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(54) Bus bar and method for producing a bus bar

Busstange und Verfahren zur Herstellung einer Busstange

Barre omnibus et procédé de production d'une barre omnibus

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Description

[0001] The present invention relates to a bus bar according to claim 1 and to a method for producing a bus bar according to claim 6.

[0002] A bus bar is a strip of conductive material, for example a metal, that conducts electricity within an electrical apparatus. Bus bars are for example used in anti-lock breaking system (ABS) modules for automobile safety.

[0003] It is known to weld contact legs of electrical elements to bus bars. To this end, bus bars are provided with protruding welding bumps that are made by stamping. It is known to weld contact legs on such welding bumps by means of resistance welding.

[0004] EP 0 793 298 A2 describes a terminal for terminating the shield of a high-speed cable. The terminal includes a ground plate portion. A hump projects from the ground plate portion and has a slot for receiving the cable at a location along the cable. A solder connection is established between the metallic shield and the ground plate portion at the hump.

[0005] US 2007/0246241 A1 describes a bus plate with a plurality of darts that are laterally aligned and laterally spaced from each other.

[0006] It is an object of the present invention to provide an improved bus bar. This objective is achieved by a bus bar according to claim 1. It is a further object of the present invention to provide an improved method for producing a bus bar. This objective is achieved by a method according to claim 6. Preferred embodiments are disclosed in the dependent claims.

[0007] A bus bar comprises a first surface and a second surface. The bus bar comprises a metal. The bus bar further comprises a first welding bump at a first position of the bus bar and a second welding bump at a second position of the bus bar. The first welding bump protrudes above the first surface and the second welding bump protrudes above the second surface. The first position and the second position are directly adjacent to each other. Advantageously, this bus bar allows to be welded on two contact legs that are located very close to each other. Advantageously, this allows to design an apparatus that uses the bus bar with very small dimensions.

[0008] A crack is arranged in the bus bar between the first position and the second position. Advantageously, this allows the material of the bus bar to protrude in the areas of the welding bumps such that the welding bumps can be arranged directly adjacent to each other.

[0009] In an embodiment of the bus bar the first welding spot protrudes between 0.3 mm and 0.5 mm above the first surface. Advantageously, this allows the first welding spot to be welded reliably on an electric contact.

[0010] In an embodiment of the bus bar the first welding bump comprises an elongate shape. Advantageously, this increases the usable surface of the first welding bump, allowing to compensate for tolerances in the fabrication and alignment of the bus bar and electric com-

ponents welded on said bus bar.

[0011] In an embodiment of the method the first welding bump and the second welding bump are point symmetric. Advantageously, this allows both welding bumps to be welded on contacts in the same way.

[0012] In an embodiment of the bus bar the bus bar comprises a copper-tin alloy. Advantageously, a copper-tin alloy comprises high-electric conductance and is well-suited for resistance welding.

[0013] A method for producing a bus bar comprises steps of providing a metal comprising bus bar with a first surface and a second surface, for stamping a first welding bump and a second welding bump into the bus bar, wherein the first welding bump is stamped at a first position of the bus bar and the second welding bar is stamped at a second position of the bus bar. The first welding bump protrudes above the first surface and the second welding bump protrudes above the second surface. The first welding bump and the second welding bump are stamped simultaneously. Advantageously, stamping the first welding bump and the second welding bump simultaneously provides reproducible control over the behaviour of the material of the bus bar in an area between the first position and the second position.

[0014] A crack is created in the bus bar between the first position and the second position while stamping the welding bumps. Advantageously, such controlled creation of a crack between the first position and the second position prevents an uncontrolled tearing of the material of the bus bar in the area between the first position and the second position while allowing the first position and the second position to be close to each other.

[0015] Accordingly the first position and the second position are directly adjacent to each other. Advantageously, this allows the first welding bump and the second welding bump to be located very close to each other.

[0016] In an embodiment of the method a hole is created in the bus bar between the first position and the second position before stamping the welding bumps. Advantageously, creating a hole between the first position and the second position supports a controlled creation of a crack in the bus bar between the first position and the second position whilst stamping the welding bumps. Advantageously, this prevents an uncontrolled tearing of the material of the bus bar between the first position and the second position of the bus bar at a later point in time.

[0017] In one embodiment of the method the hole is drilled, punched or stamped into the bus bar. Advantageously, these techniques of creating the hole provide simple and reliable ways of creating the hole in the bus bar.

[0018] In a further development of the method the first welding bump is resistance welded on a contact leg. Advantageously, this allows the bus bar to be electrically connected to the contact leg.

[0019] The invention will now be explained in more detail with reference to the Figures, in which:

Fig. 1 shows a perspective view of a bus bar;

Fig. 2 shows a top-view of a bus bar in a first manufacturing state;

Fig. 3 shows a side-view of the bus bar during stamping of welding bumps;

Fig. 4 shows a sectional view of the bus bar;

Fig. 5 shows a side-view of the bus bar with welding bumps; and

Fig. 6 shows a top-view of the bus bar with welding bumps.

[0020] Figure 1 shows a perspective view of a bus bar 100. The bus bar 100 serves to conduct electricity within an electrical apparatus. The bus bar 100 may for example be used in an anti-lock breaking system (ABS) module.

[0021] The bus bar 100 comprises an electrically conductive material, for example a metal. The bus bar 100 may for example comprise a copper-tin alloy or another alloy.

[0022] The bus bar 100 comprises the shape of a flat-strip with a first surface 101 and a second surface 102. Between the first surface 101 and the second surface 102 the bus bar 100 comprises a thickness 103. The thickness 103 may for example be about 5 mm.

[0023] The bus bar 100 comprises a first welding bump 110 and a second welding bump 120. The first welding bump 110 is arranged at a first position 111 of the bus bar 100. The second welding bump 120 is arranged at a second position 121 of the bus bar 100. The first welding bump 110 and the second welding bump 120 each comprise an elongate shape arranged in parallel to a longitudinal direction of the bus bar 100.

[0024] The first position 111 and the second position 121 are arranged directly adjacent to each other along the longitudinal direction of the bus bar 100.

[0025] The first welding bump 110 protrudes over the first surface 101 of the bus bar 100. The second welding bump 120 protrudes over the second surface 102 of the bus bar 100. The first welding bump 110 and the second welding bump 120 are thus point symmetric with respect to each other.

[0026] In an intermediate area 131 between the first welding bump 110 at the first position 111 and the second welding bump 120 at the second position 121 a crack 130 is arranged in the bus bar 100. The crack 130 is an opening in the material of the bus bar 100 and was formed in a controlled manner at the same time that the first welding bump 110 and the second welding bump 120 were formed.

[0027] The first welding bump 110 and the second welding bump 120 are each provided for being welded on electrical conductors, for example for being welded on contact legs of electrical elements such as capacitors.

In the example shown in Figure 1 the first welding bump 110 is welded on a contact leg 140 by a weld joint 141. The contact leg 140 may for example be a contact leg of a capacitor. The weld joint 141 may have been created by means of resistance welding for example.

[0028] A method for producing the bus bar 100 will now be explained with reference to Figures 2 to 6.

[0029] In a first step the metal bus bar 100 is provided without welding bumps 110, 120 as shown in the top-view of Figure 2. The bus bar 100 is provided as an elongate strip of a metal with the first position 111 designated for creation of the first welding bump 110 and the second position 121 designated for creation of the second welding bump 120.

[0030] Optionally a hole 132 may be drilled in the intermediate area 131 between the first position 111 and the second position 121. The hole 132 may also be created otherwise in the intermediate area 131. For example, the hole 132 may be punched or stamped in the intermediate area 131. The hole 132 supports a controlled formation of the crack 130. Creation of the hole 131 may, however, be omitted.

[0031] Figure 3 schematically shows the creation of the first welding bump 110 and the second welding bump 120. Figure 3 depicts a side-view of the bus bar 100. A first plunger 150 is pressed against the second surface 102 in a first direction 151 at the first position 111 of the bus bar 100. Simultaneously, a second plunger 160 presses against the first surface 101 in a second direction 161 at the second position 121 of the bus bar 100. The first plunger 150 thus stamps the first welding bump 110. The second plunger 160 simultaneously stamps the second welding bump 120. At the same time the crack 130 is formed in the intermediate area 131 in a controlled manner.

[0032] Figure 4 shows a sectional view of the bus bar 100 after stamping the first welding bump 110 with the first plunger 150 and the second welding bump 120 with the second plunger 160. In the sectional view of Figure 4 the bus bar 100 is sliced along line AA shown in Figure 2. At the first position 111 the first welding bump 110 has been created. Simultaneously, the second welding bump 120 has been created at the second position 121.

[0033] Also simultaneously, the crack 130 has been created in the intermediate area 131 between the first position 111 and the second position 121 by tearing of the material of the bus bar 100. The creation of the crack 131 may have been supported by the hole 132 drilled, punched, stamped or created otherwise into the bus bar 100 in the intermediate area 131 before stamping the welding bumps 110, 120. Alternatively, the crack 130 may have been created without a preceding formation of the hole 132.

[0034] The first welding bump 110 protrudes over the first surface 101 of the bus bar 100 by a first height 112. The second welding bump 120 protrudes over the second surface 102 of the bus bar 100 by a second height 122. The first height 112 and the second height 122 may for

example be between 0.3 mm and 0.5 mm, in particular about 0.4 mm.

[0035] Figure 5 shows a side-view of the bus bar 100 with the first welding bump 110 protruding over the first surface 101 and the second welding bump 120 protruding over the second surface 102.

[0036] Figure 6 shows a top-view of the bus bar 100 with the first welding bump 110 at the first position 111, the second welding bump 120 at the second position 121 and the crack 130 in the intermediate area 131 between the first position 111 and the second position 121.

[0037] Figure 7 summarises the method for producing the bus bar 100 in a schematic flow-diagram 200. In a first step 210 the metal bus bar 100 is provided without welding bumps 110, 120. In an optional second method step 220 the hole 132 is drilled in the intermediate area 131 between the first position 111 and the second position 121 of the bus bar 100. In a third method step 230 the first welding bump 110 is stamped at the first position 111. Simultaneously, the second welding bump 120 is stamped at the second position 121. Stamping of the welding bumps 110, 120 creates the crack 130 in the intermediate area 131 at the same time. In an optional fourth method 240, the first welding bump 110 is resistance welded onto the contact leg 140. Alternatively or additionally, the second welding bump 120 is resistance welded on a further electric conductor.

Reference symbols

[0038]

100	bus bar
101	first surface
102	second surface
103	thickness
110	first welding bump
111	first position
112	first height
120	second welding bump
121	second position
122	second height
130	crack
131	intermediate area
132	hole
140	contact leg
141	weld joint
150	first plunger
151	first direction
160	second plunger
161	second direction
200	method
210	providing a bus bar
220	drilling a hole
230	stamping welding bumps
240	resistance welding

Claims

1. A bus bar (100),
wherein the bus bar (100) comprises a first surface (101) and a second surface (102),
wherein the bus bar (100) comprises a metal,
wherein the bus bar (100) comprises a first welding bump (110) at a first position (111) of the bus bar (100) and a second welding bump (120) at a second position (121) of the bus bar (100),
characterized in that
the first welding bump (110) protrudes above the first surface (101) and the second welding bump (120) protrudes above the second surface (102),
wherein the first position (111) and the second position (121) are directly adjacent to each other,
wherein a crack (130) is arranged in the bus bar (100) between the first position (111) and the second position (121).
2. The bus bar (100) as claimed in claim 1,
wherein the first welding spot protrudes between 0.3 mm and 0.5 mm above the first surface (101).
3. The bus bar (100) as claimed in any one of the preceding claims,
wherein the first welding bump (110) comprises an elongate shape.
4. The bus bar (100) as claimed in any one of the preceding claims,
wherein the first welding bump (110) and the second welding bump (120) are point symmetric.
5. The bus bar (100) as claimed in any one of the preceding claims,
wherein the bus bar (100) comprises a copper tin alloy.
6. A method for producing a bus bar (100),
the method comprising the following steps:
- providing a metal comprising bus bar (100) with a first surface (101) and a second surface (102);
- stamping a first welding bump (110) and a second welding bump (120) into the bus bar (100),
wherein the first welding bump (110) is stamped at a first position (111) of the bus bar (100) and the second welding bump (120) is stamped at a second position (121) of the bus bar (100),
characterized in that the first welding bump (110) protrudes above the first surface (101) and the second welding bump (120) protrudes above the second surface (102),
wherein the first welding bump (110) and the second welding bump (120) are stamped simultaneously,
wherein the first position (111) and the second po-

sition (121) are directly adjacent to each other, wherein a crack (130) is created in the bus bar (100) between the first position (111) and the second position (121) while stamping the welding bumps (110, 120).

7. The method as claimed in claim 6 wherein a hole (132) is created in the bus bar (100) between the first position (111) and the second position (121) before stamping the welding bumps (110, 120).
8. The method as claimed in claim 7, wherein the hole (132) is drilled, punched or stamped into the bus bar (100).
9. The method as claimed in any one of claims 6 to 8, wherein the first welding bump (110) is resistance welded on a contact leg (140).

Patentansprüche

1. Sammelschiene (100),
wobei die Sammelschiene (100) eine erste Oberfläche (101) und eine zweite Oberfläche (102) umfasst,
wobei die Sammelschiene (100) ein Metall umfasst,
wobei die Sammelschiene (100) einen ersten Schweißhöcker (110) an einer ersten Position (111) der Sammelschiene (100) und einen zweiten Schweißhöcker (120) an einer zweiten Position (121) der Sammelschiene (100) umfasst,
dadurch gekennzeichnet, dass
der erste Schweißhöcker (110) über der ersten Oberfläche (101) vorsteht und der zweite Schweißhöcker (120) über der zweiten Oberfläche (102) vorsteht,
wobei die erste Position (111) und die zweite Position (121) sich direkt beieinander befinden,
wobei ein Spalt (130) in der Sammelschiene (100) zwischen der ersten Position (111) und der zweiten Position (121) angeordnet ist.
2. Sammelschiene (100) nach Anspruch 1,
wobei der erste Schweißpunkt zwischen 0,3 mm und 0,5 mm über der ersten Oberfläche (101) vorsteht.
3. Sammelschiene (100) nach einem der vorhergehenden Ansprüche,
wobei der erste Schweißhöcker (110) eine längliche Gestalt umfasst.
4. Sammelschiene (100) nach einem der vorhergehenden Ansprüche,
wobei der erste Schweißhöcker (110) und der zweite Schweißhöcker (120) punktsymmetrisch sind.
5. Sammelschiene (100) nach einem der vorhergehenden

den Ansprüche,
wobei die Sammelschiene (100) eine Kupfer-Zinn-Legierung umfasst.

6. Verfahren zum Herstellen einer Sammelschiene (100),
wobei das Verfahren die folgenden Schritte umfasst:

- Bereitstellen einer metallumfassenden Sammelschiene (100) mit einer ersten Oberfläche (101) und einer zweiten Oberfläche (102);
- Prägen eines ersten Schweißhöckers (110) und eines zweiten Schweißhöckers (120) in die Sammelschiene (100),

wobei der erste Schweißhöcker (110) an einer ersten Position (111) der Sammelschiene (100) geprägt ist und der zweite Schweißhöcker (120) an einer zweiten Position (121) der Sammelschiene (100) geprägt ist, **dadurch gekennzeichnet, dass** der erste Schweißhöcker (110) über der ersten Oberfläche (101) vorsteht und der zweite Schweißhöcker (120) über der zweiten Oberfläche (102) vorsteht,
wobei der erste Schweißhöcker (110) und der zweite Schweißhöcker (120) gleichzeitig geprägt werden,
wobei die erste Position (111) und die zweite Position (121) sich direkt beieinander befinden,
wobei ein Spalt (130) in der Sammelschiene (100) zwischen der ersten Position (111) und der zweiten Position (121) beim Prägen der Schweißhöcker (110, 120) erzeugt wird.

7. Verfahren nach Anspruch 6,
wobei ein Loch (132) in der Sammelschiene (100) zwischen der ersten Position (111) und der zweiten Position (121) vor dem Prägen der Schweißhöcker (110, 120) erzeugt wird.
8. Verfahren nach Anspruch 7,
wobei das Loch (132) in die Sammelschiene (100) gebohrt, gestanzt oder geprägt wird.
9. Verfahren nach einem der Ansprüche 6 bis 8,
wobei der erste Schweißhöcker (110) auf einen Kontaktschenkel (140) widerstandsgeschweißt wird.

Revendications

1. Barre omnibus (100),
la barre omnibus (100) comprenant une première surface (101) et une deuxième surface (102),
la barre omnibus (100) comprenant un métal,
la barre omnibus (100) comprenant une première bosse de soudure (110) à une première position (111) de la barre omnibus (100) et une deuxième bosse de soudure (120) à une deuxième position (121) de la barre omnibus (100),

caractérisée en ce que

la première bosse de soudure (110) fait saillie au-dessus de la première surface (101) et la deuxième bosse de soudure (120) fait saillie au-dessus de la deuxième surface (102),
la première position (111) et la deuxième position (121) étant directement adjacentes l'une à l'autre, une fissure (130) étant disposée dans la barre omnibus (100) entre la première position (111) et la deuxième position (121).

2. Barre omnibus (100) selon la revendication 1, dans laquelle le premier point de soudure fait saillie entre 0,3 mm et 0,5 mm au-dessus de la première surface (101).
3. Barre omnibus (100) selon l'une quelconque des revendications précédentes, dans laquelle la première bosse de soudure (110) comprend une forme allongée.
4. Barre omnibus (100) selon l'une quelconque des revendications précédentes, dans laquelle la première bosse de soudure (110) et la deuxième bosse de soudure (120) sont symétriques par rapport à un point.
5. Barre omnibus (100) selon l'une quelconque des revendications précédentes, la barre omnibus (100) comprenant un alliage cuivre-étain.
6. Procédé de production d'une barre omnibus (100), le procédé comprenant les étapes suivantes :
 - se procurer une barre omnibus comprenant un métal (100) avec une première surface (101) et une deuxième surface (102) ;
 - estamper une première bosse de soudure (110) et une deuxième bosse de soudure (120) dans la barre omnibus (100),

la première bosse de soudure (110) étant estampée à une première position (111) de la barre omnibus (100) et la deuxième bosse de soudure (120) étant estampée à une deuxième position (121) de la barre omnibus (100),

caractérisé en ce que la première bosse de soudure (110) fait saillie au-dessus de la première surface (101) et la deuxième bosse de soudure (120) fait saillie au-dessus de la deuxième surface (102), la première bosse de soudure (110) et la deuxième bosse de soudure (120) étant estampées simultanément,
la première position (111) et la deuxième position (121) étant directement adjacentes l'une à l'autre, une fissure (130) étant créée dans la barre omnibus (100) entre la première position (111) et la deuxième

position (121) pendant l'estampage des bosses de soudure (110, 120).

7. Procédé selon la revendication 6, dans lequel un trou (132) est créé dans la barre omnibus (100) entre la première position (111) et la deuxième position (121) avant l'estampage des bosses de soudure (110, 120).
8. Procédé selon la revendication 7, dans lequel le trou (132) est percé, poinçonné ou estampé dans la barre omnibus (100).
9. Procédé selon l'une quelconque des revendications 6 à 8, dans lequel la première bosse de soudure (110) est soudée par résistance sur une patte de contact (140).

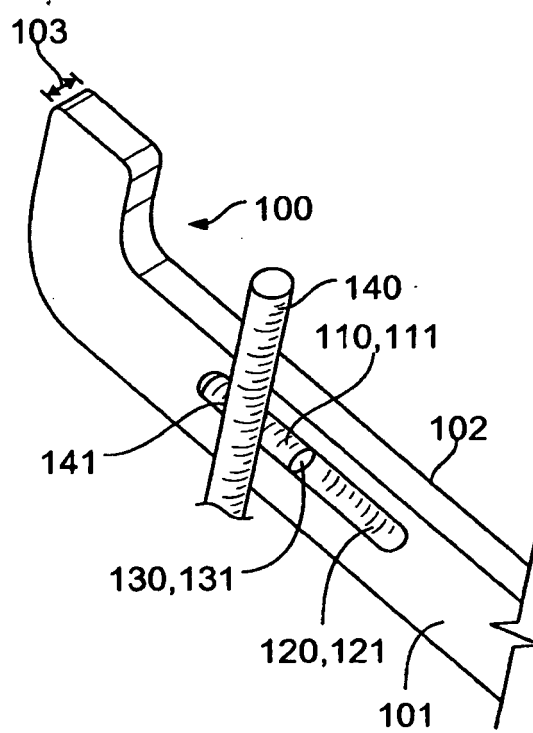


Fig. 1

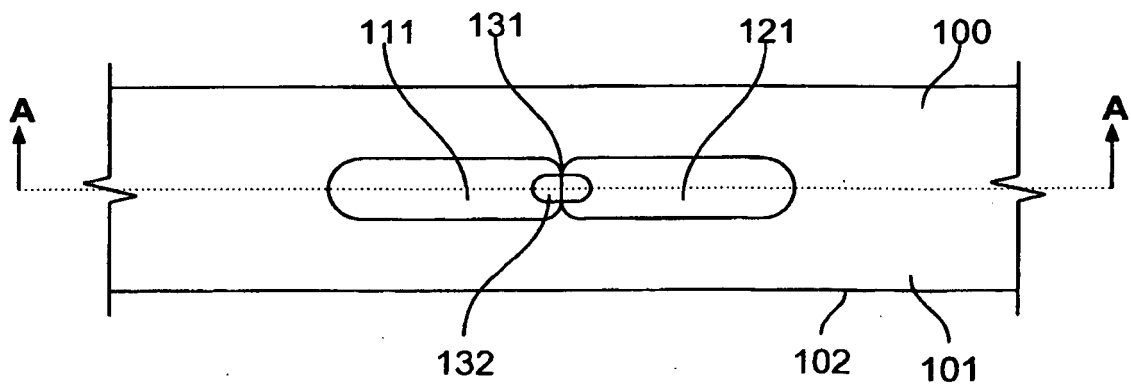


Fig. 2

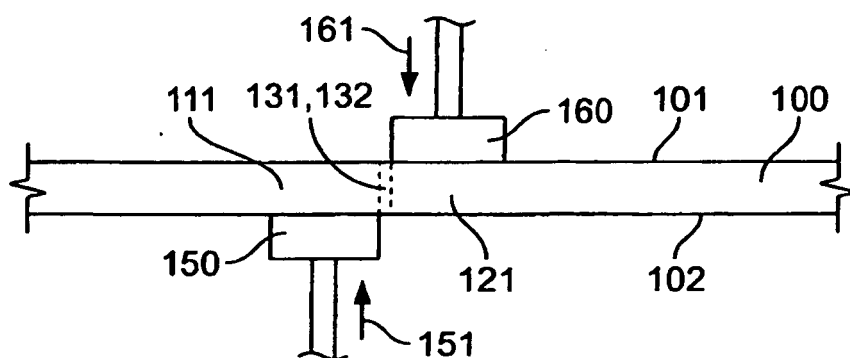


Fig. 3

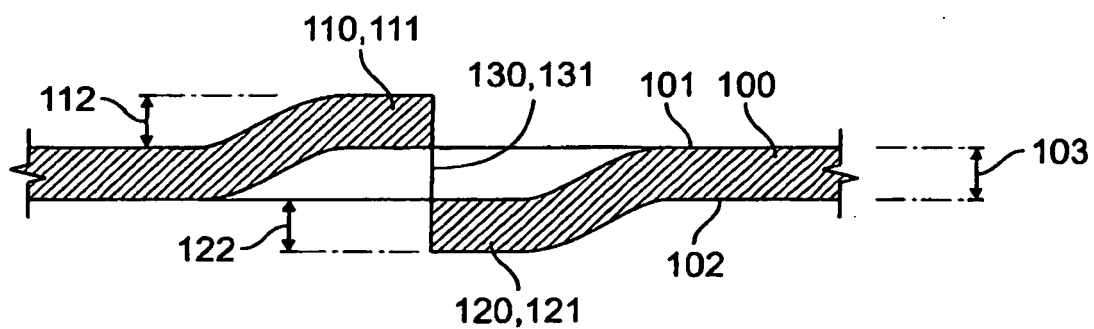


Fig. 4

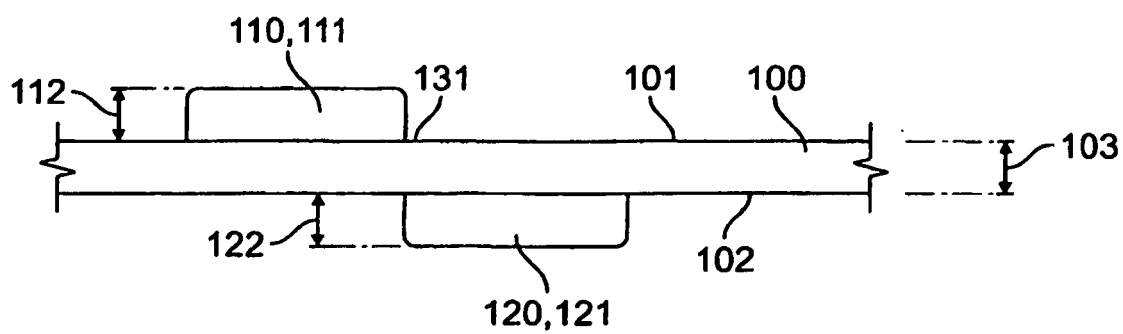


Fig. 5

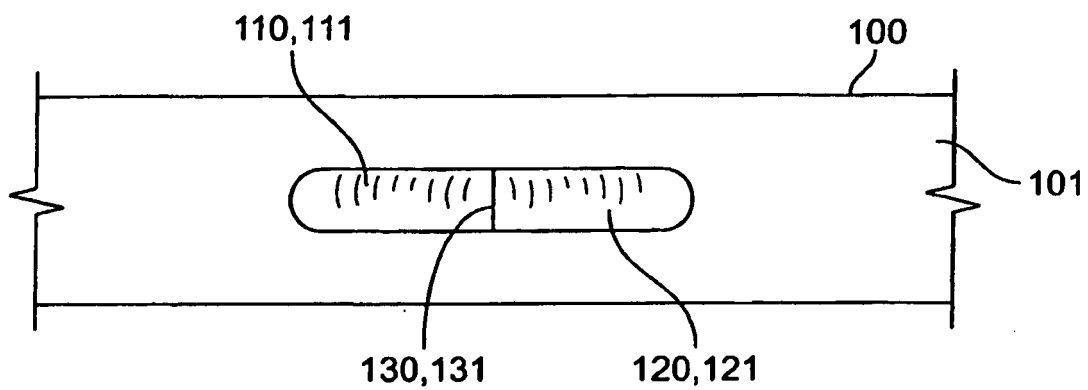


Fig. 6

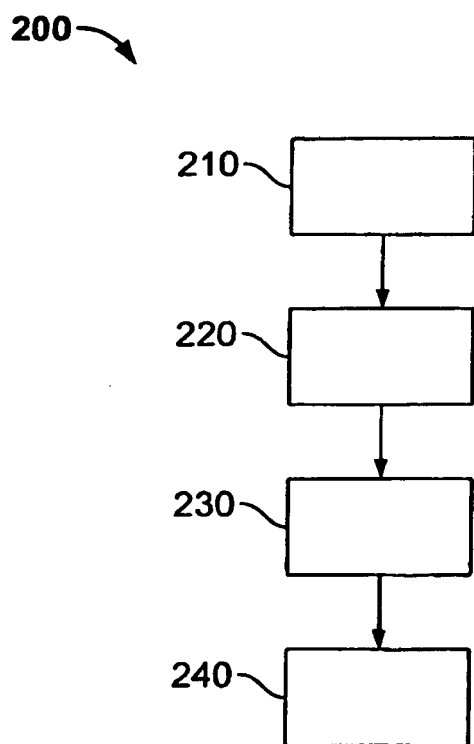


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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