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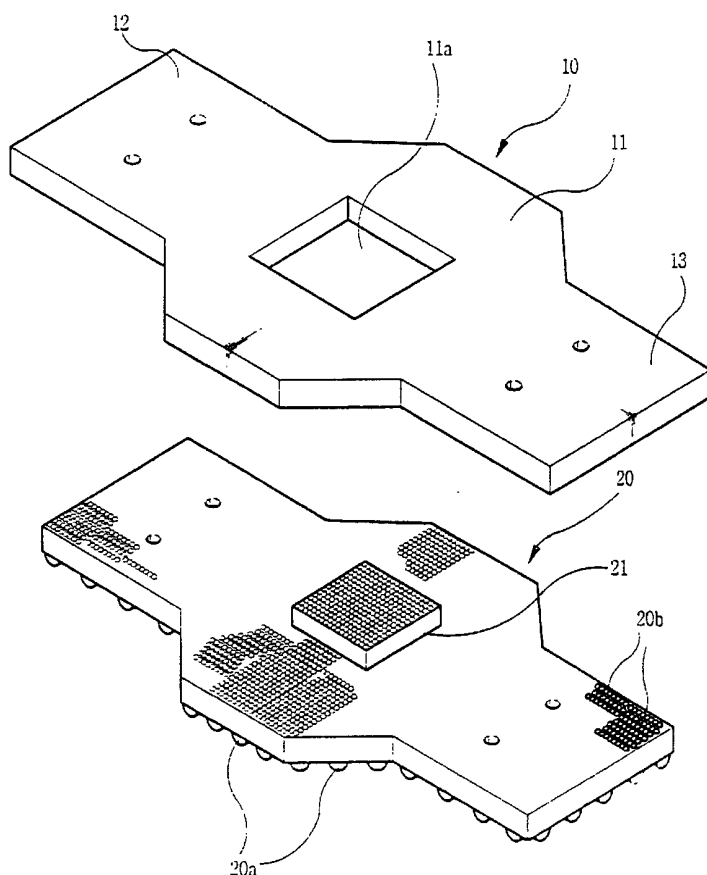
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[Continued on next page]

(54) Title: **SUPPORT FOR SUPPORTING RAIL OF RAILWAY**



(57) Abstract: The present invention relates to a support for supporting a rail of a railway capable of effectively relaxing an impact and absorbing a vibration of a railway rail installed on a precast concrete tie, and in particular to a support for supporting a rail of a railway by which an easier construction and an excellent durability are implemented by providing a structurally engaged buffering plate. The support for supporting a rail of a railway includes a fixing plate formed of a flat body on which a rail is installed and left and right fixing portions extended in a horizontal direction from both sides of the body, the body including a through hole at a center portion of the same, and a buffering plate engaged to a lower portion of the fixing plate for elastically supporting the fixing plate and including a buffering plate support portion inserted into the center portion through the through hole of the fixing plate and having an upper surface protruded beyond the upper surface of the fixing plate for thereby supporting the rail and decreasing the weight and impact of the rail.



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SUPPORT FOR SUPPORTING RAIL OF RAILWAY

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a support for supporting a rail of a railway capable of effectively relaxing an impact and absorbing a vibration of a railway rail installed on a precast concrete tie, and in particular to a support for supporting a rail of a railway by which an easier construction and an excellent durability are implemented by providing a structurally engaged buffering plate.

2. Description of the Background Art

10 Figure 14 is a disassembled perspective view illustrating a fixing structure of a conventional rail of a railway.

As shown therein, a conventional rail 4 of a railway is pressurized by an e-
15 shaped rail fixing clip 8 which is fixed in such a manner that an insulation pad 7 is mounted on a precast concrete tie 2, and a flange portion 4a is inserted into a fixing hole 5a of a rail fixing clip plate 5 embedded in the tie 2. The railway rail 4 is fixed on a rail support 1 on the tie 2 in such a manner that the flange portion 4a is pressurized by the rail fixing clip 8 fixed in such a manner that the flange portion 4a is inserted in
20 the plate 5 on the insulation pad 7 of an elastic material(a polyurethane material) which is used for a buffering and insulation purpose. An elastic insulation plate 6 is

disposed between the rail fixing clip 8 and the rail flange portion 4a.

A dynamic weight and an impact of a train which moves on the railway rail 4 is first buffered by the insulation pad 7 and is transferred to the tie 2. The dynamic weight and impact which are first buffered by the insulation pad 7 are last absorbed
5 for thereby preventing a vibration noise and stably supporting the railway rail 4.

However, in the above-described conventional railway rail, the insulation pad 7 is attached on the tie 2 using an adhesive. Therefore, the adhesive durability is very weak. If the weight and impact from the train which moves on the rail 4 are accumulated after a certain period is passed, the insulation pad 7 is escaped from the
10 tie 2 and the rail 4. Thereafter, the construction of the railway is completed, the insulation pad 7 must be periodically changed. Namely, since the period of the adhesive durability of the insulation pad 7 is short, the insulation pad 7 is escaped. In this case, the weight and impact force of the train which moves on the rail 4 is directly transferred to the tie, so that the lifespan of the tie 2 is significantly decreased, and a
15 metallic friction noise occurs between the rails 4 for thereby causing a noise pollution. Therefore, after the railway is constructed, whenever the period of the durability of the insulation pad 7 is passed, a periodic maintenance is needed for changing the insulation pad.

In addition, in the conventional railway rail fixing structure, when performing a
20 maintenance work for initially constructing the rail or changing the insulation pad, the operations for applying an adhesive on the insulation pad 7 and attaching the insulation pad 7 on the tie are manually performed. Namely, an insulation pad

attaching operation is manually performed. Therefore, the assembling quality is bad, and the construction period of the railway rail is extended, and the construction cost and the maintenance cost of the railway rail are increased.

Recently, since it is difficult to purchase gravels for being graveled on the railway, the railway rail is generally installed on the precast concrete tie. In the case of the railway rail which is installed on the concrete tie, a steel or concrete single tie or a wooden tie is used as a rail support. However, in this case, the insulation pad which is applied with an adhesive is used, the above-described problems occur. In addition, in the case that the rail is installed on the concrete railway, a steel or single tie which is used as a rail support is previously embedded, and then the concrete railway is hardened for thereby causing much inconvenience.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a railway rail support which includes a fixing plate formed of a flat body on which a rail is installed and left and right fixing portions extended in a horizontal direction from both sides of the body, the body including a through hole at a center portion of the same, and a buffering plate engaged to a lower portion of the fixing plate for elastically supporting the fixing plate and including a buffering plate support portion inserted into the center portion through the through hole of the fixing plate and having an upper surface protruded beyond the upper surface of the fixing plate for thereby supporting the rail and decreasing the weight and impact of the rail.

The left and right fixing portions of the fixing plate are extended based on a width smaller than the body.

A movement prevention shoulder portion is formed along an edge portion of the lower surface of the fixing plate for preventing a movement of the buffering plate.

5 A plurality of sliding prevention protrusions are formed on a lower surface of the rail on the upper surface of the buffering support portion of the buffering plate.

A plurality of buffering protrusions are arranged in a lattice shape on a lower surface of the buffering plate.

The fixing plate includes left and right fixing members at both sides of the
10 through hole for supporting the rail fixing clip.

A fixing hole into which the rail fixing clip is inserted passes through the interior of the left and right fixing members in the forward and backward directions.

The left and right fixing holes are an elongated hole having a cross section in the horizontal direction.

15 The fixing plate includes an extended support portion having a width smaller than a horizontal width of the body and extended from the front and rear portions of the body.

A rail mounting groove is further formed at a center portion of an upper surface of the body of the fixing plate for mounting a rail therein.

20 A rail mounting groove is further formed in the body of the fixing plate and at a center portion of the upper surface of the extended support portion for mounting the rail therein, and an extended buffering portion extended in a horizontal direction from

the front and rear portions of the buffering support portion of the buffering plate is formed for thereby supporting the lower portion of the rail mounted in the mounting groove.

The left and right fixing holes have an inclination in an angle range of $0 \sim 90^\circ$.

5 The inclination angle of the left and right fixing holes is 45° .

A bolt hole is formed for engaging a bolt for fixing the rail fixing clip fixing plate at both sides of the through hole.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

10 Figure 1 is a perspective view illustrating a fixing plate of a railway rail support according to a first embodiment of the present invention, Figure 2 is a disassembled perspective view illustrating a railway rail support and a buffering plate installed below the same according to a first embodiment of the present invention, Figure 3 is a perspective view illustrating a state that a rail fixing clip fixing member is
15 integrally formed, Figure 4 is a view illustrating a state in use of the same, and Figure 5 is a cross-sectional view taken along line V-V of Figure 4.

As shown in Figure 1, a railway rail support according to the present invention includes a fixing plate 10, and a buffering plate 20 engaged to a lower portion of the fixing plate 10.

20 The fixing plate 10 includes a pentagonal body 11 having a rectangular through hole 11a formed at a center portion of the same and left and right fixing portions 12 and 13 extended in parallel from both sides of the body 11 and having

bolt engaging holes 12a and 13a. A movement prevention shoulder portion(16 of Figure 5) is formed along an edge portion of the same and is fixed to a concrete railway(30 of Figure 5) together with the buffering plate 20 engaged to a lower portion of the same. A fixing member is installed at both sides of the through hole 11a of the
5 body 11 for fixing the rail fixing clip 50. In the first embodiment of the present invention, as shown in Figure 3, left and right fixing members 14 and 15 having fixing holes 14a and 15a formed in the forward and backward directions are integrally formed or welded.

As shown in Figure 2, the buffering plate 20 is an elastic plate corresponding
10 to the fixing plate 10 and is formed of an elastic material such as a polyurethane or rubber. The buffering plate 20 is structurally engaged to the lower portion of the fixing plate 10 in such a manner that a buffering support portion 21 which is protruded to correspond to the through hole 11a of the body 11 at the center portion of the upper surface of the same is inserted into the through hole 11a of the body 11 and is fixed
15 in the concrete railway together with the fixing plate 10. An embossed sliding prevention protrusion 20b is formed on the entire surface of the same for increasing a friction force so that it is not slid with respect to the rail 40 and the fixing plate 10, and a plurality of buffering protrusions 20a are formed on the lower portion for thereby preventing a sliding.

20 As shown in Figures 4 and 5, the fixing plate 10 and the buffering plate 20 are structurally engaged in such a manner that the buffering support portion 21 of the buffering plate 20 is inserted into the through hole 11a of the fixing plate 10 and are

fixed to the concrete railway 30 by an engaging force with respect to the anchor bolt 31 of the nut 32 in such a manner that the anchor bolts 31 embedded in the concrete railway 30 are inserted into the bolt engaging holes 12a and 13a of the left and right fixing portions 12 and 13 of the fixing plate 10.

5 The railway rail 40 traverses the center portion of the railway rail support fixed by the anchor bolts 31 in the forward and backward directions over the buffering support portion 21 of the buffering plate 20 exposed through the through hole 11a of the fixing plate 10 and are fixed by the fixing clip 50 which is fixed in such a manner that the flange portion 40a is inserted into the left and right fixing members 14 and 15
10 through the elastic insulation plate 60. The railway rail 40 is supported by the buffering support portion 21 of the buffering plate 20 and the fixing plate 10, and the buffering plate 20 and the fixing plate 10 absorb the dynamic weight and vibration applied from a train which moves on the rail 40 for thereby preventing a damage of the concrete railway 30 and a vibration and noise.

15 In the above described construction, the railway rail support according to the present invention is stably engaged in such a manner that the buffering support portion 21 of the buffering plate 20 is inserted into the through hole 11a. Namely, the fixing plate 10 and the buffering plate 20 are not engaged by an adhesive. Therefore, it is possible to prevent the buffering plate 20 from being escaped even when the
20 dynamic weight and impact are repeatedly applied from the train which moves along the rail 40. In addition, since the fixing plate 10 and the buffering plate 20 are engaged in such a manner that the buffering plate 20 is inserted into the through hole

11a of the fixing plate 10, an assembling with respect to the fixing plate 10 of the buffering plate 20 is significantly enhanced, and since the left and right fixing members 14 and 15 are integrally engaged to the fixing plate 10 by the rail fixing clip 50, it is possible to simplify the railway rail construction and maintenance.

5 Therefore, in the case that the railway rail is constructed using a railway rail support according to the present invention, a periodic maintenance is not needed with respect to the railway rail due to a periodic separation of the buffering plate. In addition, it is possible to decrease the maintenance cost. Since the processes for the construction and maintenance of the railway are decreased, the construction period
10 is decreased, and the construction and maintenance costs are decreased.

Figures 6 and 8 are views illustrating the using states of the railway rail supports according to the first embodiment of the present invention in which other rail fixing clips are used.

Figure 6 is a view illustrating a using state of a hexagonal fixing clip 51
15 having an insulation plate 512 which is fixed by the bolt 510 with respect to the railway rail support according to the first embodiment of the present invention and compensates the difference of the heights. Figure 7 is a view illustrating a using state of a fixing clip 52 which has a W-shaped structure and is fixed by the bolt 520 with respect to the railway rail support. In addition, Figure 8 is a view illustrating a Ω -
20 shaped fixing clip 53 fixedly inserted into the fixing member 530 fixed to the fixing plate 10.

Figures 9 through 11 are views illustrating the members used for the railway

rail support according to another embodiment of the present invention. As shown therein, the fixing clip fixing member installed in the fixing plate 10 is different in accordance with the fixing clip 50 of Figure 4 which fixes the railway rail.

Namely, the fixing plate of the railway rail support according to the second
5 embodiment of the present invention is a rail fixing clip 50 of Figure 4 which fixes the rail 40 of Figure 4 and includes elongated homes 14b and 15b formed in the left and right fixing members 14 and 15 and having a certain width in the horizontal direction for thereby adapting the rail fixing clip having an insertion portion which has a certain width in the horizontal direction. The fixing plate 10 of the railway rail support
10 according to a third embodiment of the present invention includes elongated holes 14c and 15c which are formed at a certain angle in the inward direction in the left and right fixing members 14 and 15 for thereby adapting the rail fixing clip having an insertion portion which has a certain width in the inward direction. Figure 11 illustrate a railway rail support according to a fourth embodiment of the present invention in
15 which a plate 70 is integrally formed at both sides of the through hole 11a for thereby adapting the conventional fixing clip 8 of Figure 14.

Figure 12 is a disassembled perspective view illustrating a railway rail support according to a fifth embodiment of the present invention, and Figure 13 is a cross-sectional view taken along line X-X.

20 The railway rail support according to the fifth embodiment of the present invention is formed in such a manner that the rail support portion 11b is extended from front and rear portions of the body 11 of the fixing plate 10 for thereby more

stably supporting the rail. The railway rail support has an excellent supporting strength with respect to the railway rail 40 for thereby stably supporting the rail and preventing a vibration and noise. In addition, the railway rail support according to the fifth embodiment of the present invention includes a rail mounting groove 11c which
5 traverses the center portion of the fixing plate 10 for thereby easily setting the position of the railway rail 40 when constructing the railway rail. In addition, an engaging force with respect to the railway rail 40 is excellent, and it is possible to prevent a penetration of a foreign material such as dust which causes a noise between the rail and the railway rail support 40 and decreases the life span of the
10 buffering plate. Therefore, in the case of the railway rail support according to the fifth embodiment of the present invention, the railway rail receives a torsion weight from the train and a weight in a lateral direction, so that the railway rail may be escaped from the railway rail support due to a relative movement with respect to the railway rail support. In addition, in the case that the rail is adapted to a curved railway which
15 causes a floating state of the rail from the railway rail support, it is possible to prevent an escape of the rail support from the rail and a penetration of a foreign material into a lower surface of the rail. Therefore, the railway rail support according to the fifth embodiment of the present invention is well adaptable to the curved rail which may be escaped from the railway rail support and may be floated due to a relative
20 movement with respect to the railway rail support by receiving a torsion weight or a weight in the lateral direction from the train or a certain region such as a station region, a school zone or a residential region in which much vibration and noise occur

or a rail installed in a region in which a ground foundation is weak.

As described above, the railway rail support according to the present invention may be used as a railway rail installed on the concrete railway which does not need a reinforcement of the ground foundation. In this case, the additional tie is
5 not needed for thereby significantly decreasing the railway construction cost.

In addition, since the fixing plate and the buffering plate are stably engaged with respect to the railway rail support without using an adhesive in the case that the railway rail support according to the present invention is used, it is possible to prevent a periodic separation of the buffering plate or the maintenance. Therefore, it is
10 possible to significantly decrease the railway maintenance cost by using the railway rail support according to the present invention. In addition, the assembling property of the buffering plate is improved, and the rail fixing clip fixing member is integrally formed, the number of the fabrication processes is decreased when assembling the buffering plate and the rail fixing clip fixing member, and the railway construction
15 period and the maintenance period are significantly decreased.

A buffering effect with respect to the rail is excellent, and the rail is supported by the buffering support member of the buffering plate, so that it is possible to decrease the noises due to the dynamic weight and impact of the train.

As the present invention may be embodied in several forms without departing
20 from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed

broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the meets and bounds of the claims, or equivalences of such meets and bounds are therefore intended to be embraced by the appended claims.

CLAIMS

What is claimed is:

1. A railway rail support, comprising:

a fixing plate formed of a flat body on which a rail is installed and left and right fixing portions extended in a horizontal direction from both sides of the body, said body including a through hole at a center portion of the same; and

a buffering plate engaged to a lower portion of the fixing plate for elastically supporting the fixing plate and including a buffering plate support portion inserted into the center portion through the through hole of the fixing plate and having an upper surface protruded beyond the upper surface of the fixing plate for thereby supporting the rail and decreasing the weight and impact of the rail.

2. A railway rail support of claim 1, wherein said left and right fixing portions of the fixing plate are extended based on a width smaller than the body.

3. A railway rail support of claim 1, further comprising a movement prevention shoulder portion formed along an edge portion of the lower surface of the fixing plate for preventing a movement of the buffering plate.

4. A railway rail support of claim 1, further comprising a plurality of sliding prevention protrusions on a lower surface of the rail on the upper surface of the buffering support portion of the buffering plate.

5. A railway rail support of claim 1, further comprising a plurality of buffering protrusions arranged in a lattice shape on a lower surface of the buffering plate.

5 6. A railway rail support of claim 1, wherein said fixing plate includes left and right fixing members at both sides of the through hole for supporting the rail fixing clip.

7. A railway rail support of claim 6, wherein a fixing hole into which the rail fixing clip is inserted passes through the interior of the left and right fixing members in the
10 forward and backward directions.

8. A railway rail support of claim 6, wherein said left and right fixing holes are an elongated hole having a cross section in the horizontal direction.

15 9. A railway rail support of claim 1, wherein said fixing plate includes an extended support portion having a width smaller than a horizontal width of the body and extended from the front and rear portions of the body.

10. A railway rail support of claim 1, further comprising a rail mounting groove
20 formed at a center portion of an upper surface of the body of the fixing plate for mounting a rail therein.

11. A railway rail support of claim 9, further comprising:

a rail mounting groove formed in the body of the fixing plate and at a center portion of the upper surface of the extended support portion for mounting the rail therein; and

5 an extended buffering portion extended in a horizontal direction from the front and rear portions of the buffering support portion of the buffering plate for thereby supporting the lower portion of the rail mounted in the mounting groove.

12. A railway rail support of claim 8, wherein said left and right fixing holes have

10 an inclination in an angle range of $0 \sim 90^\circ$.

13. A railway rail support of claim 12, wherein said inclination angle of the left and right fixing holes is 45° .

15 14. A railway rail support of claim 1, further comprising a bolt hole for engaging a bolt for fixing the rail fixing clip fixing plate at both sides of the through hole.

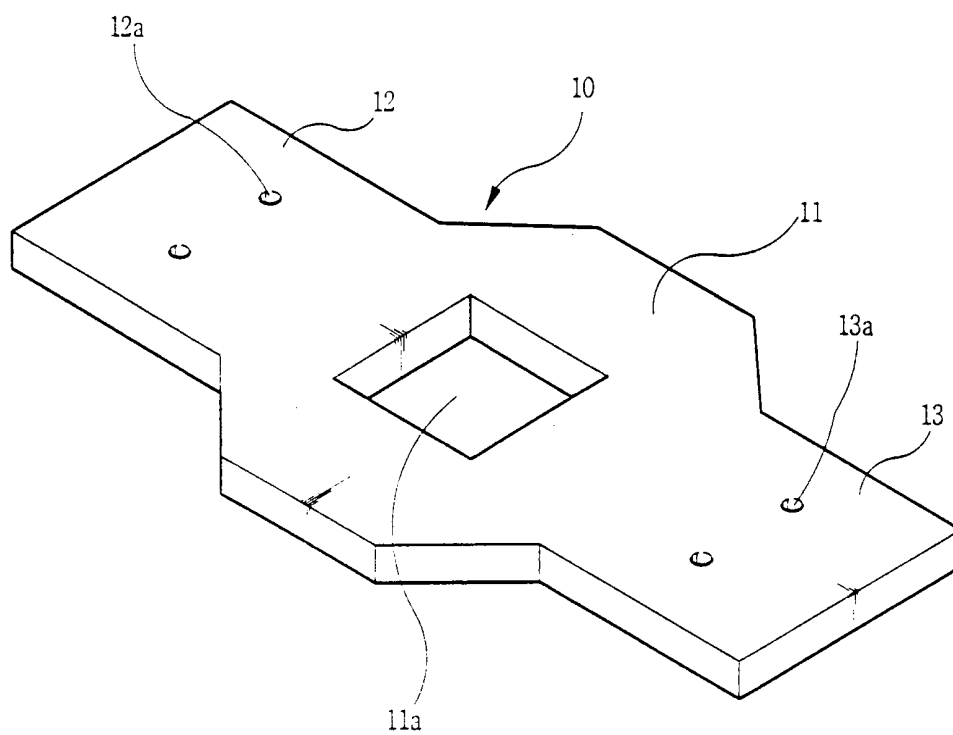
rail of a railway by which an easier construction and an excellent durability are implemented by providing a structurally engaged buffering plate. The support for supporting a rail of a railway includes a fixing plate formed of a flat body on which a rail is installed and left and right fixing portions extended in a horizontal direction

5 from both sides of the body, the body including a through hole at a center portion of the same, and a buffering plate engaged to a lower portion of the fixing plate for elastically supporting the fixing plate and including a buffering plate support portion inserted into the center portion through the through hole of the fixing plate and having an upper surface protruded beyond the upper surface of the fixing plate for

10 thereby supporting the rail and decreasing the weight and impact of the rail.

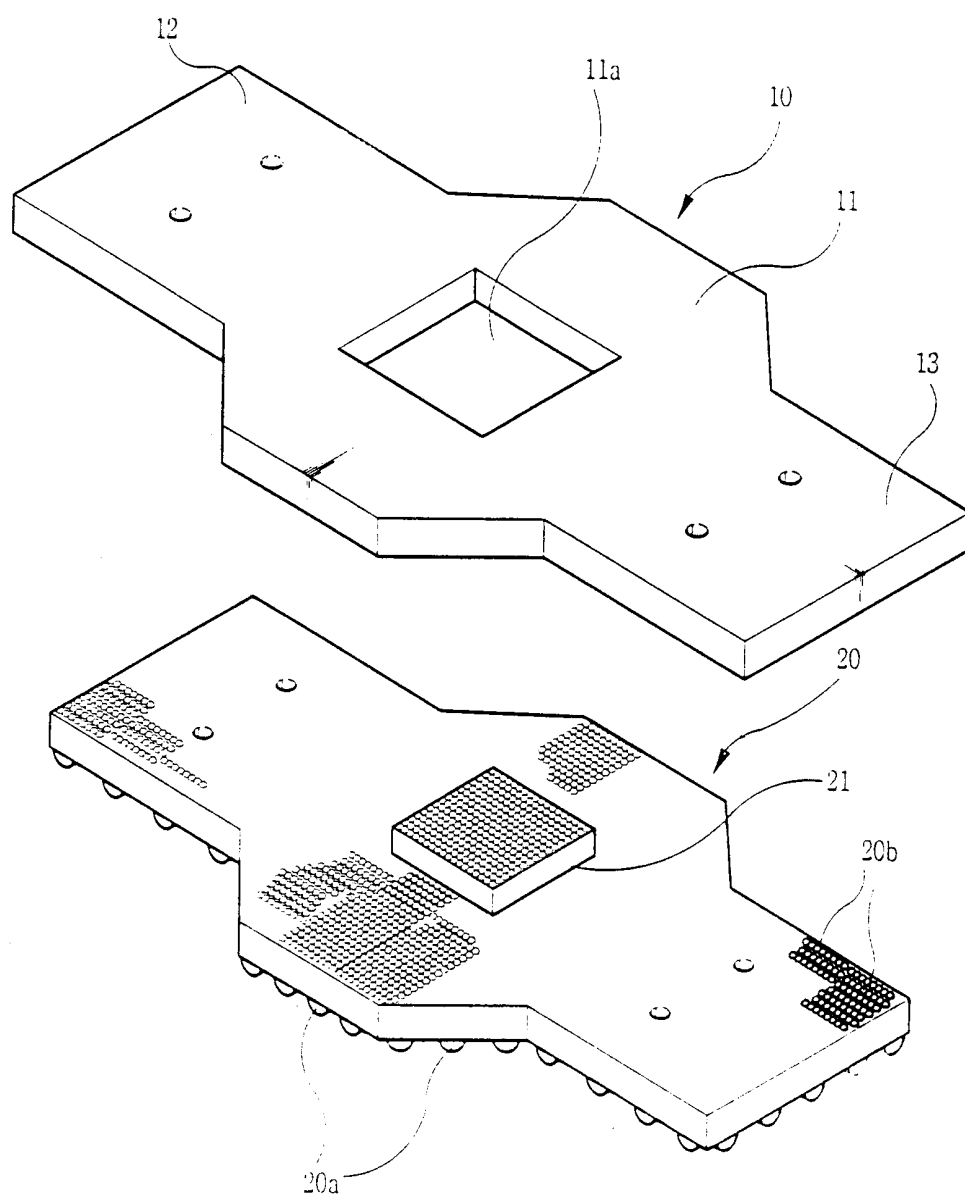
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FIG. 1



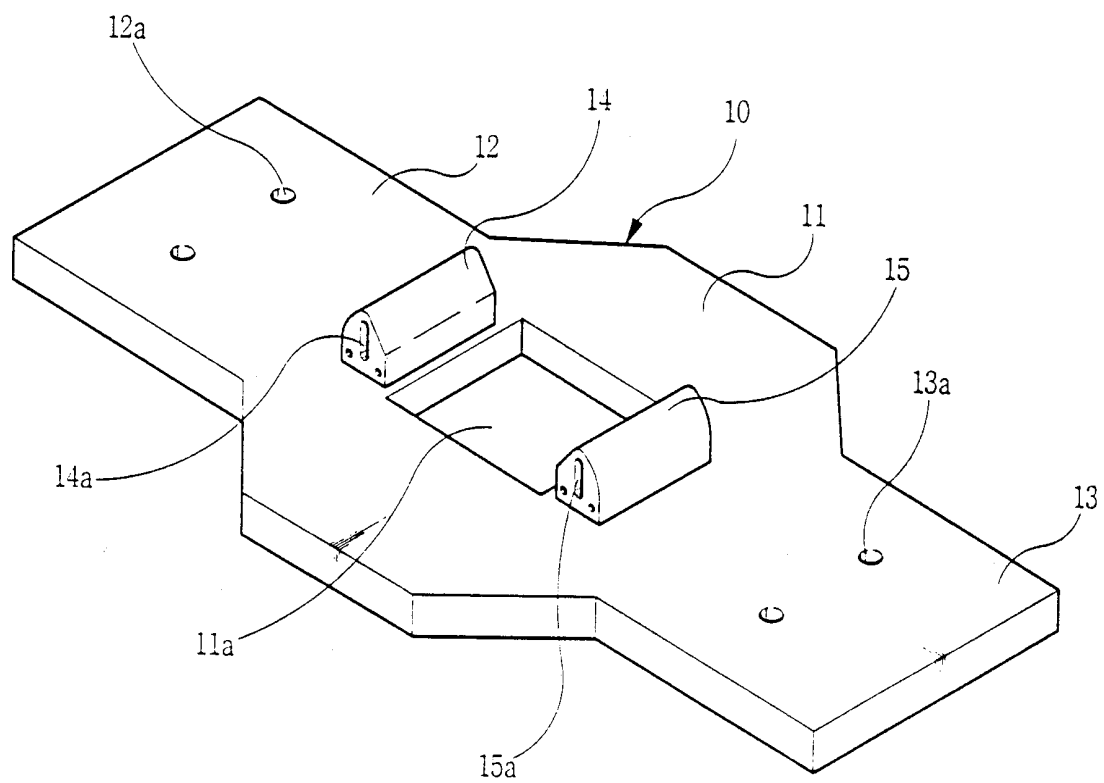
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FIG. 2



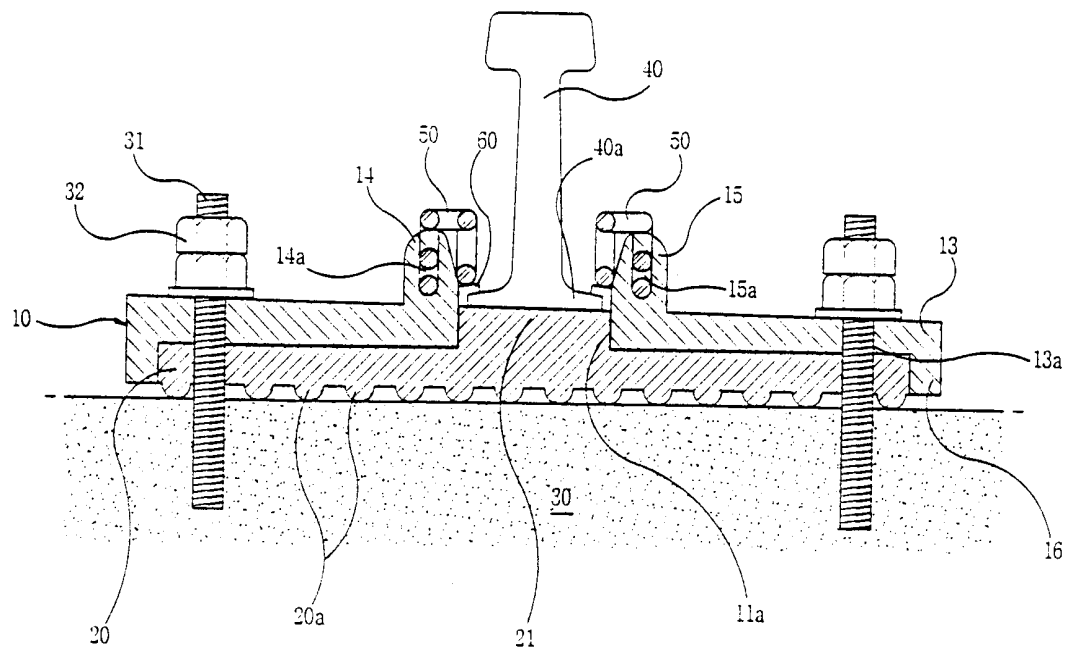
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FIG. 3



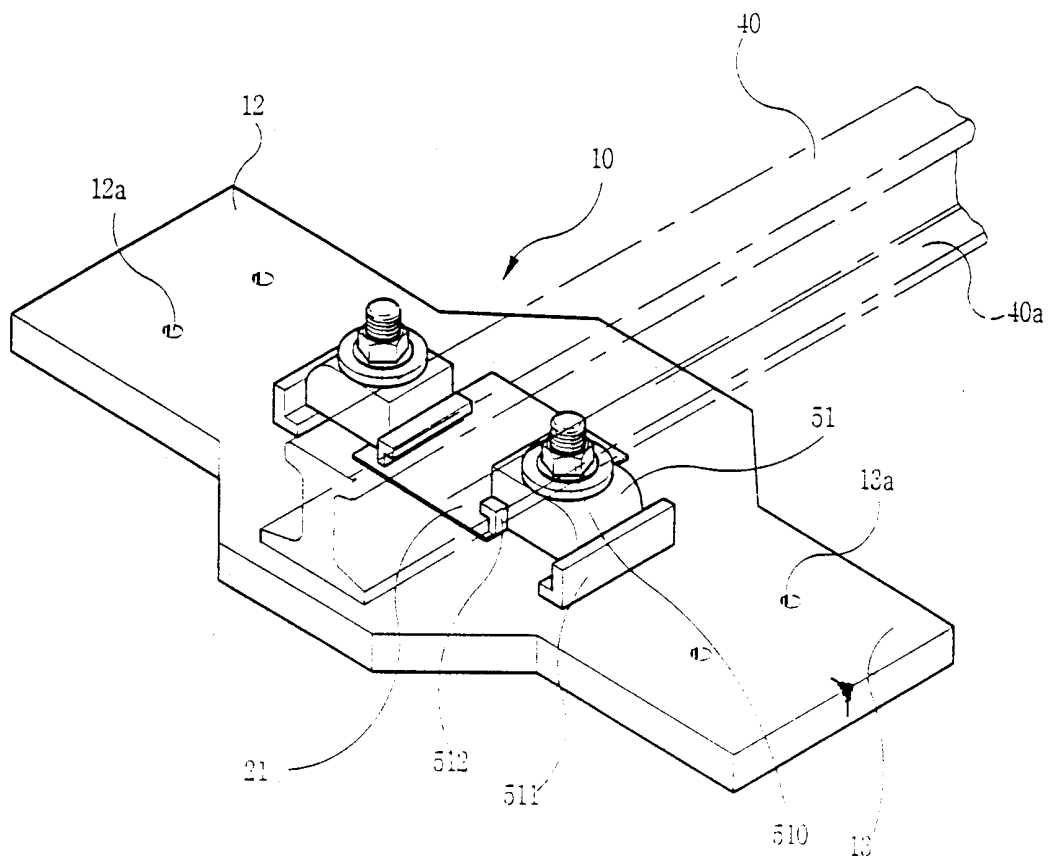
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FIG.5



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FIG. 6



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FIG. 7

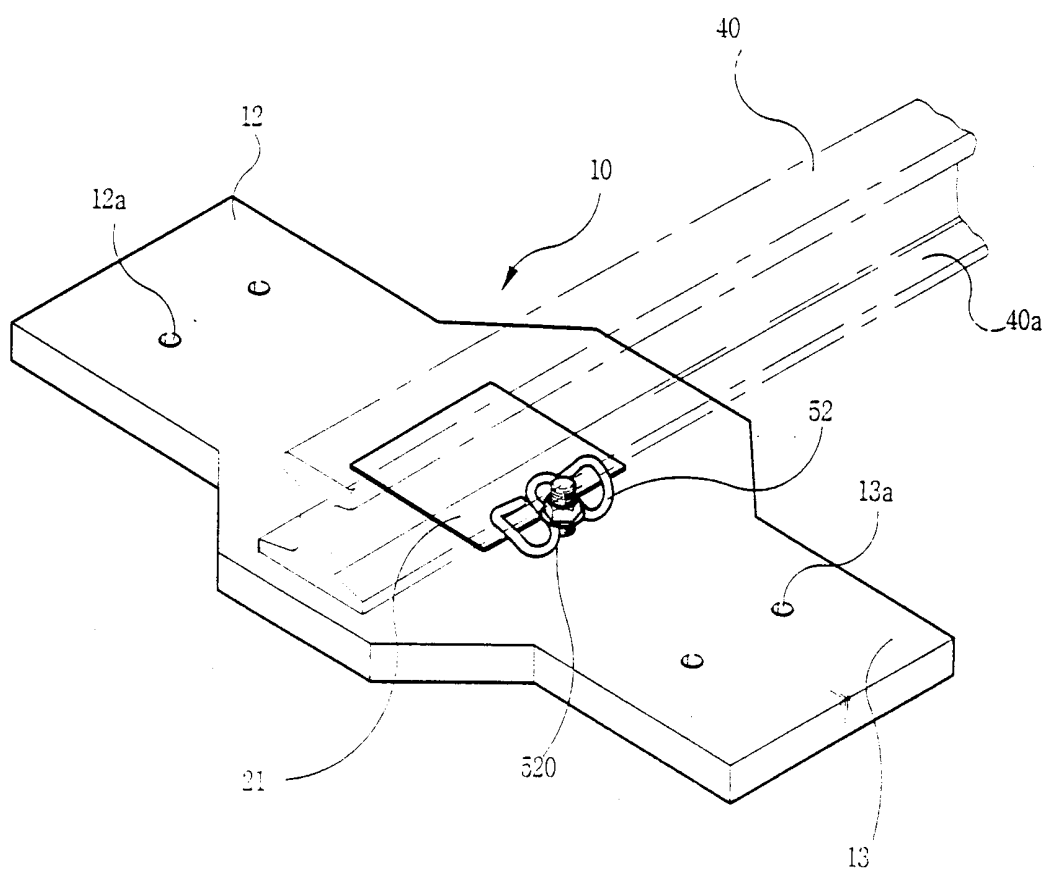
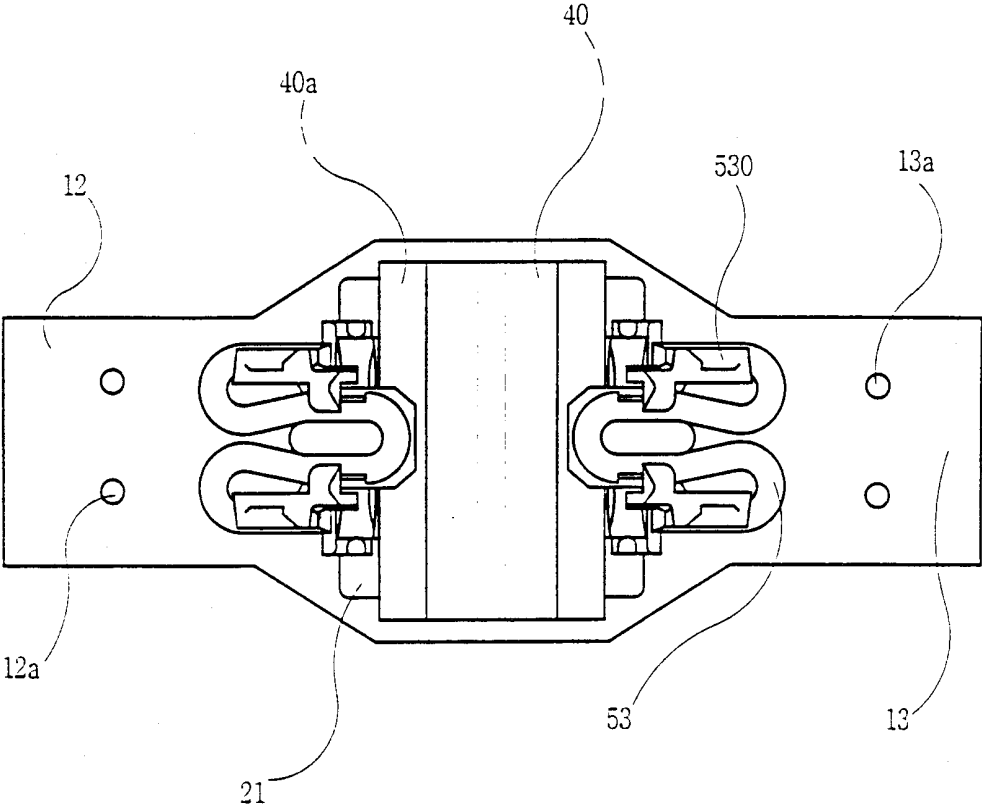
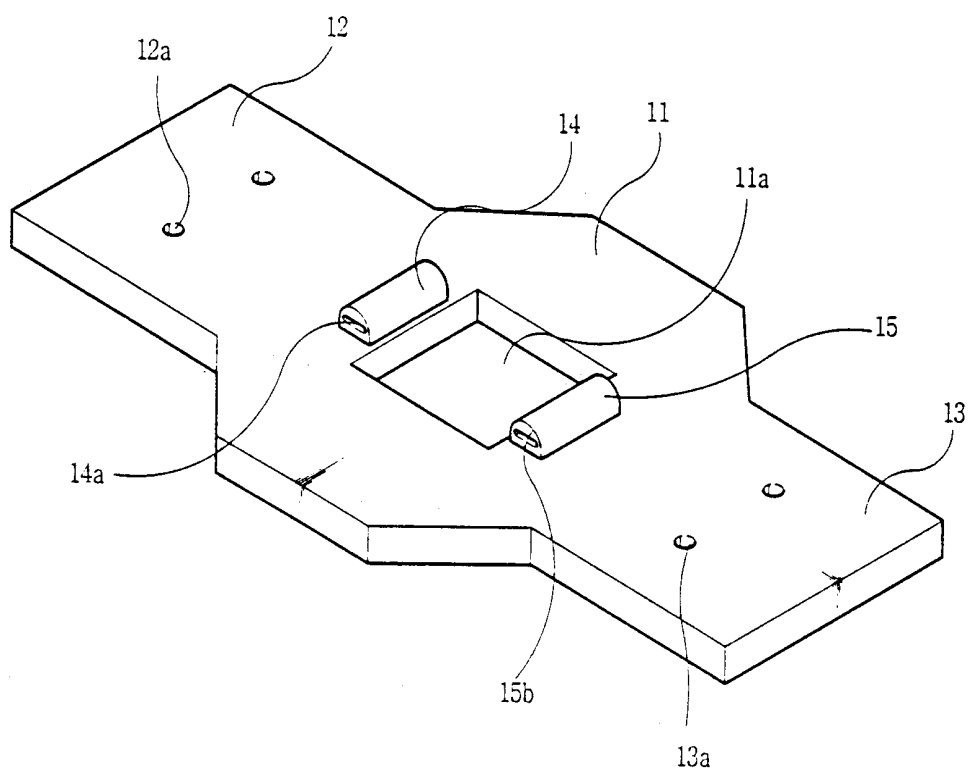


FIG. 8



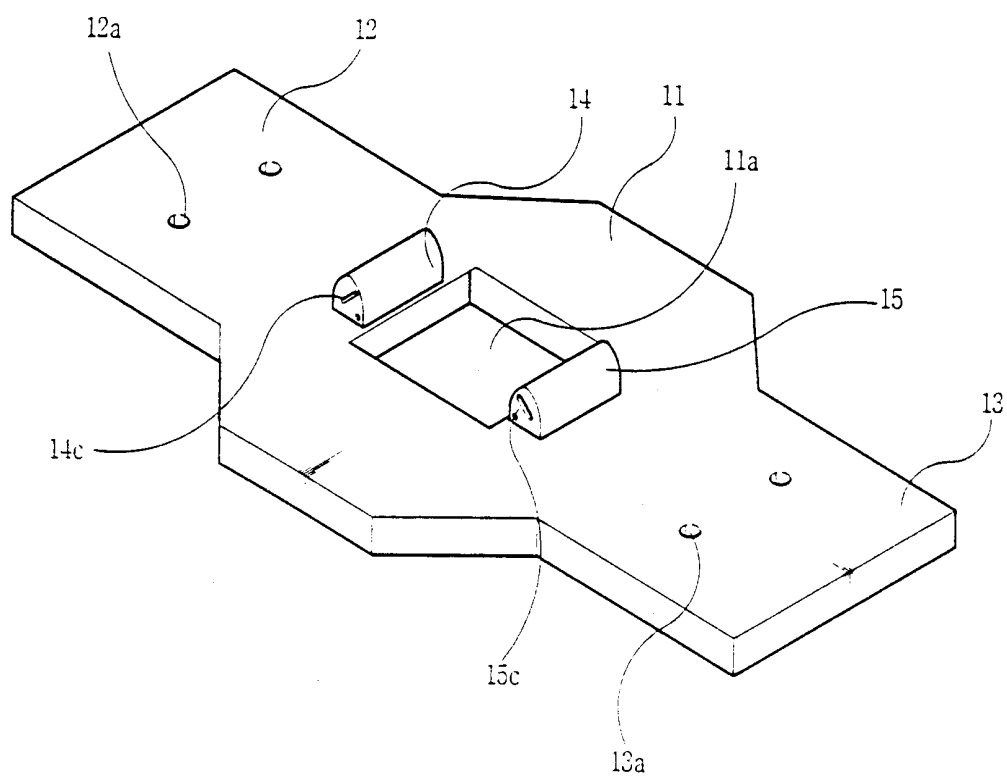
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FIG. 9



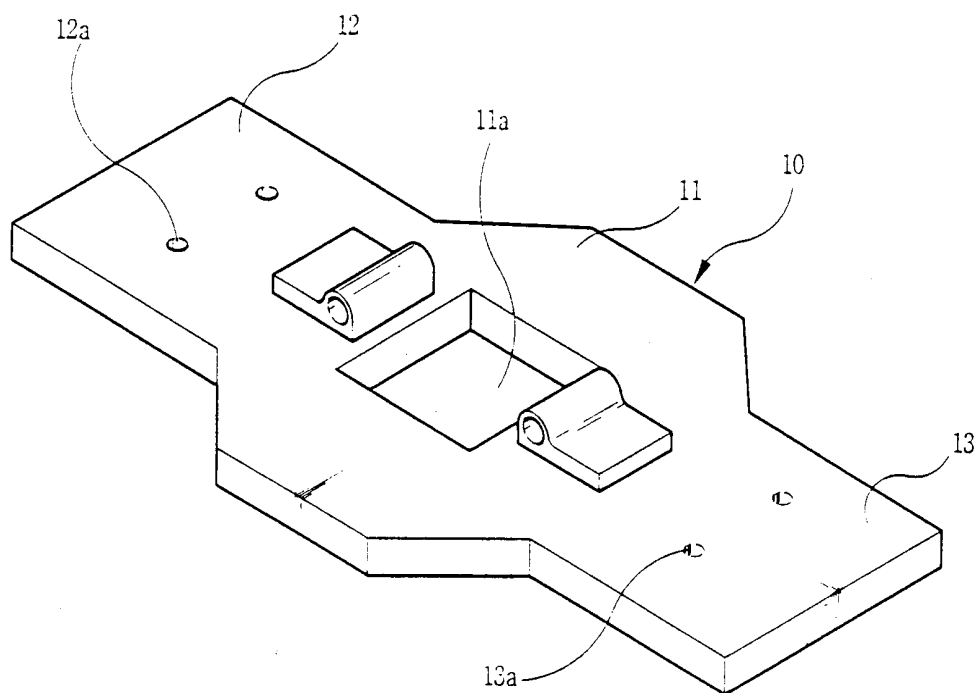
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FIG. 10



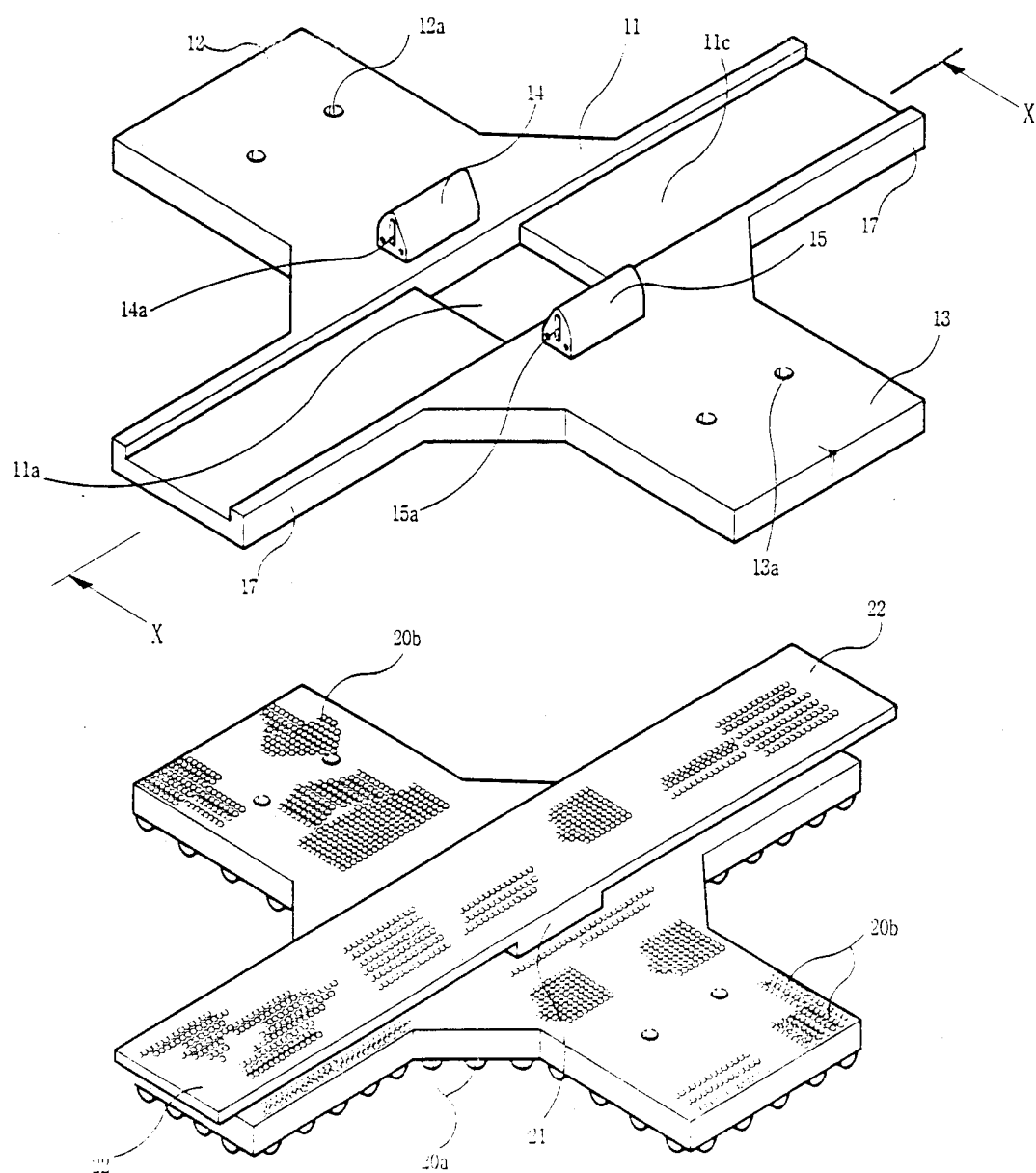
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FIG. 11



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FIG. 12



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FIG. 13

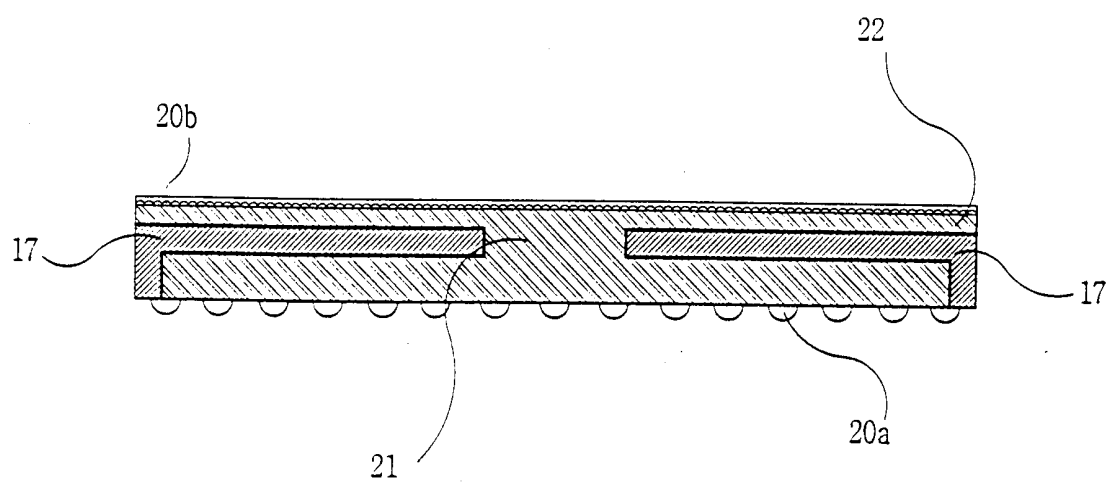
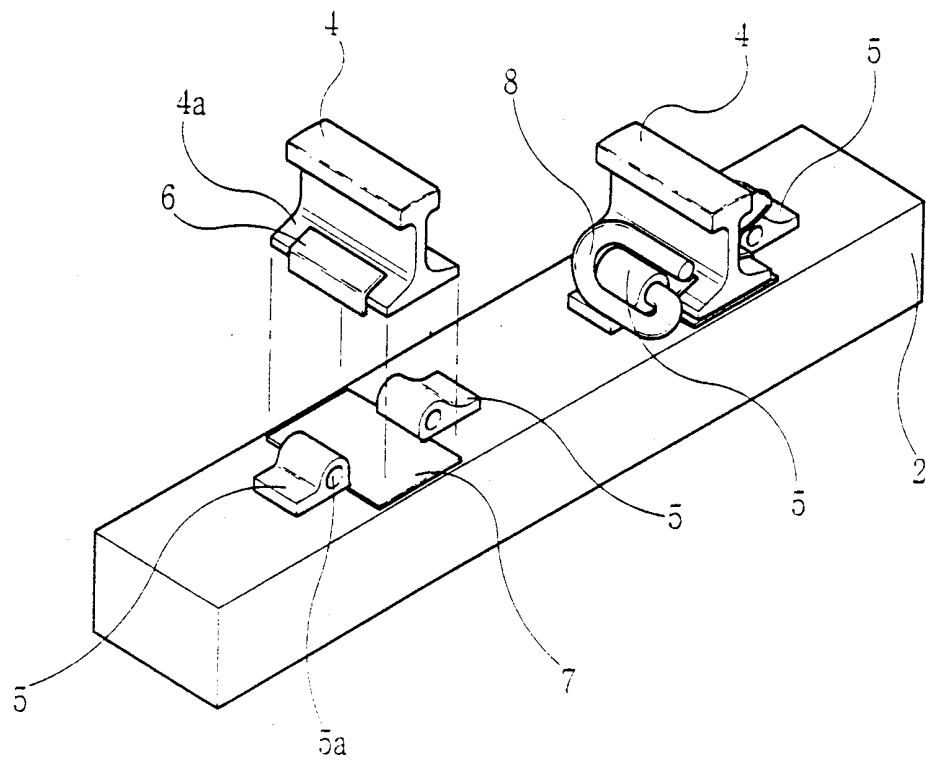


FIG. 14



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR00/01326

A. CLASSIFICATION OF SUBJECT MATTER**IPC7 E01B 9/68**

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)

IPC7 E01B9/68. 9/36, 9/38, 9/40, 9/42, 9/44

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

KR, JP : E01B9/68. 9/36, 9/38, 9/40, 9/42, 9/44

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 59-163603, U (Bakuei Co. Ltd.), 1 Nov, 1984 (01.11. 1984), Full text ; Figs. 1 to 6 (Family : None)	1 - 5
A	JP, 54-93907, U (Dougaigomu Co. Ltd.), 3 July, 1979 (03. 07. 1979), Full text ; Figs. 1 to 7 (Family : None)	1 - 5
A	KR, 98-11071, U (Pandrol-Daewon Co. Ltd), 25 May, 1998 (25. 05. 1998), Full text ; Figs. 1 to 4 (Family : None)	1 - 7



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
 "E" earlier application or patent but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
 "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
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Date of the actual completion of the international search

19 MARCH 2001 (19.03.2001)

Date of mailing of the international search report

20 MARCH 2001 (20.03.2001)

Name and mailing address of the ISA/KR

Korean Industrial Property Office
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 Metropolitan City 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, Young Min

Telephone No. 82-42-481-5804



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR00/01326

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 8, 12
because they relate to part of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
Because there aren't left and right fixing holes in claim 6, the International Search Authority finds that no meaningful search could be carried on claims 8, 12.
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Search Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be established without effort justifying an additional fee, this Authority did not invite payment of any addition fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR00/01326

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP, 59-163603, U	01. 11. 1984	None	
JP, 54-93907, U	03. 07. 1979	None	
KR, 98-11071, U	25. 05. 1998	None	