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(11) **EP 0 985 800 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.03.2000 Bulletin 2000/11

(51) Int. Cl.⁷: **E21D 11/38, E21F 16/02**

(21) Application number: **98810887.4**

(22) Date of filing: **08.09.1998**

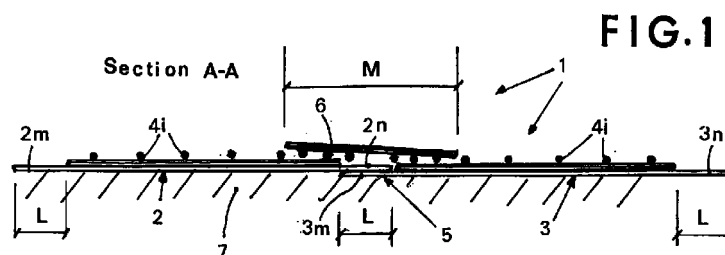
(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI
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(54) **Drainage device for waterproofing lining**

(57) The present patent describes a drainage and waterproofing lining layer (1) to be applied to the inside of tunnels in the areas where guniting work is to be carried out, comprising sheets of plastic onto which said metal meshwork is applied, said lining layer consisting of several consecutive sheets (2, 3) of heat-sealable plastic, each of which has, on two opposite edges, two lateral strips (2m, 2n, 3m, 3n) with a width (L) onto which the said metal meshwork (4i) is not applied, two adjacent strips (2n, 3m) of two consecutive sheets (2, 3)

are superimposed and welded together, and the joint (5) thus obtained is covered by a metal meshwork portion (6) which has a width (M) equal to or greater than the said width (L) of the two superimposed strips and which is fixed along its two lateral flanks onto the metal meshwork portions (4i) which are joined to the two consecutive sheets (2, 3) between which the said joint (5) has been formed.



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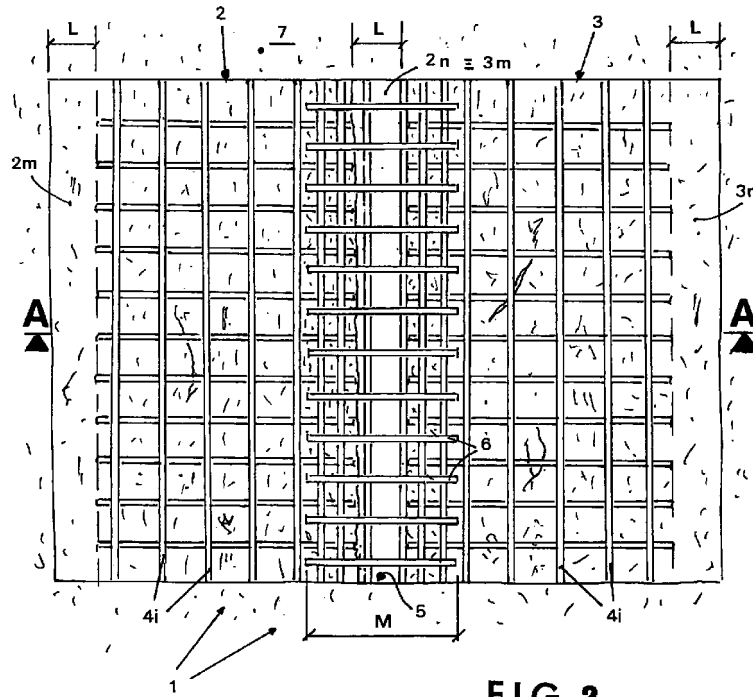


FIG. 2

Description

[0001] The present invention relates to the sector of construction engineering and more particularly to the area thereof which is concerned with the lining of tunnels by means of guniting.

[0002] As is known to persons skilled in the art, the application of a layer of gunite onto a rock or concrete wall which has water seeping through it is practically impossible since the water, wetting the layer which should adhere to the wall, prevents it from setting, causing a gradual collapse of the entire layer which may have been successfully applied.

[0003] Industries in the sector have therefore devised and produced lining layers made with sheets of plastic which are applied onto the walls to be treated so as to drain the water in a predetermined direction, preventing it from coming into contact with the gunite.

[0004] These lining layers must also form a suitable support for the layer of gunite which must be able to adhere to it and therefore comprise a layer of metal meshwork which is applied externally and formed so as to allow, as mentioned, adhesion and setting of the gunite and the possibility of adaptation by means of plastic deformation to the roughness and irregularities of the surfaces to be lined.

[0005] In the past the same Applicant has produced a lining layer obtained by arranging, alongside one another, consecutive sheets of plastic (mainly polyethylene) onto which portions of metal meshwork with a shape and dimensions identical to those of the sheets themselves were placed.

[0006] Each sheet was then applied onto the walls to be treated, fixing the lateral vertical edges thereof by means of seams of quick-setting mortar.

[0007] This type of lining layer, however, has been prone to certain limitations and disadvantages due to the fact that application of the said mortar seams nevertheless requires fairly long execution times and, in some cases, is difficult or even impossible when there is a considerable amount of surfacing water and moisture which affects large areas of the surface to be treated.

[0008] The wet strength of these seams is moreover practically never guaranteed over their whole length.

[0009] In order to overcome these drawbacks, the inventor of the present invention has devised a new type of lining layer in which the sheet of plastic is made from heat-sealable material and is not covered entirely by the metal meshwork.

[0010] Along the two side edges (normally those which are arranged vertically) strips are left uncovered by the metal meshwork and are then heat-welded together and a further portion of metal meshwork is then added, said portion being superimposed partially onto both the portions of meshwork present on the two consecutive sheets.

[0011] This results in a lining layer which provides effective total waterproofing of the surface onto which

the gunite is applied, with all the advantages arising therefrom. In addition, the heat-sealing performed on-site is also advantageous from the point of view of the execution times.

[0012] The present patent application therefore relates to a lining layer as defined in the preamble of the accompanying Claim 1 and is characterized by the characterizing part of the same claim.

[0013] A more detailed description of a preferred exemplary embodiment of the lining layer according to the invention is now provided, with reference also to the accompanying drawings, in which:

- Figure 1 shows a cross-sectional view of two consecutive sheets of the lining layer joined together;
- Figure 2 shows a front view corresponding to the situation described in Figure 1.

[0014] If we consider Figures 1 and 2, it can be seen how two consecutive sheets 2,3 of heat-sealable plastic have, applied onto them, portions of metal meshwork 4i which are cut so as not to cover the two side edges 2m, 2n as well as 3m, 3n of the two same sheets 2, 3, which are made of heat-sealable plastic (preferably PVC or polyvinyl chloride), over a width L which may be about 20 cm. The strips 2n, 3m are arranged on top of one another and welded together.

[0015] The joint 5 of width L, thus obtained, on which the metal meshwork 4i of the sheets which are joined together is not applied, is covered by a portion of metal meshwork 6 which has a width M at least equal to, but preferably greater, by a predetermined amount, than the said width L of the joint 5.

[0016] For this reason this portion 6 is superimposed with its two lateral flanks onto the metal meshwork portions 4i of both the sheets 2, 3 which are joined together by the said joint 5 and onto which it is fixed by means of known methods (ties, etc.).

[0017] A uniform, uninterrupted, lining layer which has an effective waterproofing action and can be easily covered by means of guniting is thus obtained.

[0018] For the sake of simplicity of the illustrations, the lining layer 1 shown in the Figures covers a flat wall 7. It is obvious that, since this situation exists only very rarely in reality, most of the time the lining layer 1 has an irregular profile, which is of such a nature, as already mentioned, as to adapt perfectly to the roughness and irregularities of the wall to be lined.

[0019] The inventor suggests using PVC sheets with a thickness of about 0.7 mm, onto which a metal meshwork having meshes with a width of 1.6 cm and made of wire with a diameter of about 1.2 mm is applied and fixed using known methods.

[0020] Obviously other embodiments, different from that described hitherto and shown in the drawings, may be obtained. These embodiments are nevertheless included within the scope of protection of the present application provided that they refer to that which is

stated in the accompanying Claim 1.

Claims

1. Drainage and waterproofing lining layer (1) to be applied to the inside of tunnels in the areas where guniting work is to be carried out, comprising sheets of plastic onto which said metal meshwork is applied, characterized in that it consists of several consecutive sheets (2, 3) of heat-sealable plastic, each of which has, on two opposite edges, two lateral strips (2m, 2n, 3m, 3n) with a width (L) onto which the said metal meshwork (4i) is not applied, the two adjacent strips (2n, 3m) of two consecutive sheets (2, 3) are superimposed and welded together, and the joint (5) thus obtained is covered by a metal meshwork portion (6) which has a width (M) equal to or greater than the said width (L) of the two superimposed strips and which is fixed along its two lateral flanks onto the metal meshwork portions (4i) which are joined to the two consecutive sheets (2, 3) between which the said joint (5) has been formed.
2. Lining layer according to Claim 1, in which the said lateral strips (2m, 2n, 3m, 3n) onto which the metal meshwork (4i) is not applied has a width (L) of about 20 cm.
3. Lining layer according to one of the preceding claims, in which the said sheets of plastic (2, 3) are made of PVC (polyvinyl chloride) and have a thickness of about 0.7 mm.
4. Lining layer according to one of the preceding claims, in which the said metal meshwork (4i) consists of meshes with a side of 1.6 cm made of metal wire having a diameter of about 1.2 mm.

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FIG.1

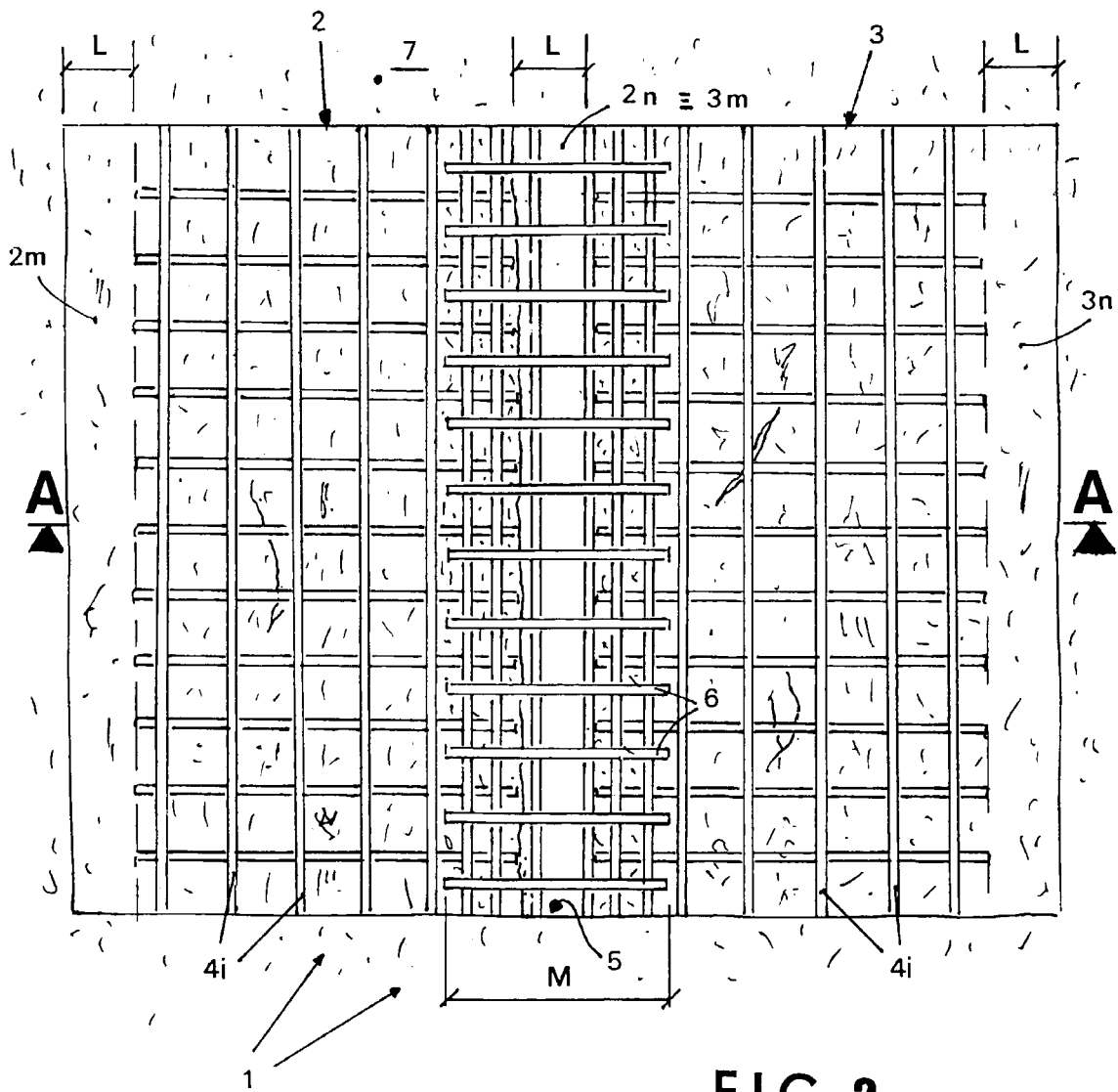
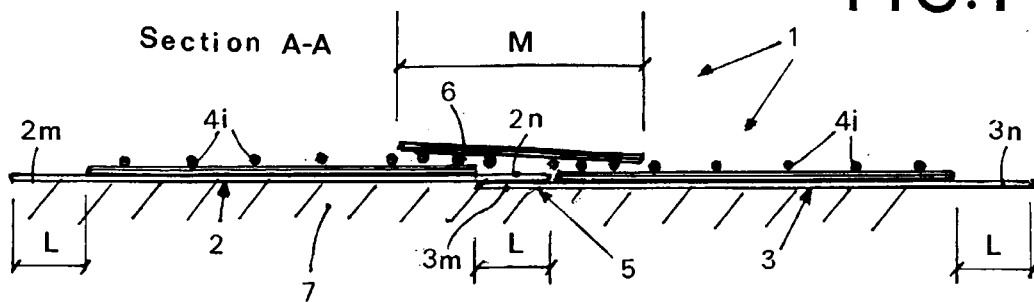


FIG.2



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EUROPEAN SEARCH REPORT

Application Number
EP 98 81 0887

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	GB 1 125 848 A (PLASTEX) * column 2; figures * ---	1-4	E21D11/38 E21F16/02
A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 139 (C-348), 22 May 1986 & JP 61 000282 A (FUJIMORI KOGYO KK), 6 January 1986 * abstract * ---	1-3	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26 January 1999	Examiner Fonseca Fernandez, H
CATEGORY OF CITED DOCUMENTS 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 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 L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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