(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 459 932 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.02.1996 Bulletin 1996/08

(51) Int Cl.[6]: **E01F 15/00**

(21) Application number: **91500050.9**

(22) Date of filing: **29.05.1991**

(54) **Improvements in safety barriers for roads**

Sicherheitsleitvorrichtung für Strassen

Dispositif de sécurité pour routes

(84) Designated Contracting States:
AT BE CH DE DK FR GB GR IT LI LU NL SE

(30) Priority: **29.05.1990 ES 9001484**

(43) Date of publication of application:
04.12.1991 Bulletin 1991/49

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(56) References cited:
EP-A- 0 297 182
AT-B- 388 006
CH-A- 676 013
FR-A- 2 294 269
FR-A- 2 585 047
GB-A- 2 219 332

EP 0 459 932 B1

Printed by Jouve, 75001 PARIS (FR)

Description

The invention is about some improvements on safety barriers for roads, which enable the installation of typical dividing walls for roads, dual carriageways, etc., in a simple, quick and economical manner. It also offers the possibility of making the barrier mobile, semirigid, demountable or fixed.

Until now, various solutions had been conceived for the installation of safety barriers for roads -such as those claimed by USA Patents 4,348,133 and 4,496,264- using concrete, sand or any other type of heavy material as ballast. The barriers built according to the object of the above mentioned Patents use the same basic concept for their construction, and vary only the type of material used for the barrier itself and for its external finish, as well as the type of fixing to the ground.

Regardless of the type of fixing to the ground used in the barriers described in the two above mentioned USA Patents, the limitations they both present are those of their rigid constitution and of being anchored to the ground, which does not allow the dismantling of part of the barrier in case of accidents closing up one of the directions of the road, and thus prevent the opening of lanes which could release the potential traffic jam caused by the accident.

Another safety device is known from FR-A-2,585,047 which shows inside the safety device vertical nerves or partitions and a water-tight longitudinal tube adapted for receiving a threaded rod joining adjacent devices.

As background, we could also mention the Spanish Patent 8702657 (ES-A-2 005 324), which claims a procedure to manufacture dividing walls or safety barriers for roads in situ, based on lost moulds made of a light material placed where the barrier or dividing wall is to be installed, and then fill up those moulds with an appropriate material (concrete or a similar one), and thus fix correlatively the various blocks which will make up the dividing wall or barrier.

Although it solves the problems presented by the USA Patents, this procedure has the disadvantage of not offering alternative ways of performance, and of being designed only to be filled up to concrete or a similar material, therefore having to be considerably thick in the wall to offer enough resistance to the filling material.

The safety barrier according to claim 1 of the present invention solves definitely, efficiently and economically the problems presented by the above-mentioned designs of barriers or dividing walls. In order to achieve this, the mould produced according to one of the objects of the invention includes one or more top apertures for water extraction and filling when this component is used as filling material, which is convenient to create separations in road maintenance or upgrading works carried out sporadically.

According to another object of the invention, the mould presents a series of internal nerves or ribs which make it highly resistant against cracks or damage caused by the weight of the filling material.

According to another object of the invention, the mould is made in two versions -male and female. The former is equipped with side projections which fit in complementary recesses in the female mould, enabling them to be dismantled even with the barrier already in place, just by lifting up one of the moulds and then dismantling the remaining ones simply moving them.

The moulds also offer the possibility of being equipped with some side hook rods to make up dismountable barriers, since those hook rods act as articulations between moulds, and therefore between modules. The device also enables the moulds to be equipped with side bars, perpendicular to the side face, to make up armour means which cause the barrier to be rigid. Finally, there remains to be said that moulds, and therefore the modules are designed to be anchored to the ground or tar which conforms the road, forming a fixed as well as rigid barrier.

In order to make the characteristics of the device more easily understood, there follows a detailed description based on a set of drawings which are attached to the present description as an integral part of it, and where the following has been represented with a merely indicative and not limitative character:

Figure 1 shows a stretch of barrier built according to the object of the invention, that is to say, placing continuously male and female mould or modules.

Figure 2 shows a transversal section of one of the modules or moulds.

Figure 3 shows a detailed side view of the most favourable arrangement of nerves and internal fobs of the module or mould.

Figure 4 shows a detailed cross section of two parts of modules joined articulately.

Figure 5 shows another detail like the one in the previous figure, but with a rigid joint between modules.

Finally, figure 6 shows the same detail as figure 5, with the addition of vertical anchoring of modules to the ground.

As can be seen the above mentioned figures, the barrier devised is based on a couple of modules (1) and (1′), being the former a male module and the latter a female one. These modules will be preferably 2 metres long, without rejecting the possibility of employing other lengths, and will weigh approximately 22 kgs. each. They will be made of a compound of polyester resin fibre, structurally designed to bear the hydrostatic pressure exerted by the filling material (concrete, water, sand, etc.)

Both modules differ only in that the male one (1) is equipped with vertical projections (2) in its end faces, whereas the female module (1′) is equipped with complementary recesses (3). As regards the other characteristics of these modules (1) and (1′), they are both the same, with marked apertures (4) in their top faces which enable a valve to be installed, if desired, for the extraction of water when it is used as filling material, for example

in mobil road works.

As figure 1 shows, a barrier is made just by placing aligned empty male (1) and female (1′) modules alternatively, fitting in the projections (2) of the male modules (1) in the recesses (3) of the female modules (1′). This is done directly on the tar or wearing course (5) of the road, and the modules are then filled up through the loading apertures (4). When the modules are full, these apertures or mouths (4) can be closed or not.

This barrier can be dismantled in any of its sections, just by starting the operation lifting up, with a crane, one of the male modules (1), and then moving away the adjacent modules.

In their base, the above mentioned modules (1) and (1′) have transversal canals or outlets (6) to allow rain water to circulate, and inside these modules (1) and (1′) there and nerves or ribs (7) which cross their main walls (8) transversally, as well as other nerves or ribs (9) which run parallel to them. Figure 3 shows in detail the lay out of these nerves or ribs (7 and 9) on the inner side of the main walls (8) of the module, being noticeable how the number of transversal nerves (7) doubles in the lower area.

Finally, it is necessary to point that the barrier built according to the above described procedure does not need to have modules (1) and (1′) fixed to the ground or tar (5), since, having a flat base, the full module will not float.

On the subject of the design of modules (1) and (1′), and taking into account the material they are made of, it is possible to foresee certain areas with a small thickness of wall, which allows them to be broken at will to act as filling aperture, or water canals, or even as orifices to install elements which articulate, or make rigid, or anchor to the ground, the consecutive modules.

Regarding this point, it can be said the versatility of the basic module enables the construction or installation of at least four types of barriers:

- Barriers to be used in mobil road works.
- Articulate barriers.
- Rigid barriers.
- Rigid and fixed barriers.
- Ecological barriers.

As regards the type of barriers used in mobil road works, it can be said that it is the one shown by figure 1, where modules (1) and (1′) are assembled and filled with water or another light, easy to pour material, to allow the modules to be easily moved. This type of barrier is ideal to protect workers carrying out road works.

In this case, the modules can be equipped with electric contacts closing a circuit, so that if by accident there is a cut in the series of modules, the inactivation of a relay will activate an optical and/or audio alarm in the area where workers are working.

As for articulate barriers, the difference offered is that modules (1) and (1′) include L-shaped (10) and hook (11) roughturned rods respectively, enabling an articulate joint to be performed in order to a) absorb the impact energy in its component vertical to the barrier itself, and b) offer the possibility of dismantling any module or modules any time. Figure 4 shows the above mentioned articulation.

As for rigid barriers, these are formed when modules (1) and (1′) have blind orifices in their end faces - preferable two in each end face - to allow the inclusion of roughturned rods (12) in the facing and assembly of modules, to make rigid each couple of consecutive modules (1) and (1′). This design is shown in figure 5. Finally, in the fixed and rigid type of barriers, modules (1) and (1′) apart from being assembled trough the roughturned rod (12) like in the previous case, are also fixed to the floor or tar (5) through vertical or roughturned rods (13) placed partially in lower orifices in each module, and with their protruding part in concrete mortars (14) performed in the floor or tar (5). This type of barrier is shown in detail in figure 6.

Claims

1. A safety barrier for roads applicable when used as a dividing wall between two lanes of opposite directions, or as a side wall on the outer side of a road (5), or when used in mobile road works, said safety barrier being formed of a succession of hollow modules (1, 1') made of plastic material, placed directly on the wearing course, all the modules including top apertures (4) to load a filling material such as concrete, and lower transversal canals (6) for the passage of rain water, characterized in that some of the hollow modules are equipped with a vertical projection (2) in both of their end faces, forming male modules (1), while the other hollow modules have complementary recesses (3) in both end faces for said projections (2), forming female modules (1'), in that the walls (8) of each module have internal nerves or ribs running both longitudinally (9) and transversally (7), forming a reinforcement lattice to bear the hydrostatic pressure exerted by the filling material, in that the end faces and the base of each module are equipped with orifices to respectively install joining rods (10, 11, 12) between the modules and/or rods (13) anchoring to the ground, and in that the modules (1, 1') have certain areas with a small thickness of wall, which allows them to be broken at will to act as filling apertures (4), water canals (6) and/or orifices to install the joining rods (10, 11, 12) and/or the anchoring rods (13).

2. A safety barrier according to claim 1, characterized in that some end face orifices of the hollow modules are equipped with a L-shaped rough-turned rod (10), other end face orifices being equipped with a hook rough-turned rod (11), said joining rods (10, 11)

being able to crimp each other to form an articulated joint, between a projection and the facing recess, dismantlable just by simply lifting up two adjoining modules one from another.

3. A safety barrier according to claim 1, characterized in that some end face orifices of the modules (1, 1') can house a rough-turned rod (12), said joining rod (12) being common for each couple of facing orifices of two adjoining modules, determining a rigid joint of said modules.

4. A safety barrier according to claim 3, characterized in that the hollow modules (1, 1') have in their bases other rough-turned rods (13) which protrude through the lower orifices in the lower side to enable them to be fixed onto a special mortar (14) placed to that purpose in the ground or wearing course itself, determining a fixed anchorage of the modules to the ground.

5. A safety barrier according to any of the foregoing claims, characterized in that the modules (1, 1') are equipped with some electric contacts which close a circuit in such a manner that, should the series of modules be cut accidentally, the inactivation of a relay would activate an optical and/or audio alarm in the desired area.

Patentansprüche

1. Sicherheitssperre für Landstrassen, anwendbar für die Benutzung in Trennmauern zwischen zwei Fahrbahnen entgegengetzter Richtungen oder als seitliche Mauer am äusseren Teil einer Landstrasse (5), oder für die Benutzung in mobilen Strassenarbeiten, wobei diese Sperre von einer Reihe von hohlen Modulen (1, 1') gebildet ist, welche aus einem Kunststoff hergestellt sind, und direkt auf die letzte Gleitschicht aufgesetzt werden, wobei alle Module obere Öffnungen (4) aufweisen, zur Einfüllung eines Füllmaterials wie Beton, sowie untere Querkanale (6) für den Durchf luss des Regenwassers, dadurch gekennzeichnet, dass einige der hohlen Module an beiden Enden mit einem senkrechten Vorsprung (2) versehen sind, und so die Vatermodule (1) bilden, während die anderen hohlen Module komplementäre Einschnitte (3) für die genannten Vorsprünge (2) aufweisen und so die Muttermodule (1') bilden, dass die Wände (8) jedes Moduls Rippen oder innere Versteifungen aufweisen, die sich sowohl längs (9) als auch quer (7) erstrecken, und ein Versteifungsnetz bilden, um den von dem Füllmaterial ausgeübten hydrostatischen Druck aufzunehmen, dass die Seitenflächen und die Grundfläche jedes Moduls mit Öffnungen versehen sind für den Einbau von Verbindungsstäben (10, 11, 12) zwischen den Modulen, und /oder von Stäben (13) zur Verankerung in der Erde, und dass die Module (1, l't) einige Bereiche mit einer geringen Mauerdicke aufweisen, welche ermöglicht dass diese nach Belieben aufgebrochen werden können, un als FÜllöffnungen (4) zu dienen, als Wasserkanäle (6) und/oder als Öffnungen zum Einbau von Verbindungsstäben (10, 11, 12) und/oder verankerungsstäben (13).

2. Sicherheitssperre nach Anspruch 1, dadurch gekennzeichnet, dass einige der Öffnungen in den Seitenwänden der hohlen Module mit einem grobgedrehten Stab in L-Form versehen sind (10), wobei die anderen Öffnungen der Seitenwände mit einen grobgedrehten Stab in Form eines Hakens (11) versehen sind, wobei diese Verbindungsstäbe (10, 11) untereinander verbiegbar sind und so eine Gelenkverbindung zwischen einem Vorsprung und einem darüberliegenden Einschnitt bilden und einfach auseinandergebaut werden können, indem ein Modul vom danebenliegenden nach oben gehoben wird.

3. Sicherheitssperre nach Anspruch 1, dadurch gekennzeichnet, dass einige der Öffnungen der Seitenwände der Module (1, 1') eine grobgedrehten Stab (12) aufnehmen können, wobei dieser Verbindungsstab (12) für jeweils zwei plangedrehte Öffnungen von zwei nebeneindanderliegenden Modulen dient und eine starre Verbindung dieser Module herstellt.

4. Sicherheitssperre nach Anpruch 3, dadurch gekennzeichnet, dass die hohlen Module (1, 1') in ihrer Grundfläche weitere grobgedrehte Stäbe (13) aufweisen, welche über untere Öffnungen auf der unteren Seite herausragen, um so zu ermöglichen dass diese in einem speziellen Mörtel (14), der zu diesem Zweck auf der Erde bzw. auf die letzte Gleitschicht selbst gesetzt wurde, befestigt werden, um so eine feste Verankerung der Module in der Erde zu bewirken.

5. Sicherheitssperre nach einer der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Module (1, 1') mit einigen elektrischen Kontakten versehen sind, die einen Stromkreis so schliessen, dass bei einem zufälligen Ausfall einer Reihe von Modulen, die Entaktivierung eines Relais einen optischen und/oder akustischen Alarm in dem gewünschten Bereich verursachen würde.

Revendications

1. Une barrière de sécurité pour routes, applicable à l'utilisation comme murs de séparation entre deux couloirs de directions opposées, ou comme un mur latéral entre la partie externe d'une route (5), ou

comme utilisation pour travaux de routes mobiles, ladite barrière étant formée d'une succession de modules creux (1,1') fabriqués dans un matériau plastique, placés directement sur la couche finale de roulement, tous les modules comprenant des ouvertures supérieures (4) pour charger un matériau de remplissage comme le béton et des canaux transversaux inférieurs (6) pour le passage de l'eau de pluie, caractérisée par le fait que certains modules creux sont munis d'une partie saillante verticale (2) aux deux extrémités latérales, formant des modules mâles (1), tandis que les autres modules creux possèdent des encoches complémentaires (3) pour lesdites parties saillantes (2), formant les modules femelles (1'), que les parois (8) de chaque module ont des nerfs ou renforcements internes qui s'étendent aussi bien longitudinalement (9) que transversalement (7), formant une maille de renforcement pour supporter la pression hydrostatique exercée par le matériau de remplissage, que les faces internes et la base de chaque module sont munies d'orifices pour l'installation respectivement de tiges d'assemblage (10,11,12) entre les modules, et/ou de tiges (13) d'ancrage au sol, et que certaines zones des modules (1,1') possèdent une petite épaisseur de mur, qui permet de les casser à volonté pour qu'ils agissent comme ouvertures de remplissage (4), comme canaux pour l'eau (6) et/ou comme orifices pour installer les tiges d'assemblage (10,11,12) et/ou les tiges d'ancrage (13).

2. Une barrière de sécurité conforme à la revendication 1, caractérisée par le fait que quelques orifices aux faces latérales des modules creux sont équipés d'une tige grossièrement tournée en forme de L (10), les autres orifices des faces latérales étant équipés d'une tige grossièreemnt tournée en forme de crochet (11), lesdites tiges d'assemblage (10,11) pouvant se plier entre elles pour former un joint articulé, entre une partie saillante et l'encoche superposée et pouvant se démonter en soulevant simplement un module adjacent.

3. Une barrière de sécurité conforme à la revendication 1, caractérisée par le fait que quelques orifices des côtés des modules (1,1') peuvent loger une tige grossièrement tournée (12), ladite tige d'assemblage (12) étant commune à deux orifices surfacés au tour de deux modules adjacents, provoquant un assemblage rigide desdits modules.

4. Une barrière de sécurité conforme à la revendication 3, caractérisée par le fait que les modules creux (1,1') possèdent à leurs bases d'autres tiges grossièrement tournées (13) qui dépassent des orifices inférieurs à la face inférieure pour permettre aux tiges en question d'être fixées sur un mortier spécial (14) placé à cet effet au sol ou sur la couche finale ele-même de roulement, provoquant un ancrage fixe des modules au sol.

5. Une barrière de sécurité conforme à l'une quelconque des revendications précédentes, caractérisée par le fait que les modules (1,1') sont munis de quelques contacts électriques qui ferment un circuit de sorte que, si la série de modules se coupait accidentellement, la désactivation d'un relais activerait une alarme optique et/ou sonore à la zone souhaitée.

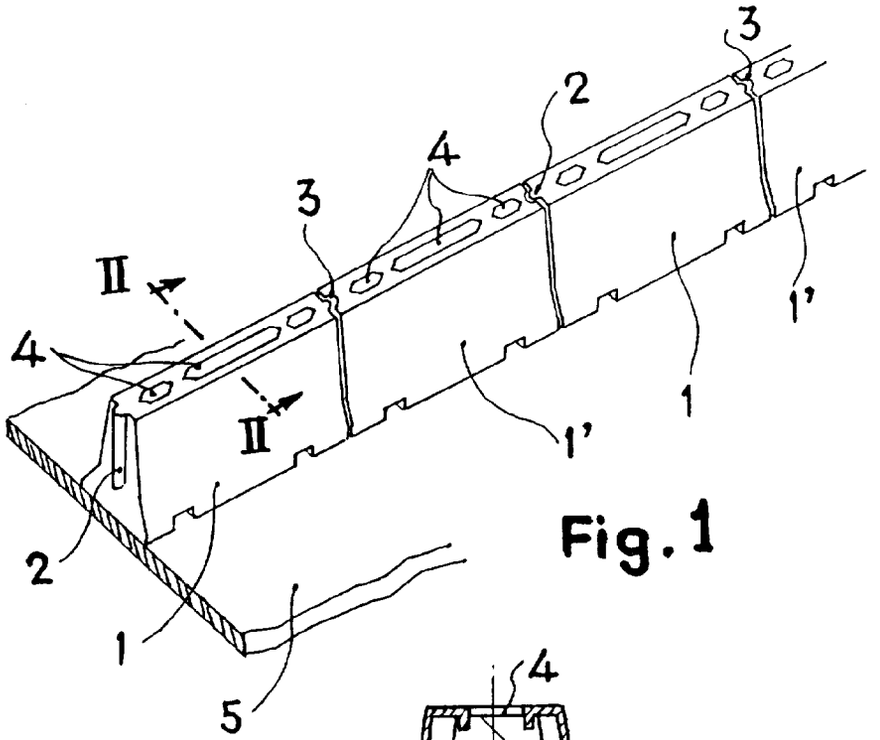

Fig. 1

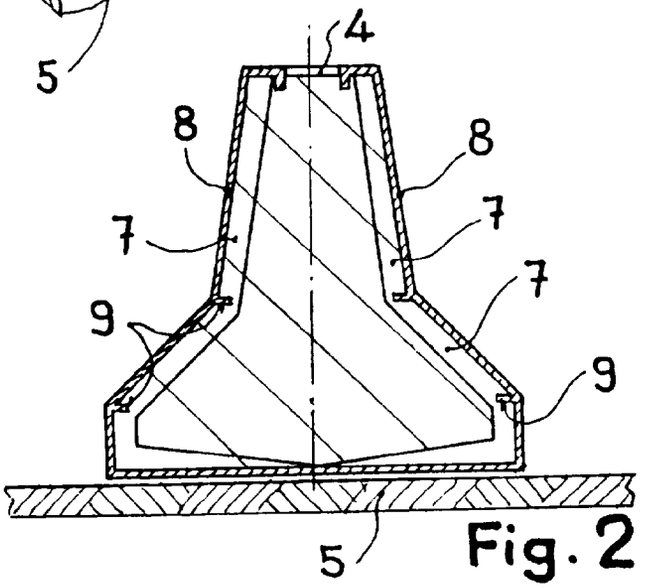

Fig. 2

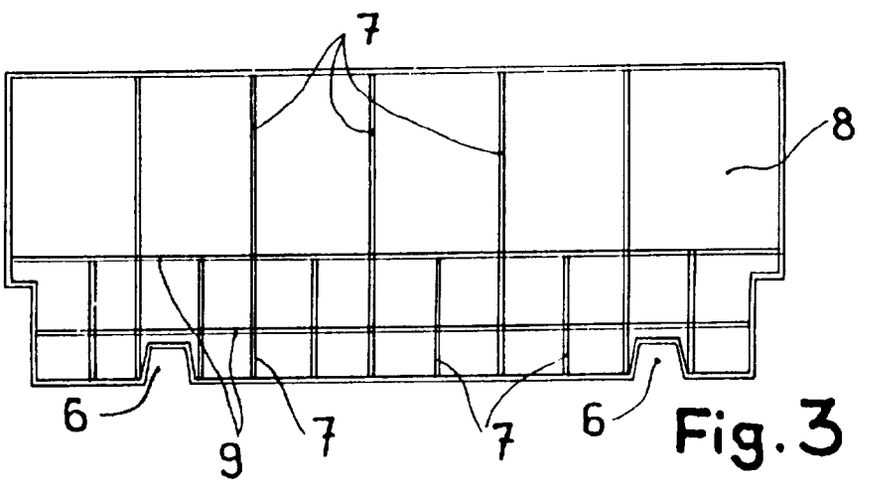

Fig. 3

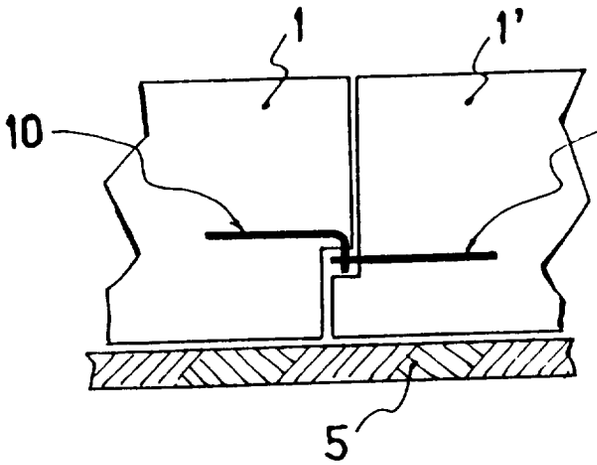

Fig.4

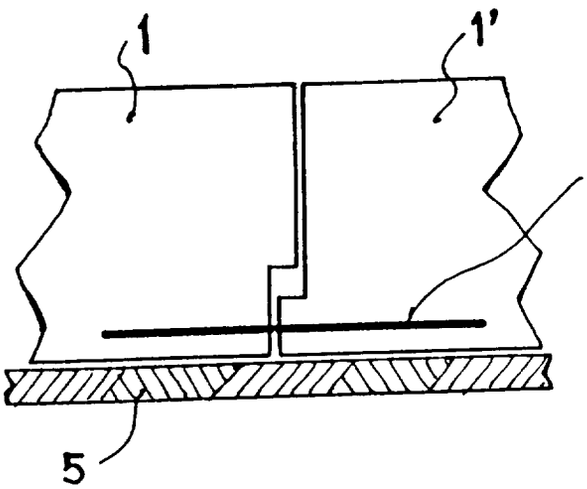

Fig.5

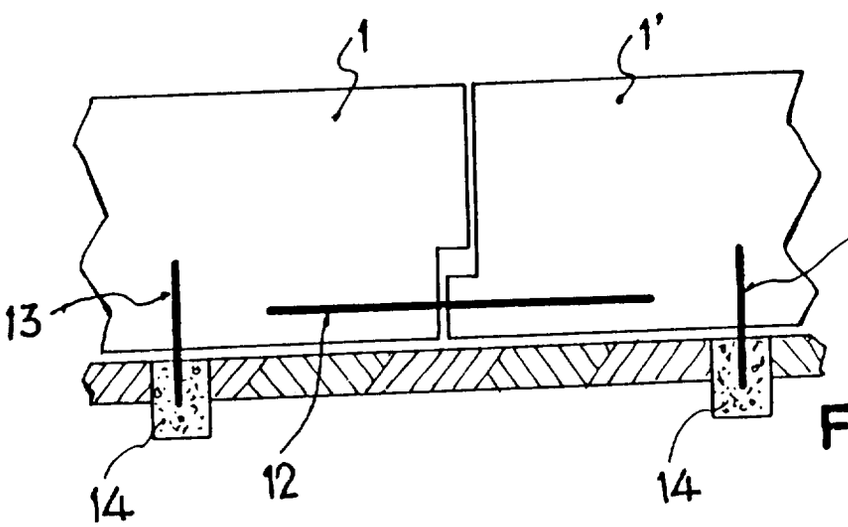

Fig.6