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(54) **INSULATED SLAB-ON-GRADE FOUNDATION SYSTEM**

ISOLIERTES BETONBODENPLATTENFUNDAMENTSYSTEM

SYSTÈME DE FONDATION DALLES SUR SOL ISOLÉ

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a system of insulated slab-on-grade foundation system to protect building shallow foundations and is more particularly concerned with method of installing such system.

BACKGROUND OF THE INVENTION

[0002] It is well known in the art to use insulated slab-on-grade foundation system to protect shallow foundations. More particularly, the invention pertains to an insulated slab-on-grade foundation system and it method for shallow foundation. The typical isolation system for foundation does not adjust and is fixed or does not adapt to the different dimension of shallow foundations. DE 29709300 U1 discloses a novel base section for a foundation structure, having a generally flat, box-shaped outline and comprising a light concrete material. It has a horizontal underside, two vertical outer sidewalls, a top wall running parallel to the underside, a sloping surface, and two end walls. One sidewall is wider than the other. The top surface extends from the top edge of this sidewall), over about two thirds the width of the underside. The top and side walls are connected by the sloping surface, which acts as a run-off wall.

[0003] US 8656653 B1 discloses a building foundation having a plurality of insulating members arranged to define a perimeter that acts as a form for concrete is described. Concrete is poured into the form in a non-rigid state and allowed to harden into a concrete slab integrally formed with the plurality of insulating members. KR 20110055848 A discloses a structure of free cast concrete tank is provided to minimize the posts which is installed in a water tank and to prevent the displacement and water leakage of the connection of a water tub. EP 0460891 A2 discloses a structure comprising a vertical load supported on a wall characterized in that the wall supporting said vertical load comprises concrete slab cladding of a reinforced earth structure, said cladding comprising at least two tiers of concrete slabs, and method of construction therewith. Accordingly, there is a need for an improved insulated slab-on-grade foundation system with a simple configuration.

[0004] Accordingly, there is a need for an improved insulated slab-on-grade foundation system with a simple configuration

SUMMARY OF THE INVENTION

[0005] It is therefore a general object of the present invention to provide an improved insulated slab-on-grade foundation system.

[0006] An advantage of embodiments of the present invention is that the insulated slab-on-grade foundation system may have the capacity to adapt to any size projects such as building, housing, garage and other construction project.

[0007] Another advantage of embodiments of the present invention is that the insulated slab-on-grade foundation system may be more efficient than known systems.

[0008] A further advantage of embodiments of the present invention is that it may be made mostly of EPS (expanded polystyrene material), it may be pre-shape, it may not be molded and therefore may be less expensive.

[0009] Still another advantage of embodiments of the present invention is that the isolated frost protection made of said EPS may be pre-shaped in one part or more likely in two different parts so as to allow an easy installation process.

[0010] Another advantage of embodiments of the present invention is that the installation process may become easier because of the dovetail pre-form can fit together.

[0011] Still a further advantage of embodiments the present invention is that the isolated frost protection may be made of EPS in two smaller parts as compared to one large piece and so easier to operate.

[0012] Other objects and advantages of the present invention will become apparent from a careful reading of the detailed description provided herein, with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Further aspects and advantages of the present invention will become better understood with reference to the description in association with the following Figures, in which similar references used in different Figures denote similar components, wherein:

Figure 1 is a side section view of an insulated slab-on-grade foundation system, in accordance with an illustrative embodiment of the present invention;

Figure 2 is a, in accordance with a second illustrative embodiment of the present invention;

Figure 3 is, in accordance with a third illustrative embodiment of the present invention; and

Figure 4 is a, in accordance with a fourth illustrative embodiment of the present invention.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0014] With reference to the annexed drawings the preferred embodiments of the present invention will be herein described for indicative purpose and by no means as of limitation.

[0015] Referring to Figure 1, there is schematically shown an embodiment of an insulated slab-on-grade

foundation system, in accordance with a preferred embodiment of the present invention. The system is preferably installed on a natural soil layer 1 without humus. The soil layer 1 is excavated or arranged so that one portion thereof has a horizontal soil surface and another portion thereof has slanted soil surface. On top of the soil layer 1, there is disposed a layer of net gravel 2 for draining purposes. The gravel layer 2 is arranged so as to follow the profile of the soil layer 1 with one portion thereof having a horizontal gravel surface and another portion thereof having slanted gravel surface. On top of the gravel layer 2, there is disposed a modular slab 3. The modular slab 3 includes a peripheral vertical edge portion 4 made of metal for surrounding and holding different modules around the perimeter of the modular slab 3. The modular slab 3 includes a first isolating portion 5A made of rigid EPS (expanded polystyrene material) disposed along the internal surface of the modular slab 3. A vapor barrier 6 may be installed on top of the second isolating portion 5A. The modular slab 3 includes a second isolating portion 5B made of rigid EPS (expanded polystyrene material) disposed on top of the first isolating portion 5A along the internal surface of the modular slab 3. The second isolation portion 5B includes a slanted transitional portion 7A. The modular slab 3 may also include an external skirt portion 8 that extends outwardly and is disposed on top of the slanted gravel surface. Concrete 10 is poured into the modular slab 3 and rebars or reinforced bars 9 are installed in the concrete 10. At the bottom of the slanted gravel portion there is a drain 12 surrounded by gravel 11. On top of the skirt portion 8 there is a layer of filling and soil 13 for finishing the outer surroundings of the modular slab 3.

[0016] Referring to Figure 2, there is schematically shown another embodiment of an insulated slab-on-grade foundation system, in accordance with second preferred embodiment of the present invention. It is similar to the one shown in Figure 1 and the same reference numbers refer to the same elements. In this second embodiment, the modular slab 3 includes a third isolating portion 5C made of rigid EPS (expanded polystyrene material) disposed on top of the second isolating portion 5B along the internal surface of the modular slab 3. The third isolation portion 5C includes a second slanted transitional portion 7B.

[0017] Referring to Figure 3, there is schematically shown another embodiment of an insulated slab-on-grade foundation system, in accordance with third preferred embodiment of the present invention. It is similar to the one shown in Figures 1-2 and the same reference numbers refer to the same elements. A modular slab 3A of different shape as the one of Figure 1 is used.

[0018] Referring to Figure 4, there is schematically shown another embodiment of an insulated slab-on-grade foundation system, in accordance with fourth preferred embodiment of the present invention. It is similar to the one shown in Figures 1-3 and the same reference numbers refer to the same elements. A modular slab 3B of different shape as the one of Figures 1-2 is used.

[0019] Preferably, the components of the modular slab 3, 3A or 3B are prepared in the workshop according to the size and the customer's plan.

[0020] Then, one has to prepare the ground before installing the modular slab 3, 3A or 3B. In a first step, one has to remove the top soil or vegetal part of the ground where the modular slabs 3, 3A or 3B are to be installed. One has then to arrange a gravel layer of thickness of preferably about 10 cm (4 inches) to 15 cm (6 inches) so has to provide a suitable drainage. Between the soil layer 1 and gravel layer 2 there may be a geotextile fabric so as to not lose the gravel.

[0021] Then, one determines the four corners where the modular slab 3, 3A or 3B are to be installed. A preferred length size of a modular slab 3 made of EPS is about 1.2 m (4 feet). One then completes with the other modules made of EPS all around the periphery.

[0022] The internal corners are made by crossing cross of two modules 3 (and/or 3a shown in Figure 3) right with 20.32 cm (8 inches) extending beyond of one of the two segments on the perimeter. A flat panel fills this internal junction to achieve a 90 degrees internal corner.

[0023] One then installs a mechanical link, such as a U-shaped metal plate 4 (4.13 cm (1 5/8 inches) wide) that connects all modules 3 throughout the perimeter thereof 3b. Each U- shape metal plate 4 of may be superimposed and secured by self-taping screws.

[0024] The inner surface of the perimeter modules 3 (and/or 3a) are filled with EPS that is to say the first row insulating panels 5 are installed.

[0025] The assembly of the second part of the top modular part 3b (module a (3b) made of EPS - length of 2.4 m (8 feet)) is joined by a junction in a key way - Two modules (3b) cut 45 degrees in pairs make the outer corners. The perimeter segments must be completed with right modules (modular part A (3b) in EPS - length of 2.4 m (8 feet)).

[0026] One then installs a mechanical link, such as a U-shaped edge portion 4b that is made of metal (6.35 cm (2 1/2 inches) that will make the joint on all modules throughout the perimeter of modules A 3b. Each U-shaped portion 4b of metal is joined by overlay and secured by self-tapping metal screws.

[0027] The junction of the modules A 3a and B 3b is done by the key path which allows an adjustment of the final level of the perimeter of the reference modules for the pouring of the concrete.

[0028] This adjustment of the keyway between the module A and B may be fixed by insulated spray in a can.

[0029] A vapor barrier 6, which is preferably of a minimum 10 mm, is installed within the entire project area. All attached to the U-shaped metal portion 4 so as to perform jointing of A modules

[0030] The next step involves installation of a transition module (1.27 cm-7.62 cm x 30.48 cm length of 2.4 m) (1/2 inch - 3 inches x 12 inches length of 8 feet) inside MODULE A (at a distance of 60.96 cm 24 inches the

internal top of module A) this module is parallel (60.96 cm 24 inches internal distance) from module A of the project.

[0031] The new inner surface of the transition module is filled with EPS-second row insulation board.

[0032] Some installations require a second transition module after the second row EPS insulation, if it is the case then a third row of insulation made of EPS may be required. An EPS insulation board fits into the outer bottom of module B at the outer perimeter to make a frost protection skirt over the entire outer perimeter. (The dimensions of this EPS panel are based on the ground freeze calculation for the project region). Although the present invention has been described hereinabove by way of specific embodiments thereof, it can be modified, without departing from the scope of the invention as defined in the appended claims.

Claims

1. An insulated slab-on-grade foundation system, installed on a soil layer (1), in which the soil layer (1) is arranged so that one portion thereof has a horizontal soil surface and another portion thereof has a slanted soil surface, the insulated slab-on-grade foundation system comprising:

a layer of gravel (2) disposed on top of the soil layer (1), the gravel layer (2) being arranged so as to follow the profile of the soil layer (1), the gravel layer (2) having one portion thereof with a horizontal gravel surface and another portion thereof with a slanted gravel surface;
a modular slab (3; 3A, 3B) disposed on top of the gravel layer (2), the modular slab (3; 3A, 3B) including a first isolating portion (5A) and a second isolating portion (5B) disposed on top of the first isolating portion (5A), the second isolating portion (5B) having a slanted transitional portion, the modular slab (3; 3A, 3B) having a peripheral vertical edge portion (4) for surrounding and holding the first and second isolating portions (5A, 5B) to create a receptacle into which concrete is poured; and
an external skirt portion (8) that extends outwardly from the modularslab and is disposed on top of the slanted gravel surface.

2. The insulated slab-on-grade foundation system, according to claim 1, in which the first and second isolating portions (5A, 5B) are made from rigid expanded polystyrene material.

3. The insulated slab-on-grade foundation system, according to claim 1, in which reinforcing bars (9) are installed in the poured concrete

4. The insulated slab-on-grade foundation system, according to claim 1, in which a vapor barrier (6) is installed on top of the second isolating portion (5B).

5. The insulated slab-on-grade foundation system, according to claim 1, in which a drain is located at the bottom of the slanted gravel surface, the drain being surrounded by gravel.

6. The insulated slab-on-grade foundation system, according to claim 5, in which a layer of filling and soil (13) is located on top of the external skirt portion.

7. The insulated slab-on-grade foundation system, according to claim 1, in which the modularslab (3; 3A, 3B) includes a third isolating portion disposed (5C) on top of the second isolating portion (5B), the third isolating portion (5C) including a second slanted transitional portion (7B).

8. The insulated slab-on-grade foundation system, according to claim 7, in which the third isolating portion (5C) is made of rigid expanded polystyrene material.

9. The insulated slab-on-grade foundation system, according to claim 1, in which a peripheral edge portion (4) is made of metal.

10. The insulated slab-on-grade foundation system, according to claim 1, includes first and second slab modules mechanically linked together using a U-shaped metal plate.

11. A method for installing a slab-on-grade foundation system, the method comprising:

arranging a soil layer (1) so that one portion thereof has a horizontal soil surface and another portion thereof has a slanted soil surface;
arranging a gravel layer (2) on top of the soil layer (1) so as to follow the profile of the soil layer (1), the gravel layer (2) having one portion thereof with a horizontal gravel surface and another portion thereof with a slanted gravel surface;
creating a receptacle into which concrete is poured by disposing a modular slab (3; 3A, 3B) on top of the gravel layer (2), the modular slab (3; 3A; 3B) including a first isolating portion (5A) and a second isolating portion (5B) disposed on top of the first isolating portion (5A), the second isolating portion (5B) having a slanted transitional portion, the modular slab (3; 3A; 3B) having a peripheral vertical edge portion(4), the receptacle surrounding and holding the first and second isolating portions (5A; 5B); and
installing an external skirt portion (8) so as to extend outwardly from the modular slab, the skirt

portion (8) being disposed on top of the slanted gravel surface.

12. The method, according to claim 11, further includes installing reinforcing bars (9) in the poured concrete.

13. The method, according to claim 11, further includes installing a vapour barrier (6) on top of the second isolating portion (5B).

Patentansprüche

1. Isoliertes Betonbodenplattenfundamentsystem, das auf einer Bodenschicht (1) eingerichtet wird, wobei die Bodenschicht (1) so angeordnet ist, dass ein Abschnitt davon eine horizontale Bodenoberfläche aufweist und ein anderer Abschnitt davon eine geneigte Bodenoberfläche aufweist, wobei das isolierte Betonbodenplattenfundamentsystem Folgendes umfasst:

eine Kiesschicht (2), die auf der Bodenschicht (1) vorgesehen ist, wobei die Kiesschicht (2) so angeordnet ist, dass sie dem Profil der Bodenschicht (1) folgt, wobei die Kiesschicht (2) einen Abschnitt davon mit einer horizontalen Kiesoberfläche und einen anderen Abschnitt davon mit einer geneigten Kiesoberfläche aufweist;
eine modulare Platte (3; 3A, 3B), die auf der Kiesschicht (2) vorgesehen ist, wobei die modulare Platte (3; 3A, 3B) einen ersten Isolierabschnitt (5A) und einen zweiten Isolierabschnitt (5B) einschließt, der auf dem ersten Isolierabschnitt (5A) vorgesehen ist, wobei der zweite Isolierabschnitt (5B) einen geneigten Übergangsabschnitt aufweist, wobei die modulare Platte (3; 3A, 3B) einen umlaufenden vertikalen Randabschnitt (4) zum Umgeben und Halten des ersten und zweiten Isolierabschnitts (5A, 5B) aufweist, um einen Behälter zu bilden, in den Beton gegossen wird; und
einen äußeren Schürzenabschnitt (8), der sich von der modularen Platte nach außen erstreckt und auf der geneigten Kiesoberfläche vorgesehen ist.

2. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 1, bei dem der erste und zweite Isolierabschnitt (5A, 5B) aus starrem expandiertem Polystyrolmaterial hergestellt sind.

3. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 1, bei dem Bewehrungsstäbe (9) in dem gegossenen Beton eingerichtet sind

4. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 1, bei dem eine Dampfsperre (6) auf dem zweiten Isolierabschnitt (5B) eingerichtet ist.

5. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 1, bei dem sich am Boden der geneigten Kiesoberfläche ein Abfluss befindet, wobei der Abfluss von Kies umgeben ist.

6. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 5, bei dem sich eine Füll- und Erdschicht (13) auf dem äußeren Schürzenabschnitt befindet.

7. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 1, bei dem die modulare Platte (3; 3A, 3B) einen dritten Isolierabschnitt einschließt (5C), der auf dem zweiten Isolierabschnitt (5B) vorgesehen ist, wobei der dritte Isolierabschnitt (5C) einen zweiten geneigten Übergangsabschnitt (7B) einschließt.

8. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 7, bei dem der dritte Isolierabschnitt (5C) aus starrem expandiertem Polystyrolmaterial hergestellt ist.

9. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 1, bei dem ein umlaufender Randabschnitt (4) aus Metall hergestellt ist.

10. Isoliertes Betonbodenplattenfundamentsystem nach Anspruch 1, das ein erstes und zweites Plattenmodul einschließt, die unter Verwendung einer U-förmigen Metallplatte mechanisch miteinander verbunden sind.

11. Verfahren zum Einrichten eines Betonbodenplattenfundamentsystems, wobei das Verfahren Folgendes umfasst:

Anordnen einer Bodenschicht (1), sodass ein Abschnitt davon eine horizontale Bodenoberfläche und ein anderer Abschnitt davon eine geneigte Bodenoberfläche aufweist;
Anordnen einer Kiesschicht (2) auf der Bodenschicht (1), sodass sie dem Profil der Bodenschicht (1) folgt, wobei die Kiesschicht (2) einen Abschnitt davon mit einer horizontalen Kiesoberfläche und einen anderen Abschnitt davon mit einer geneigten Kiesoberfläche aufweist;
Erzeugen eines Behälters, in den Beton gegossen wird, indem eine modulare Platte (3; 3A, 3B) auf der Kiesschicht (2) vorgesehen wird, wobei die modulare Platte (3; 3A, 3B) einen ersten Isolierabschnitt (5A) und einen zweiten Isolierabschnitt (5B) einschließt, der auf dem ersten Isolierabschnitt (5A) vorgesehen ist, wobei der zweite Isolierabschnitt (5B) einen geneigten Übergangsabschnitt aufweist, wobei die modu-

lare Platte (3; 3A, 3B) einen umlaufenden vertikalen Randabschnitt (4) aufweist, wobei der Behälter den ersten und zweiten Isolierabschnitt (5A, 5B) umgibt und hält; und
Einrichten eines äußeren Schürzenabschnitts (8), sodass er sich von der Modulplatte nach außen erstreckt, wobei der Schürzenabschnitt (8) auf der geneigten Kiesoberfläche vorgesehen ist.

12. Verfahren nach Anspruch 11, das ferner das Einrichten von Bewehrungsstäben (9) in dem gegossenen Beton einschließt.

13. Verfahren nach Anspruch 11, das ferner das Einrichten einer Dampfsperre (6) auf dem zweiten Isolierabschnitt (5B) einschließt.

Revendications

1. Système de fondation dalles sur sol isolé, installé sur une couche de sol (1), dans lequel la couche de sol (1) est agencée de sorte qu'une partie correspondante ait une surface de sol horizontale et qu'une autre partie correspondante ait une surface de sol inclinée, le système de fondation dalles sur sol isolé comprenant :

une couche de gravier (2) disposée au-dessus de la couche de sol (1), la couche de gravier (2) étant agencée de manière à suivre le profil de la couche de sol (1), la couche de gravier (2) ayant une partie correspondante avec une surface de gravier horizontale et une autre partie correspondante avec une surface de gravier inclinée ;
une dalle modulaire (3 ; 3A, 3B) disposée au-dessus de la couche de gravier (2), la dalle modulaire (3 ; 3A, 3B) comprenant une première partie isolante (5A) et une deuxième partie isolante (5B) disposées au-dessus de la première partie isolante (5A), la deuxième partie isolante (5B) ayant une partie de transition inclinée, la dalle modulaire (3 ; 3A, 3B) ayant une partie de bord vertical périphérique (4) pour entourer et maintenir les première et deuxième parties isolantes (5A, 5B) pour créer un réceptacle dans lequel le béton est coulé ; et
une partie de jupe externe (8) qui s'étend vers l'extérieur depuis la dalle modulaire et est disposée au-dessus de la surface de gravier inclinée.

2. Système de fondation dalles sur sol isolé, selon la revendication 1, dans lequel les première et deuxième parties isolantes (5A, 5B) sont réalisées à partir d'un matériau de type polystyrène expansé rigide.

3. Système de fondation dalles sur sol isolé, selon la revendication 1, dans lequel des barres d'armature (9) sont installées dans le béton coulé.

4. Système de fondation dalles sur sol isolé, selon la revendication 1, dans lequel un pare-vapeur (6) est installé au-dessus de la deuxième partie isolante (5B).

5. Système de fondation dalles sur sol isolé, selon la revendication 1, dans lequel un drain est situé au bas de la surface de gravier inclinée, le drain étant entouré de gravier.

6. Système de fondation dalles sur sol isolé, selon la revendication 5, dans lequel une couche de remplissage et de sol (13) est située au-dessus de la partie de jupe externe.

7. Système de fondation dalles sur sol isolé, selon la revendication 1, dans lequel la dalle modulaire (3 ; 3A, 3B) comprend une troisième partie isolante disposée (5C) au-dessus de la deuxième partie isolante (5B), la troisième partie isolante (5C) comprenant une seconde partie de transition inclinée (7B).

8. Système de fondation dalles sur sol isolé, selon la revendication 7, dans lequel la troisième partie isolante (5C) est constituée d'un matériau de type polystyrène expansé rigide.

9. Système de fondation dalles sur sol isolé, selon la revendication 1, dans lequel une partie de bord périphérique (4) est réalisée en métal.

10. Système de fondation dalles sur sol isolé, selon la revendication 1, qui comprend des premier et second modules de dalle reliés mécaniquement ensemble à l'aide d'une plaque métallique en forme de U.

11. Procédé d'installation d'un système de fondation dalles sur sol, le procédé comprenant :

un agencement d'une couche de sol (1) de sorte qu'une partie correspondante ait une surface de sol horizontale et qu'une autre partie correspondante ait une surface de sol inclinée ;
un agencement d'une couche de gravier (2) au-dessus de la couche de sol (1) de manière à suivre le profil de la couche de sol (1), la couche de gravier (2) ayant une partie correspondante avec une surface de gravier horizontale et une autre partie correspondante avec une surface de gravier inclinée ;
une création d'un réceptacle dans lequel le béton est coulé en disposant une dalle modulaire (3 ; 3A, 3B) au-dessus de la couche de gravier

(2), la dalle modulaire (3 ; 3A ; 3B) comprenant une première partie isolante (5A) et une deuxième partie isolante (5B) disposée au-dessus de la première partie isolante (5A), la deuxième partie isolante (5B) ayant une partie de transition inclinée, la dalle modulaire (3 ; 3A ; 3B) ayant une partie de bord vertical périphérique (4), le réceptacle entourant et maintenant les première et deuxième parties isolantes (5A ; 5B) ; et
une installation d'une partie de jupe externe (8) de manière à s'étendre vers l'extérieur à partir de la dalle modulaire, la partie de jupe (8) étant disposée au-dessus de la surface de gravier inclinée.

12. Procédé, selon la revendication 11, comprenant en outre l'installation de barres d'armature (9) dans le béton coulé.

13. Procédé, selon la revendication 11, comprenant en outre l'installation d'un pare-vapeur (6) au-dessus de la deuxième partie isolante (5B).

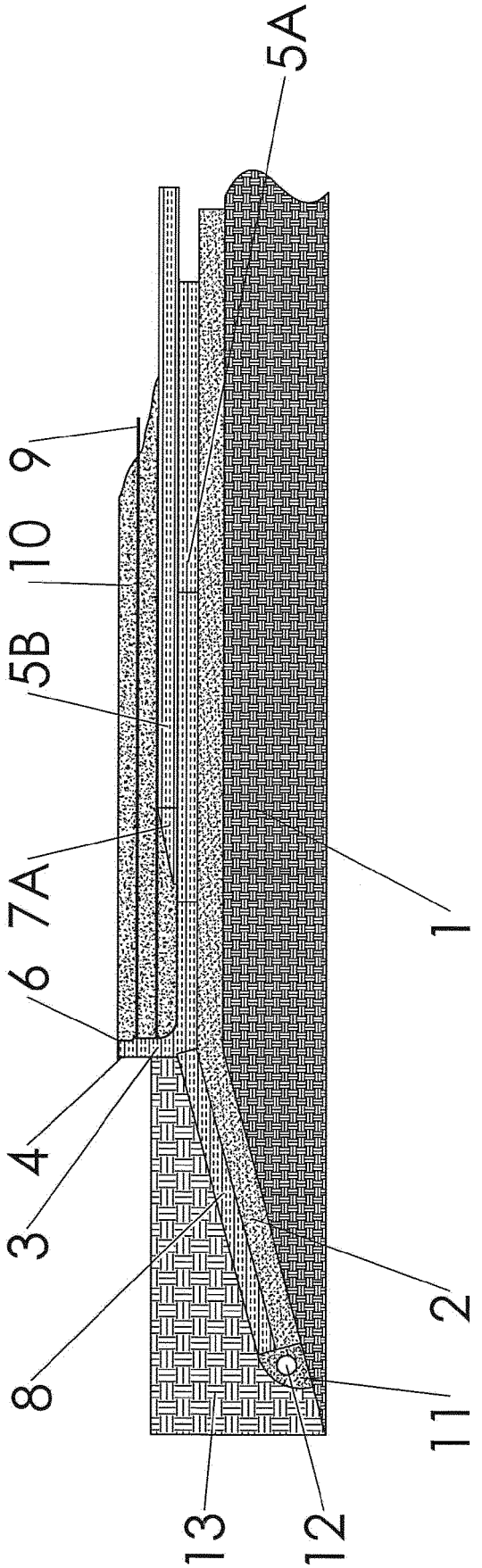

FIGURE 1

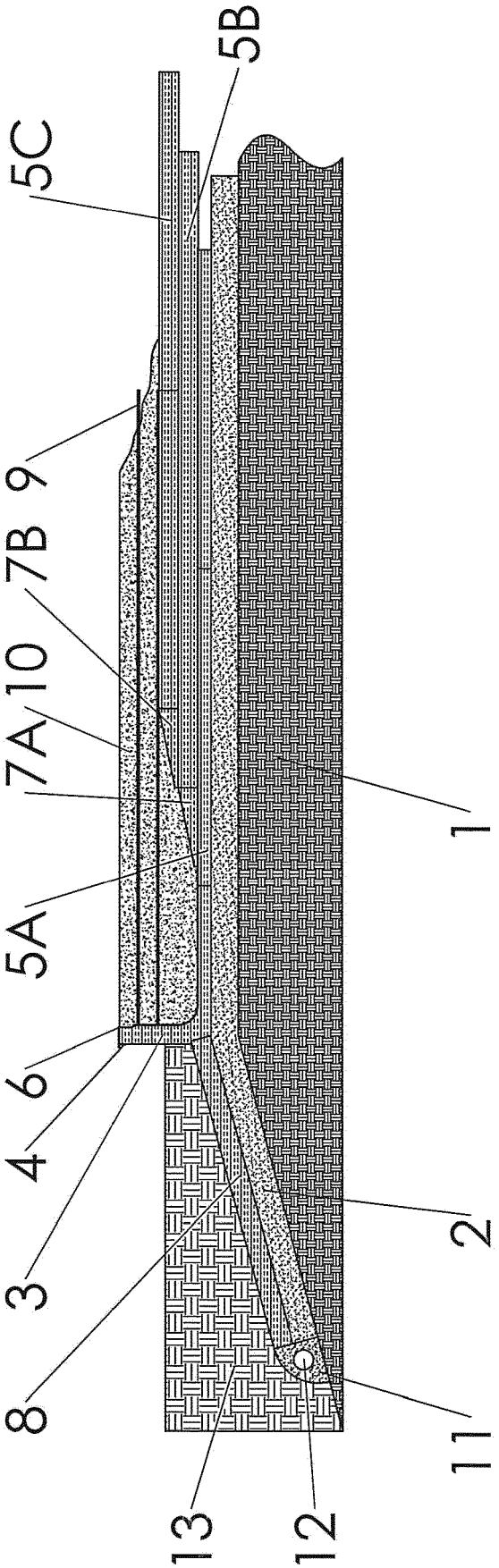

FIGURE 2

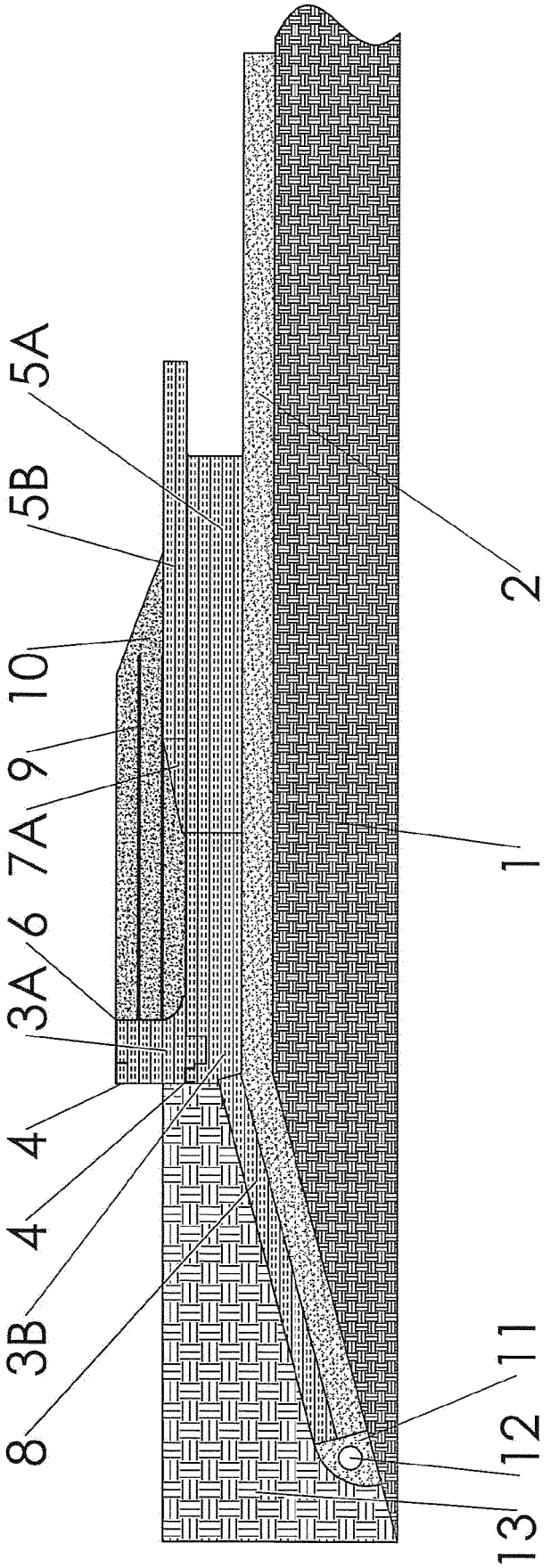

FIGURE 3

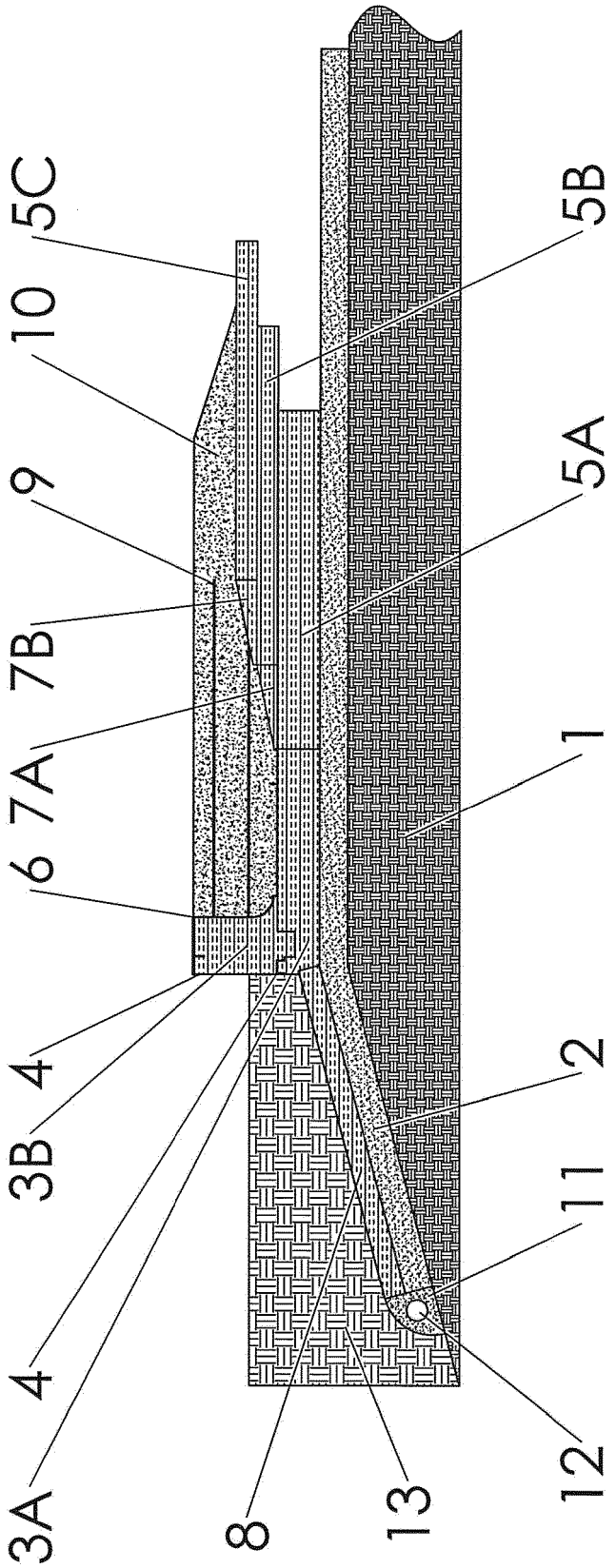

FIGURE 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

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