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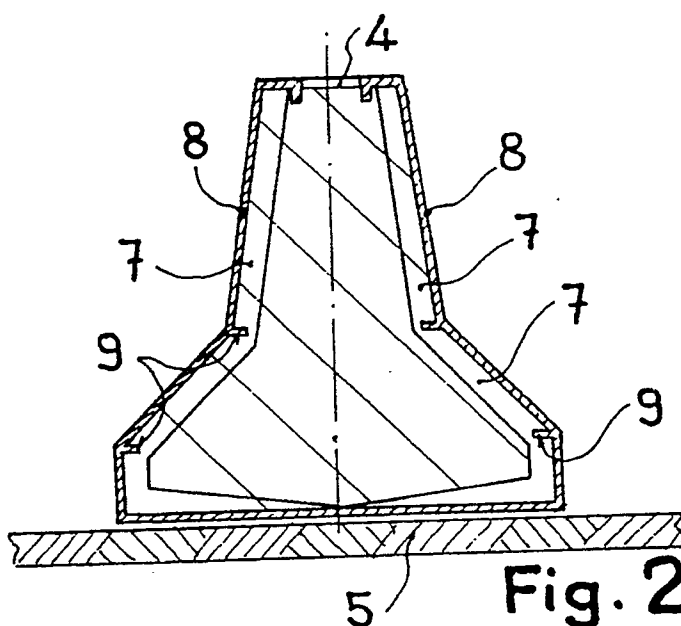
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(54) **Improvements in safety barriers for roads.**

(57) The barrier consists of a series of light weight modules, filled of a conventional material as ballast to give them stability and resistance. The modules are noticeably rectangular prismatic bodies with top apertures (4) which act as loading nozzles for the filling material, and with lower transversal canals for the circulation of water. One type of module is male and the other female, and to form the barrier they are placed alternatively the ones on the others on the wearing course of the road. The modules can be dismantled to leave an open way in the barrier; they can be articulated or even rigid between themselves and anchored to the ground.



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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 Invention 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 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.

As back ground, we could also mention the Spanish Invention Patent 8702657, 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 improvements object of the present invention solve 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 include 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 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 plac-

ing 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 are 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 through 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°.- Improvements on safety barriers for roads applicable in those cases when the barriers form a dividing wall between two lanes of apposite directions, a side wall on the outer side of the road to prevent the potential risk represented by the edge of the road, and when they are used in mobil road works to protect workers. These barriers are formed by placing correlatively hollow modules made of a suitable plastic material, placed directly on the wearing course to be filled up with a suitable material; these barriers are characterized because some of the hollow modules are equipped with a vertical projection in their end faces, forming male modules, while the other hollow modules have complementary recesses for those projections, forming female modules, and with the peculiarity of all the modules including top apertures to load the filling material and lower transversal canals for the circulation of rain water; the walls of the modules have internal nerves and ribs running both transversally and longitudinally, forming a reinforcement lattice to bear the hydrostatic pressure exerted by the filling.

2°.- Improvements on safety barriers for roads, according to claim 1°, characterized because in their end faces the modules are equipped with L-shaped and hook roughturned rods, which crimp between themselves, determining an articulation every two adjoining modules.

3°.- Improvements on safety barriers for roads, according to claim 1°, characterized because in their end faces the modules are equipped with orifices which can house a roughturned rod, common for each couple facing orifices of two adjoining modules, determining a rigid joint of said modules.

4°.- Improvements on safety barriers for roads, according to the previous claim, characterized because, besides the rigidization rods every couple of modules, these modules have in their bases other roughturned rods which protrude trough the lower side to enable them to be fixed onto a special mortar placed to that purpose in the ground or wearing couse itself, determining a fixed anchorage of the modules to the ground.

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5°.- Improvements on safety barriers for roads, according to the previous claims, characterized because the modules may be 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.

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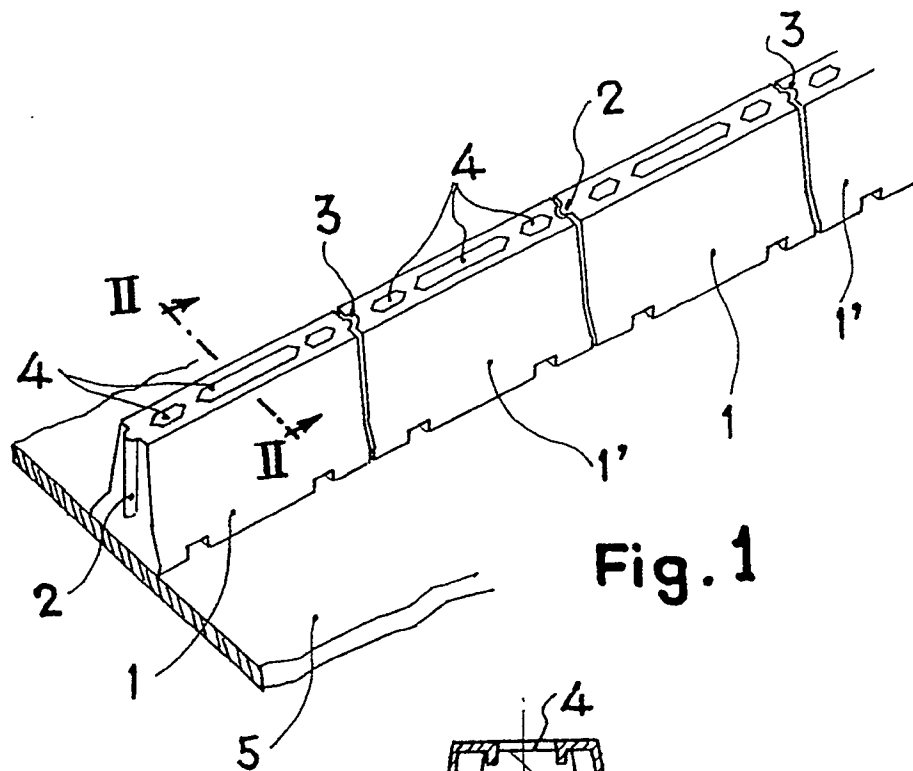


Fig. 1

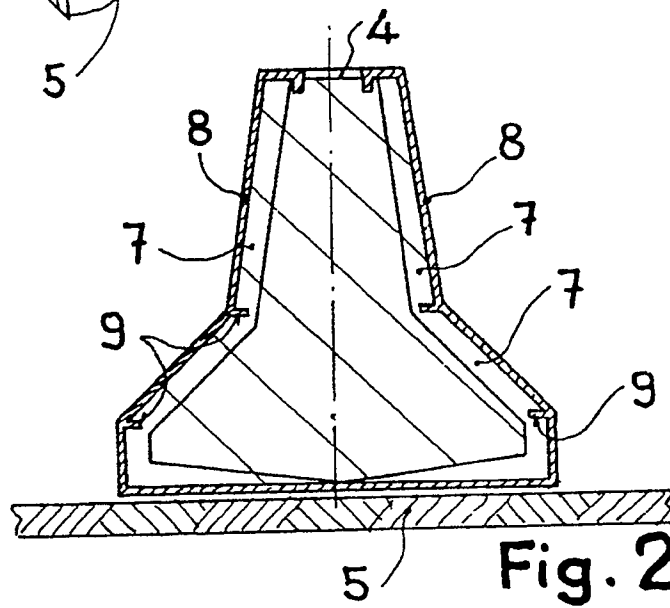


Fig. 2

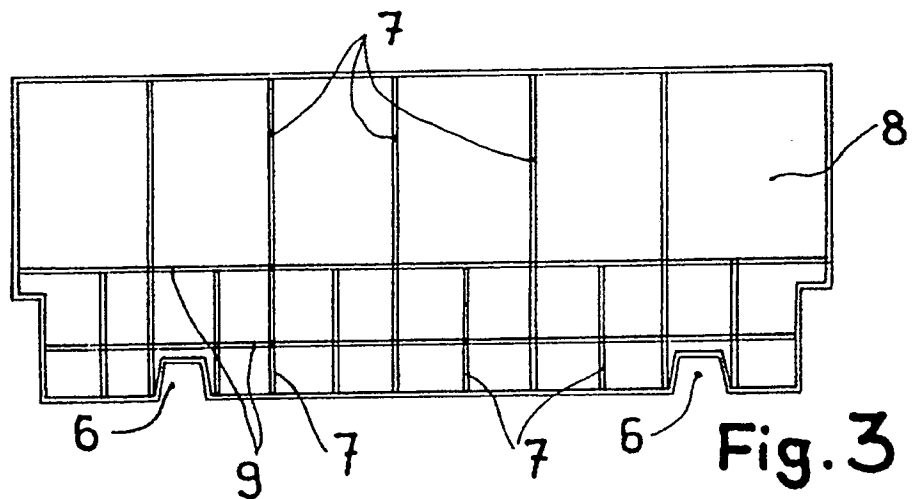


Fig. 3

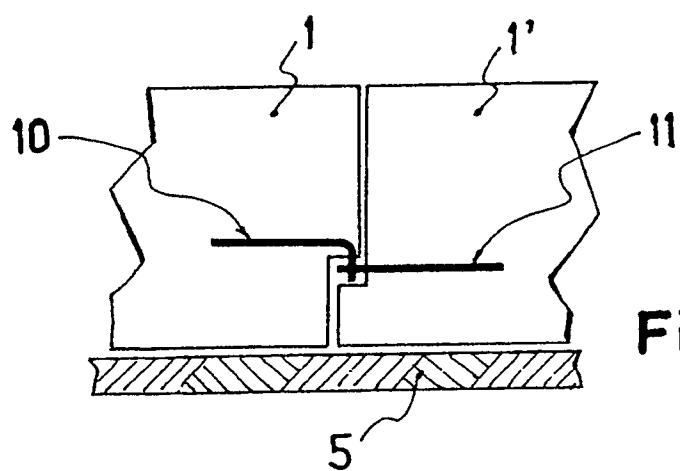


Fig. 4

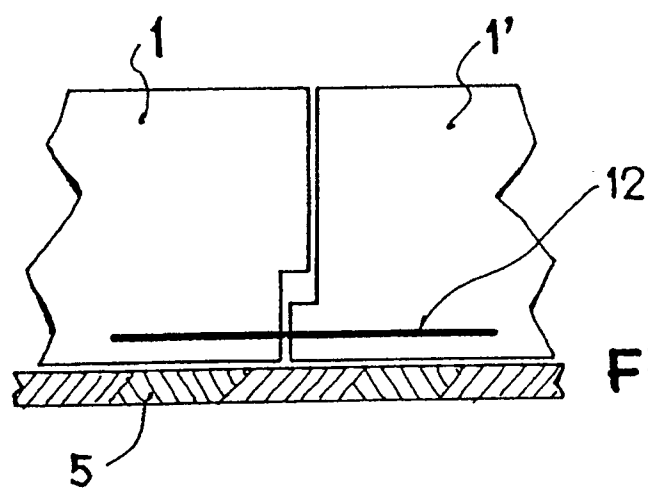


Fig. 5

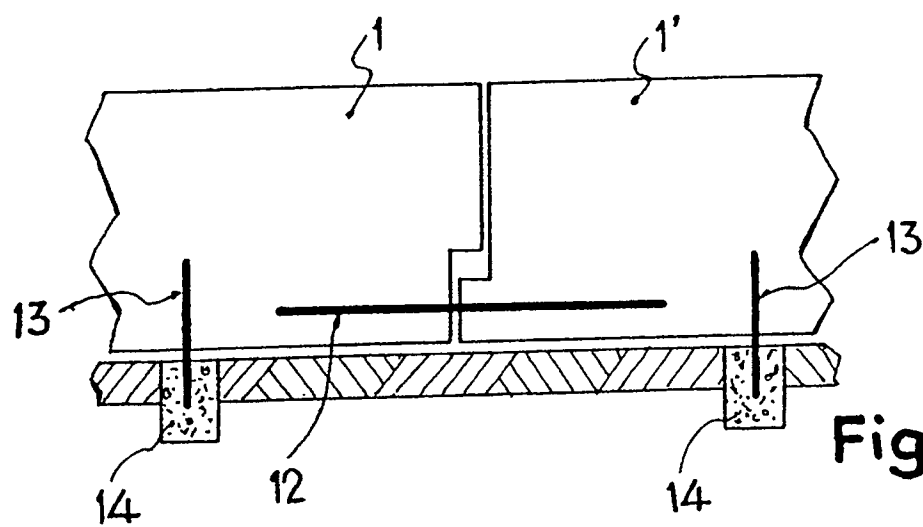


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number

EP 91 50 0050

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2 585 047 (TECHNIQUES SPECIALES DE SEC.)	1, 3	E01F15/00
Y	* page 2, line 10 - page 3, line 11 *	4	
	* page 4, line 2 - page 5, line 25; figures *		

Y	GB-A-2 219 332 (J. GARSIDE)	4	
A	* page 5, paragraph 2 - paragraph 5 *	1, 2	

A	AT-B-388 006 (F. SCHUSTER)	1, 3, 4	E01F
	* page 2, line 1 - line 18 *		
	* page 2, line 53 - page 3, line 48; figures *		

A	FR-A-2 294 269 (P. BOFINGER)	1	
	* page 3, line 6 - line 33; figures 3-6 *		E01F

A	EP-A-0 297 182 (M.L. THOMPSON)	1	
	* column 7, line 18 - line 43; figures 1, 10, 12, 13 *		E01F

P, A	CH-A-676 013 (WIRTGEN)		E01F

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03 SEPTEMBER 1991	Examiner VERVEER D.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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