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CA 2496475 A1 2004/03/04

(21) 2 496 475

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) Date de dépôt PCT/PCT Filing Date: 2002/08/23
(87) Date publication PCT/PCT Publication Date: 2004/03/04
(85) Entrée phase nationale/National Entry: 2005/02/21
(86) N° demande PCT/PCT Application No.: EP 2002/009445
(87) N° publication PCT/PCT Publication No.: 2004/018883

(51) Cl.Int.^{7}/Int.Cl.^{7} F16B 12/12, F16B 5/00

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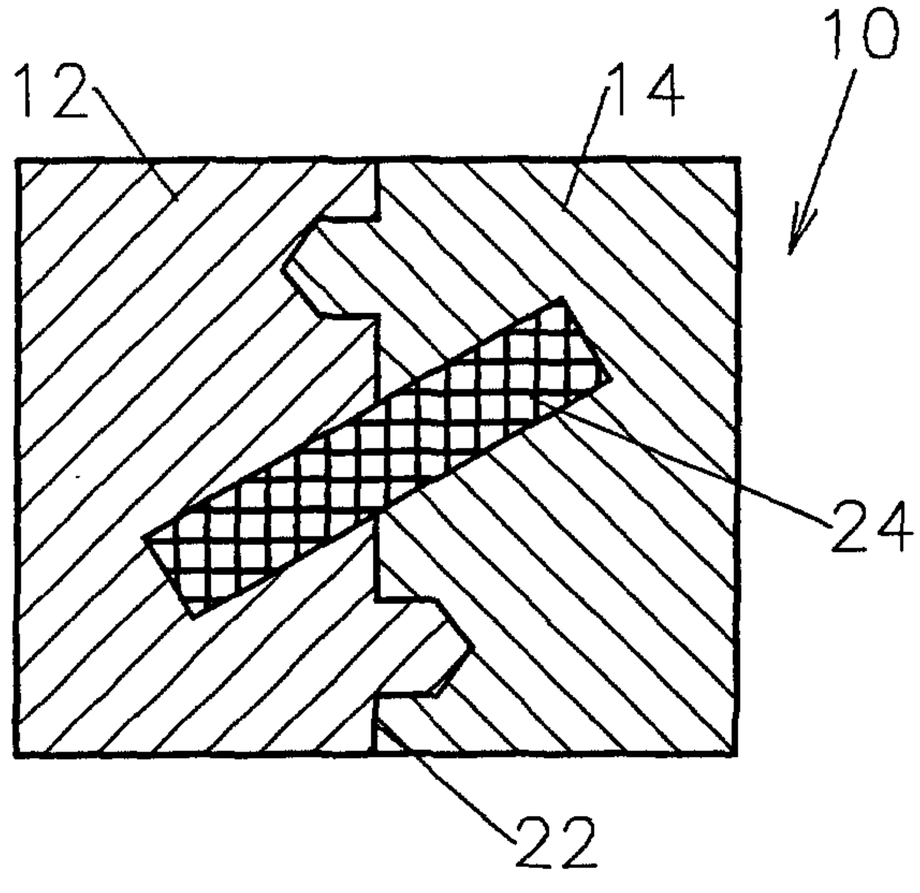
(54) Titre : DISPOSITIF D'ASSEMBLAGE
(54) Title: CONNECTING DEVICE



(57) Abrégé/Abstract:
The invention concerns an assembling device (10) in particular for mutually connecting together two bars (12, 14), which have at an assembly point two substantially complementary profiled sections, one positive and one negative. Said profiled sections are set in assembling position along a parting line (22), taking into account a given degree of freedom, a separate safety lock (24) extending on either side of the parting line (22) between the positive profiled section and the negative profiled section. The bars (12, 14) associated with the safety lock (24) form an assembly consisting of three elements, between which a mobility locking is formed by the safety lock (24) in the direction opposite to the direction of the degree of freedom, immediately prior to assembly positioning. When the assembly is carried out, the lines of the positive and negative profiled sections form a recess corresponding to a transverse profiled section of the safety lock (24), said recess being covered on both sides by the parting line (22).

Abstract

Connecting device (10), in particular between two first and second rods (12, 14) to be joined, which have two essentially complementary positive (18) and negative profiles (20) at a connecting point (16) which can be brought into their connected position along a separating line (22) having a preset degree of freedom (X), with a separate safety bolt (24) which extends on both sides of the separating line (22) between the positive profile (18) and the negative profile (20), wherein the rods (12, 14) with the safety bolt (24) form an integrated unit consisting of three components between which there is a motion barrier created by the safety bolt (24) in the direction opposite the direction of the degree of freedom (X) directly prior to reaching the connected position, the profiling of the positive profile and the negative profile defining a recess (26) corresponding to the cross-sectional profile of the safety bolt (24) in the assembled state, said recess bridging the separating line (22) on both sides.

(Fig. 1b)

The invention relates to a connecting device, in particular between two first and second rods to be joined which have two essentially complementary positive and negative profiles at their point of connection, said profiles can be brought into their connected position along a separating line with a preset degree of freedom.

Connecting devices of this type are basically known. Usually, these are mortise-and-tenon joints in which the rods to be joined are pushed together in this area. This point of connection must still be secured which is commonly accomplished with adhesives, welding, screws or rivetting.

Thus, to produce the connection, at least one tool is required, as a result of which the manufacturing costs for these connections are high. In addition, with special connections such as e.g. welded or riveted connections, the ultimate consumer can no longer complete these connections. Therefore, this connection must already be finished at the manufacturing site. This results in high transportation costs, in particular with rod constructions of large dimensions.

Thus, the object of the invention is to provide a connecting device of the aforementioned type which ensures a continuously secure and stable connection with technically simple means and, at the same time, can be joined together without any additional devices.

According to the invention, this object is solved in a connecting device of the aforementioend type by a separate safety bolt which extends on both sides of the separating line between the positive profile and the negative profile, the rods together with the safety bolt forming a connection consisting of three components between which there is a motion barrier due to the safety bolt in direction opposite the direction of the degree of freedom

immediately prior to reaching the connected position, the profiling of the positive profile and the negative profile in the joined state defining a recess corresponding to the cross-sectional profile of the safety bolt, said recess spanning the separating line on both sides.

This connecting device according to the invention is very easy to handle since the positive and negative profiles only have to be joined together in the direction preset by the profiling. After these profiles of the rod ends have been joined together, only the corresponding safety bolt has to be inserted into the existing recess. This action is very easy and does not require any tools.

First, a closing shape is produced as a result of the positive and negative profiles first being joined together. Only the insertion or introduction of the safety bolt then results in a frictional connection.

According to an advantageous embodiment of the invention, it is provided that the positive and negative profiles mutually engage at least a first undercut. The shape of the two profiles thus already ensures a certain hold.

However, it is also possible that the safety bolt engages in second undercuts when in the joined state. Therefore, in this case, the two rods are only prevented from becoming loose in direction of the longitudinal axis of the rods once the safety bolt has been inserted.

An especially secure connection is then given when both the positive and negative profiles and the safety bolt engage in third undercuts.

To prevent a movement in direction of the last degree of freedom prior to the final connection, it is sufficient if the

longitudinal axis of the safety bolt extends at a right angle to the direction of the degree of freedom. This already gives a very secure connection for tensile strain along the longitudinal axis of the rods.

However, the connection can of course also be released by mutual shifting at a right angle to these longitudinal axes of the rods. To also prevent this, it is advantageous if the longitudinal axis of the safety bolt extends inclined to the direction of the degree of freedom. The safety bolt can also be screwed in.

The aforementioned connections generally related to connections along the longitudinal axis of the rods to be joined. However, it is also possible that the rods are joined together at an obtuse, right or acute angle.

According to an advantageous embodiment, it is provided that at least four rods are joined to form a frame. Based on this easily established connection, these four rods can then be economically transported when in the dismantled state with minimal space requirement and assembled at the designated site.

This is especially true when these frames are large. In fact, for some applications, frames are required whose long sides are about 7 m long. Since the shorter sides are about 3.50 m in this case, a large and thus very expensive transport capacity would be required for a fully assembled frame. This transport capacity can now be minimized according to the invention, since the individual frame sides can be transported stacked above one another.

These individual frame sides are then appropriately joined at the designated site and the appropriate safety bolt is inserted at every corner.

In this case, the inserted safety bolt can be removed or released

again as desired. However, this also applies to all of the previously mentioned connections.

According to a further embodiment, it is provided that the safety bolt is rectangular, circular, rhombic, octagonal, dovetailed, ellipsoidal or cross-shaped in cross section.

If the rods to be joined are to have a low weight yet still have a high stability, it is advantageous if the rods are hollow rods and have reinforcements adjoining the connections.

In this case, it is especially advantageous if the reinforcements are hollow or solid material rods adapted to the cavity of the rods, said hollow or solid material rods contacting the inner surface of the rods over the entire surface or along at least two lines in longitudinal direction, the reinforcement being situated either over the entire length of the rod or over a part of the rod length.

Usually, the positive and negative profiles are produced with various tools, in particular shaping tools, such that they essentially complement one another in the assembled state. However, an especially advantageous cost-reducing production and also storage is given when the positive profile and the negative profile are centrosymmetrical in cross section in the assembled state. Therefore, profiles of this type can all be made by the same tool, in particular a shaping tool. If the rods are placed on top of one another, then the front ends have an identical profiling. To be able to slide these positive and negative profiles into one another, a rod lying on the other rods must only be turned by 180° and inserted into the corresponding profiling.

It is advantageous if the components consist of metal, wood or plastic or of a combination of at least two types of material. Other materials can, of course, also be used.

Further advantages/features of the invention can be seen in the following description of several embodiments with reference to the drawings, showing:

Figs. 1a, b to 15a, b profilings of the front ends of the rods as well as assembled connecting devices according to the 1st to 15th embodiments.

With reference to Figs. 1a, b to 15a, b, fifteen embodiments will now be described, whereby it is simultaneously pointed out that a plurality of other possibilities for producing this connecting device are also given.

For reasons of clarity, the same reference numbers are used for all embodiments despite the different profiling.

Connecting devices 10 which are used between two joined first and second rods 12 and 14 are shown in the figures.

These rods 12, 14 are joined together at one connecting point 16. For this purpose, the rods 12 and 14 have two essentially complementary positive 18 and negative profiles 20 which can be brought into their connected position along a separating line 22 having a preset degree of freedom X. In this case, this degree of freedom X signifies the last direction of movement to obtain a form-lock between the positive 18 and negative profiles 20. Although only one arrow direction was always used for the degree of freedom X in the figures, it is understood that the opposite direction can also be used to produce the connection. This degree of freedom X can either be in a straight line, as shown in the figures, or also not in a straight line, for example, a circular or curved movement.

To illustrate, it is always assumed in the drawings that the first rod 12 remains at rest and the second rod 14 is moved to establish the connection with the first rod 12.

When these two rods 12 and 14 have now been brought into their connected position, a separate safety bolt 24 is inserted into a recess 26.

This recess 26 is secured in the assembled state by the profiling of the positive profile 18 and the negative profile 20 and corresponds to the cross section of the profile of the safety bolt 24.

The separate safety bolt 24 extends on both sides of the separating line 22 between the positive profile 18 and the negative profile 20. In this case, the rods 12 and 14 together with the safety bolt 24 form an integrated unit consisting of three components between which there is a motion barrier due to the safety bolt 24 in direction opposite to the direction of the degree of freedom X directly prior to reaching the connected position.

By joining the two rods 12 and 14, a form lock results first due to the profiling. A frictional lock is obtained once the safety bolt 24 has been inserted.

There are three possibilities for realizing this form lock and frictional lock. On the one hand, the positive 18 and negative profiles 20 can be profiled such that they mutually engage at least one first undercut 28. This is shown in Figures 8, 9, 11, 14 and 15.

Another possibility lies therein that the safety bolt 24 engages in second undercuts 30 in the assembled state. Undercuts of this type are shown in Figures 1 to 5, 7 and 10.

Finally, it is also possible to combine the two undercut possibilities. This is obtained thereby that both the positive 18 and negative 20 profiles and the safety bolt 24 engage in third undercuts 32. This is illustrated in Figs. 6, 12 and 13.

One possibility for the shape of the safety bolt 24 lies therein that the longitudinal axis of the safety bolt 24 extends at a right angle to the direction of the degree of freedom X. That is, it extends at a right angle to the plane of the drawing of Figs. 1 to 15.

However, it is also possible that the three components of the connecting device 10 still move in a vertical direction to the plane and can thus be disconnected.

In the event that this is not desired, this can be countered thereby that the longitudinal axis of the safety bolt 24 extends inclined to the direction of the degree of freedom X. The safety bolt 24 thus extends inclined to the normal of the plane.

Thus, in the first possibility, the safety lock extends diagonally in a uniaxial manner, while it extends diagonally in a biaxial manner in the second possibility.

Thusfar, connections of rods 12 and 14 were described in which the longitudinal axes of the rods 12 and 14 coincide. However, it is also possible that the rods 12 and 14 can be joined together at an obtuse, right or acute angle.

However, the right angle will be the most common one to produce a rectangular frame with aid of rods 12 and 14 and the connecting device 10.

This is especially interesting if the frame is large. For example, there are even frames with edge lengths of about 7 m by 3.50 m. It has thusfar been common practice to ship large frames of this type in the completely assembled state or to assemble them at the designated site accordingly with aid of tools, for example, welding devices.

It is now possible to ship frames of this type in the unassembled

state, as a result of which transportation costs can be saved. In comparison to former times, only small packages are now shipped. At the designated site, the corresponding rods 12 and 14 are then joined together in such a way that the positive 18 and negative profiles 20 engage in one another. Finally, only the safety lock 24 has to be inserted now into every corner. Of course, other spatial structures or constructions can also be assembled with this.

These inserted safety locks 24 can either be situated in the recess 20 so as to be detachable. However, it is also possible to secure these safety locks 24 with appropriate means.

The cross section of the safety bolt 24 can be designed in a number of ways. Thus, for example, the cross section of the safety lock 24 can be rectangular (see Figs. 1, 5, 6, 8, 9, 14 and 15), circular (see Figs. 10 to 12), rhombic (see Fig. 13), octagonal (see Fig. 4), dovetailed (see Fig. 7), circular (see Figs. 10 to 12), ellipsoidal or cruciform (see Figs. 2 and 3).

If, for reasons of weight reduction, the rods 12, 14 are hollow rods, the connection, in particular the rods 12, 14, are to nevertheless have a certain stability, it is possible to provide reinforcements on or in the rods 12, 14 adjacent to the connections. It is thereby possible that the reinforcements are hollow or solid material rods adapted to the cavity of the rods 12 and 14. The shape of the cross section of the adapted hollow or solid rods can thereby be selected in such a way that the adapted hollow or solid rods come into contact with the inner surface of the rods 12 and 14 over the entire surface or over at least two lines in longitudinal direction, said reinforcement being placed either over the entire rod length or over a part of the rod length. As a result, an enormous torsional resistance and bending resistance can be obtained, in particular with respect to the large frames already mentioned above.

All embodiments have in common that the positive profile 18 and the negative profile 20 are centrosymmetrical in cross section in the assembled state. This means that the two profiles are identical when placed on top of one another. This reduces manufacturing and storage costs. However, it is also possible to provide unsymmetrical profilings.

Many types of material are feasible, however, metal, wood or plastic or a combination of at least two of these materials are preferred.

List of Reference Numbers:

10	Connecting device
12	First rod
14	Second rod
16	Connecting point
18	Positive profile
20	Negative profile
22	Separating line
24	Safety bolt
26	Recess
28	First undercut
30	Second undercut
32	Third undercut
X	(Arrow) Degree of freedom

Patent Claims:

1. Connecting device (10), in particular between two first and second rods (12, 14) to be joined, which have two essentially complementary positive (18) and negative profiles (20) at a connecting point (16) which can be brought into their connected position along a separating line (22) having a preset degree of freedom (X), characterized in that a separate safety bolt (24) which extends on both sides of the separating line (22) between the positive profile (18) and the negative profile (20), wherein the rods (12, 14) with the safety bolt (24) form an integrated unit consisting of three components between which there is a motion barrier created by the safety bolt (24) in the direction opposite the direction of the degree of freedom (X) directly prior to reaching the connected position, the profiling of the positive profile (18) and the negative profile (20) defining a recess (26) corresponding to the cross-sectional profile of the safety bolt (24) in the assembled state, said recess bridging the separating line (22) on both sides.

2. Connecting device according to claim 1, characterized in that the positive (18) and negative profiles (20) mutually engage at least a first undercut (28).

3. Connecting device according to claim 1, characterized in that the safety bolt (24) engages in second undercuts (30) in the assembled state.

4. Connecting device according to claim 1, characterized in that both the positive (18) and negative profiles (20) as well as the safety bolt (24) engage in third undercuts (32).

5. Connecting device according to any one of the claims 1 to 4, characterized in that the longitudinal axis of the safety bolt (24) extends at a right angle to the direction of the degree of freedom (X).

6. Connecting device according to any one of the claims 1 to 4, characterized in that the longitudinal axis of the safety bolt (24) extends inclined to the direction of the degree of freedom (X).

7. Connecting device according to any one of the claims 1 to 6, characterized in that the rods (12, 14) are joined together at an obtuse, right or acute angle.

8. Connecting device according to any one of the claims 1 to 7, characterized in that at least four rods (12, 14) are connected to form a frame.

9. Connecting device according to any one of the claims 1 to 8, characterized in that the inserted safety bolt (24) can be removed again or is detachable.

10. Connecting device according to any one of the claims 1 to 9, characterized in that the safety bolt (24) is rectangular, circular, rhombic, octagonal, dovetailed, ellipsoidal or cruciform in cross section.

11. Connecting device according to any one of the claims 1 to 10, characterized in that the rods (12, 14) are hollow rods and have reinforcements adjacent to the connections.

12. Connecting device according to claim 11, characterized in that the reinforcements are hollow or solid rods adapted to the cavity of the rods (12, 14) and which come in contact with the inner surface of the rods (12, 14) over the entire surface or over at least two lines in longitudinal

direction, the reinforcemnt being situated either over the entire length of the rod or over a part of the length of the rod.

13. Connecting device according to any one of the claims 1 to 12, characterized in that the positive profile (18) and the negative profile (20) are centrosymmetrical in cross section in the assembled state.

14. Connecting device according to any one of the claims 1 to 13, characterized in that the components consist of metal, wood or plastic or of a combination of at least two types of material.

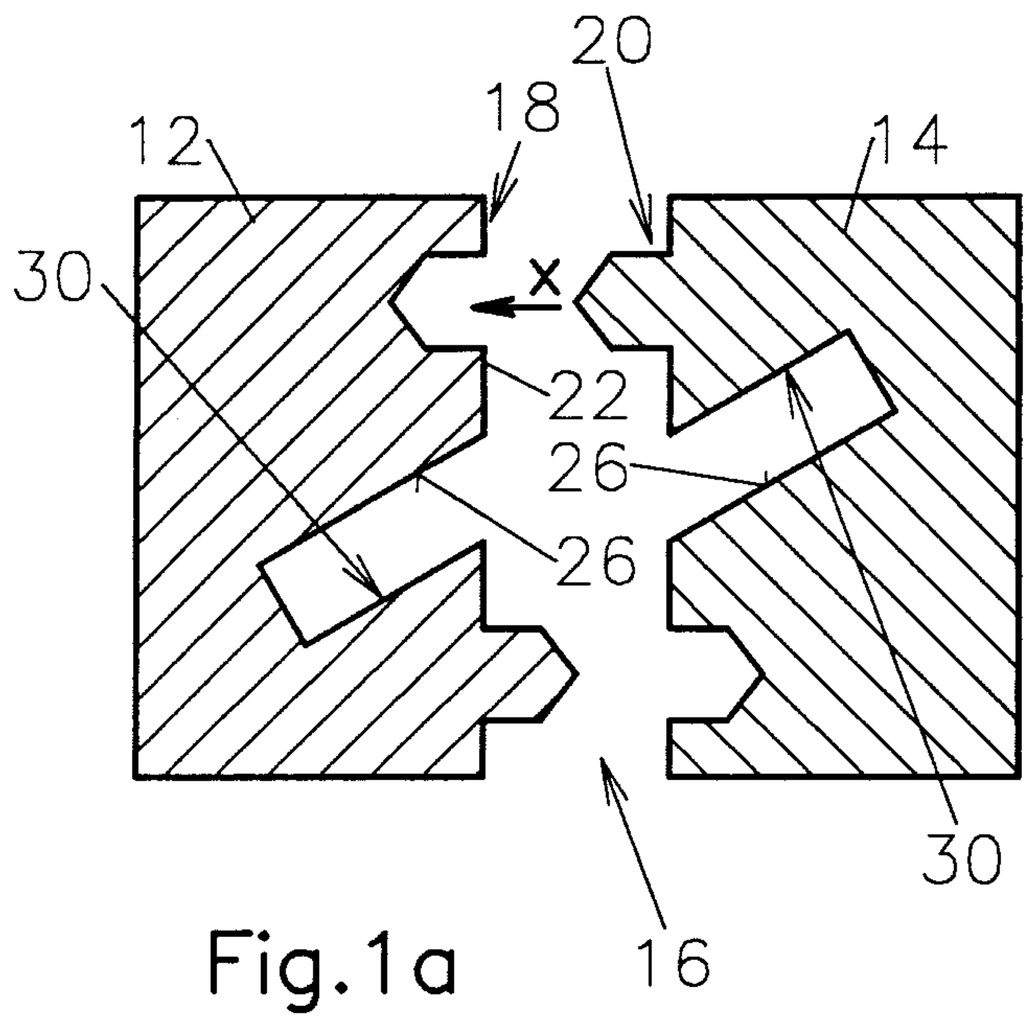


Fig.1a

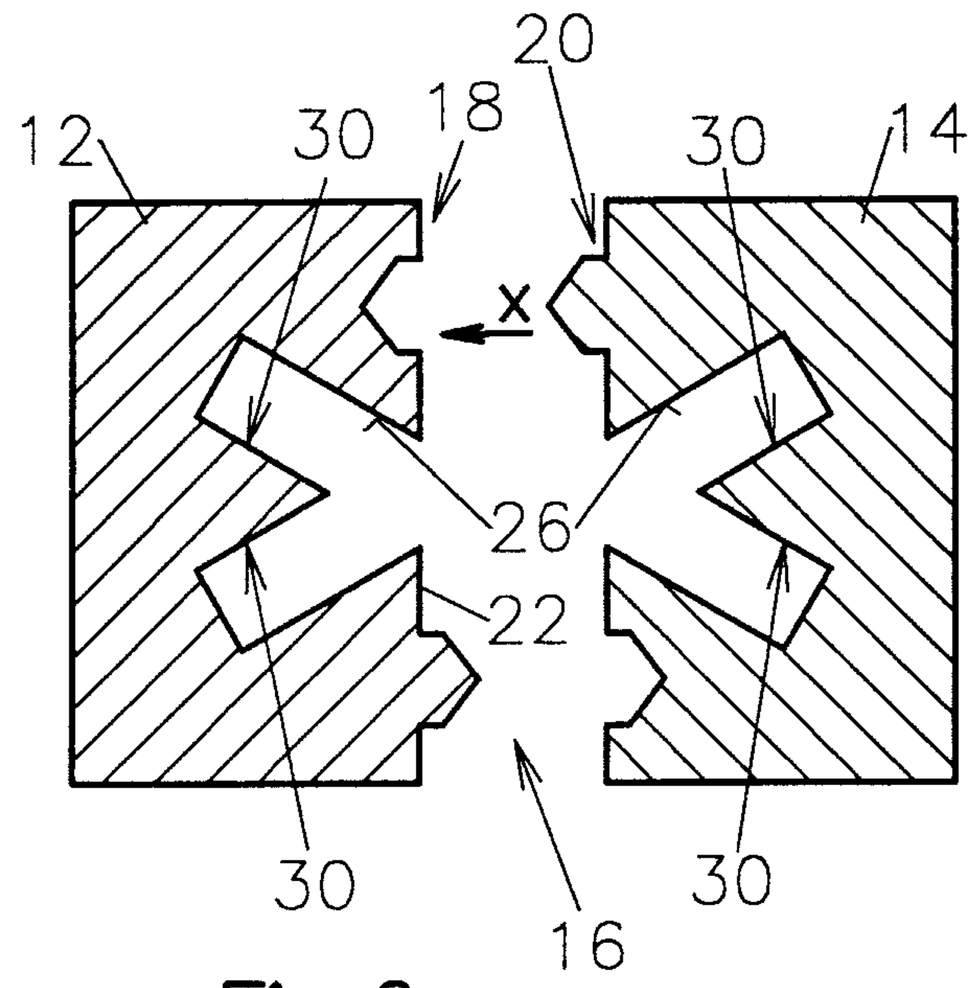


Fig.2a

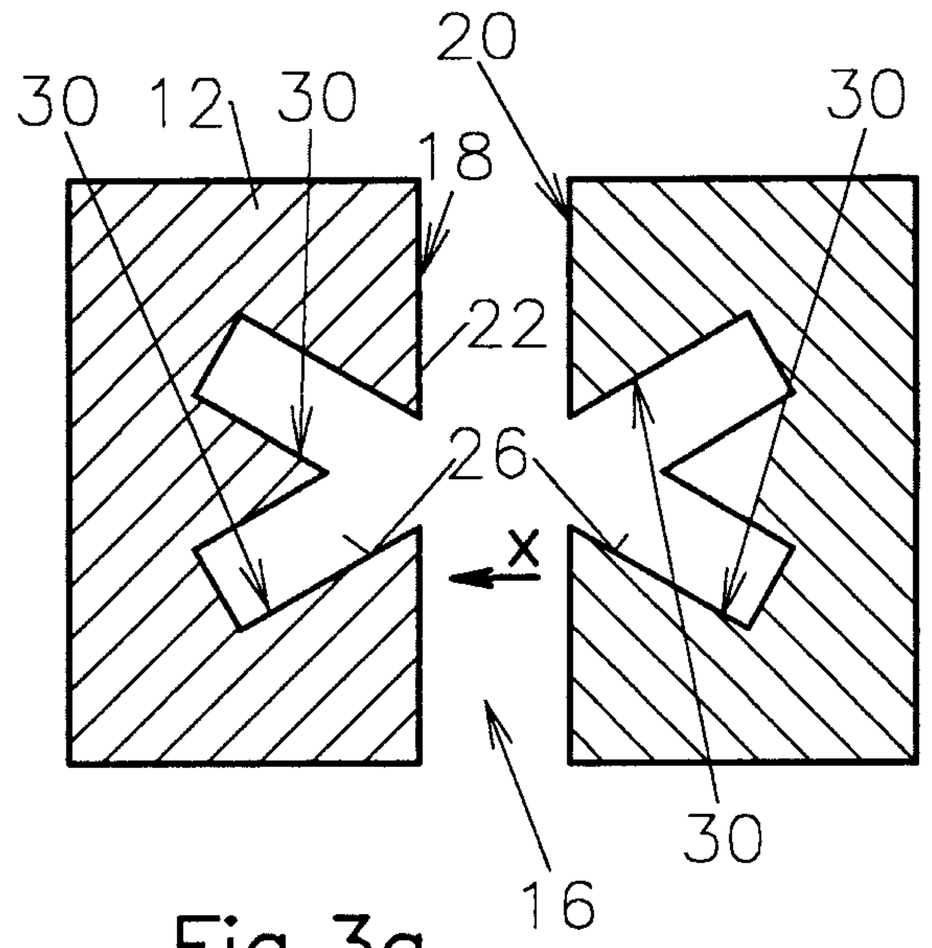


Fig.3a

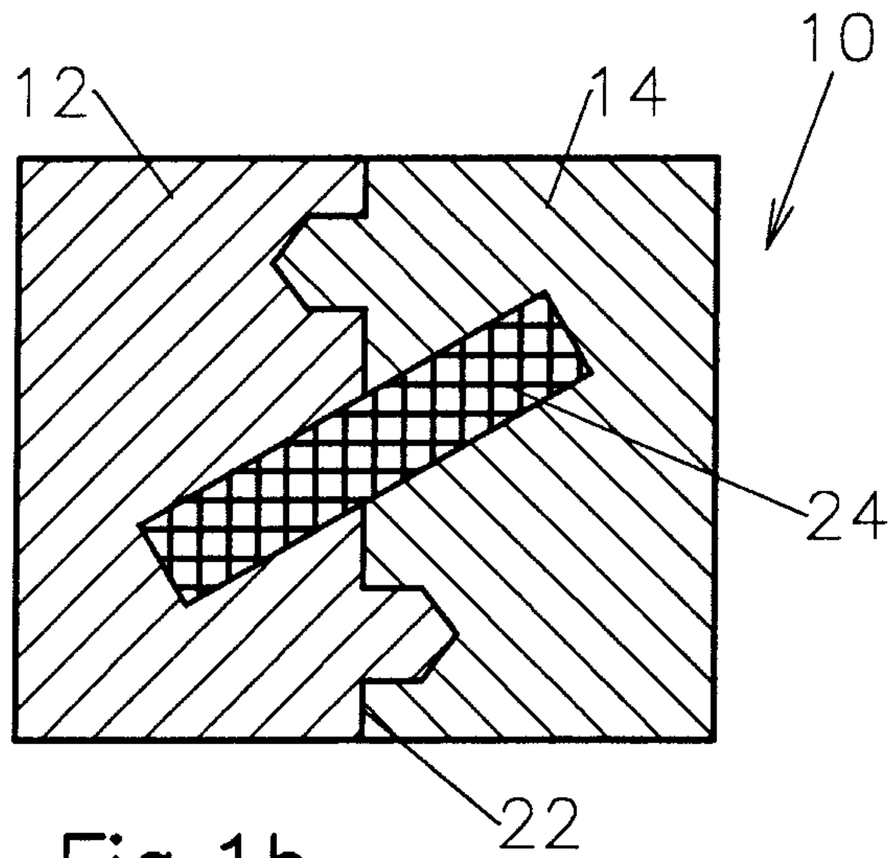


Fig.1b

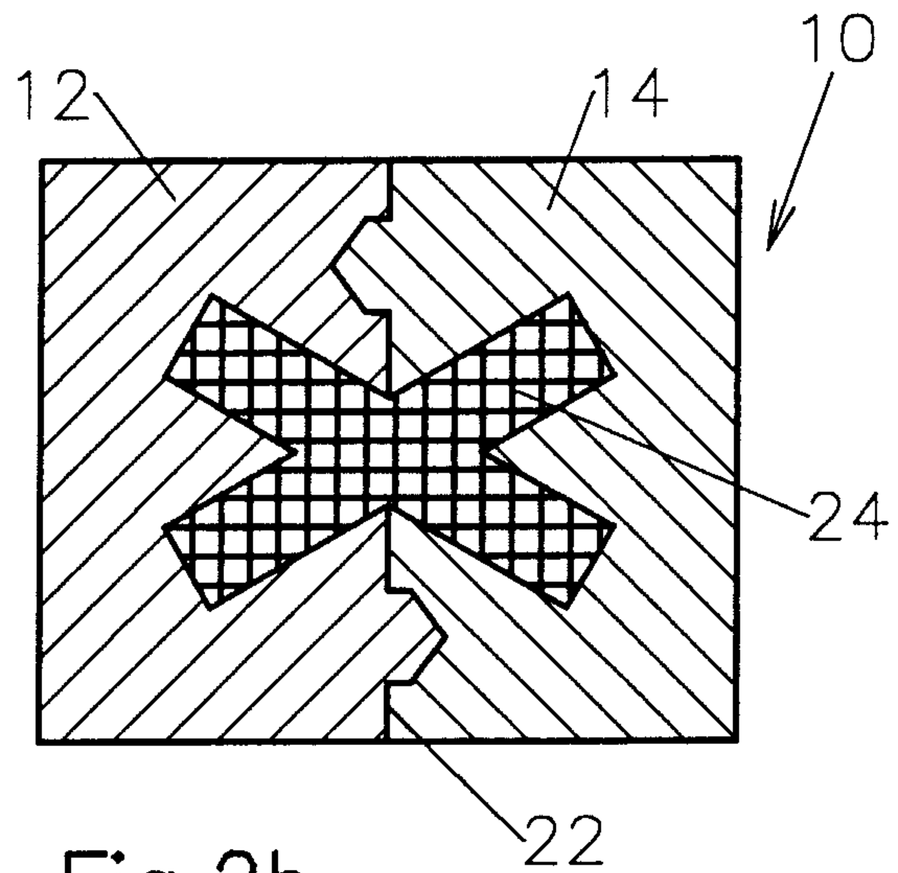


Fig.2b

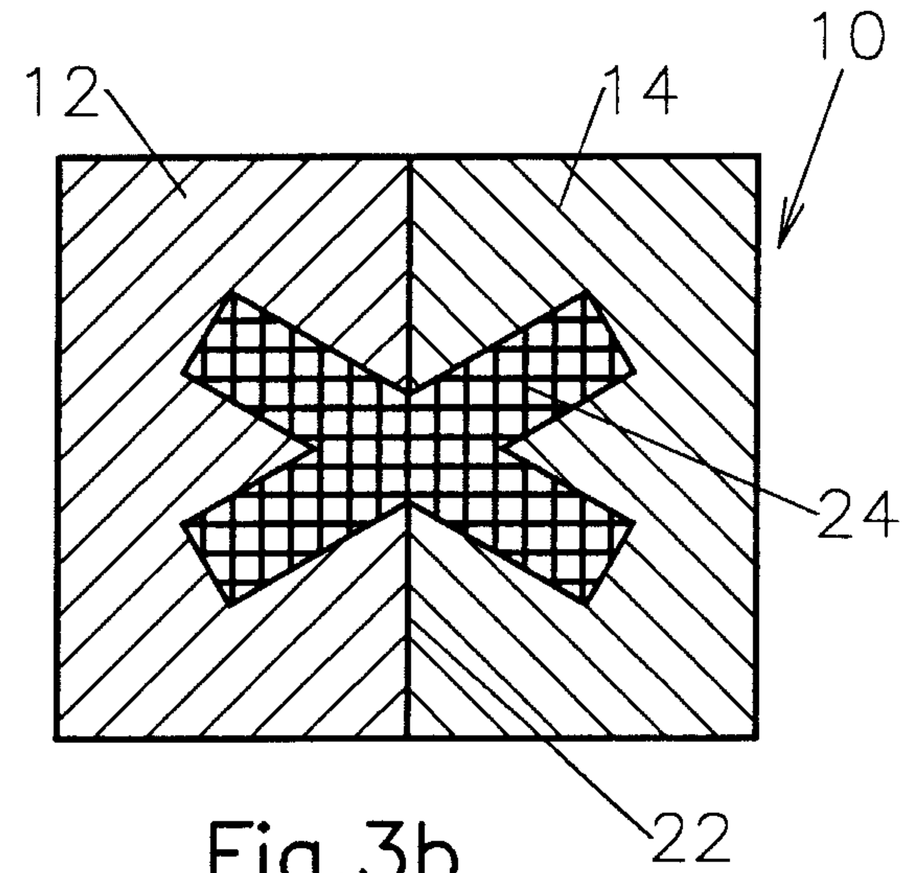


Fig.3b

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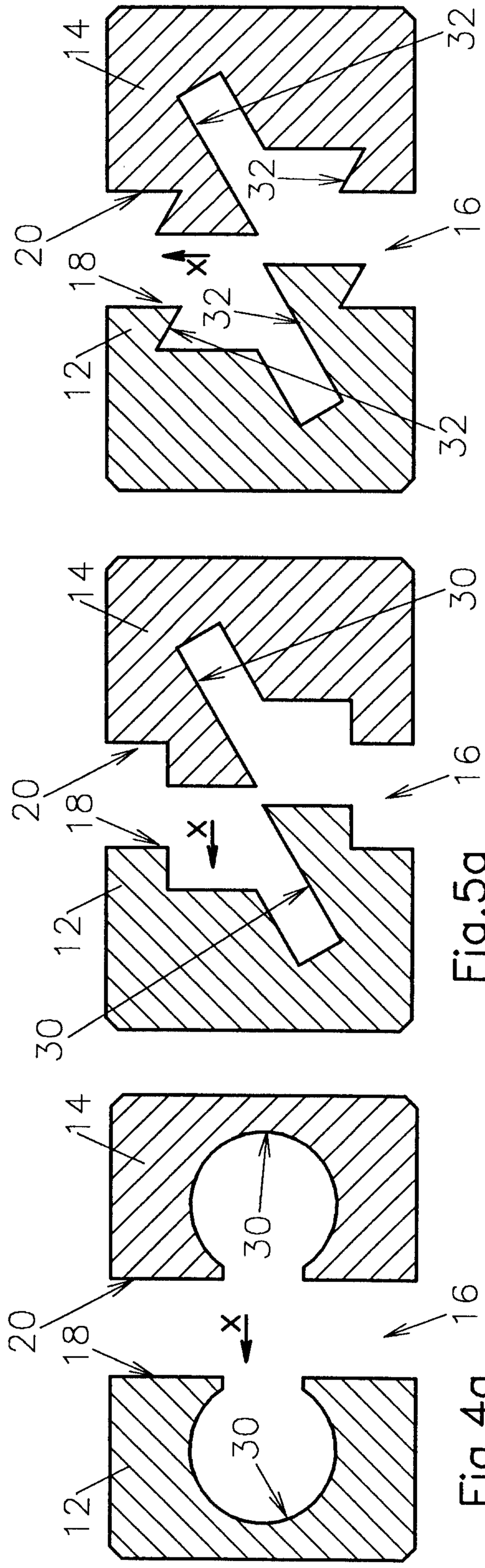

Fig.6a

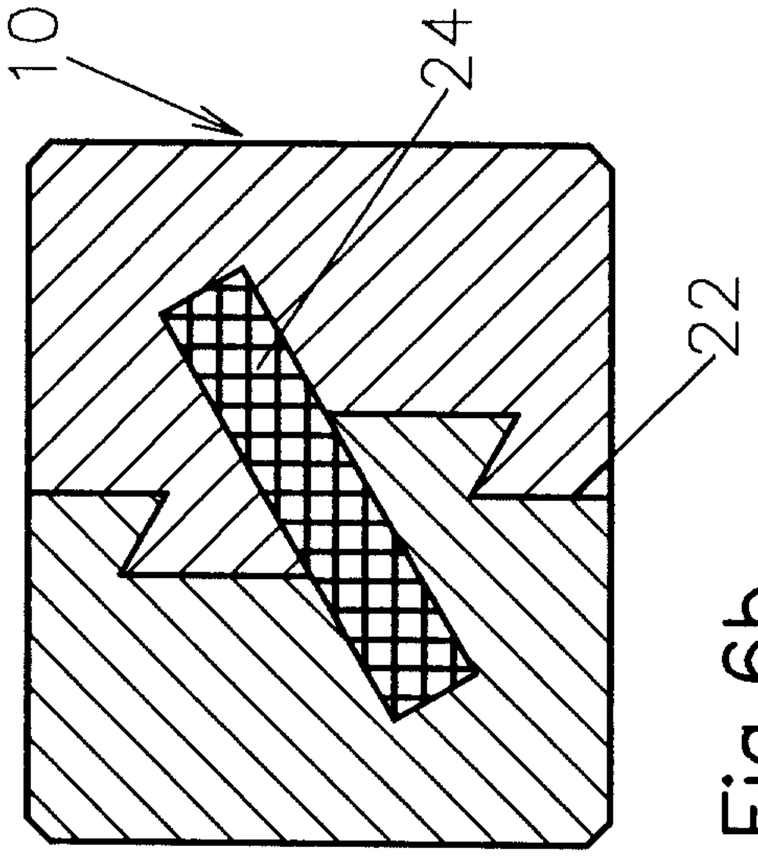

Fig.6b

Fig.5a

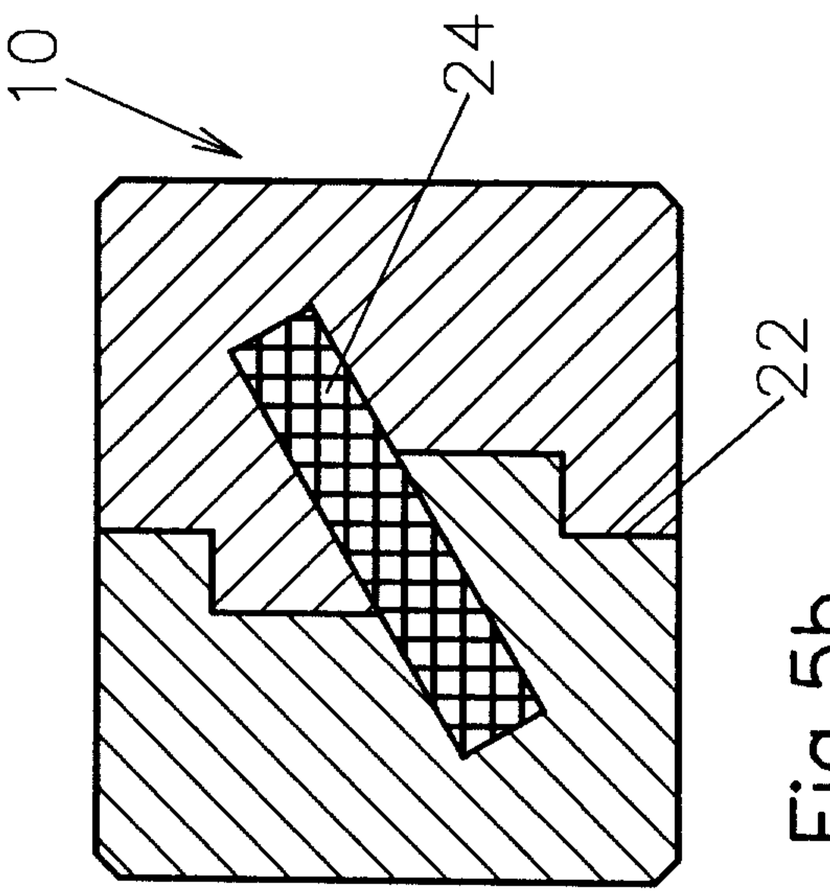

Fig.5b

Fig.4a

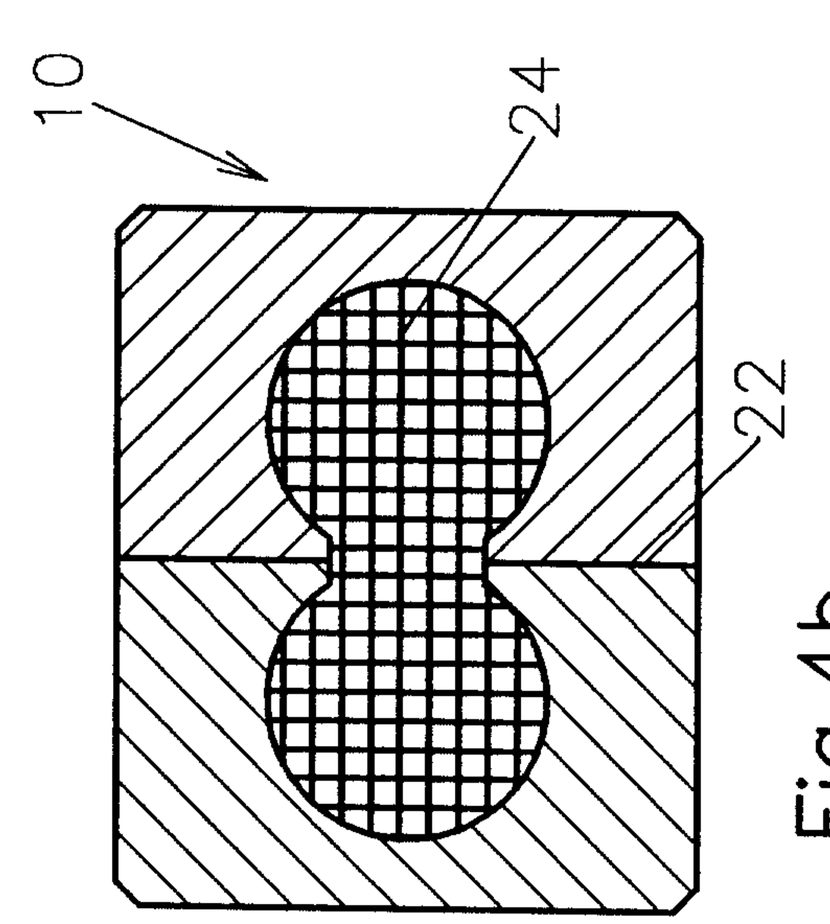

Fig.4b

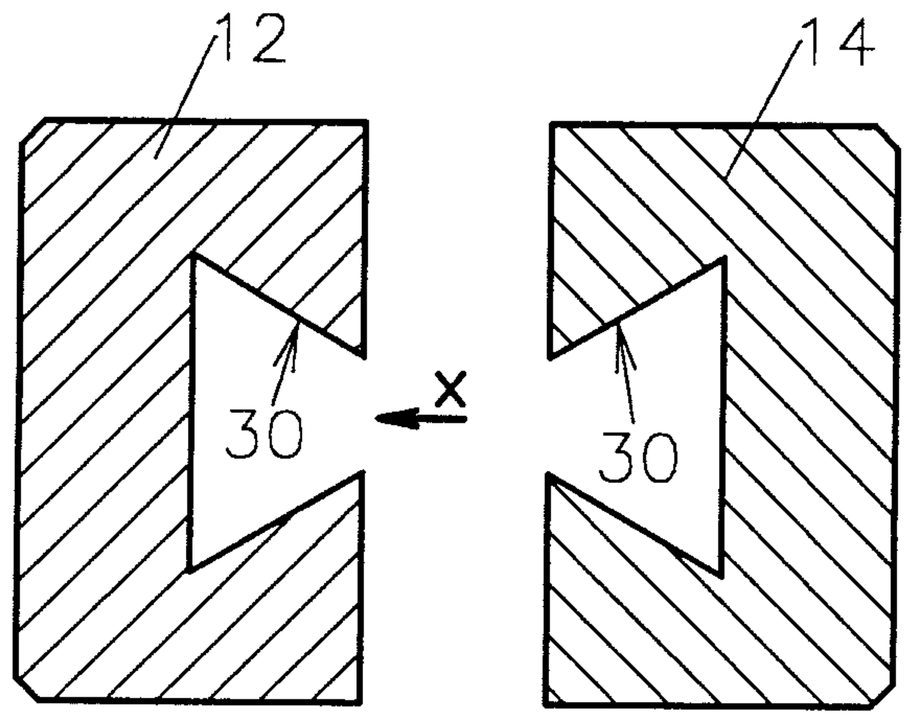

Fig.7a

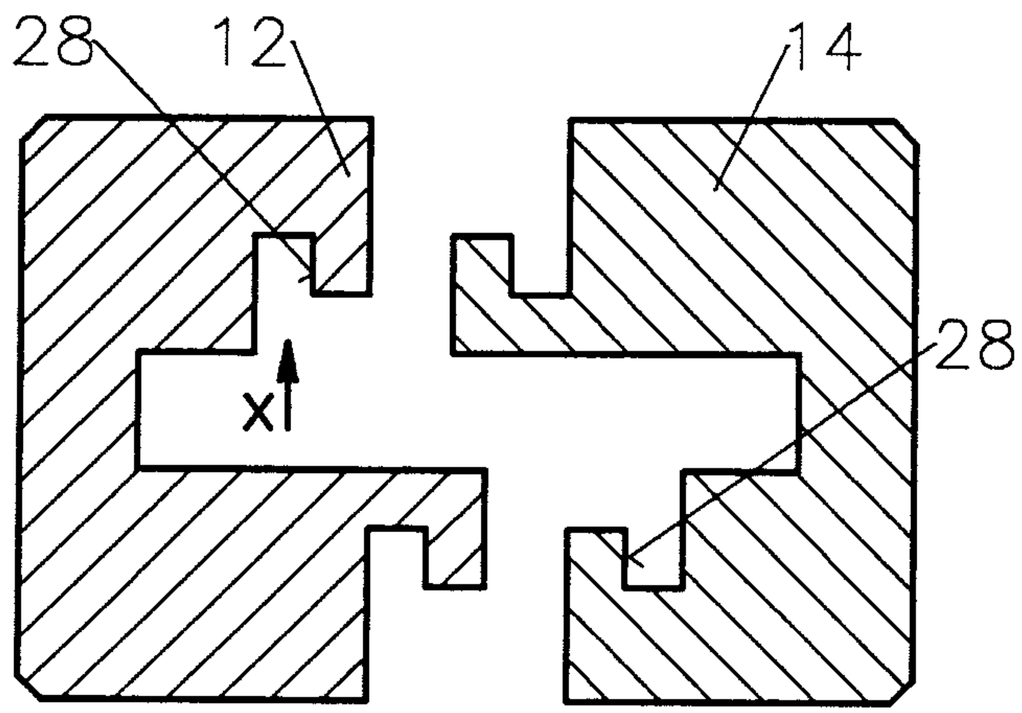

Fig.8a

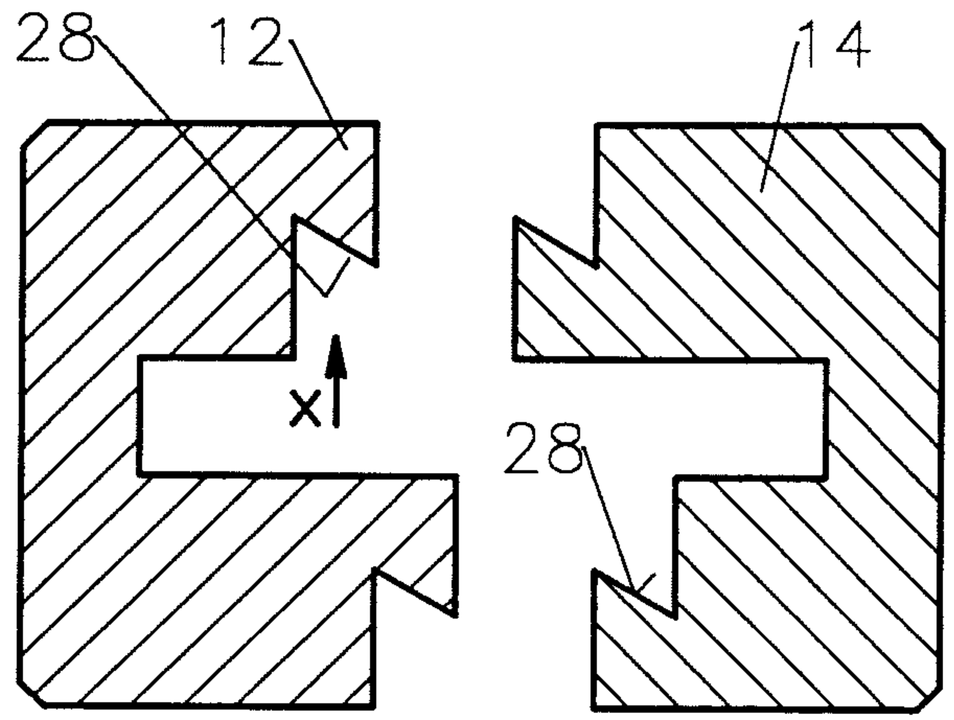

Fig.9a

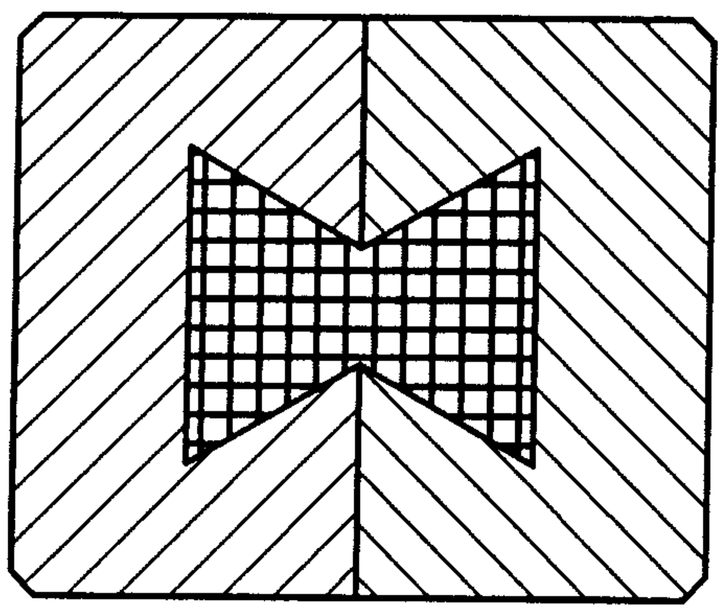

Fig.7b

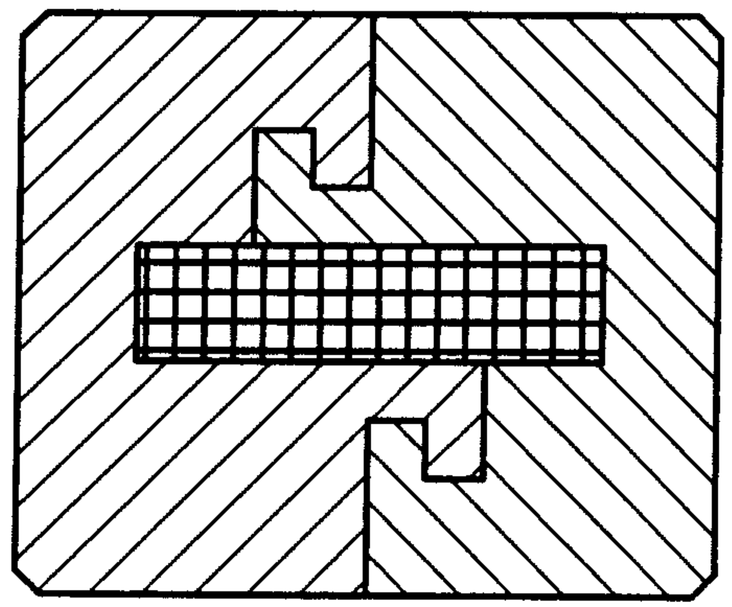

Fig.8b

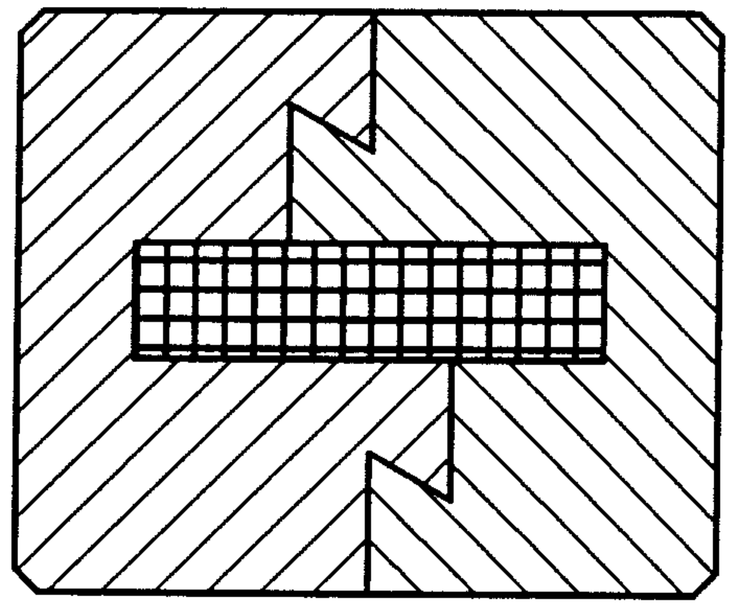

Fig.9b

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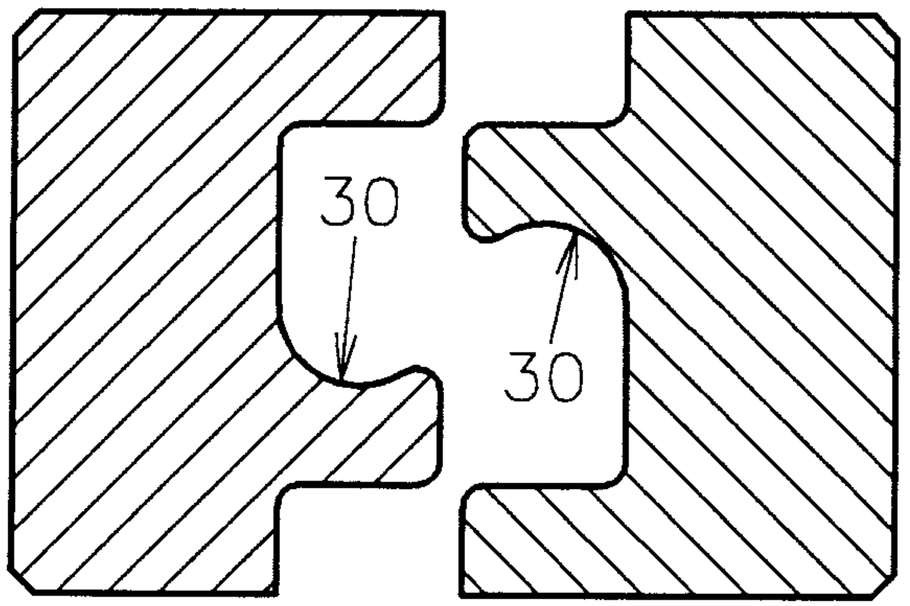

Fig.10a

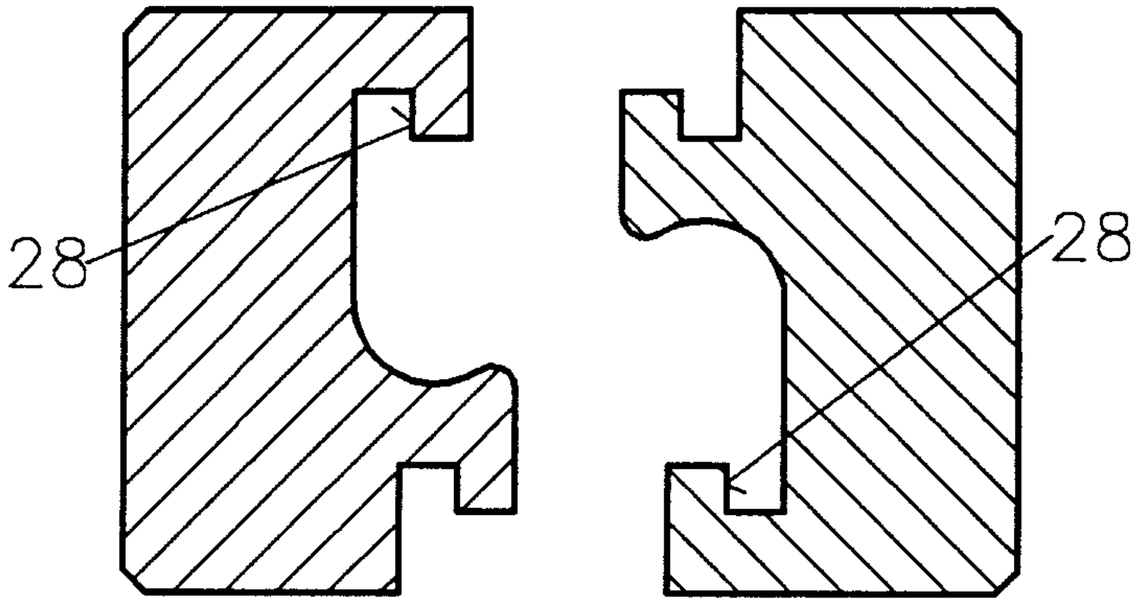

Fig.11a

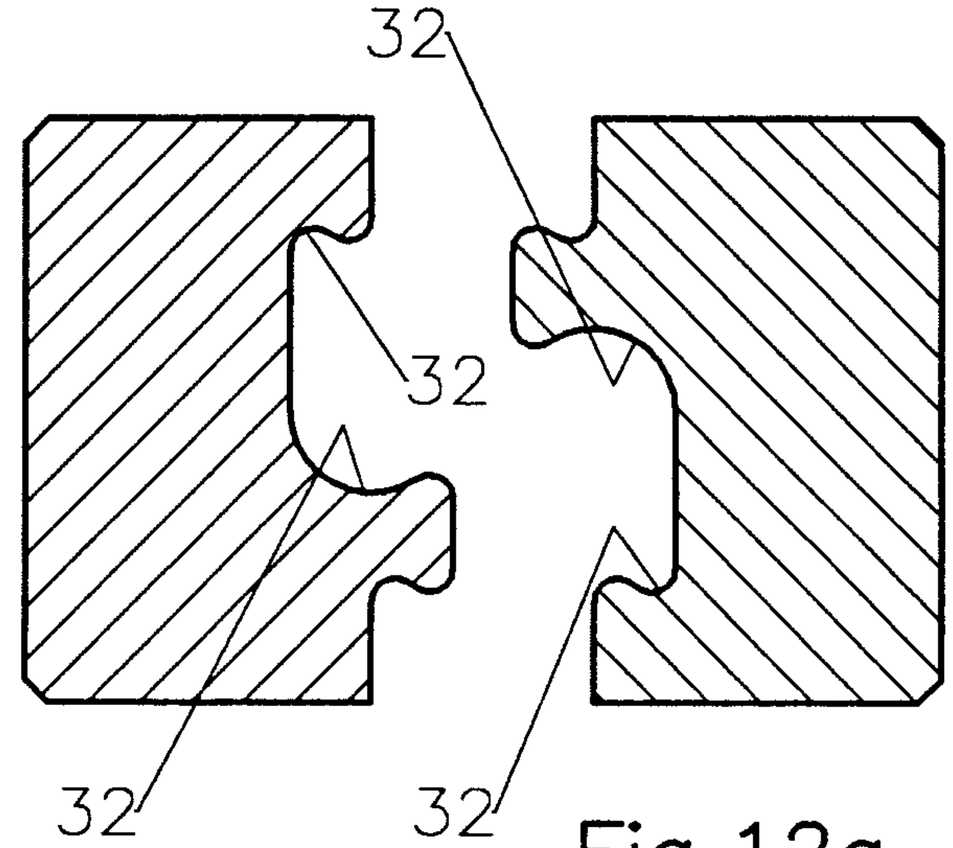

Fig.12a

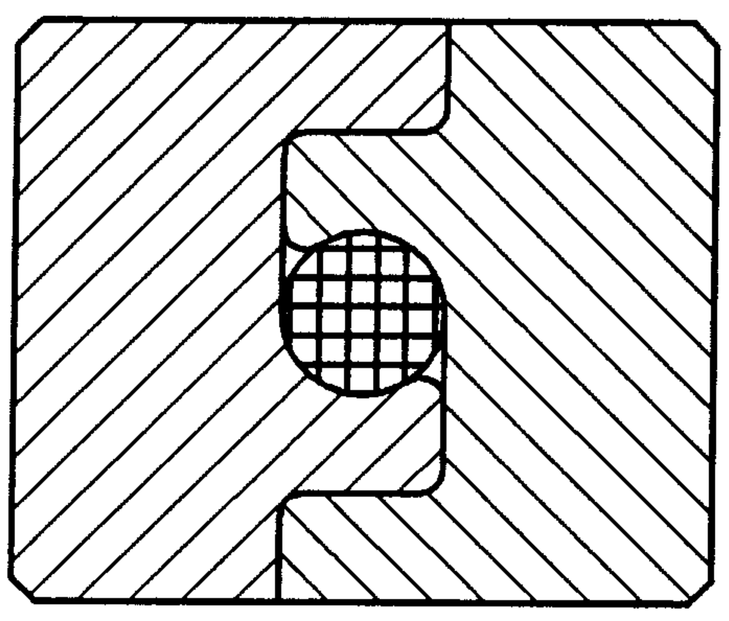

Fig.10b

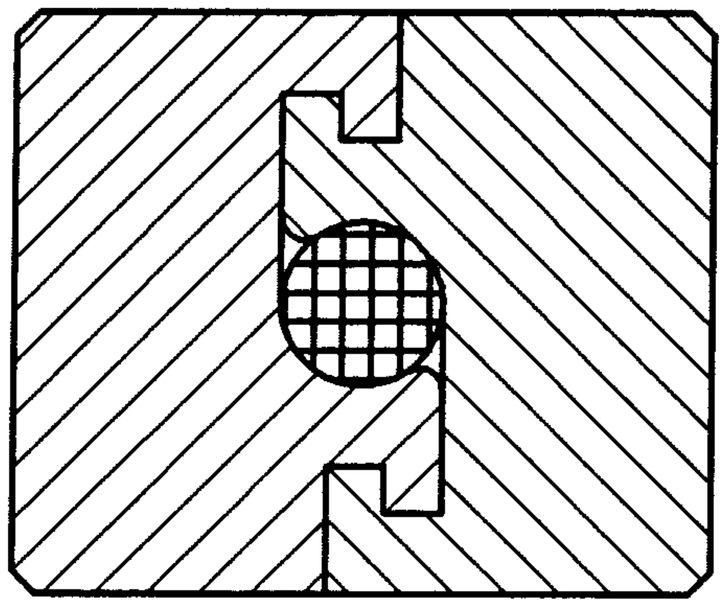

Fig.11b

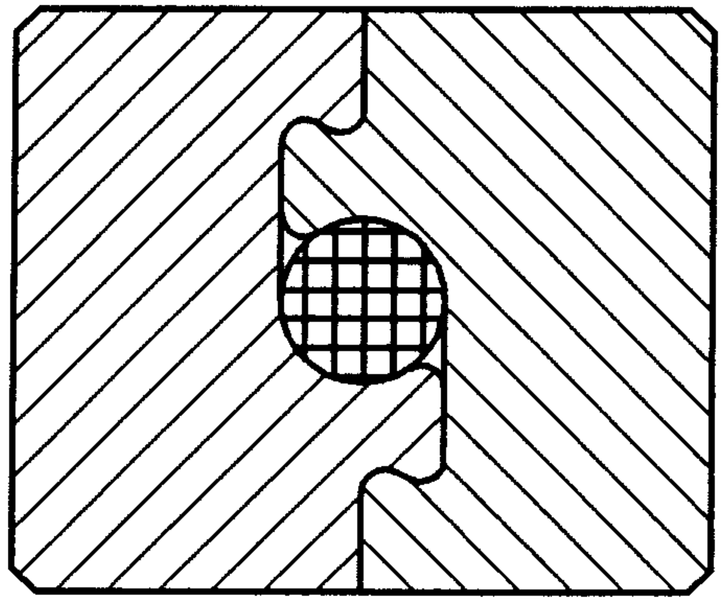

Fig.12b

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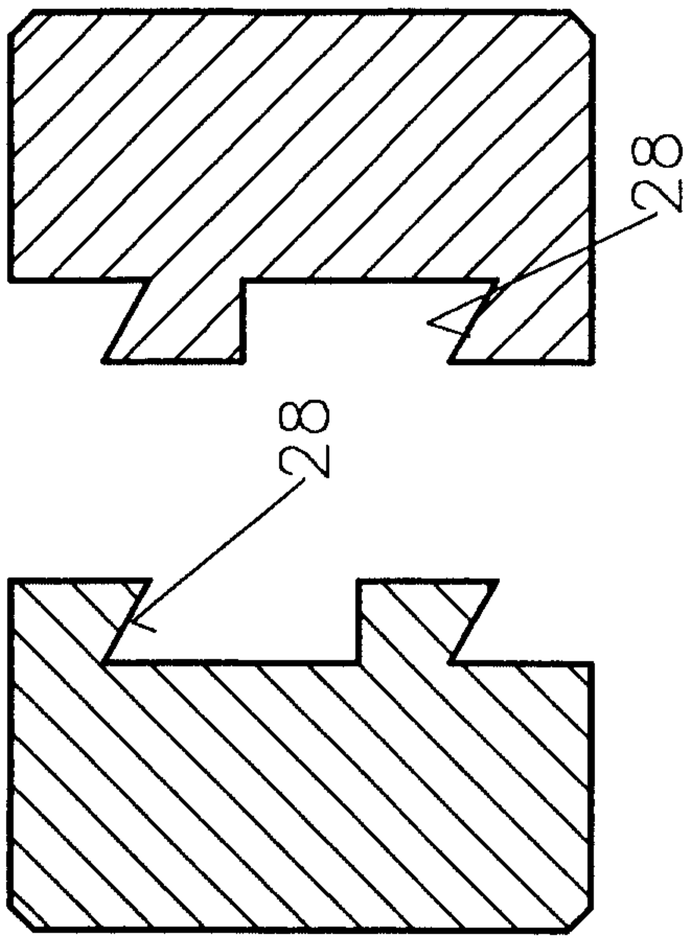


Fig.15a

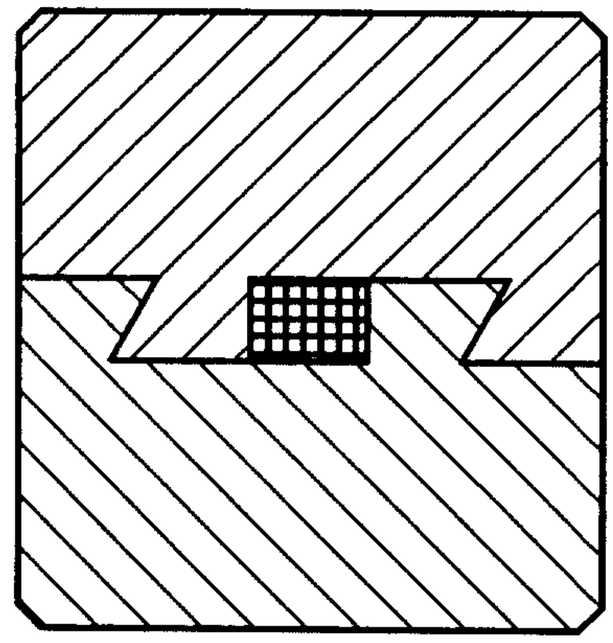


Fig.15b

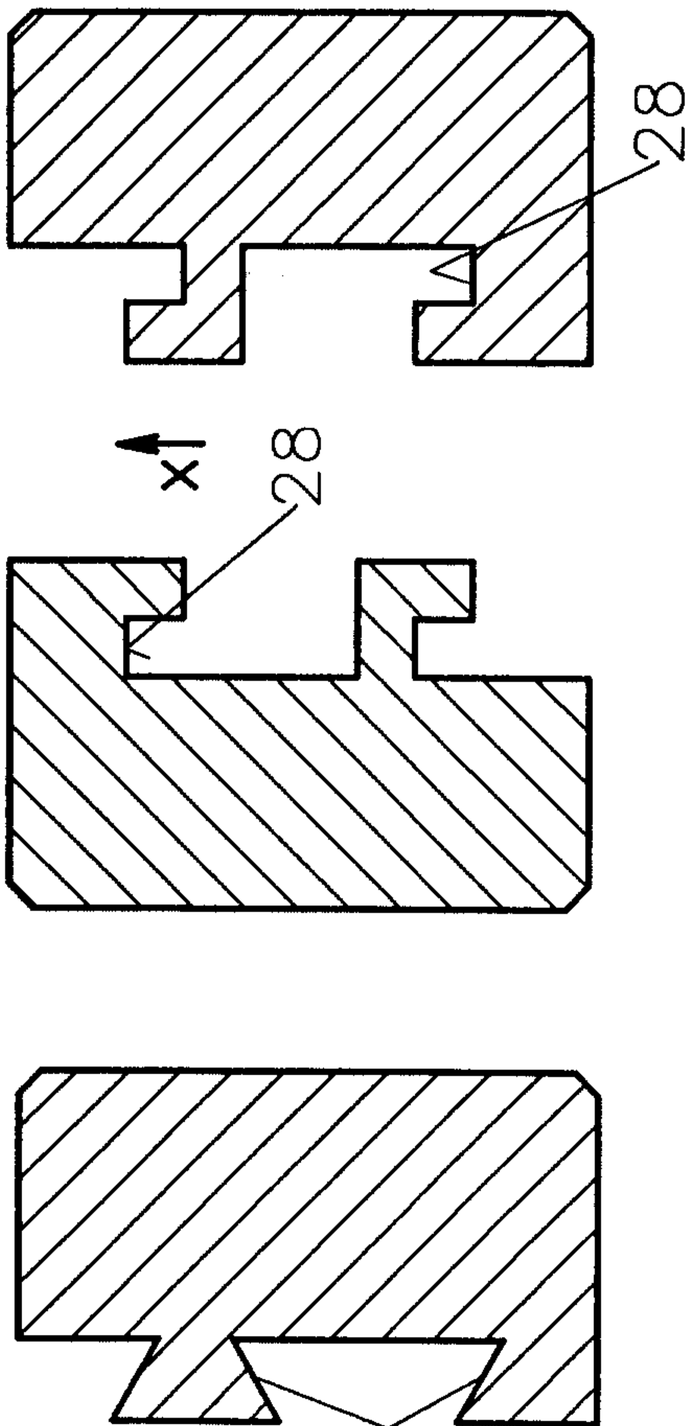


Fig.14a

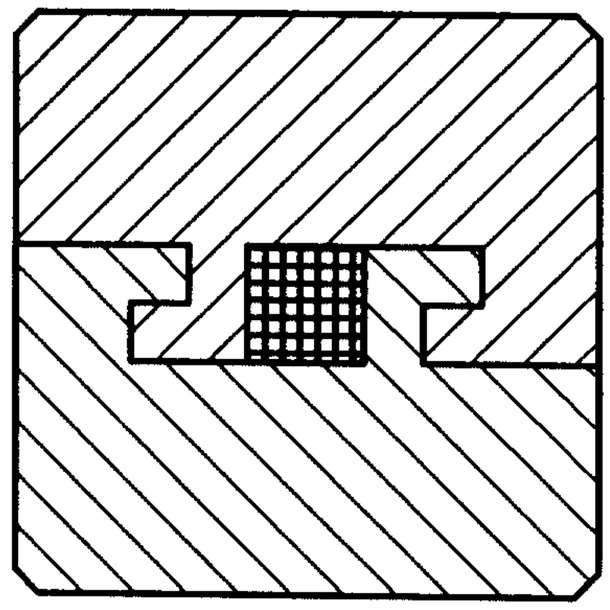


Fig.14b

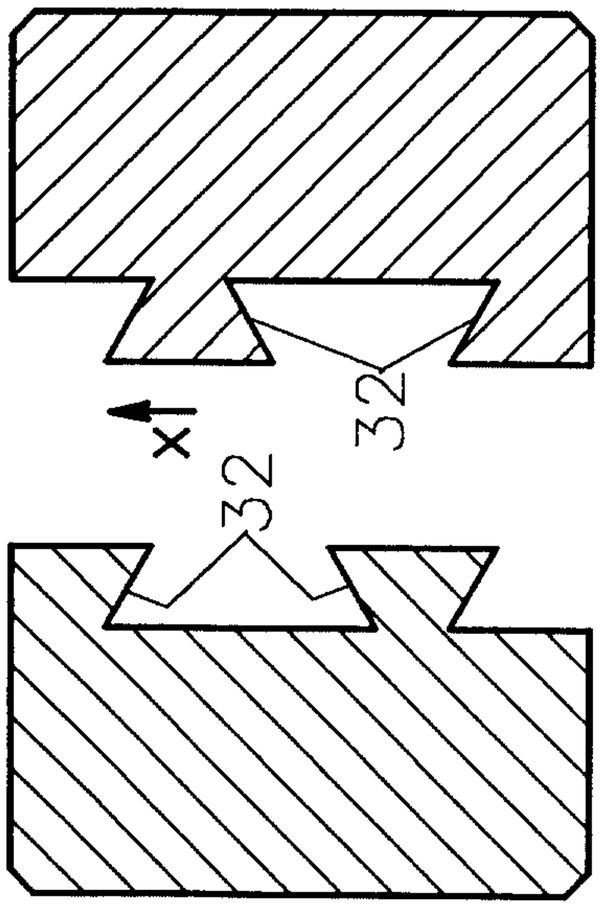


Fig.13a

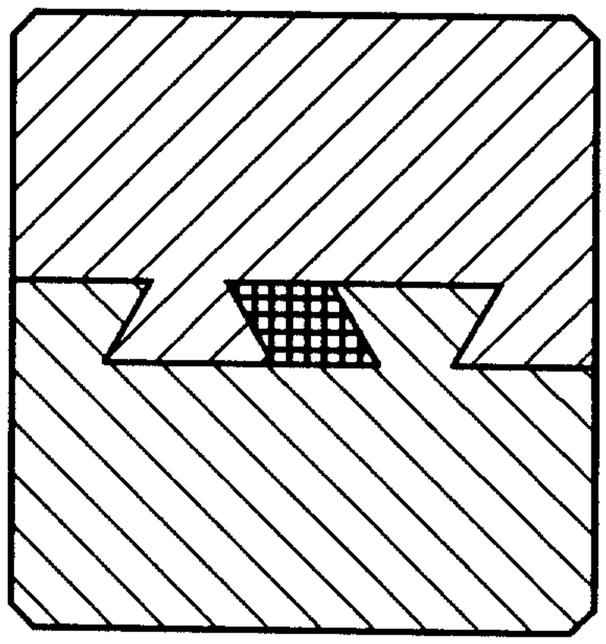
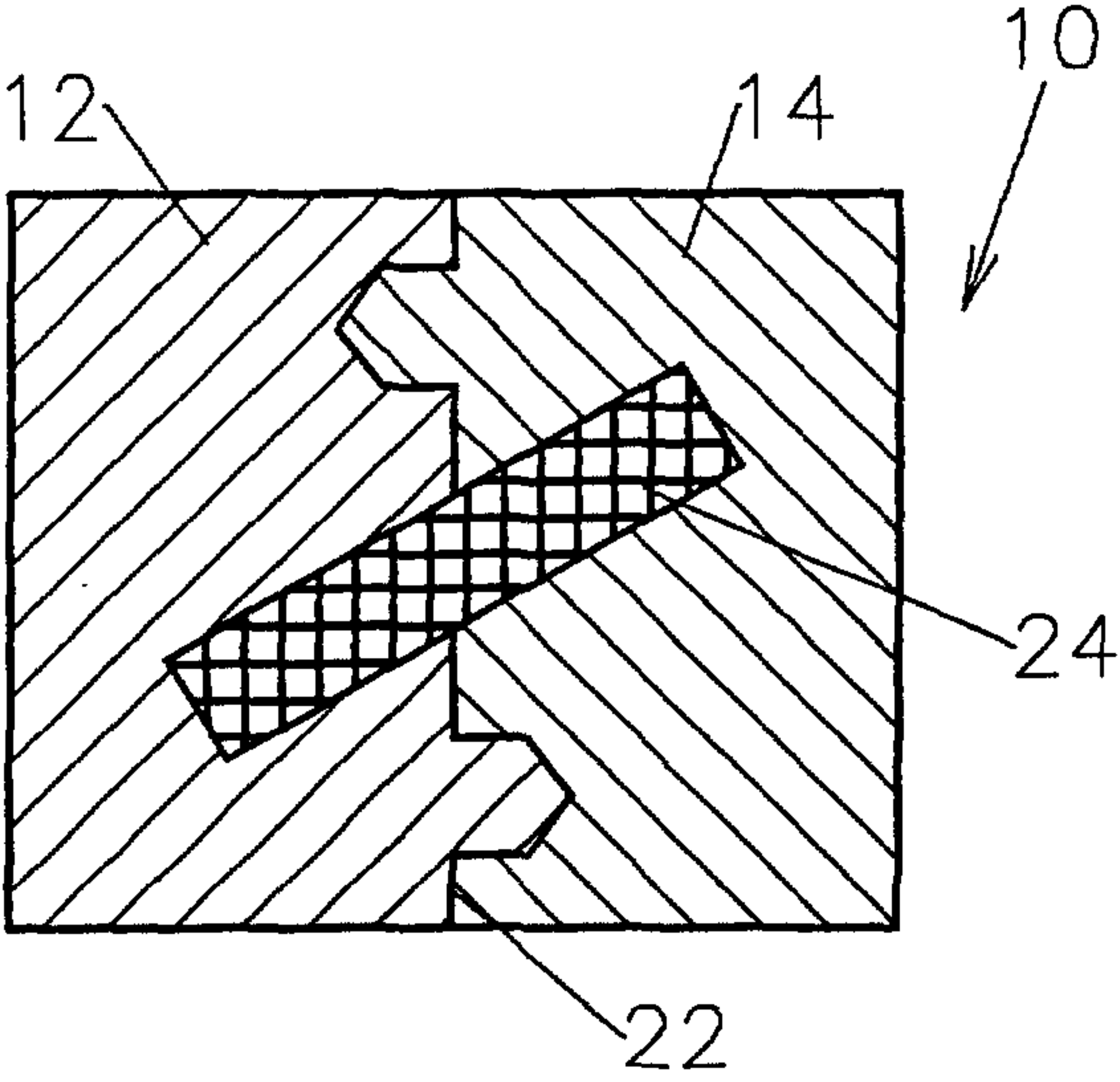


Fig.13b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