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(54) **Modular electric radiator**

Modularer Elektrischer Heizkörper

Radiateur électrique modulaire

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US-A- 2 646 972 US-A- 3 031 171
US-B1- 6 205 290

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Description

OBJECT OF THE INVENTION

[0001] The present invention refers to an electric heater or heating radiator.

[0002] The object of the invention is to simplify the constructive structure of radiators by achieving that this is implemented in a simple and modular manner and the manufacture of which is easy. It is based on assembling aluminium profiles made to engage on each other by simply applying pressure, without screws, and it has an internal heating system which transmits the heat by conduction to the aluminium profiles which in turn release it into the surroundings by radiation and by convection.

BACKGROUND OF THE INVENTION

[0003] There are two classic types of radiator built in aluminium, one with ingress and egress of water and another with a closed chamber containing a thermal liquid (oil). In the first case, previously heated water usually flows through the radiators. In the second case, the oil is heated by means of an electric resistance with which the radiator is equipped.

[0004] The radiators employed up to now are formed from injected aluminium elements which are joined to each other, by means of left-hand and righthand thread couplings, the constitution of the radiators being quite complicated for this reason.

[0005] Moreover, in the case of radiators which work with water, it is necessary to have a pipe system and a boiler, which together with the radiators themselves constitute an interconnected and also interdependent installation.

[0006] When they are hermetic with oil and have a conventional electric resistance element, neither boiler nor pipes are necessary, but the drawback remains of having a chamber of oil under pressure and, consequently, the risk that leaks can occur.

[0007] Also, when equipped with a conventional electric resistance, the risk is present that an electrical shunt can arise with the danger that this involves. This risk can be considerably diminished with special resistance elements with double insulation but at a substantial extra cost.

[0008] The patent US-6 205 290 describes an electric heater including a receiving chamber formed by heat sinks members.

DESCRIPTION OF THE INVENTION

[0009] The modular electric radiator which constitutes the object of this invention is built in aluminium in accordance with a particular structural design, has an alternative form of heating and offers safe operation with electric protection similar to that of the insulated resistance elements, without chambers under pressure and without flu-

id, with significantly improved characteristics in comparison with the radiators cited in the previous section.

[0010] The radiator of the invention has been conceived to avoid or resolve the problem which a receptacle under pressure and with oil or water signifies. They also provide enhanced electrical safety, within costs below those of radiators with conventional resistance elements.

[0011] More specifically, the radiator is constituted from a profile of extruded aluminium, which has a series of parallel fins, the configuration of which allows good dissipation and emission of the heat, and also it can be assembled to the following profile and successively to all those that constitute the radiator. For this purpose the fins have on their ends a kind of confronting hooks which facilitate their coming together by displacement on inclined planes until they interlock on reaching the anchor point impeding their return and leaving the radiator mounted.

[0012] This solution allows heaters to be configured of diverse lengths, heights and ratings, with assembling simply by pressure.

[0013] The modular radiator object of the invention also has the particularity that it has at least one housing into which is inserted, transversally to the profiles, a heating plate, which constitutes one of the essential features of the invention and which, due to the special configuration thereof, achieves an effective transmission of heat by conduction with maximum electrical safety.

[0014] The incorporation of two or more housings at different heights in the structure constituting the radiator allows the incorporation of two or more heating plates which can be located strategically to achieve a more uniform diffusion of the heat and obtain homogeneity of the temperatures in the surroundings.

[0015] In a first constructive solution the heating plate incorporates one or more resistances of resistance wire wound on some base boards of insulating material, usually Micanite, which are mounted, in sandwich form, between two sheets of the same insulating material and of such dimensions that they surpass the external boundary of the resistances with the object of obtaining perfect electrical isolation in all directions. The emergence of the insulated cables from the interior allows an entirely safe electrical connection.

[0016] This "sandwich" is inside an external enclosure of aluminium sheet which through a stamping process is constituted in a closed, hollow and elastically compressible profile provided with prominent sectors alternating with recesses which define cavities of different size.

[0017] The wider cavities define a total thickness of the enclosure somewhat greater than the width of the housing foreseen in the extruded aluminium profiles and the less wide cavities are somewhat larger than the thickness of the Micanite "sandwich".

[0018] When introducing the complete heating plate into its housing, the narrower and more rigid cavity in the enclosure forces the entire enclosure to be compressed elastically, assuring a constant pressure between the re-

sistance wire and the Micanite sheets, which pressure is transmitted from the sheets to the aluminium enclosure and, finally from the enclosure to the extruded profiles, achieving thereby an effective chain for transmission of heat by conduction from the interior to the body of the radiator.

[0019] In another possible constructive solution of the heating plate, it consists of a closed, hollow, elastically compressible profile, which conforms an aluminium enclosure obtained by a stamping or rolling process which incorporates a central tubular receptacle in which is held a straight shielded tubular resistance element which has electric terminals on each end for their connection to the electricity mains.

[0020] The closed profile alternates two prominent sectors of preferably trapezoidal configuration with a recess of the same configuration in which the tubular receptacle is defined.

[0021] The width of the closed profile, defined between its prominent sectors, is greater in size than the foreseen width of the housing defined between the fins, so that in the tubular receptacle the resistance is mounted with play, in such a way that on introducing the heating plate in the housing defined between fins, the enclosure is forced into elastic compression and remains adapted in said position, and also the tubular resistance is subjected to pressure in the tubular receptacle, achieving in this way an effective chain of transmission of heat by conduction from the resistance to the fins.

[0022] The radiator is finished in the upper part with a piece which closes each profile favouring the diffusion of the heat which rises by convection, as well as protecting the edges produced in the operation of obtaining the profile by cutting, achieving at the same time an aesthetically very attractive finish.

[0023] This finishing piece is inserted by simple pressure inside each aluminium profile, having fins which allow its insertion but impede its extraction.

[0024] The radiator so constituted offers a high efficiency for its special configuration, and also allows power consumption to be controlled by means of electric devices and programmers which are incorporated therein, and requires no type of installation or building work, nor boilers, gas flues, pipes, etc., and needs no type of maintenance.

[0025] It is also convenient to point out the fact that the heat which the disclosed modular electric radiator delivers is healthy, free from odours and with a uniform distribution of the heat, it being possible to program each of them independently and even displace them with no problem from one location to another.

DESCRIPTION OF THE DRAWINGS

[0026] To complete the description that is being made and with the object of assisting in a better understanding of the characteristics of the invention, in accordance with a preferred example of practical embodiment thereof, as

an integral part of said description, the same is accompanied with a set of drawings wherein, by way of illustration and not restrictively, the following has been represented:

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Figure 1. - It shows a representation according to a general perspective of a first aluminium profile and part of a second identical profile, coupled with the first to form a modular electric radiator in accordance with the object of the invention, in which the heating plate is observed penetrating into the housing defined in the radiator and the finishing piece facing one of the profiles on which it fits.

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Figure 2. - It shows a front view in which the elements are observed which form the sandwich, in which one of the sheets has not been represented.

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Figure 3. - It shows a side view in cross section of a first embodiment of the heating plate with the external enclosure thereof.

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Figure 4. - It shows a side view of the radiator in which the location of the heating plate in a housing is observed.

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Figure 5. - It shows a plan view of the radiator in which the position is observed of the heating plate with respect to the profiles which constitute the radiator, the method of engagement between profiles being appreciated.

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Figure 6. - It shows a view in perspective of the modular electric radiator configured by two modules and the top cover, wherein individual heating plates are appreciated located at different heights.

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Figure 7. - It shows a view in elevation of the modular electric radiator with the heating plates lodged in housings located at different heights.

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Figure 8. - It shows a view in detail of a second embodiment of the heating plate which incorporates the central tubular resistance.

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Figure 9. - It shows a view in perspective of the electric radiator configured by two modules and a top cover in which the heating plates are observed equipped with central tubular resistance.

Figure 10. - It shows a view in elevation of the electric radiator of the previous figure in which the location is observed in respective housings of heating plates equipped with tubular resistance.

PREFERRED EMBODIMENT OF THE INVENTION

[0027] In the light of the aforesaid figures it can be ob-

served how the modular electric radiator implemented in accordance with the object of the invention comprises two or more profiles (1, 1'), preferably of aluminium which are assembled to each other and are equipped with parallel heat dissipating fins (2, 2', 2'') forming a modular assembly which incorporates at least one electric heating plate (4, 4') inserted in at least one housing (5) defined between the heat dissipating fins (2, 2', 2'').

[0028] The heating plate (4, 4') has an external enclosure (11, 11') which can be of aluminium obtained by stamping, consisting of an elastically compressible closed symmetrical profile of width slightly greater than the width of the housing (5) for the press-fitting thereof into said housing (5).

[0029] The housing (5) in which the electric heating plate (4, 4') is inserted will usually be defined between two central dissipating fins (2'') and its width will correspond to the spacing between those two central dissipating fins (2'').

[0030] In a first embodiment the heating plate (4) comprises one or more base plates (7) of Micanite, on which a resistance wire (8) is wound, which are located between a pair of sheets (9), also of Micanite, configuring a sandwich (10) which is completed with the external enclosure (11) which has prominent sectors (12) alternating with recesses (13), which recesses (13) define in their interior a cavity of width slightly greater than the thickness of the sandwich (10), which is compressed elastically on inserting the heating plate (4) in the housing (5) assuring a constant pressure between the resistance wire (8) and the Micanite sheets (9) and between these and the external enclosure (11) of aluminium. Thus an effective transmission of heat is achieved by conduction from the resistance wires (8) to the outermost sector of the profiles (1, 1'), and from these to the surroundings.

[0031] In a second embodiment the radiator incorporates at least a second electric heating plate (4'), as is represented in figure 8, which comprises a hollow, elastically compressible enclosure (11'), which incorporates a central tubular receptacle (7) which houses a straight, shielded and tubular resistance (15) which has electric terminals on each end for its connection to the electric mains.

[0032] The enclosure (11') is formed on its sides by prominent sectors (12'), of configuration preferably trapezoidal, alternating with a recess in which there is a tubular receptacle (7) of slightly greater diameter than the diameter of the resistance (15) which is fixed to the enclosure (11') by elastic deformation of this on being inserted into the housing (5).

[0033] It has been foreseen that each profile (1) has some internal fins (2') of greater length than the rest of the fins (2, 2'') provided with means of engagement on their ends (3) for their anchoring with complementary other means of engagement (3) defined on the internal fins (2') of the contiguous profile, the central fins (2'') and side fins (2) remaining with their edges at scant distance from those corresponding on the contiguous profile (1') to

guarantee transmission of the heat.

[0034] The means of engagement (3) of each of the profiles (1, 1') consist of some latches (3) by way of opposing hooks provided with inclined planes which facilitate their approximation until reaching an anchoring point in which they latch impeding their return so that the profiles (1, 1') are coupled and the radiator is mounted.

[0035] The heating plate (4, 4') can be retained in a lower housing (5) by means of a closing cover (6), as is observed in figure 4, said closing cover (6) being coupled underneath between the central dissipating fins (2'').

[0036] The profiles (1, 1') with the heating plate (4) can be enclosed in an external casing, the radiator being thereby suitable for locating anywhere with no need for building work nor installations of any type, including appropriate means for the control of power and temperature.

[0037] The radiator incorporates a finishing piece (14) on its top part which is fitted by simple pressure on each of the profiles (1, 1') favouring the diffusion of heat which rises by convection and protecting the edges of the profile.

Claims

1. Modular electric radiator comprising two or more profiles (1, 1'), preferably of aluminium which are assembled to each other and are equipped with parallel heat dissipating fins (2, 2', 2''), and also it incorporates at least one electric heating plate (4, 4') inserted in at least one housing (5) defined between the heat dissipating fins (2, 2', 2''), **characterized in that** the heating plate (4, 4') comprises an external enclosure (11, 11') which consists of an elastically compressible closed symmetrical profile of slightly greater width than the width of the housing (5) for the press-fitting thereof in said housing (5).
2. Modular electric radiator according to claim 1 **characterized in that** the heating plate (4) further comprises at least one base plate (7) of Micanite on which is wound a resistance wire (8), which are located between a pair of sheets (9), also of Micanite, of greater surface area than the base plates (7) configuring a sandwich (10) inserted in the external enclosure (11) which transmits the heat from the sandwich to the profiles (1, 1') and from these to the surroundings.
3. Modular electric radiator according to claim 2 **characterized in that** the external enclosure (11) has prominent sectors (12) alternating with recesses (13), defining inside the recesses (13) a cavity of slightly greater width than the thickness of the sandwich (10) for the fitting of the external enclosure (11) against the sandwich (10) by elastic deformation of said external enclosure (11) on inserting the heating

plate (4) in the housing (5).

4. Modular electric radiator according to claim 1 **characterized in that** the external enclosure (11'), is formed on its sides by prominent sectors (12'), alternating with a recess in which there is a tubular receptacle (7) which houses a straight shielded tubular resistance (15), which has electric terminals on each end for the connection thereof to the electric mains.
5. Modular electric radiator according to claim 4, **characterized in that** the central tubular receptacle (7) is of slightly greater diameter than the diameter of the resistance (15) in order to establish contact between the enclosure (11') and the resistance (15) by elastic deformation of the enclosure (11') on the heating plate (4') being inserted in the housing (5).
6. Modular electric radiator according to claim 1, **characterized in that** the housing (5) in which the electric heating plate (4, 4') is inserted is defined between two central dissipating fins (2").
7. Modular electric radiator according to claim 1 **characterized in that** each profile (1) has some internal fins (2'), of greater length than the rest of the fins (2-2"), provided with means of engagement (3) on their ends for their anchoring with complementary other means of engagement (3) defined on the internal fins (2') of the contiguous profile (1'), the central fins (2") and side fins (2) remaining with their edges at scant distance from those corresponding on the contiguous profile (1') to guarantee transmission of the heat.
8. Modular electric radiator according to claim 7 **characterized in that** the means of engagement (3) of each of the profiles (1, 1') consist of some latches (3) by way of opposing hooks provided with inclined planes which facilitate their approximation until reaching an anchor point in which they latch onto each other impeding their return.
9. Modular electric radiator according to claim 1 **characterized in that** it incorporates a cover (6) which is coupled underneath between the central dissipating fins (2") retaining the heating plate (4, 4') in the housing (5).
10. Modular electric radiator according to claim 1 **characterized in that** it incorporates a finishing piece (14) which closes each profile (1), in the top part thereof, favouring the diffusion of the heat which rises by convection and protecting the edges.

Patentansprüche

1. Modularer elektrischer Heizkörper mit zwei oder mehr vorzugsweise aus Aluminium gebildeten Profilen (1,1'), die aneinander befestigt sind und mit parallelen Wärmeverteilungsrippen (2,2',2") versehen sind, und ferner mit mindestens einer elektrischen Heizplatte (4,4'), die in mindestens ein zwischen den Wärmeverteilungsrippen (2,2',2") ausgebildetes Gehäuse (5) eingeführt ist, **dadurch gekennzeichnet, dass** die Heizplatte (4,4') eine äußere Einfassung (11,11') aufweist, die aus einem elastisch zusammendrückbaren, geschlossenen, symmetrischen Profil besteht, dessen Breite etwas größer ist als die Breite des Gehäuses (5), um das Profil durch Presseinpassung in dem Gehäuse (5) anzuordnen.
2. Modularer elektrischer Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** die Heizplatte (4) ferner mindestens eine Basisplatte (7) aus Mikanit aufweist, auf die ein Widerstandsdraht (8) gewickelt ist, wobei die mindestens eine Basisplatte zwischen einem Paar ebenfalls aus Mikanit bestehender Platten (9) angeordnet ist, das einen größeren Oberflächenbereich als die Basisplatten (7) hat und das eine Sandwich-Anordnung (10) bildet, die in die äußere Einfassung (11) eingeführt ist, welche die Wärme aus der Sandwich-Anordnung an die Profile (1,1') und von diesen in die Umgebung überträgt.
3. Modularer elektrischer Heizkörper nach Anspruch 2, **dadurch gekennzeichnet, dass** die äußere Einfassung (11) vorstehende Sektoren (12) aufweist, die mit Vertiefungsbereichen (13) alternieren, wobei die äußere Einfassung in den Vertiefungsbereichen (13) einen Hohlraum definiert, dessen Breite etwas größer ist als die Dicke der Sandwich-Anordnung (10), um beim Einführen der Heizplatte (4) in das Gehäuse (5) durch elastische Verformung der äußeren Einfassung (11) die äußere Einfassung (11) passend in Anlage gegen die Sandwich-Anordnung (10) zu bringen.
4. Modularer elektrischer Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** die äußere Einfassung (11') an ihren Seiten durch vorstehende Sektoren (12') gebildet ist, die mit einer Vertiefung alternieren, in der eine rohrförmige Aufnahme (7) mit einem darin untergebrachten geradlinigen, abgeschirmten, rohrförmigen Widerstand (15) angeordnet ist, der an jedem Ende elektrische Anschlüsse zur Verbindung des Widerstands mit dem Netzanschluss aufweist.
5. Modularer elektrischer Heizkörper nach Anspruch 4, **dadurch gekennzeichnet, dass** die zentrale rohrförmige Aufnahme (7) einen etwas größeren Durch-

messer hat als der Durchmesser des Widerstands (15), um beim Einführen der Heizplatte (4') in das Gehäuse (5) durch elastische Verformung der Einfassung (11') einen Kontakt zwischen der Einfassung (11') und dem Widerstand (15) herzustellen.

6. Modularer elektrischer Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** das Gehäuse (5), in das die elektrische Heizplatte (4,4') eingeführt ist, zwischen zwei zentralen Verteilungsrippen (2'') definiert ist.

7. Modularer elektrischer Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes Profil (1) eine Anzahl innerer Rippen (2') aufweist, deren Länge größer ist als diejenige der übrigen Rippen (2-2'') und die an ihren Enden mit Eingriffsvorrichtungen (3) zur Verankerung mit komplementären weiteren Eingriffsvorrichtungen (3) versehen sind, welche an den inneren Rippen (2') des angrenzenden Profils (1') definiert sind, wobei zur Gewährleistung der Wärmeübertragung die zentralen Rippen (2'') und die seitlichen Rippen (2) mit ihren Rändern in engem Abstand zu den Rändern verbleiben, die dem angrenzenden Profil (1') entsprechen.

8. Modularer elektrischer Heizkörper nach Anspruch 7, **dadurch gekennzeichnet, dass** die Eingriffsvorrichtungen (3) jedes der Profile (1,1') aus einer Anzahl von Verriegelungsteilen (3) in Form einander gegenüberliegender Haken bestehen, die mit schrägverlaufenden Ebenen versehen sind, welche ihre gegenseitige Annäherung erleichtern, bis die Haken einen Verankerungspunkt erreichen, an dem sie verriegelnd miteinander zusammengreifen und ihre Rückbewegung verhindern.

9. Modularer elektrischer Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der Heizkörper eine Abdeckung (6) aufweist, die unten zwischen den zentralen Verteilungsrippen (2'') befestigt ist, wobei sie die Heizplatte (4,4') in dem Gehäuse (5) rüchhält.

10. Modularer elektrischer Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** der Heizkörper ein Endstück (14) aufweist, das jedes Profil (1) in dessen oberen Bereich schließt sowie die Verteilung der durch Konvektion aufsteigenden Wärme begünstigt und die Ränder schützt.

Revendications

1. Radiateur électrique modulaire comportant deux ou plusieurs profilés (1, 1') de préférence en aluminium, assemblés l'un à l'autre et équipés d'ailettes de dissipation de chaleur, parallèles (2, 2', 2'') et comportant au moins une plaque chauffante électrique (4,

4') insérée dans au moins un logement (5) formé entre les ailettes de dissipation de chaleur (2, 2', 2''), **caractérisé en ce que**

la plaque chauffante (4, 4') comporte une enceinte externe (11, 11') formée d'un profilé symétrique fermé, susceptible d'être comprimé élastiquement, et ayant une épaisseur légèrement supérieure à celle du logement (5) pour y être placée de manière serrée.

2. Radiateur électrique modulaire selon la revendication 1,

caractérisé en ce que

la plaque chauffante (4) comporte en outre au moins une plaque de base (7) en micanite, sur laquelle est enroulé un fil résistant (8) placée entre une paire de feuilles (9) également en micanite, de plus grande surface que les plaques de base (7), selon une configuration en sandwich (10), insérée dans l'enceinte externe (11) transmettant la chaleur à partir de la structure en sandwich vers les profilés (1, 1') et à partir de ceux-ci, à l'environnement.

3. Radiateur électrique modulaire selon la revendication 2,

caractérisé en ce que

l'enceinte externe (11) comporte des secteurs (12) en saillie, alternant avec des creux (13) formant, sur le côté intérieur, une cavité de largeur légèrement supérieure à l'épaisseur de la structure en sandwich (10) pour recevoir l'enceinte externe (11) appliquée contre la structure en sandwich (10) par déformation élastique de l'enceinte externe (11) lors de l'insertion de la plaque chauffante (4) dans le logement (5).

4. Radiateur électrique modulaire selon la revendication 1,

caractérisé en ce que

l'enceinte externe (11') a des côtés formés avec des secteurs en saillie (12') alternant avec un creux recevant un réceptacle tubulaire (7) logeant une résistance tubulaire (15) gainée, droite, ayant à chacune de ses extrémités des bornes électriques pour son branchement sur l'alimentation électrique.

5. Radiateur électrique modulaire selon la revendication 4,

caractérisé en ce que

le réceptacle tubulaire central (7) a un diamètre légèrement supérieur au diamètre de la résistance (15) pour réaliser le contact entre l'enceinte (11') et la résistance (15) par déformation élastique de l'enceinte (11') de la plaque chauffante (4') insérée dans le logement (5).

6. Radiateur électrique modulaire selon la revendication 1,

caractérisé en ce que

le logement (5) dans lequel est insérée la plaque chauffante électrique (4, 4') est défini entre deux ailettes centrales de dissipation (2'').

7. Radiateur électrique modulaire selon la revendication 1, 5
caractérisé en ce que
chaque profilé (1) a quelques ailettes internes (2') de longueur plus grande que la partie restante des ailettes (2-2'') et comportant des moyens d'imbrication (3) aux extrémités pour s'accrocher à des moyens d'imbrication complémentaires (3) prévus sur les ailettes internes (2') du profilé adjacent (1'), les ailettes centrales (2'') et le bord des ailettes latérales (2) restant écartés du profilé adjacent (1') pour garantir la transmission de la chaleur. 10
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8. Radiateur électrique modulaire selon la revendication 7, 20
caractérisé en ce que
le moyen d'imbrication (3) de chacun des profilés (1, 1') se compose de quelques verrous (3) avec des crochets opposés prévus sur le plan incliné facilitant leur approche jusqu'à atteindre un point d'accrochage pour lequel ces moyens sont verrouillés l'un à l'autre, interdisant leur mouvement inverse. 25
9. Radiateur électrique modulaire selon la revendication 1, 30
caractérisé en ce qu'
il comporte un couvercle (6) dont le dessous est couplé entre les ailettes de dissipation centrales (2'') retenant la plaque chauffante (4, 4') dans le logement (5). 35
10. Radiateur électrique modulaire selon la revendication 1, 40
caractérisé en ce qu'
il comporte une pièce de finition (14) fermant la partie supérieure de chaque profilé (1) et favorisant la diffusion de la chaleur montant par convection et protégeant les bords. 45

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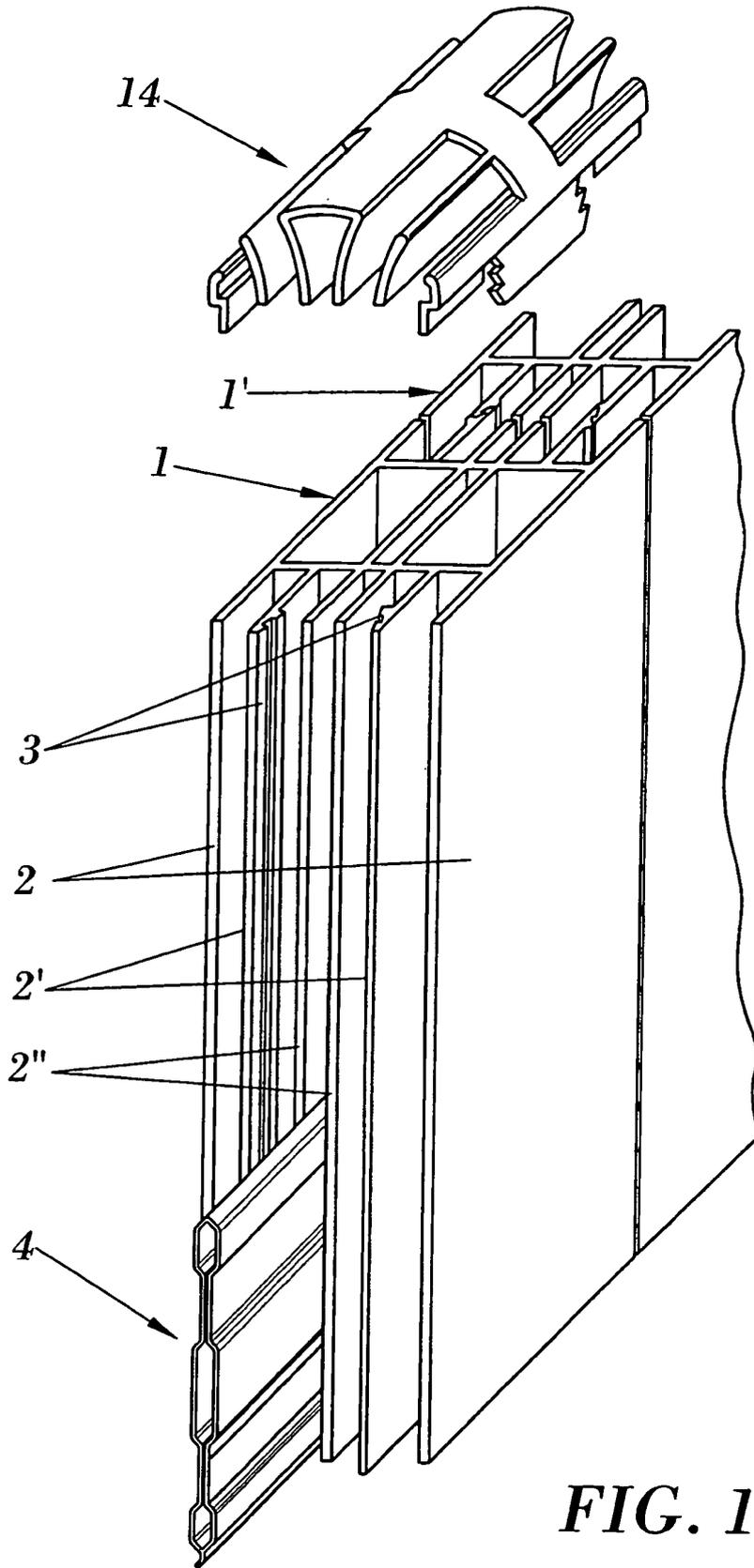


FIG. 1

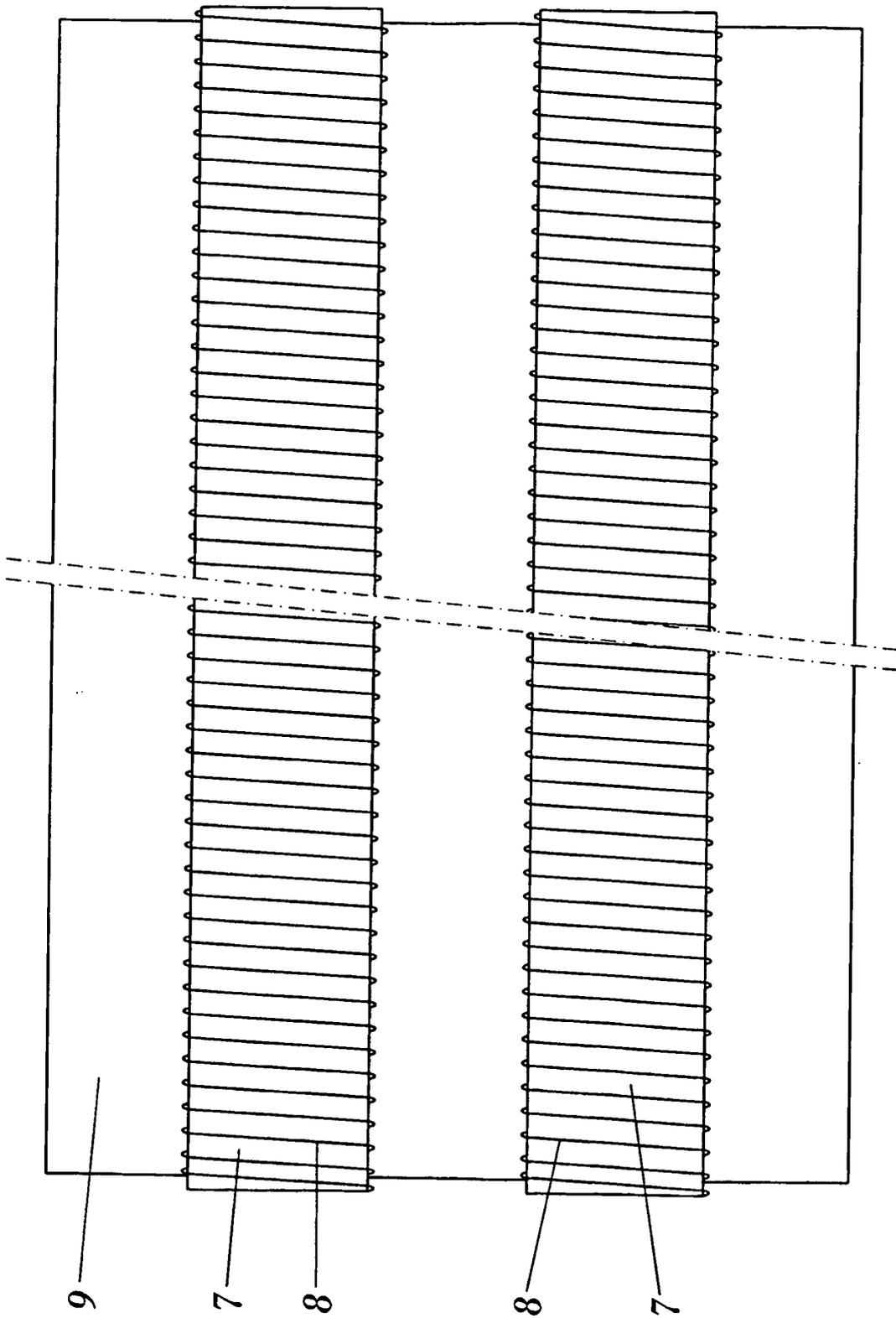


FIG. 2

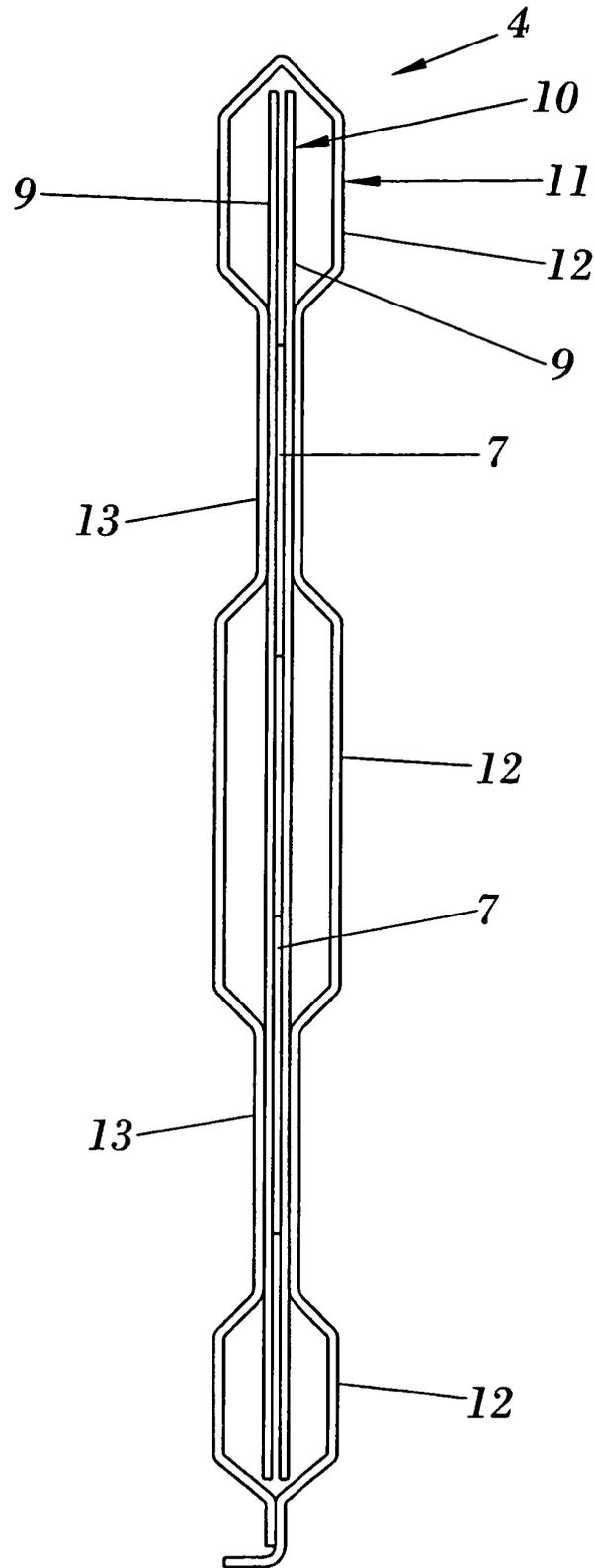


FIG. 3

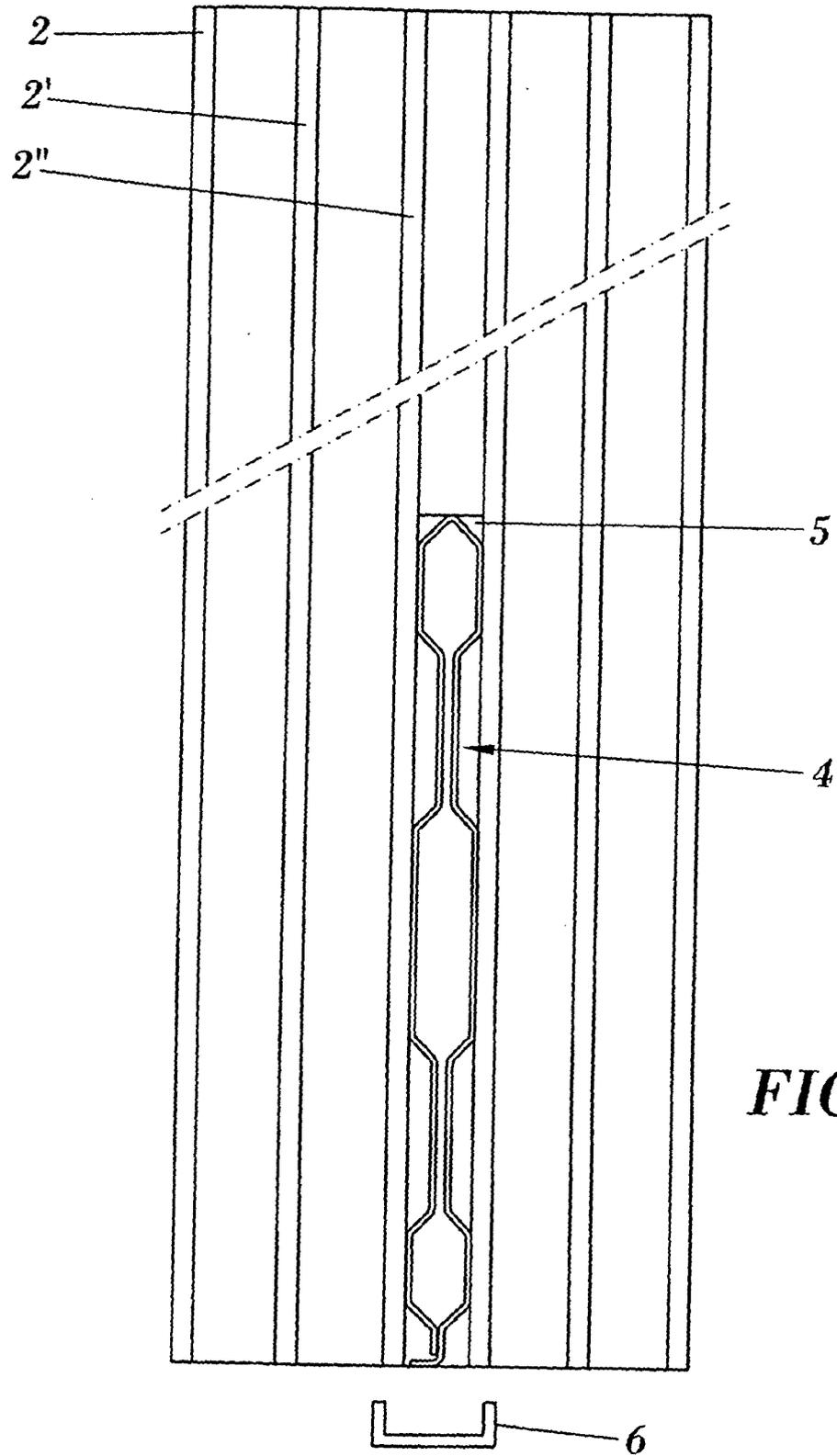


FIG. 4

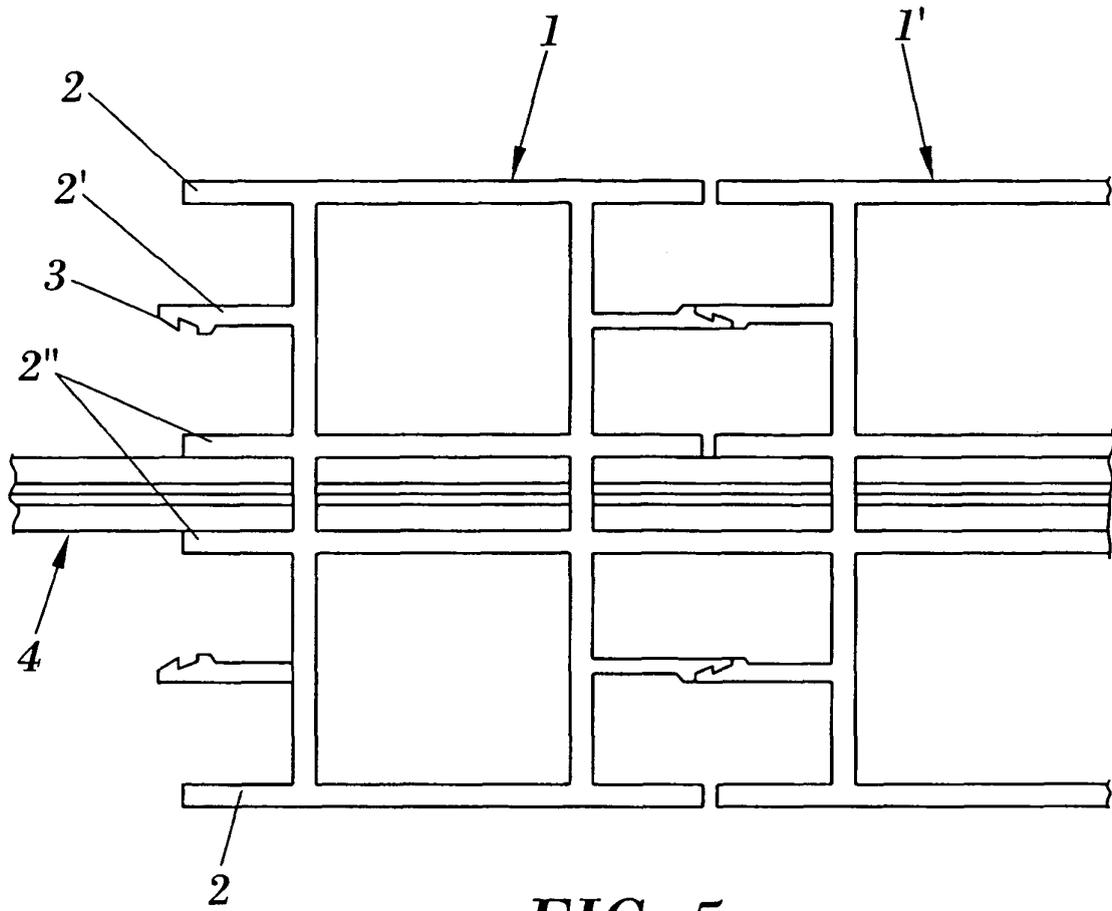


FIG. 5

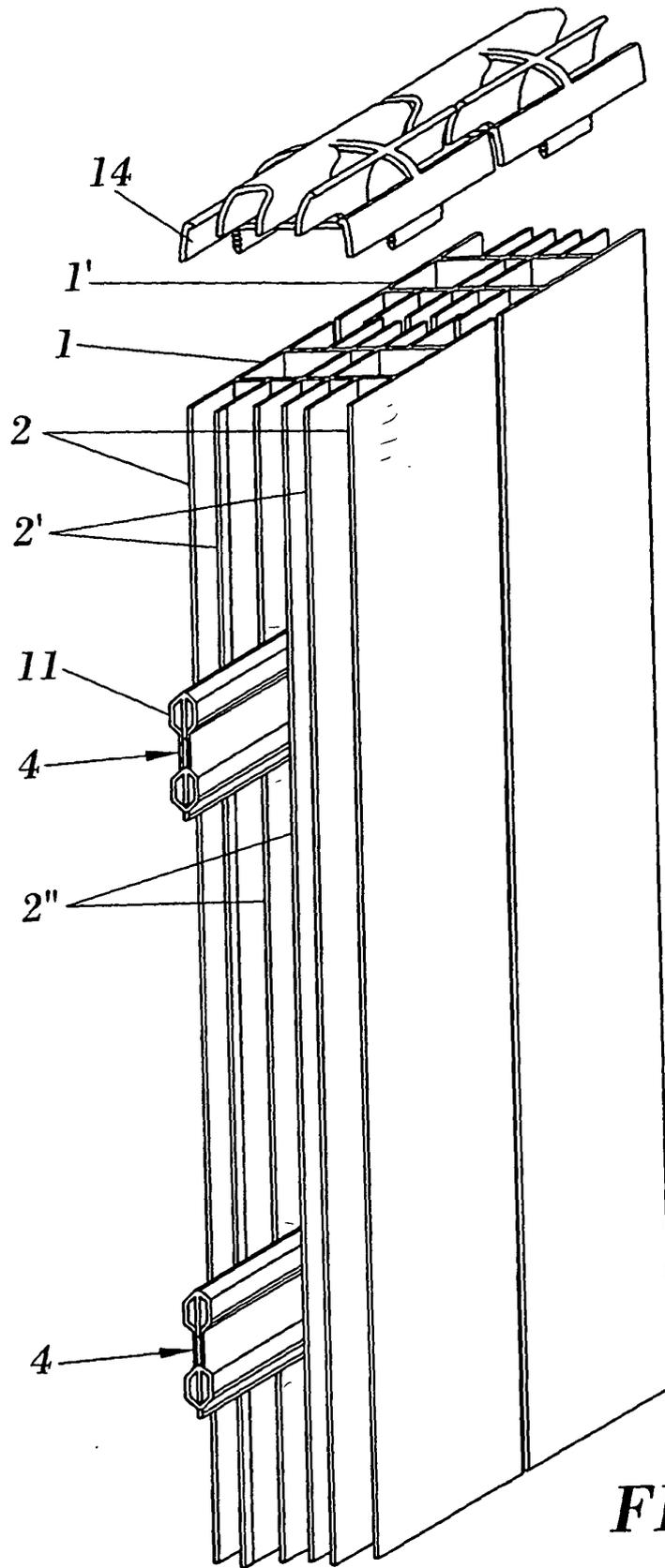


FIG. 6

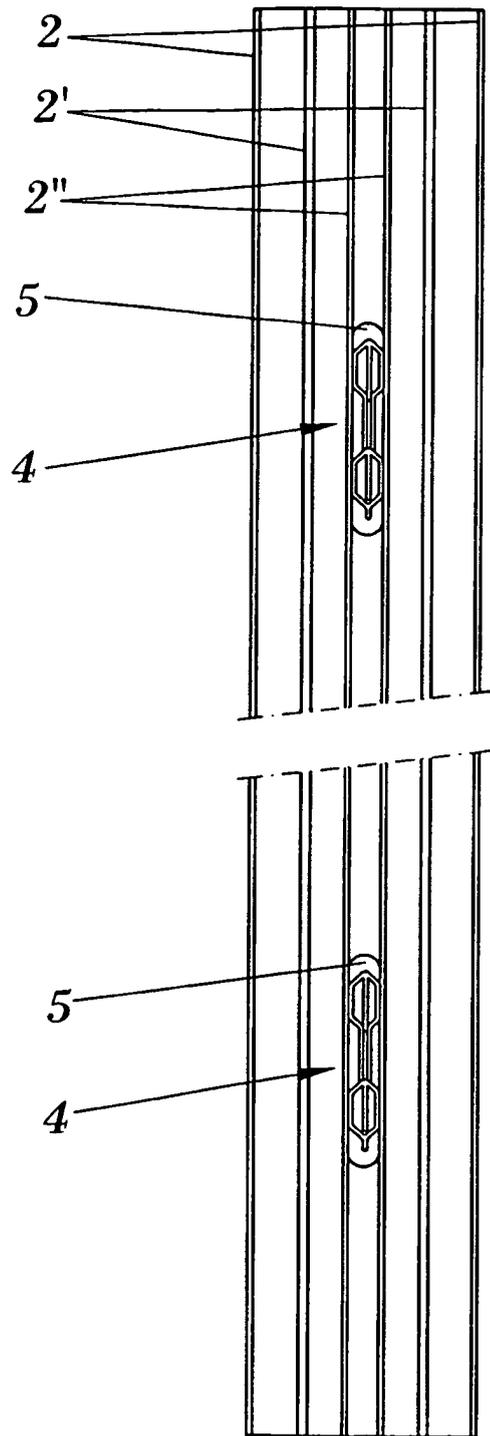


FIG. 7

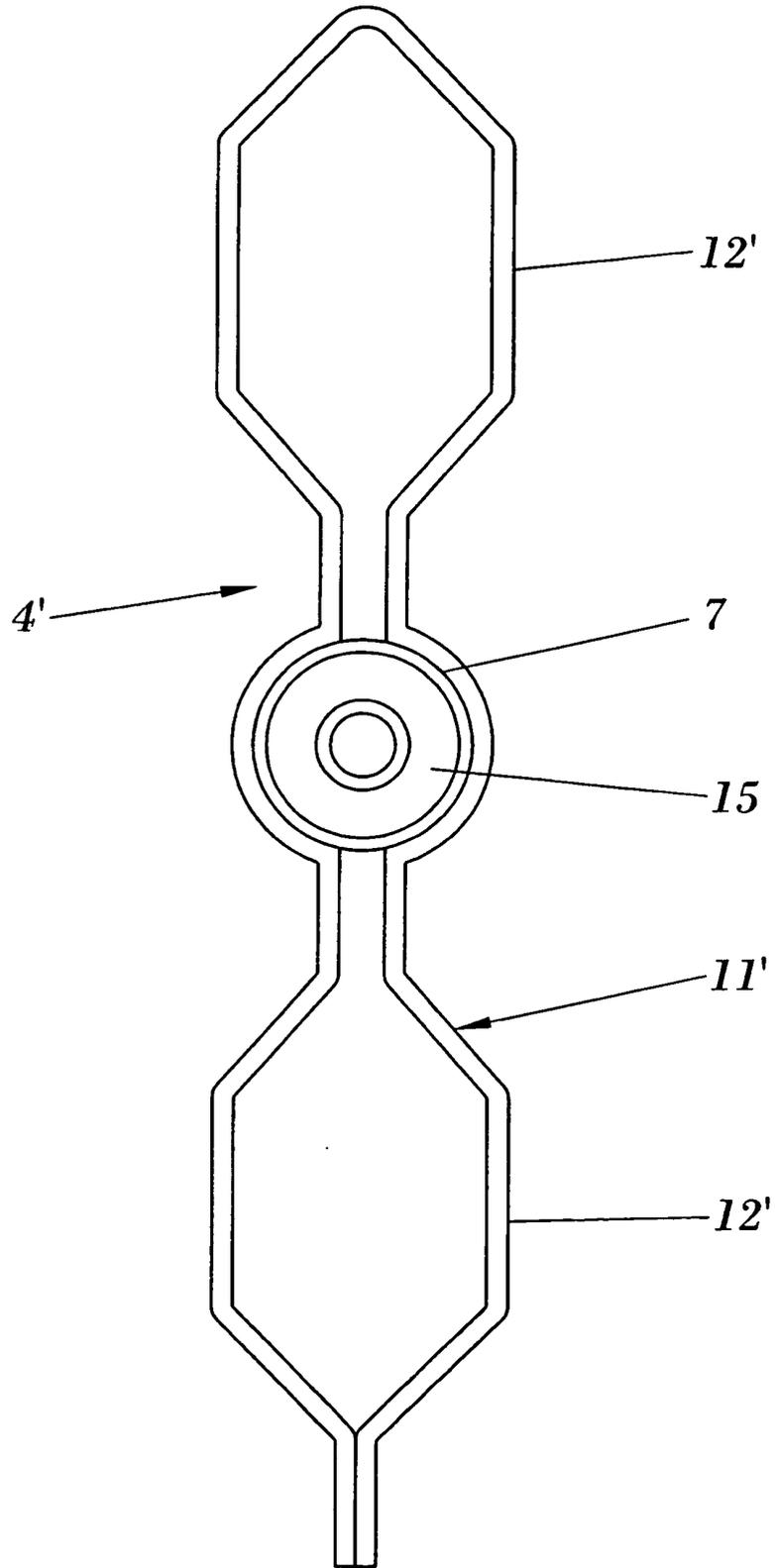


FIG. 8

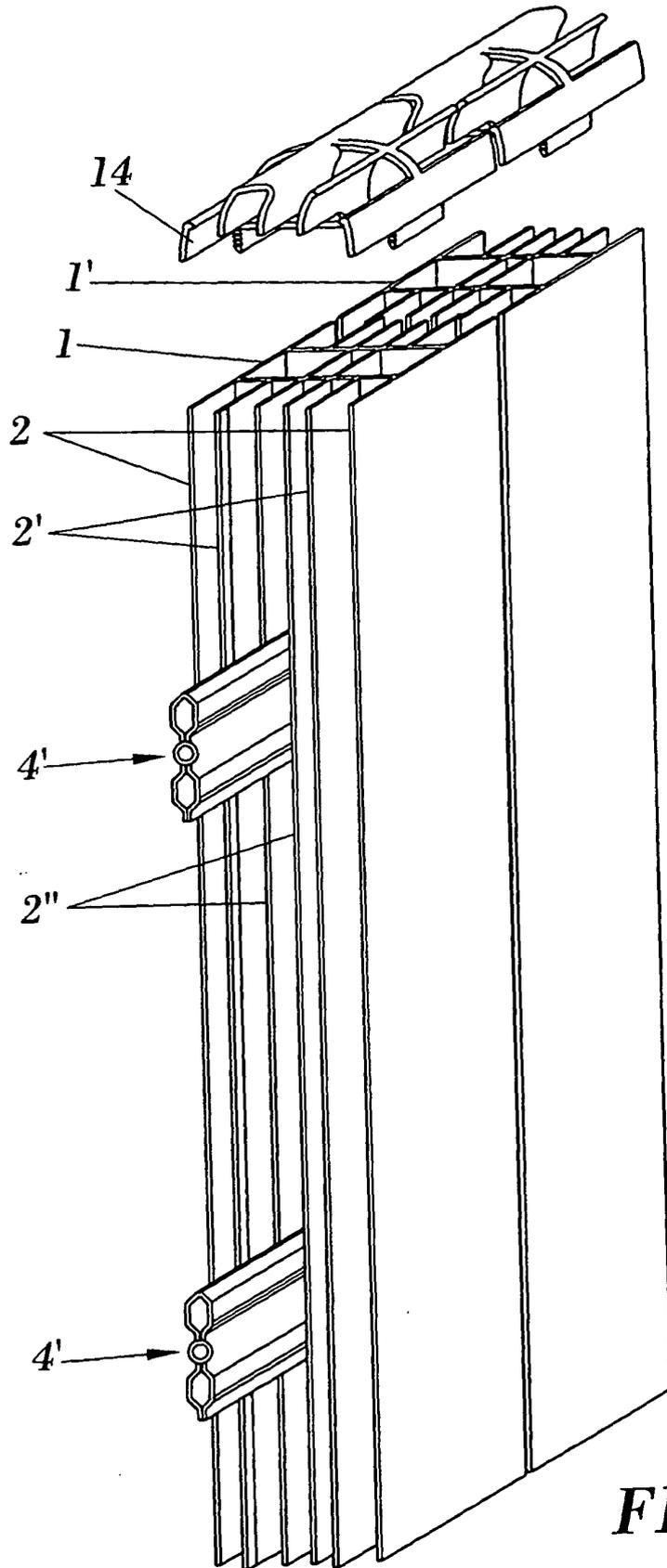


FIG. 9

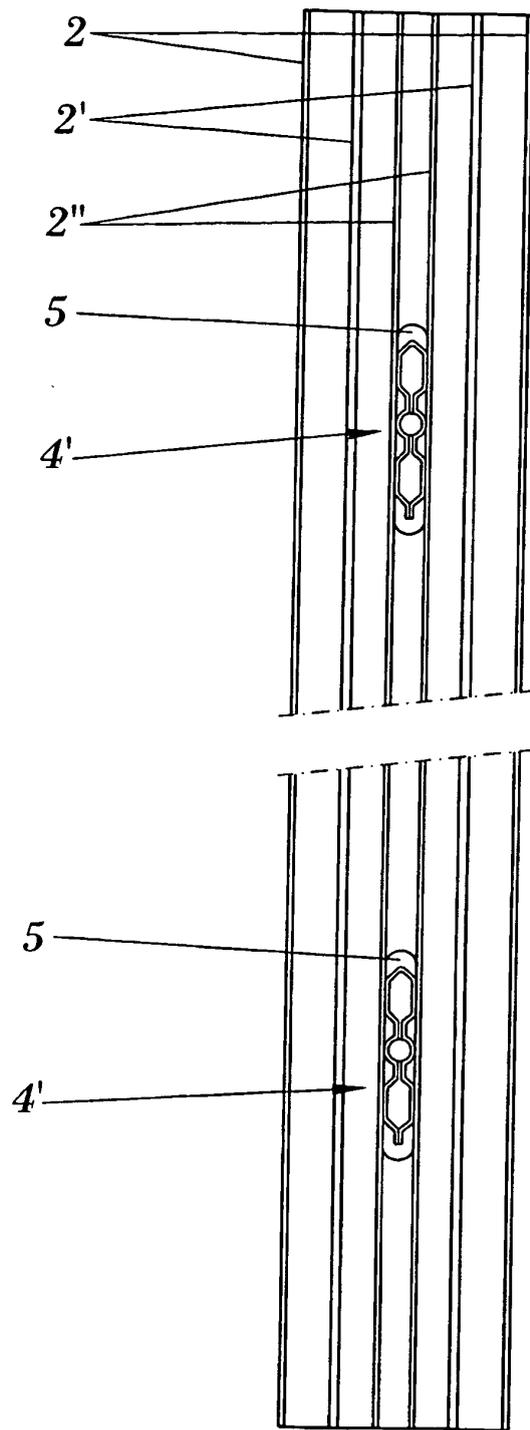


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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