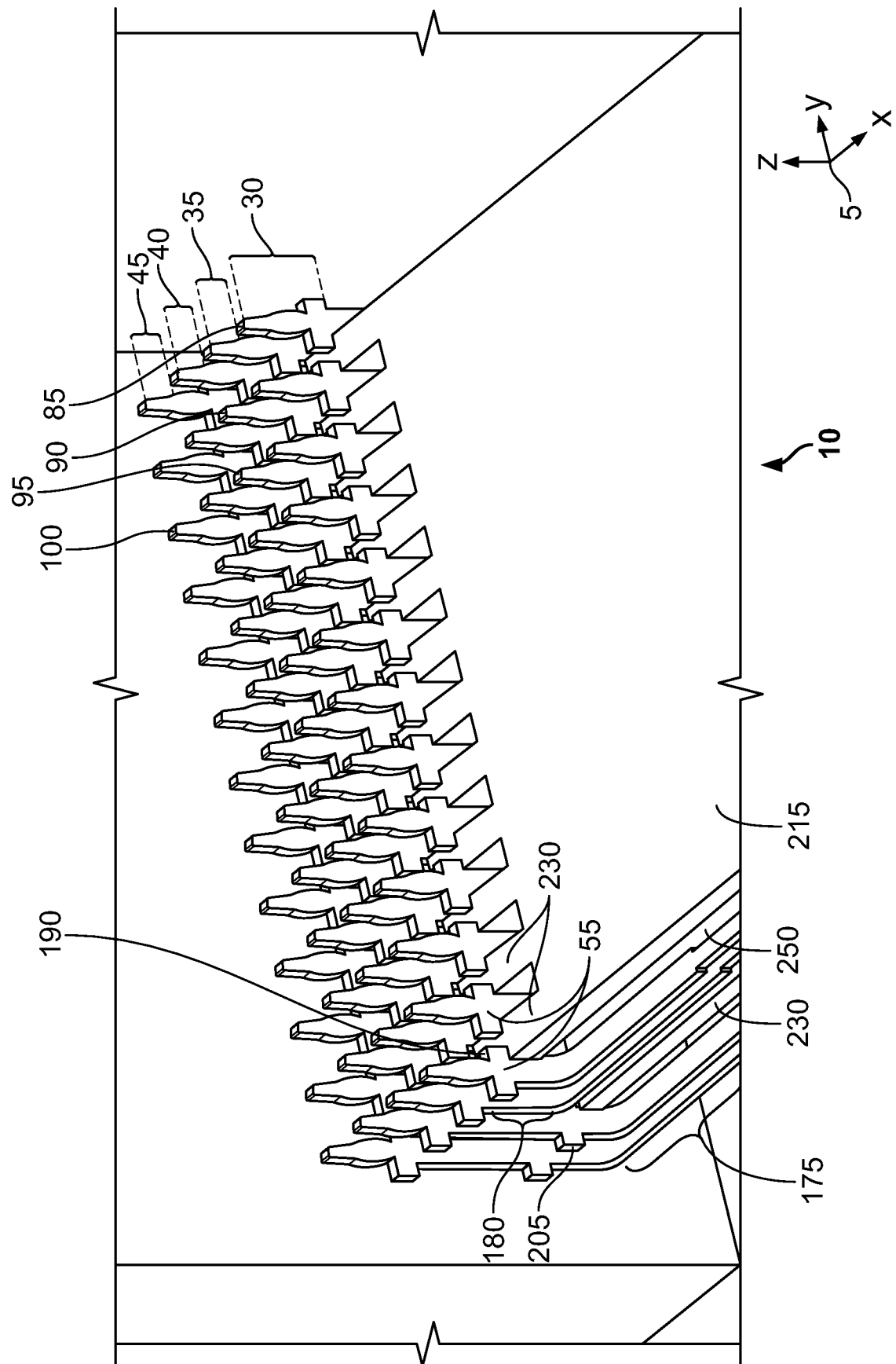


Fig. 5

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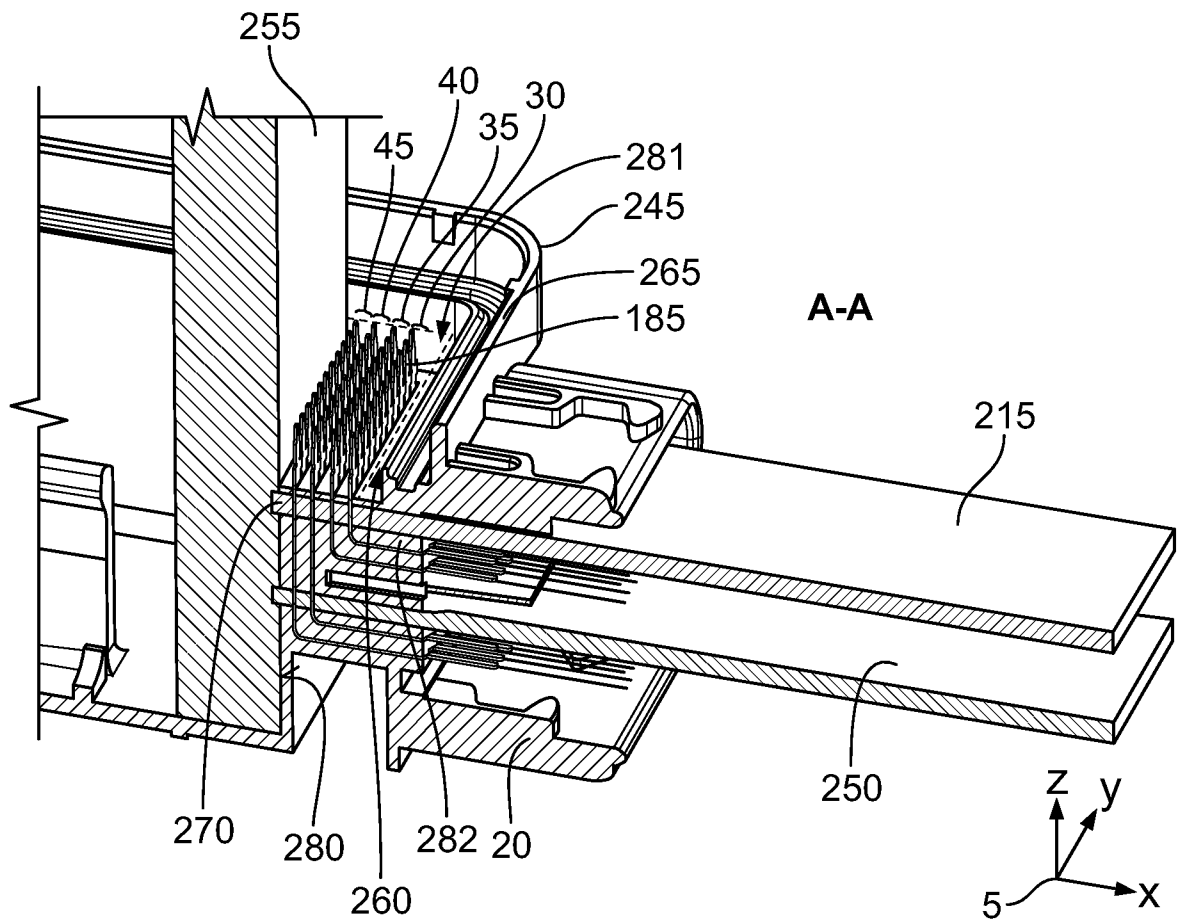


Fig. 6

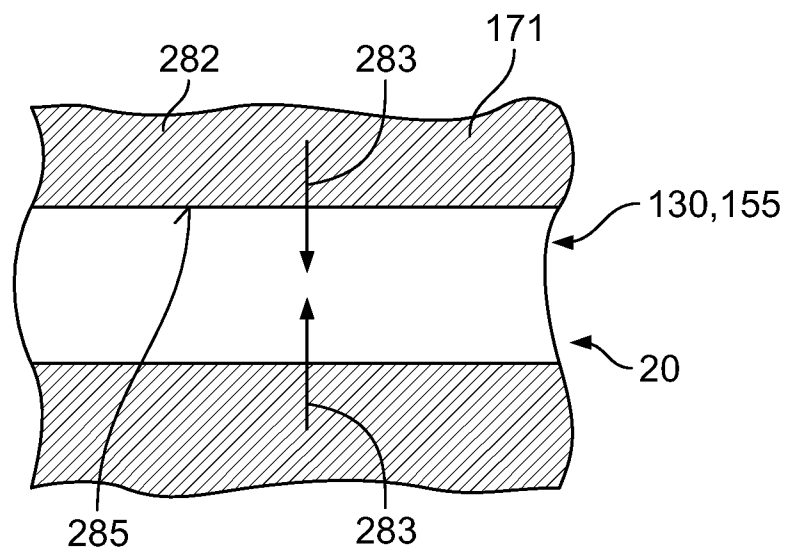


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/058015

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R13/405 H01R43/24
ADD. B29C45/14

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 B29C

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	DE 10 2013 114136 A1 (WEIDMÜLLER INTERFACE GMBH & CO KG [DE]) 18 June 2015 (2015-06-18) paragraphs [0033], [0041], [0042], [0043], [0047]; figures 1c-2d -----	1-3,8-15
X	JP 2009 066858 A (SUMITOMO WIRING SYSTEMS) 2 April 2009 (2009-04-02) abstract; figures 1-14 -----	1-7,13
A	JP H09 161866 A (YAZAKI CORP) 20 June 1997 (1997-06-20) figure 2 -----	4



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

17 May 2018

Date of mailing of the international search report

28/05/2018

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2018/058015

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