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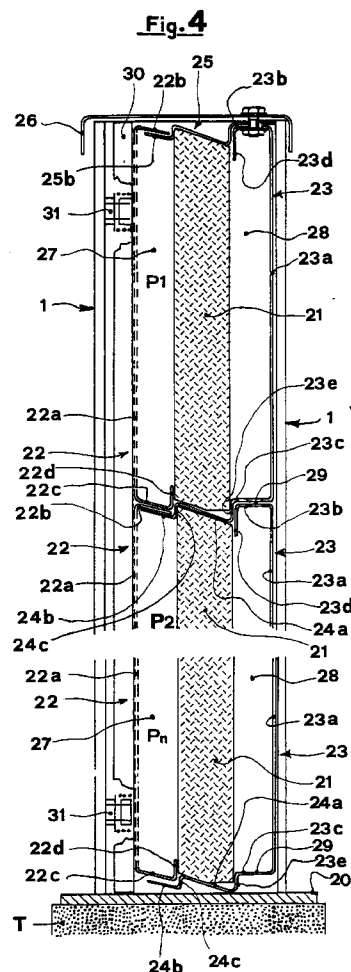
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(54) Improved deadening barrier for highways, railways and the like

(57) A deadening barrier comprising an array of panels (P1,...,Pn), stacked and supported by fixed uprights (1) spaced from one another. Each panel comprises a first (3,23) and a second (7,22) containment sheet element having a substantially C-shaped section and facing each other, between which a layer (6,21) of material with high deadening coefficient is interposed. The containment element facing the noise source is uniformly perforated. The layer (6,21) is supported by first containment element (3,23) and second containment element (7,22) rests against the layer to hold it in position inside first containment element and support means (11,24) are provided for the second containment element and means (13,30) for blocking it between the support means and the panel support uprights.



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Description

The present invention relates to a deadening barrier suited to be installed along highways, railways, highly trafficked roads, areas in which loud noise is produced, etc., for the purpose of absorbing and deviating the noise to such a degree that the fraction of noise passing the barrier is tolerable.

The disturbance created by proximity to a source of noise of high intensity is well known. It is also widely accepted that prolonged exposure to noise louder than certain levels can cause serious physical and psychological damage. These inconveniences are particularly felt in areas of high population density that are located near highly traveled railways and roadways, where inhabitants are subjected at all hours of the day and night to peaks of noise caused by the transit of trains or to continuous noise, less intense though no less disturbing, produced by road traffic.

To reduce the disturbance and health risks to those living or working in proximity to this type of source of noise pollution, for quite some time deadening barriers have been used which make it possible to reduce, if not block, the transmission of sound waves. Such barriers are formed of panels made of mineral fibers, such as glass wool, rock wool and the like, closed inside containment elements, for example made of materials such as aluminum sheet, designed to be superimposed on one another and/or placed side by side and to be sustained by metallic uprights positioned at an opportune distance from one another. In general, the containment elements are formed by two metallic bodies which delimit the space for the housing of the panel and have means for connecting themselves to each other and to the containment elements of adjacent panels. Normally, the wall of the containment element facing the source of the noise is uniformly perforated, whereas the wall facing the inhabited area is full. These panels are prefabricated and are assembled on site in order to form deadening barriers of the desired height and length. The most commonly used uprights for the support of this type of panel have a section in the form of an H, thus forming two seats for the ends of two coplanar groups of superimposed panels resting on one another.

Maintenance operations and the substitution of panels are difficult in all deadening barriers of the conventional type. In fact, when, for example, an intermediate panel of a tract of barrier comprised between two uprights has to be dismantled for cleaning or substitution of the perforated sheet which is more subject to deterioration, or for substituting the deadening material, it is necessary to dismount the entire portion of barrier since the individual panels composing the barrier rest on and are engaged in one another. This inconvenience lengthens maintenance time and, therefore, increases the overall costs keeping noise barriers.

One object of the present invention is to provide a deadening barrier having independent panels so that the

individual component panels are easy to dismount without the necessity of dismantling an entire tract of barrier.

A further object of the present invention is to provide a deadening barrier having independent panels of the above-mentioned type, in which also the operations of mounting the panels is simplified.

Another object of the present invention is to provide a deadening barrier having independent panels of the above-mentioned type which can be produced and stocked less expensively than known barriers.

These objects are accomplished by the deadening barrier according to the present invention whose novel features are set forth in the characterizing portion of claim 1.

In one particularly preferred embodiment of the invention, a first containment element of a panel comprises a flat wall from one longitudinal side of which an edge on which the layer of deadening material rests extends in a substantially orthogonal direction. Said edge terminates with a flat extension to which the second containment element of a lower panel is hung. In order to block the two containment elements in this position, a section is provided to rest against the second elements of the upper panels engaged in an upright and abutting on the latter by means of a spacing element whose length is adjustable.

According to another possible embodiment of the invention, the second containment elements are hung on a substantially square bracket which is fixed to the upright and has extensions slidably engaging in the ends of the upper second containment elements with means for blocking the containment elements with respect to said extensions.

The invention will now become more apparent in the following detailed description of its possible embodiments, given as examples and not limitative, with reference to the attached drawings in which:

- figure 1 is a top view of a portion of deadening barrier according to a first embodiment of the invention in proximity to a support upright;
- figure 2 is a vertical sectional view of the barrier of Figure 1 made according to arrows II - II;
- figure 3 is a side sectional view of the barrier of Figure 1 made according to arrows III - III;
- figure 4 is a side sectional view of a second embodiment of the deadening barrier according to the present invention;
- figure 5 is a partial, enlarged top view of the barrier of Figure 4;
- figure 6 is an enlarged detailed view of the circled detail indicated with A in Figure 5.

With reference to the above-mentioned figures, the deadening barrier according to the present invention comprises a plurality of metallic uprights having a section in the form of an H (only one is shown in the figures and is indicated with 1) rising from a masonry base (not shown) and placed at a preestablished distance from

one another, as well as a plurality of deadening panels, generically indicated with 2, placed one on top of the other and engaged with their end portions in the H section of two consecutive uprights 1.

As shown in figure 2, each deadening panel is composed of a first box-like containment element 3, for example, in aluminum, having a transversal section generically in the form of a C. More precisely, each panel comprises a continuous wall 3a from whose longitudinal sides two edges 3b and 3c extend orthogonally. Edge 3c is bent toward edge 3b and with it and wall 3a delimits a first room 4 destined to remain empty. Edge 3b is also bent coplanarly with edge 3c in the same direction, and from it, a further edge 3d extends which delimits a room 5 destined to house a layer 6 of material having a high deadening coefficient, such as rock wool or an equivalent material. Edge 3d has a slight upward inclination, for example 18°, so that layer 6 can support itself during mounting.

From the opposite side of containment element 3, a second box-like containment element 7 is provided for, in aluminum for example, which also has a section substantially in the shape of a C having a uniformly perforated wall 7a facing the source of noise, from the longitudinal sides of which two edges 7b with ends 7c bent toward each other and placed near layer 6 extend orthogonally. Once mounted, therefore, layer 6 is supported laterally between the two shoulders constituted by bent ends 7c of edges 7b, with the shoulder provided by edge 3c and wall 3d connecting the steps of edge 3b.

As shown particularly in Figure 1, to the core 1a of the upright, a metallic section 8 is fixed having a section substantially in the form of an L with an arm 9 fixed by means of through screws 10 to said core 1a and with an arm 11 extending in a substantially perpendicular manner from said core. In particular, arm 11 has two portions 11a and 11b perpendicular to core 1a but lying on two parallel planes and united to one another by an inclined portion 11c. As shown in Figure 3, cuts 12 extend from the free edge of portion 11b up to an intermediate point of portion 11c, so that, between one cut and the next on portion 11b, extensions are defined which engage slidingly inside the ends of box-like elements 7 thus functioning as a support for them. Portion 11a of arm 11 of section 8 abuts on the other hand, on layer 6 thus blocking said layer and containment element 3 against wing 1b of upright 1.

Perforated containment elements 7 are, therefore, slideable transversally along said extensions and can be independently removed by sliding them from one side or the other toward one of the two uprights 1 which delimit them all the way to the end of cuts 12. To impede this sliding when the panels are in place, a shaped blocking plate 13 is provided for having substantially the form of an open L which is fixed by means of screws to the inclined portion 11c of section 8 so that it presses the ends of perforated containment elements 7 against portion 11b of section 8 itself. From the foregoing, it is clear that if one wishes to remove one of perforated contain-

ment elements 7, for example for cleaning or to substitute layer 6, it is sufficient to remove plate 13 and slide the perforated element of interest from one side or the other to be able to withdraw it.

Advantageously, bent edges 7b of perforated containment elements 7 also provide perforations for the circulation of air and drainage of humidity. Similarly, portions of edges 3b of containment element 3 which delimit free room 4 have perforations for the circulation of air and collection of humidity.

Furthermore, edges 7b of perforated containment elements 7 have a width greater than the thickness of portion 11b of section 8 in order to ensure an interstice of air between them and layer 6 which, combined with the interstice of air provided by room 4, contributes to improving the deadening properties of the panel as a whole.

In figures 4, 5 and 6 a second possible embodiment of the invention is illustrated which, if on the one hand provides for box-like containment elements of more complex form, on the other is characterized by more simplified mounting. In Figure 4, upright 1 rises from an anchoring plate 20 integral with a base T, and the panels, mounted one on top of the other and engaged with their ends in two consecutive fixed uprights, are indicated with P1, P2.....Pn. Each panel comprises a layer of material 21, for example mineral fibers such as glass wool, which has a high deadening coefficient and is placed between a first containment element 22, having a perforated wall and facing the source of noise, and a second containment element 23, that is not perforated and faces the opposite way. Perforated element 22 and nonperforated element 23 can be formed in aluminum sheet.

Perforated element 22 comprises a flat, uniformly perforated, vertical wall 22a from which two edges 22b and 22c extend parallel to each other and inclined. From the end of edge 22c, another edge 22d extends projecting inward and parallel to wall 22a.

The nonperforated element 23 comprises a full wall 23a from which two edges 23b and 23c extend perpendicularly. At the end of edge 23b a further edge 23d extends, projecting inward and parallel to wall 23a. From edge 23c, on the other hand, extends edge 23e which is also parallel to wall 23a but faces the outside of element 23. Extending in a substantially transversal direction from the end of edge 23e is an extension 24 formed by two inclined walls 24a and 24b which lie on two parallel planes and are connected by a small uniting wall 24c.

Nonperforated elements 23 are placed one on top of the other so that edges 23c and 23e of one rest on and respectively abut on edges 23b and 23d of the one below. Deadening layer 21 is, therefore, housed between the two inclined walls 24a extending from two upper nonperforated elements 23 in order to abut laterally, on one side, on a portion of edges 23d and 23e and, on the other side, on small wall 24c and a portion of edge 22d of perforated element 22. Perforated element 22 is hung with its edge 22b on inclined wall 24b extending from the corresponding nonperforated element 23. Edge 22b is,

therefore, interposed between edge 22c and inclined wall 24b of respectively the perforated element 22 and nonperforated element 23 above. In this way, furthermore, layer 21 is held firm between its perforated 22 and nonperforated 23 containment elements. An upper containment plate 25, shaped like edges 23c, 23e and the extension 24 extending from them, is provided at the top of the barrier to make it possible to hook the highest perforated element 22. Plate 25 is bolted to edge 23b of the highest nonperforated element. A covering element 26, also fixed to edge 23b of the highest nonperforated element 23, runs along the top of the barrier.

Deadening layer 21 is separated from walls 22a and 23a by means of a front room 27 and a rear room 28 in which the circulation of air is ensured by ventilation holes 29 formed along edges 23b and 23c. The holes also serve for the passage of bolts for fixing superimposed nonperforated elements 23 to one another.

Each group of panels is blocked with respect to the pair of adjacent uprights 1, inside which it is engaged, by means of a pair of pressure bars 30 (only one of which is indicated in the drawings) extending vertically in proximity to the two uprights themselves for the entire height of the barrier. As shown in greater detail in figures 5 and 6, bar 30 rests on walls 22a of perforated elements 22 of the various upper panels and is forced against them acting on a pair of screws 31 which engage in corresponding threaded seats 32 formed on bar 30 itself. Screw 31 abuts against wing 1a of upright 1 from the opposite side of seat 32. In particular, acting on screw 31 in the direction of its unscrewing, as shown in figure 5, bar 30 becomes distanced from wing 1a of upright 1 which exerts, therefore, pressure on perforated element 22 thus blocking it on nonperforated element 23. The force exerted on perforated element 22 is transmitted to nonperforated element 23 which in turn is forced against opposite wing 1b of upright 1. Thus, each group of superimposed panels of the deadening barrier according to the present invention is firmly blocked in its operative position.

A spring 33, coaxial to screw 31, acts on a washer 34 which forces against the head of screw 31 pressing it against wing 1a of upright 1 in order to keep the screw, for example under the effect of the vibrations, from turning in a loosening direction in seat 32, thus reducing the pressure exerted by bar 31. A second screw 35 is housed in a seat 36 formed in the head of screw 31 and abuts against wing 1a of upright 1 ensuring contact even in the case of its accidental detachment up to 3 mm from wing 1a due to thermal dilatation or structural yielding.

The deadening barrier according to the present invention undergoes no working, not even riveting, after the step of painting the elements. In fact, the metallic elements composing it are not assembled in any way in the factory, but directly on the installation site. Thus, the painted elements do not undergo any further manipulation, making it possible to fill orders more quickly. Finally, the fact that the component elements of the deadening barrier according to the invention are delivered to the site

in separate pieces allows, considering the relatively light weight of each individual element, for easy mounting without having to use a crane, thus reducing the risk of injuries and further facilitating the operations of removal and maintenance.

The deadening layer can be advantageously made in mineral wool covered with a coat of glass.

In order to be able to maintain also the nonperforated containment elements 23 (i.e. those facing the inhabited area) with the same ease as the perforated ones in the case of damage caused by impact and/or accidents on the lower part of the barrier, without having to resort to the use of lifting means and without having to dismount the upper panels, it is sufficient to screw the bolts which, for each span, connect the highest of the panels to covering element 8 after having disconnected the panel to be substituted from those adjacent to it and upon removal of the perforated front panels and corresponding layers of mineral wool. In this way, by turning the bolt about 30 mm, the panels above the damaged one are raised and it can be removed and substituted. The same operations can then be repeated inversely to recompose the barrier.

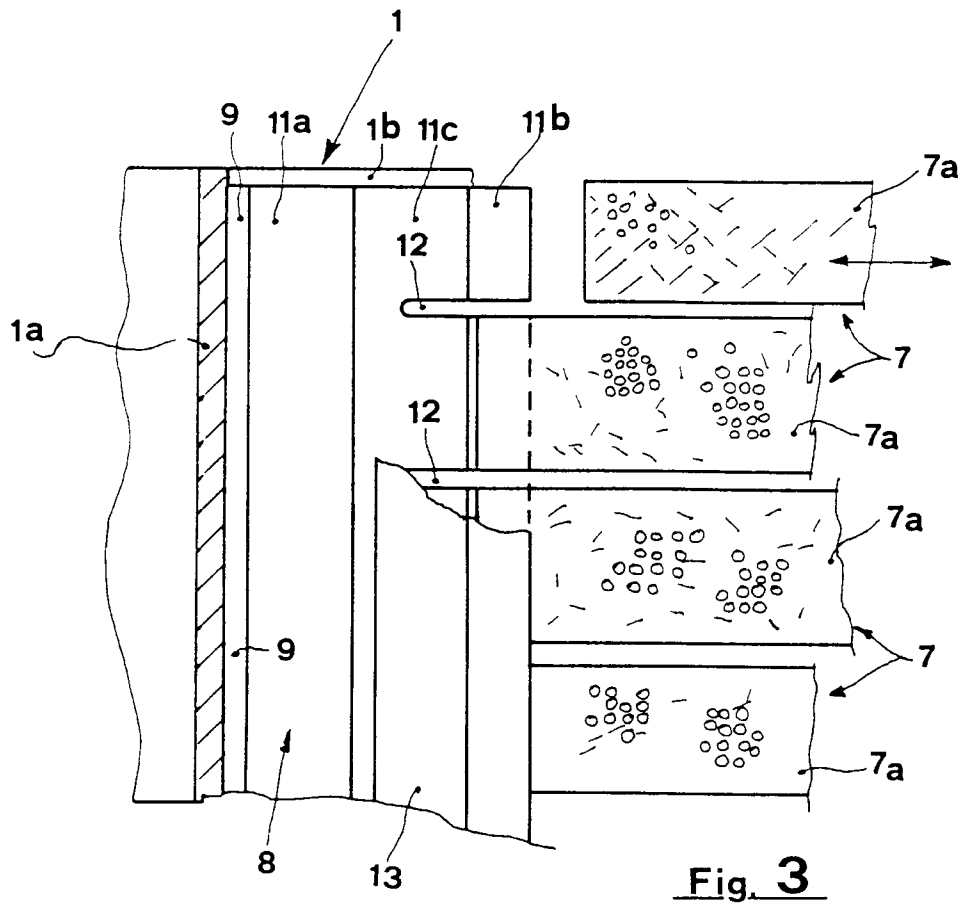
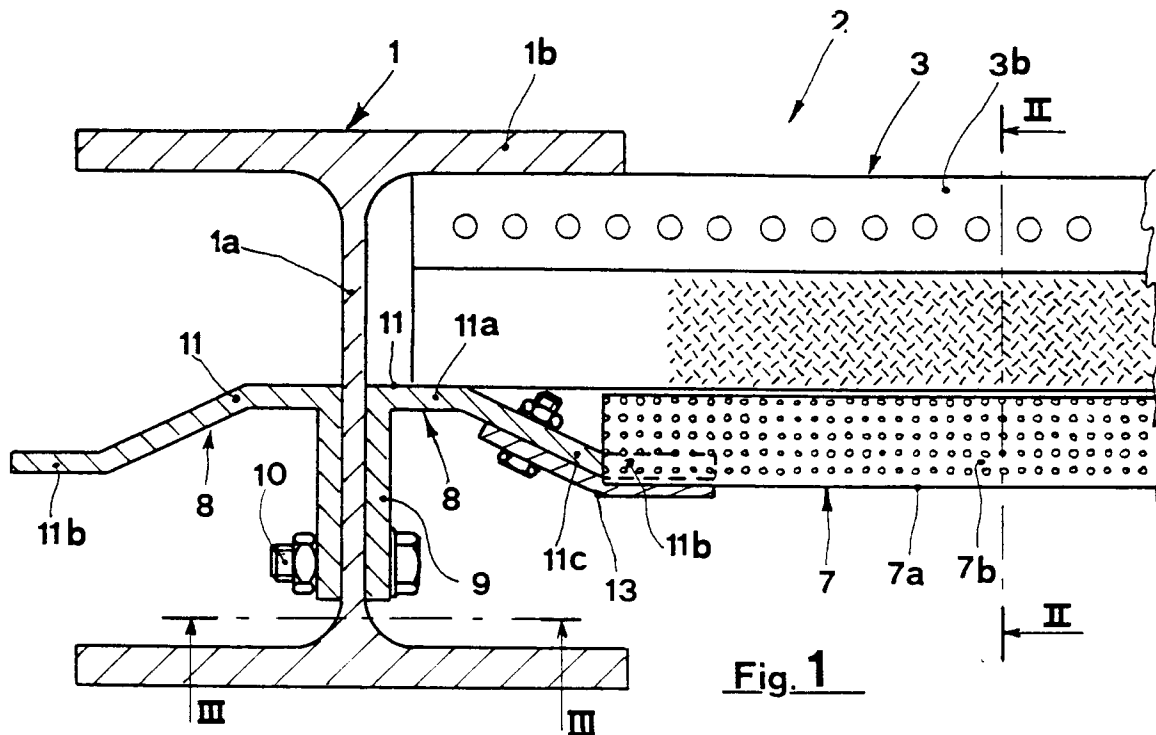
In cases in which it is necessary to use deadening barriers on both sides, the walls of each panel can both be perforated and, in order to ensure a good coefficient of insulation, a double layer of mineral wool of high density, incorporating a full sheet, can be provided for inside the walls.

From the foregoing, it is clear that the deadening barrier according to the present invention accomplishes the predetermined objects of allowing for considerable savings of time and costs with regard to the operations of mounting, dismounting and maintenance which can be limited to a single panel without necessitating the demolition of the entire span, as is the case in the deadening barriers currently on the market.

Claims

1. Deadening barrier for limiting the transmission of sound waves produced by sources of noise pollution such as highways, railways and the like, comprising an array of deadening panels (P1, P2.....,Pn) supported by fixed uprights (1) spaced from one another, each panel comprising a first (3, 23) and a second laminar containment element (7, 22) having sections substantially in the shape of a C and facing each other, between which a layer (6, 21) is interposed of material with a high deadening coefficient, the containment element facing said source of noise pollution being uniformly perforated, characterized by the fact that, in each panel (P1, P2.....,Pn), said layer (6, 21) of deadening material is supported by said first containment element (3, 23), and that the second containment element (7, 22) rests against said layer to hold it in position inside said first containment element (3, 23), support means (11, 24) being provided for said second containment element

- (7, 22) as well as blocking means (13, 30) of said second containment element (7, 22) between said support means (11, 24) and the uprights (1) sustaining said panel.
2. Deadening barrier according to claim 1, wherein from one longitudinal side of said first containment element (3, 23) a edge (3d, 24a) extends on which rests said layer (6, 21) which is interposed between two of said edges (3d, 24a) of two first upper containment elements. 5 10
 3. Deadening barrier according to claim 2, wherein said edge (3d, 24a) on which said layer (6, 21) rests is inclined toward said wall (3a, 23a). 15
 4. Deadening barrier according to the previous claims, wherein said first containment element (3, 23) has two longitudinal edges (3b, 3c; 23b, d, 23c, e) bent in a square against which rests said layer, from one of said edges extending said edge (3d, 24a) on which rests said layer, said second containment element (7, 22) having at least one longitudinal edge (7b,c, 22c,d) bent in a square for abutting once mounted against said layer. 20 25
 5. Deadening barrier according to claim 1, wherein said support means of said second containment element (7) comprise a bracket (8) substantially in the shape of an L integral with said upright (1), with an arm (11) extending substantially orthogonally to the element, along the free edge of said arm being formed a plurality of parallel equidistant cuts (12) inside which the opposite longitudinal ends of the bent edges (7b, c) of said second containment element (7) engage. 30 35
 6. Deadening barrier according to claim 5, wherein said arm (11) is formed by two portions (11a, b) orthogonal to said upright lying on two parallel planes and united by one inclined intermediate portion (1c), said cuts (12) extending to an intermediate point of said inclined portion. 40
 7. Deadening barrier according to the previous claims, wherein said blocking means of said second containment element (7) comprise a shaped plate (13) which can be fixed to said arm (11) to lock against it the ends of said second containment element (7) that are engaged in the cuts (12) of said arm (11). 45 50
 8. Deadening barrier according to claims 1 to 4, wherein said support means comprise a flat extension (24b), extending from said edge (24a), on which rests said layer (21), to said extension (24b) being hung said second containment element (22) by one of its bent edges (22b). 55
 9. Deadening barrier according to claims 1 and 8, wherein said means for blocking said second containment element (22) comprise a section (30) placed between each of said fixed uprights (1) and the second containment elements (22) of the panels engaged inside them and resting against said second containment means, between said section (30) and said upright (1), at least one spacing element (31) of adjustable length being provided, so that by increasing the length, the pressure exerted by said section on said second containment element (22) increases.
 10. Deadening barrier according to claim 9, wherein said spacing element is formed by a screw (31) engaged in a fixed seat (32) of said section (30) and abuts with its head on said upright (1).
 11. Deadening barrier according to claim 10, wherein the head of said screw forces against said upright by means of an elastic element (35) housed inside it.
 12. Deadening barrier according to claim 10, wherein between said screw head (31) and said section (30) a further elastic element (33) is provided.



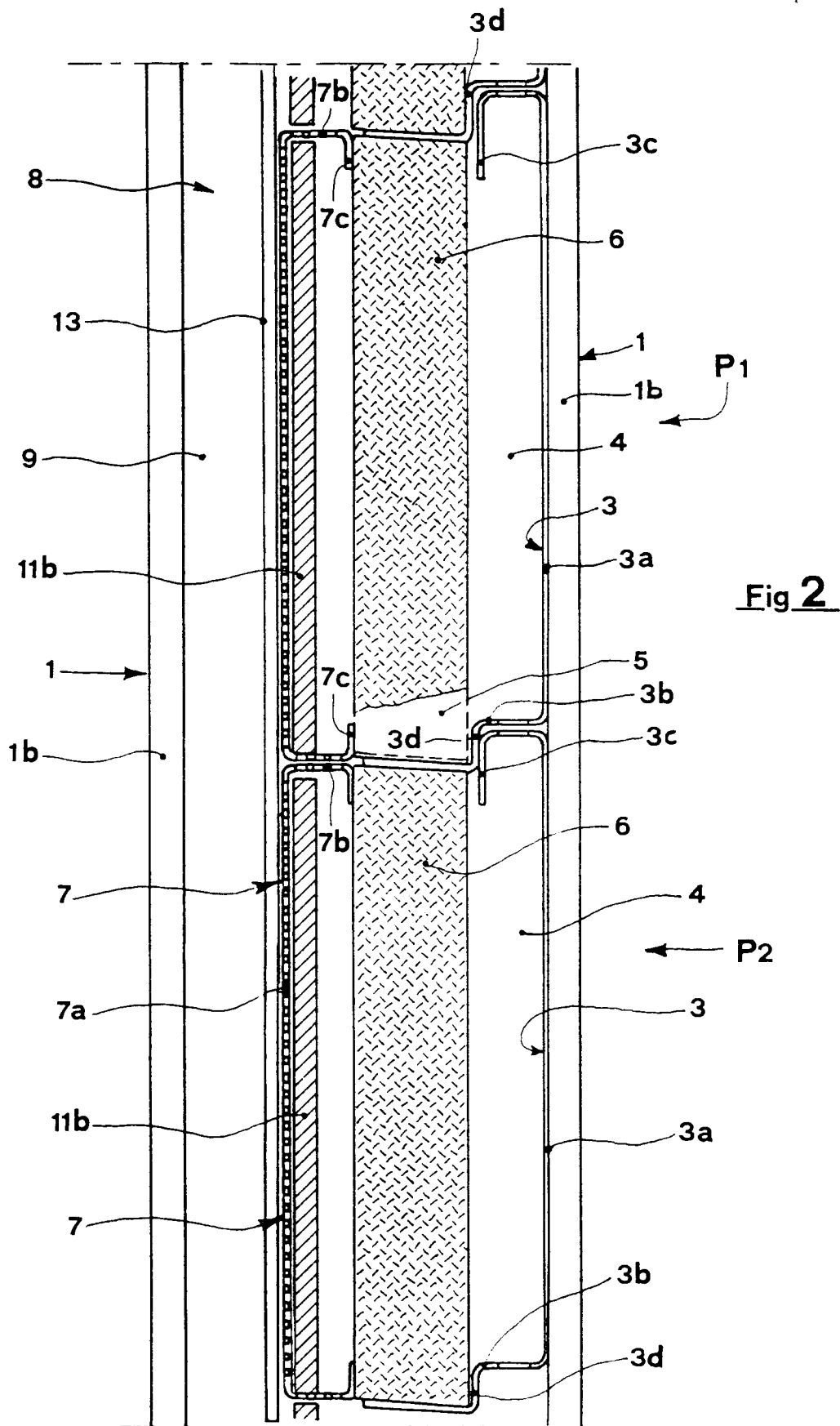
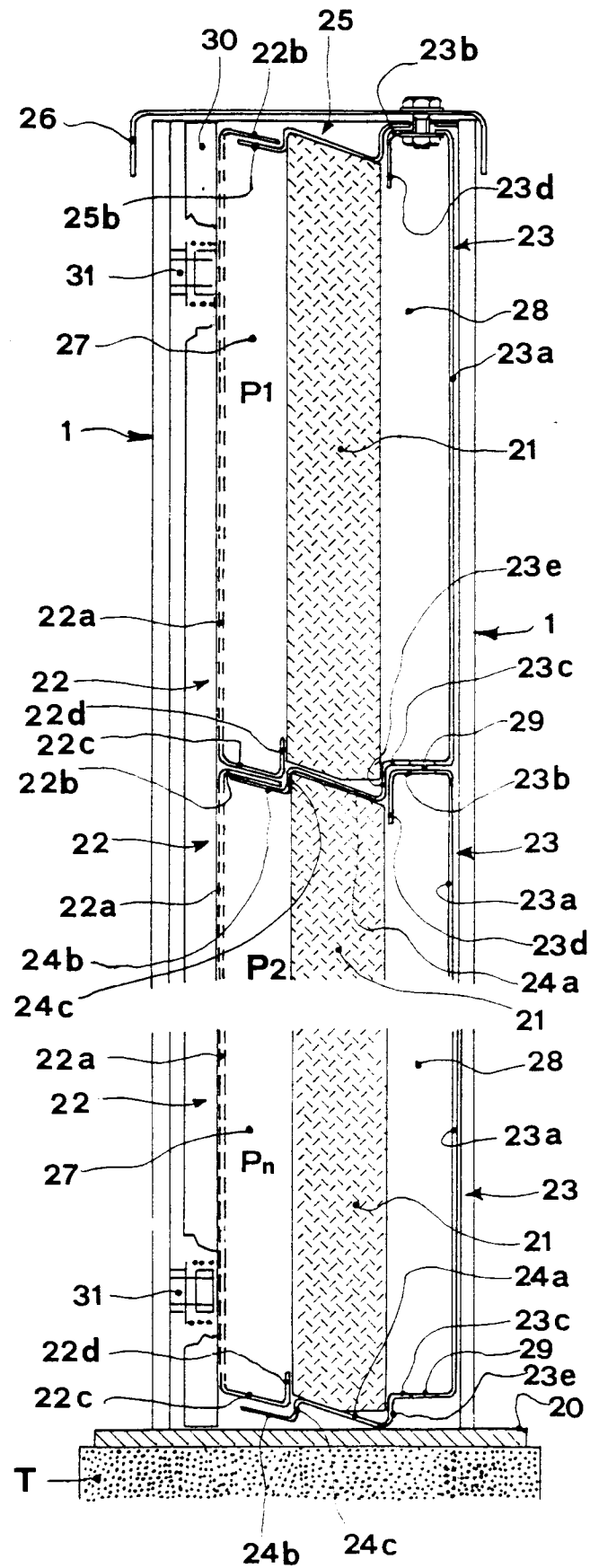


Fig. 4



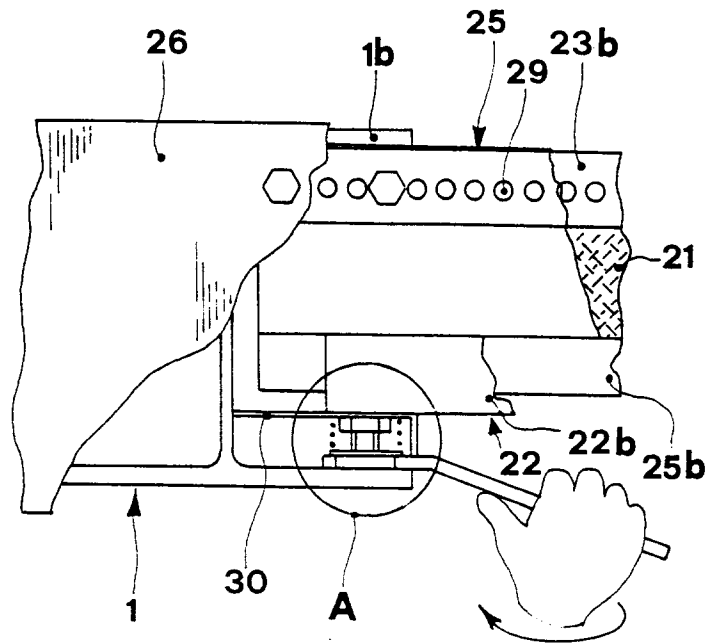


Fig. 5

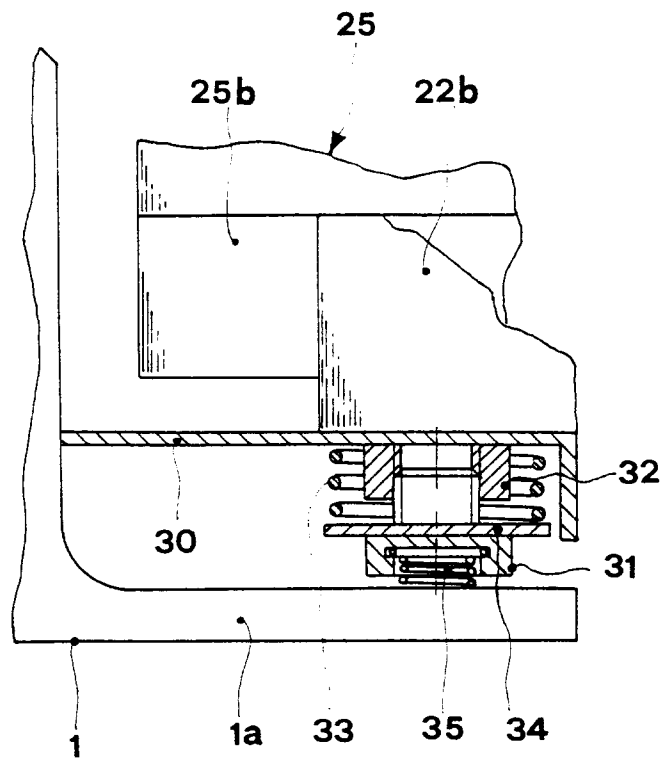


Fig. 6