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(54) A connection assembly.

(57) A connection assembly primarily for so-called air treatment apparatus housing slabs (1), the edges of the slabs (1) which are to be connected being provided with support sections (2). Each support section (2) has edge portion legs (12,25), a joining web (6) and a squeezing leg (7) substantially at right angles thereto, the leg being terminated by an abutment end (8), and having a length ( ) corresponding to approximately half the depth (L) of the slab or support section. The edge portion is U-shaped with two legs, one (25) of which being attached to the adjacent slab and one (12) being free with a gap (26) therebetween. The web (4) of the connection section (3) in a position of use is flush with one flat face (22) of the slab (1) or at a level which is parallel to this face. Locking legs (5) depart from the edges of the web (4) and with the aid of stiffening bends (9, 10) engage and retain in the connection position the abutment ends (8) of the support sections (2). The connection section (3) engages against the legs (12) of edge portions and/or with the adjacent major surface (22) of the slabs (1) with external engagement surfaces (13).

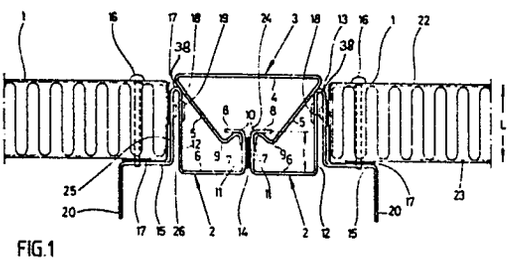

FIG.1

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A connection assembly.

The present invention relates to a connection assembly primarily for so-called air treatment apparatus housing panels, slabs or the like, of the kind disclosed in the preamble to claim 1 and constituting a further development of the art in our Swedish Patent 7702695-3.

The Swedish patent 7702695-3 relates to a connection method which also optionally allows flat or angular connection, e.g. between two wall panels or slabs. Although the connections obtained have high strength, they have the drawback that the material consumption for support connections and connection members with locking legs is large. Another drawback with the prior art is that it is tied to pre-shaped support sections made on the slabs, i.e. the support sections must be already integrated in the structure during fabrication.

Further drawbacks in the prior art is that an exact dimensional accuracy is required in the treatment apparatus housing panels or slabs and that the connection obtained will be relatively weak and easily deformed. In order to avoid immoderately large material consumption and weight of the slabs, the support sections are limited to thin sheet metal thickness. A still further drawback of the connection assembly in the prior art is that it is limited to certain specific slab or module sizes, unless deviating sizes are specially fabricated at large extra cost. Furthermore, the previously known assembly does not permit integral connection of further elements such as bracings and the like. The chief object of the present invention is therefore to provide a connection method primarily intended for air treatment apparatus housing panels or slabs, where material consumption for the different slabs and connection assemblies co-acting in the structure will be low, while at the same time a tight joint with high strength is achieved, and where it is possible to connect slabs of optional sizes without using pre-shaped support sections which are made integral with the slabs.

Another object of the invention is to achieve a connection method, which is also easy to use for unqualified or untrained staff and where only a moderate force will be required for thrusting the locking legs on the support sections, which have their legs provided with abutment ends and are situated side by side, e.g. at the edges of the ceiling slabs of air treatment apparatus housings.

A still further object of the present invention is to achieve a connection method where production of the components necessary for the method can take place without an expensive fabrication and checking procedure for the purpose of ensuring the intended secure and reliable function. It is also an object of the invention to provide simple and safe bracing and connection of further devices.

The above-mentioned objects of the present invention are achieved by the connection assembly being given the distinguishing features disclosed in the claims.

By allowing the squeezing legs with their abutment ends on the support sections to meet the outstanding locking legs on the connection section "half way" there is obtained a material saving as well as long moment arms, which co-act to keep the different details fixed in spite of moderate locking forces.

By removably attaching the support sections to the ceiling or wall slabs there is obtained the possibility of using both whole and optionally cut standardized modular slabs, since the support sections can be easily fastened to these standard slabs.

Stability is further increased by utilizing an edge leg as extra support for the attachment of the support section to the edge face of a standard slab.

By utilizing a support section having a U-shaped edge portion there is obtained the possibility of expansion and contraction in the connection with retained strength and gas tightness. Furthermore, there is an excellent possibility to connect bracings and/or other devices.

The least material consumption for achieving a connection assembly in accordance with the present invention is obtained when the connection section has its legs departing convergingly and directly from its web, to terminate in a pair of stiffening knees or bends with a gap therebetween.

Should a gas tight connection be desired, a suitable strip is placed between the squeezing legs of the respective support sections.

The invention will now be described in connection with the embodiment examples illustrated on the accompanying drawing sheet where

Figure 1 is a cross-section of a first embodiment of a connection assembly in accordance with the invention,

Figures 2 a-e are end views of different support section variants and illustrate various possibilities to connect same as well as other devices, if so desired,

Figures 3 a-c are end views of different connection section variants,

Figure 4 shows a modification of the embodiment according to Figure 1, and

Figure 5 illustrates a way of bracing an assembly according to the invention.

A complete connection assembly is illustrated in Figure 1, e.g. the connection between two ceiling slabs 1 for an air treatment apparatus housing, the

slabs having a first slab face 22 and a second slab face 23 which may be the outside and inside faces respectively of such a housing. Support sections 2 have been arranged on the respective slabs 1 in a mirror-symmetrical way, a connection section 3 being used to provide a locked connection between both slabs.

The connection section 3 has a web 4 from which depart two converging legs 5, so-called locking legs, which are terminated by an inwardly bent knee 9 each and an outwardly bent dito 10 as well as at right angle to the web legs 11, a gap 24 separating both legs, this gap being intended for accomodating squeezing legs 7 of the support sections 2 such as to keep the connection locked. In addition to the squeezing legs 7, the support sections 2 have joining webs 6 and abutment ends 8 as well as a U-shaped edge portion with legs 12 and 25 defining therebetween a gap 26. A resilient seal placed between the squeezing legs 7 has been given the reference numeral 14.

By giving the locking legs 5 a rounded termination at the places where the connection section 3 co-acts with the squeezing legs 7 and abutment ends 8, and with a similarly roun ded junction between these parts, there is ensured the possibility of good engagement and force transmission, which is important to the function.

In the connection assembly in accordance with the invention, the connection section 3 has engagement surfaces 13 against the roots of the U-shaped edge portion with its legs 12 and/or the flat faces of the slab 1. These engagement surfaces comprise the outsides of the legs 5 in Figure 1.

The support sections are suitably screwed to the side faces of the slabs 1. According to a first attachment method the support sections 2 are attached by screws 16 through the attachment web 15 of the section and through the slab, as illustrated in Figure 1 by the screw head and centre line of the screws 16. A seal 17 can be arranged between the face 23 of the slab 1 and the attachment web 15. According to another embodiment, screws 18 are arranged to pass through the edge portion 12 of the support section 2 and into the short side face of the associated element 1. An intermediate seal 17 can also be used here. Where the edge portion is U-shaped, with two legs 12, 25, the screws 18 can be taken through a larger hole in the inner of the two legs, which can then be covered by a plug 19. With the use of a U-shaped edge portion there is greater flexibility in the connection, since the U-shape can be deformed to take up differences and alterations in length. The first attachment method is particularly suitable for cut slabs, where there are no end walls on the slabs or where such can be insecurely attached and with less dimensional accuracy.

Of course, other attachment methods are also possible.

Dependent legs 20 illustrated in the Figures can be used for mounting such as extra details or peripheral equipment pertaining to an air treatment apparatus. The dependent legs 20 may be used for supporting the apparatus if they are on the underside of a floor slab 1. In general, the free dependent legs 20 can be used for mounting or bracing an air treatment apparatus, if the support sections 2 are mounted with the legs 20 on the outside.

Figure 3a illustrates the connection section illustrated in Figure 1. Figure 3b is a modification of the connection section 3, the web 4 continuing out on both sides in the form of double-folded extensions forming engagement flanges 21, the return part of the double bend then being folded at right angles to the web to form locking legs 5', the lower parts of which are provided with a substantially right angular bend 9 towards the plane of symmetry 27 and the ends of the legs are terminated in a right angular bend 10 such as to form a gap 24 between the legs 5' in which the squeezing legs of the support sections are kept locked.

Figure 3c illustrates a modified connection section 3 with outer flanges 21 and at the inner of same locking legs 5" which converge gently towards the symmetrical plane of the section, the lower ends of the legs being folded at 9 such as to be substantially parallel to the web 4 and to terminate in stiffening folds by bending backwards legs 11, with a gap 24 between the two legs in which the squeezing legs of the support sections are kept locked. In the embodiment according to Figure 3c, the legs 11 may form an angle of 90° in relation to the web 4, however. In a corresponding manner, in the embodiment according to Figure 36 the legs 11 can be part of 180° fold or they may be directed towards the web 4. Furthermore, a connection section according to Figure 3a can also include engagement flanges 21.

The engagement flanges 21 are intended to engage against the upper parts of the edge legs 12, or against the flat faces 22 of the slabs. Particularly with engagement against the slab faces 22, this results in a flexibility in the connection since it is then not absolutely necessary for exact fitting and engagement between the support sections 2 and their adjacent slabs 1, and some clearance or variation in spacing between element and side leg 12 can be accepted.

In the embodiment illustrated in Figure 1, the depth of the connection itself, (not counting the free legs 20) is substantially the depth of the slabs 1 united by the connection. Such a size relationship is to be preferred, of course. However, it is also possible to use a connection assembly in accordance with the invention for slabs 1, which

have considerably less or greater depth, e.g. if no other connection assemblies are available or if a very thick insulation is required. For thick slabs, the support sections 2 can be screwed solely into the slab face 23.

Figure 3 shows alternative embodiments of support sections and/or attachment of same and/or additional elements. Accordingly, figure 3 a shows an embodiment, which in principal corresponds to the one shown in figure 1 but having a dependent leg 20, the outer end of which is bent in parallel relation to slab 1 to provide an extra leg 39. In figure 3 b, however, a dependent leg 20 has been omitted. The support section in figure 3 c lacks both an attachment web 15 and a dependent leg 20, but a Z-shaped section 31 is inserted with one leg into gap 26 and constitutes with its web and its other leg parts corresponding to web 15 and leg 30. Between the slab and the section 31 respectively the web 25, there is prefer ably provided an extra section 30 surrounding with a U-shaped part the slab and even being in alignment with that leg of section 31 which corresponds to the dependent leg 20, in which latter region these sections can be interconnected by a screw 32. Section 30 is terminated by a free leg being parallel to the slab and turned away from the assembly. The support section according to figure 3 d corresponds to the one of figure 3 c, but is shows that even an attachment to one of the major surfaces of the slab, prefer ably adjacent to the narrow side is possible. The very attachment is effected by prefer ably a striplike section 33, which may be attached to the slab by means of a screw 34 outside the support section. Figure 3 e is similar to figure 3 d, but shows attachment to the slab by means of a screw 35 penetrating webs 12 and 25. A section 33 is thus lacking and the support section is turned 180°.

Figure 4 is similar to figure 1, but provides also for a U-section 28 surrounding joining webs 6 and being inserted into both gaps 26 with an intermediate sealing 29 covering the area between both joining webs. The screws 18 may extend through the legs of U-section 28 for achieving a very resistable and completely gastight assembly.

In all embodiments, seals and gaskets may be provided at optional locations. Said seals and gaskets may be entirely or partly made of elastic material, for instance rubber for rendering any desired elasticity.

Figure 5 illustrates, that the gap 26 may be used in a very advantageous way to retain a bracing plate 36, e.g. of triangular shape. Such a bracing plate may be provided in two gaps 26 extending within a common plane in a corner area of two adjacent slabs and may be secured by e.g. press rivets 37. The gaps may also be used for retaining securing additional elements of any kind. If it is desired to maintain substantial elasticity wihtin the area, the gapwidths is chosen larger or the thickness of the additional elements smaller, so that a certain play allows that elasticity.

The invention is not restricted to the embodiments described above, and modifications can be made within the scope of the following claims.

Claims

1. A connection assembly primarily for so-called air treatment apparatus housing panels or slabs(1), at least one of the surfaces of each slab that is to be connected is provided with a support section(2), intended for cooperation with a connection section(3)gripping around and locking two adjacent support sections(2), the connection section-(3)having a web (4) from the edges of which there project legs(5), each support section(2)being attached to the said slab via an edge leg(12)-connecting to a joining web(6)and substantially at right angle in relation to the latter a squeezing leg-(7)which is terminated in an abutment end 8, characterized in that the edge leg(12, 25)is U-shaped with one leg(25)being attached to the adjacent slab(1)and the other one(12)being spaced from the first mentioned one via a bend (38) constituting and surrounding a gap (26), that the length (1) of the squeezing leg is less than the thickness (L) of the slab or the assembly and amounts to prefer ably roughly half their size, and that the legs (5) of the connection section simultaneously form locking legs with at least one stiffening bend (9; 10) leading to free end edges (11), which bends are provided to engage in assembled position in the corner area between the squeezing legs (7) and the abutment ends of the two support sections (2), the connection section (3) abutting simultaneously the said bends (38) of the edge legs and optionally even the one major surface (22) of the slabs with exterior engagement surfaces (13).

2. An assembly as claimed in claim 1, characterized in that both locking legs (5) of the connection section (3) extend such that they start by converging in a direction away from the web (4) and towards the symmetrical plane (27) of the section and at their portions remote from the web they are folded at (9) to converge towards the web (4) and the plane (27) for subsequently terminating at a bend (at 10) to leave a gap (24), in which the squeezing legs (7) are retained in a locked position.

3. An assembly as claimed in claim 1, characterized in that locking legs (5') depend at right angles from the web (4) of the connection section (3) at a distance inwards from the outmost edges thereof, and after a substantially right angular bend

(9) towards the symmetrical plane (27) of the section are terminated at another right angular bend (10) in a direction away from the web to form a gap (24), in which the squeezing legs are retained in a locked position.

4. An assembly as claimed in claim 1, characterized in that the locking legs (5") depend convergingly from the web (4) of the connection section (3) at a distance inwards from the outmost edges thereof in a direction towards its symmetrical plane (27), subsequent to which they are folded such as to be substantially parallel to the web (4) and are terminated by stiffening folds to leave a gap (24), in which the squeezing legs are retained in a locked position.

5. An assembly as claimed in one or more of the preceding claims, characterized in that the connection section (3) in the extension of the web (4) outside the line of departure of the legs (5) has double-folded engagement flanges (21) having said engagement surfaces (13).

6. An assembly as claimed in any of claims 1 - 5, characterized in that the edge leg is attached to the adjacent slab by means of a screw (18), the scull of which has been prefer ably passed through a larger hole in the free edge leg (12),which hole prefer ably is intended for receiving and being covered by a plug (19) upon insertion of the screw (18).

7. An assembly as claimed in any of claims 1 - 6, characterized in that the gap (26) between both edge legs (12, 25) is provided to retain at least one additional element, e.g. a bracing plate or the like (36), which prefer ably is securable by press rivets (37) extending through both legs (12, 25) and the bracing or the like (36).

8. An assembly as claimed in any of claims 1 - 7, characterized in that between the support section (2) and the adjacent slab (1) there is provided a section or the like (30; 31; 33), which is securable to the slab along with and/or outside the support section, possibly replacing attachment of the support section to the slab.

9. An assembly as claimed in any of claims 1 - 8, characterized in that the gaps (26) of two support sections (2) forming an assembly are provided to retain a common section, prefer ably a U-section (28), prefer ably with an intermediate seal (29) covering the area between two adjacent joining webs (6).

10. An assembly as claimed in any of claims 1 - 9, characterized in that at least one support section (2) is provided on one of the major surfaces of the adjacent slab (1) and/or being secured there, and/or that the gap (26) is open towards adjacent narrow side of the slab or in the opposite direction.

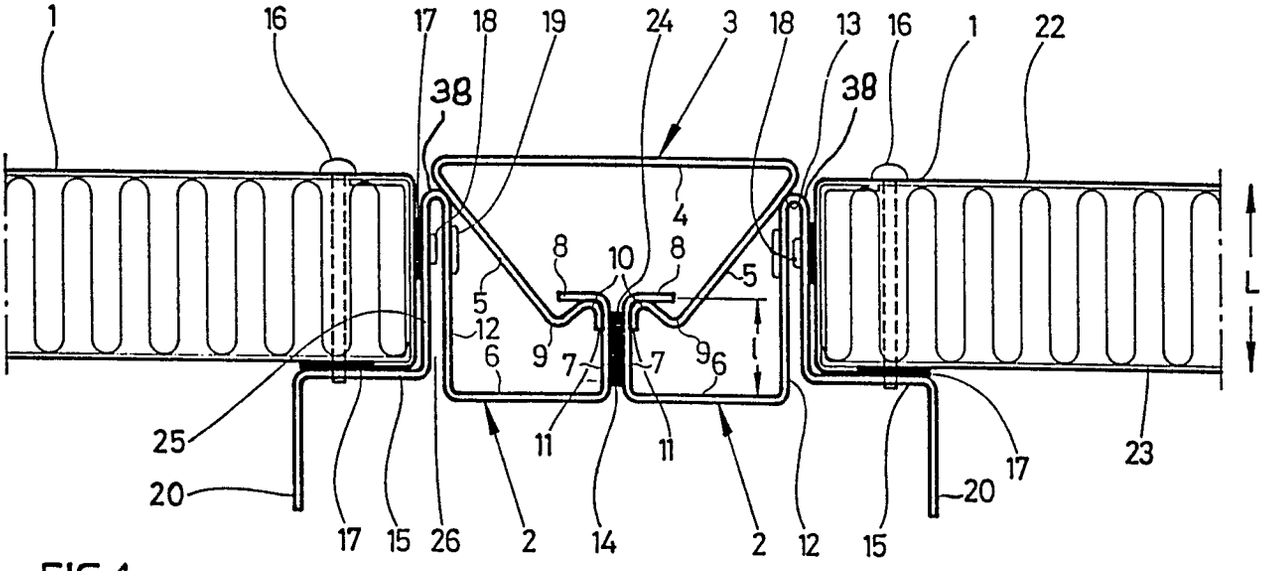
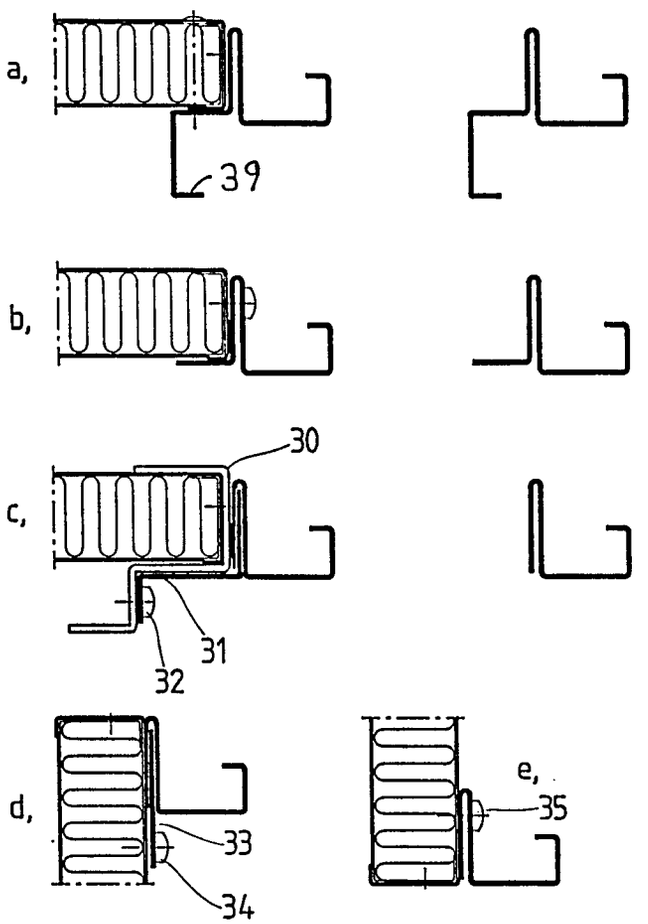


FIG.1

FIG.2



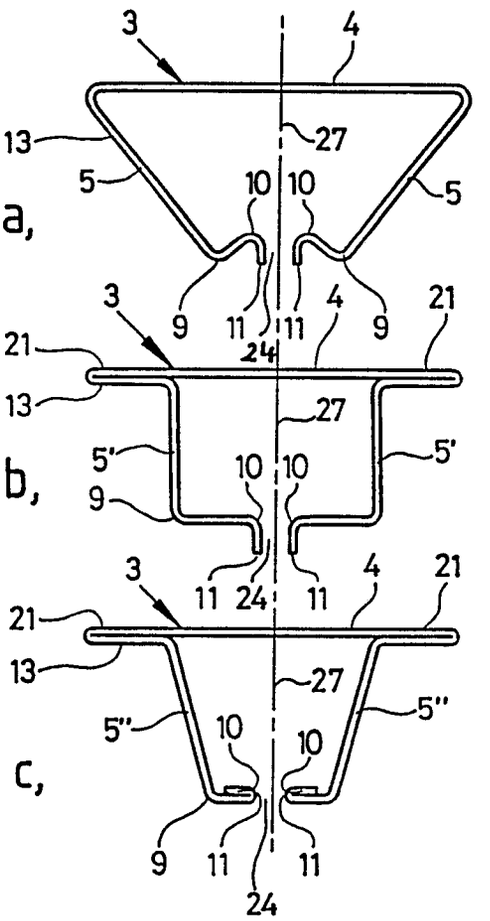


FIG.3

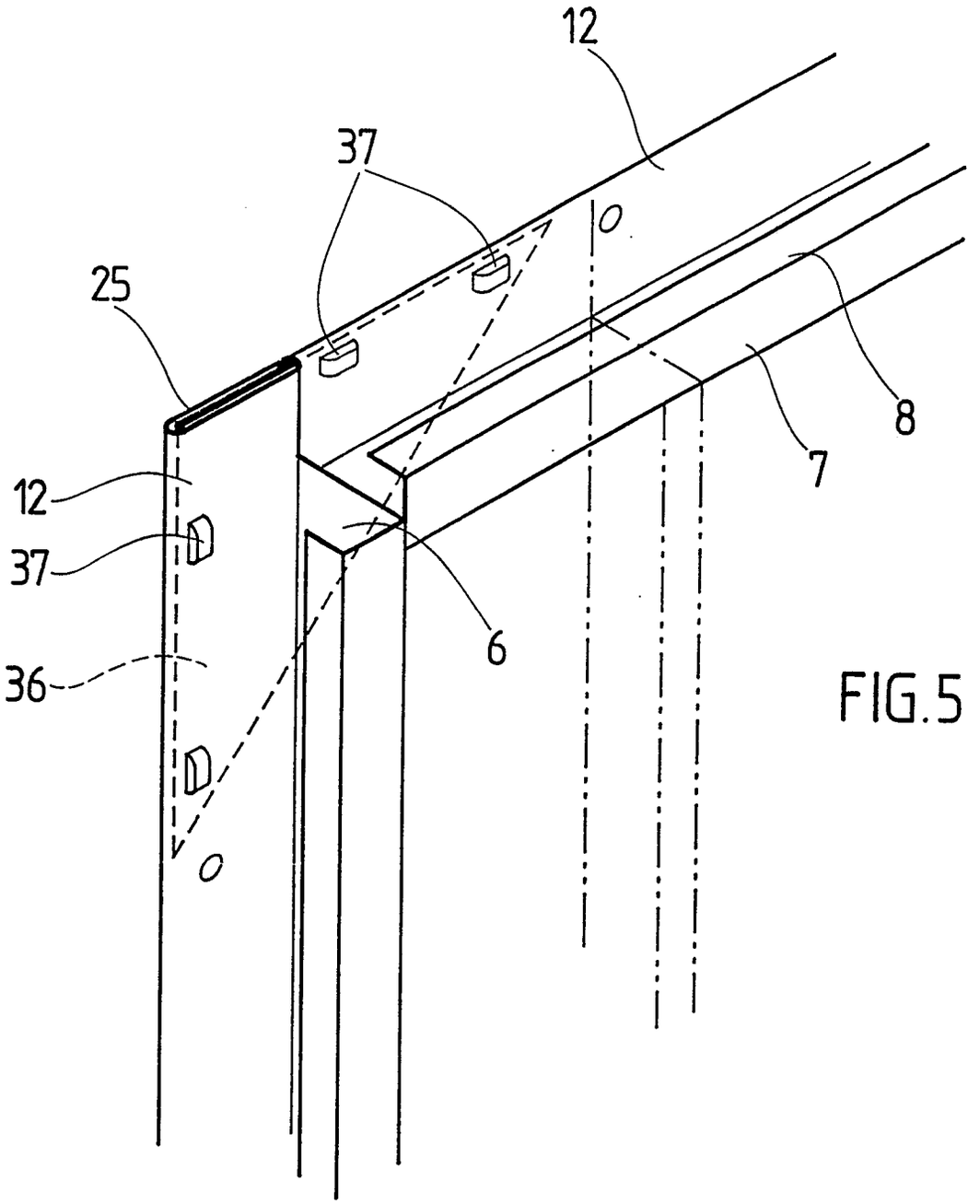


FIG.5

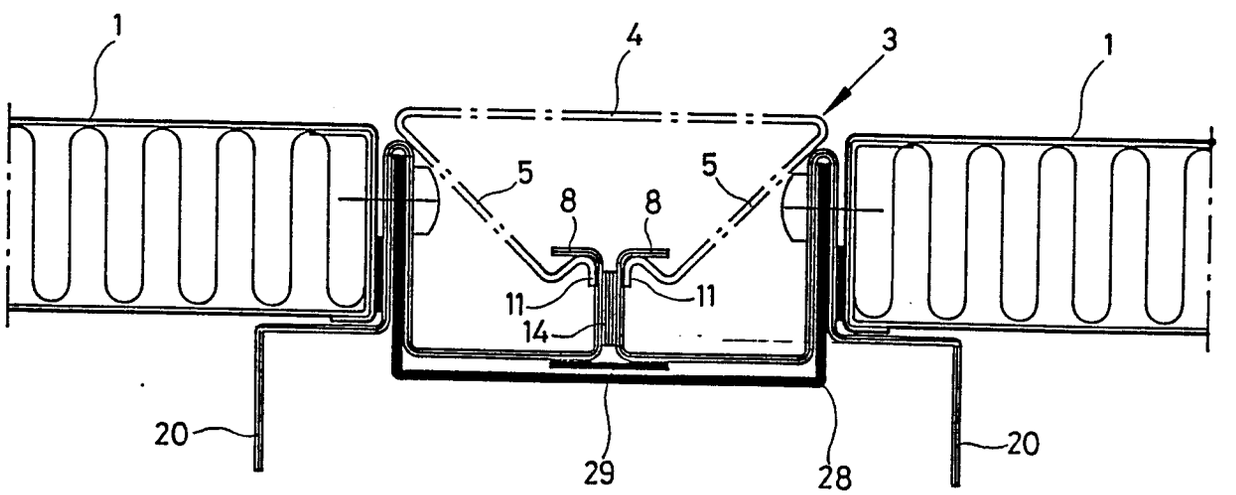


FIG.4