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

(11) **EP 2 410 109 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.01.2012 Bulletin 2012/04

(51) Int Cl.:
E04H 17/14 *(2006.01)* *E04H 12/22* *(2006.01)*

(21) Application number: **11380059.3**

(22) Date of filing: **19.07.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **20.07.2010 ES 201000774 U**

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(54) **Fence**

(57) The present invention relates to an enclosure fence that is formed by some square section uprights (1), some vertical bars (2) located between the uprights, at least one horizontal bar (3) that passes through the vertical bars and uprights and some anchoring elements (4) on which the uprights (1) lie and also said enclosing bar is mainly composed of unsaturated polyester resin and non-alkaline glass fiber strands.

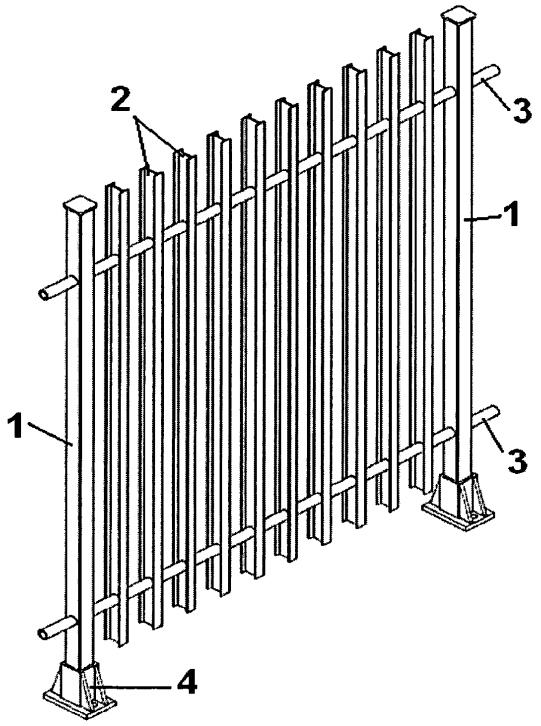

FIGURE 1

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Description

Technical Field of the Invention

[0001] The present invention, which is intended to be protected as utility model, relates to a fence used for closing, made of non-metallic material. Although this fence is specifically designed for closing and protection of railway lines, it can also be used for any other type of precinct required to be fenced and protected, such as a school, a farm, a port, etc.

Background of the Invention

[0002] Until now, fences used for closing are made mainly of iron. The metal fences, although they have great strength and resistance, have significant drawbacks, since they are susceptible to corrosion, especially if they are located near the sea, and further require the maintenance of exterior paint and are even stolen to be sold as scrap, etc.

[0003] In view of these drawbacks, the present invention describes enclosure fences with a non-metallic composition, which avoids the aforementioned problems while retaining their mechanical properties over their metal counterparts.

Description of the Invention

[0004] The present invention relates to a fence for urban or rural closings formed by a structure comprising some square section tubes or uprights among which are arranged a series of vertical bars crossed by at least one horizontal bar linking together said vertical bars and also with the uprights. Each upright lies on an anchoring part through which the fence is fixed to the ground, wall or surface on which it is located. The fence can be as long as desired, inserting uprights every certain number of vertical bars, so that although the fence has a great length is fully threaded through the anchoring parts that support the uprights.

[0005] The fence of the present invention having the structure described above is mainly composed of unsaturated polyester resin and non-alkaline glass fiber strands.

[0006] The percentage of resin of unsaturated polyester resin ranges from 30-55%, but preferably is 50%. The percentage of non-alkaline glass fiber on the fence ranges preferably between 40-45%.

[0007] Preferably the fence of the present invention has a green color, although it is possible a wide range of colors according to the desired pigmentation.

[0008] Its overall dimensions may be variable both in height and length, as well as vary the composition of its elements seeking the suitable strength for each case.

[0009] The high percentage of glass fiber provides excellent mechanical properties to the fence, but this novel composition also provides the fence with many other benefits as indicated below:

- It does not require maintenance.
- It has great lightness. At equal strengths is up to four times lighter than conventional steel structures.
- Electrical and thermal insulating. Unlike iron metal fences it does not need grounding.
- High impact and fatigue strength.
- Avoids interference in radio and radar waves.
- Expansion coefficient lower than that of metal profiles.
- Quick machining.
- Easy handling and assembly. By contrast, metal fences require crane handling, plus a welding and painting equipment in situ.
- Do not result in theft because of the value of the scrap.

Description of the drawings

[0010] Several figures corresponding to a preferred embodiment of the present invention are attached, in which is graphically represented the following:

- In Figure 1, a perspective view of the enclosure fence object of the present invention.
- In Figure 2, a detailed view of an anchoring element of the fence object of the present invention.

[0011] In said figures, the various references appearing in them have the following meanings:

1.- Uprights

2.- Vertical bars

3.- Horizontal bars

4.- Anchoring element

Detailed description of a preferred embodiment

[0012] To help better understand all that has been described above, a preferred embodiment of the invention is outlined below, all of it in accordance with the formal and functional considerations that are detailed thereupon.

[0013] As shown in Figure 1, the fence is made up of some square section uprights (1) that lie on the anchoring elements (4). These anchoring elements are screwed to the ground, wall or surface where the fence is placed. Between the uprights (1) a series of vertical bars (2) with I-shape section are arranged, which are crossed by two horizontal bars (3), one upper and one lower and which, in turn, pass through the uprights (1). In this preferred embodiment there are ten vertical bars (2) between two uprights (1).

[0014] The fence can be made longer by including a higher number of uprights (1) among which the vertical bars (2) are arranged.

[0015] The fence is composed of 50% of unsaturated polyester resin and 40-45% of non-alkaline glass fiber strands. The rest is formed by other components.

[0016] The fence with this composition, in addition to presenting great advantages, as mentioned above, has excellent mechanical properties: tensile strength, resistance, compression strength... comparable to those of iron.

[0017] Next (Example 1) a "tensile strength and density test" on the fence of the present invention is shown.

Example 1: "Tensile strength and density test"

[0018] On a sample of elements of unsaturated polyester resin-glass fiber, constituents of an enclosure fences object of the present invention, we have proceeded to perform the relevant tests to determine the tensile strength of an I-shaped profile (vertical bars), the compressive strength of an anchoring element for fixing the fence to the ground and the density of these two elements together with the square section tubes that define the sections of the fence.

[0019] The samples consist of two fence elements of about 60 cm in length and 1 m in height. From these samples the test specimens described below were extracted:

From two I-shaped profiles, one of each fence element, two pieces of the core were sectioned obtaining for the tensile test two parts of rectangular section of 38 x 4 mm and a length of about 35 cm. Also, four pieces from the full profile were sectioned to determine its density.

[0020] One of the anchor brackets of the fence was carved to obtain a piece of tube with a square section of medial side of 674 mm and 115 mm of length with which its density and compressive strength was determined.

[0021] From the tubes that define the sections of the fence (uprights), which have square section, several pieces of between 10 and 20 cm in length were cut in which its density was determined.

[0022] The tensile strength was determined in a multi-test press with a capacity of 100 kN, similarly to how is described in the UNE-EN 527-5 ISO Standard on determining the tensile properties of unidirectional composite plastics reinforced with fiber. In this test only the value of the maximum stress withstood by the specimens (in MPa) has been collected.

[0023] The compressive strength test of the supports has been carried out in a compression press with a capacity of 3000 kN, applying the load on two opposite planes of the walls of the carved tube, i.e. as if it were a crushing test, similarly to the method described in the UNE-EN 802 Standard for piping systems in plastic materials but determining, in this case, the maximum load (in kN) that the tube withstands in this arrangement before rupture.

[0024] The density has been determined by means of the hydrostatic balance following the widely standardized procedure for many materials such as, for example, that described in the UNE 53526 standard for elastomers.

Results

[0025] The results obtained from the indicated assessments are collected in the following tables:

[0026] From the tests on the I-shaped profile:

Table 1

Test	Specimens	Maximum tensile strength (MPa)	
		Individual values	Mean value
TRACTION	T1	515.6	487.7
	T2	459.8	

Table 2

Test	Specimens	Density (kg/m^3)	
		Individual values	Mean value
DENSITY	D11	’1,840	1,820
	D12	1,840	
	D21	1,840	
	D22	1,770	

[0027] From the tests on the square section tube (uprights):

Table 3

Test	Specimens	Density (kg/m^3)	
		Individual values	Mean value
DENSITY	D11	1,820	1,818
	D12	1,820	
	D21	1,820	
	D22	1,810	

[0028] From the tests on the anchoring element:

Table 4

Test	Specimen	Maximum load withstood (kN)
COMPRESSION (crushing)	C1	123.9

Table 5

Test	Specimen	Density (kg/m^3)
DENSITY	D1	1,760

Claims

1. Enclosure fence of the ones formed by some square section uprights (1), some vertical bars located between the uprights, at least one horizontal bar (3) that passes through the vertical bars and the uprights and some anchoring elements (4) on which the uprights (1) lie **characterized by** being composed mainly of unsaturated polyester resin and non-alkaline glass fiber strands.

2. Enclosure fence, according to claim 1 **characterized by** comprising between 30-55% of unsaturated polyester resin and between 40-45% of non-alkaline glass fiber strands.

3. Enclosure fence, according to claim 2 **characterized by** comprising 50% of polyester resin.

4. Enclosure fence, according to claim 1, **characterized in that** the vertical bars have an I-shaped section.

5. Enclosure fence, according to claim 1, **characterized in that** it has two horizontal bars (3).

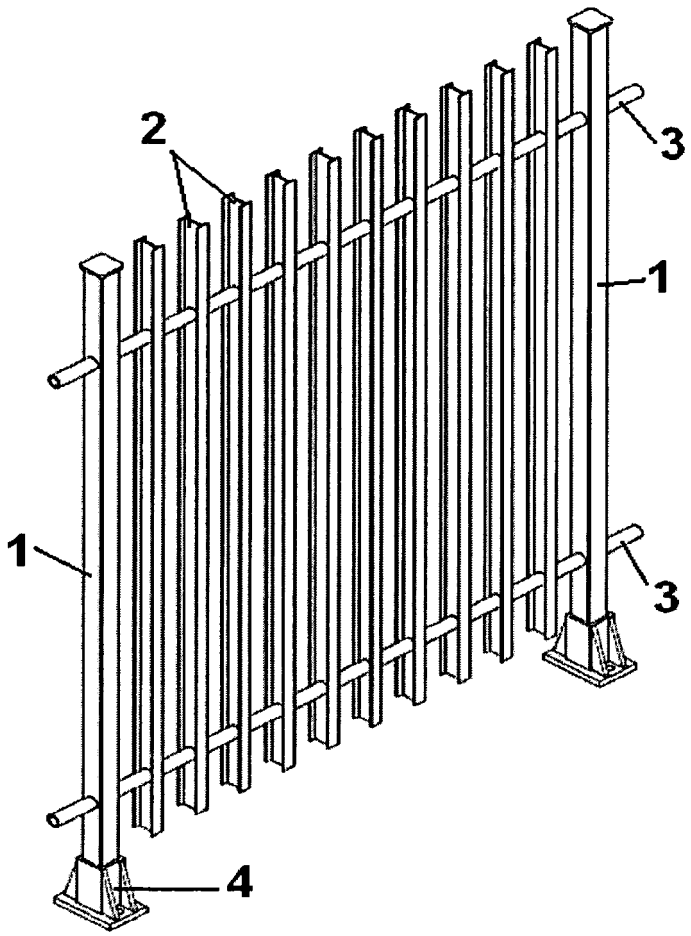

FIGURE 1

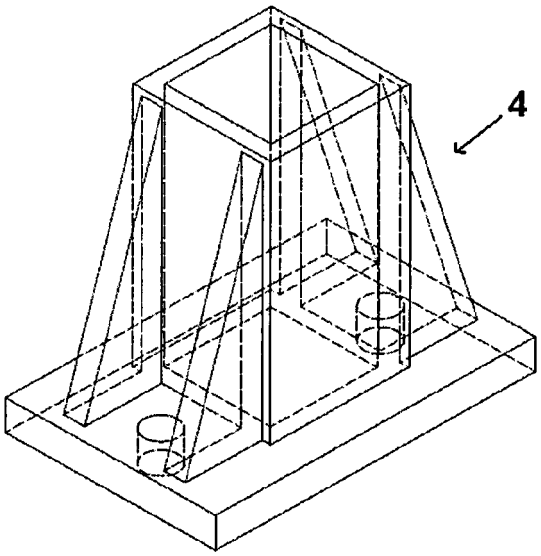

FIGURE 2