

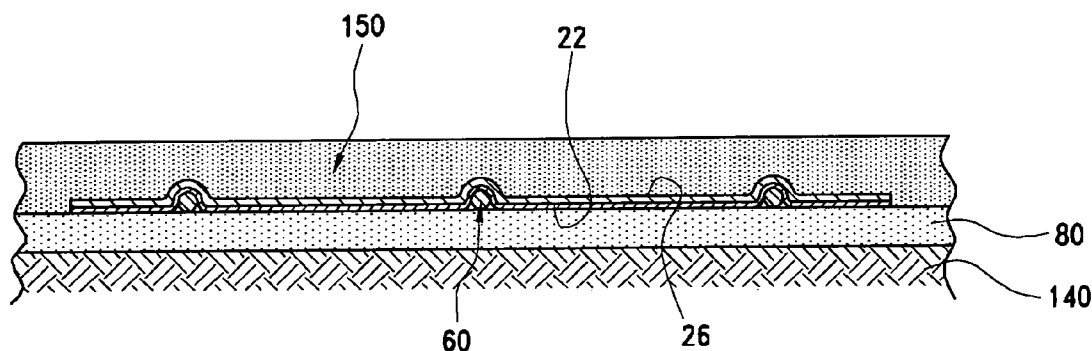


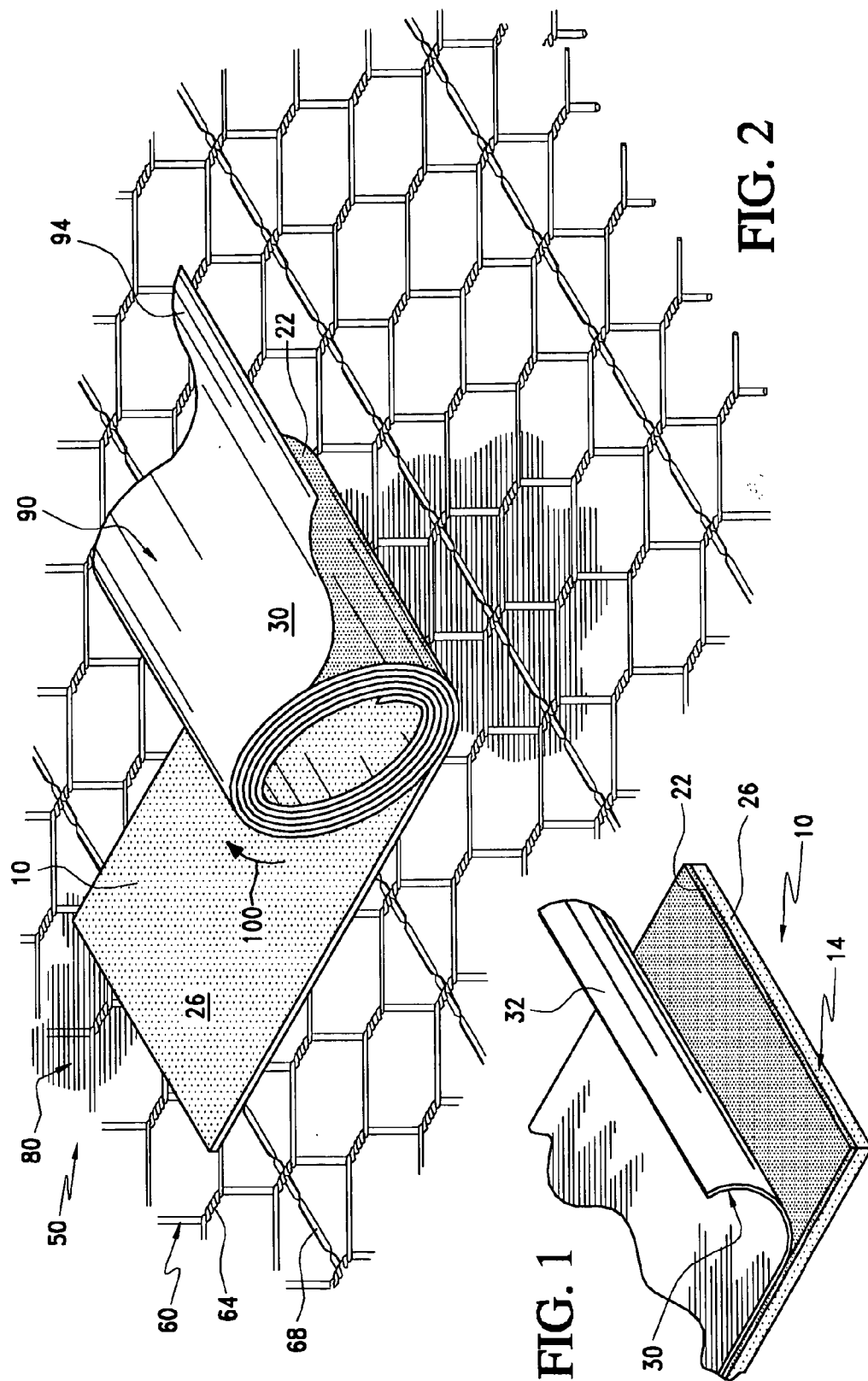
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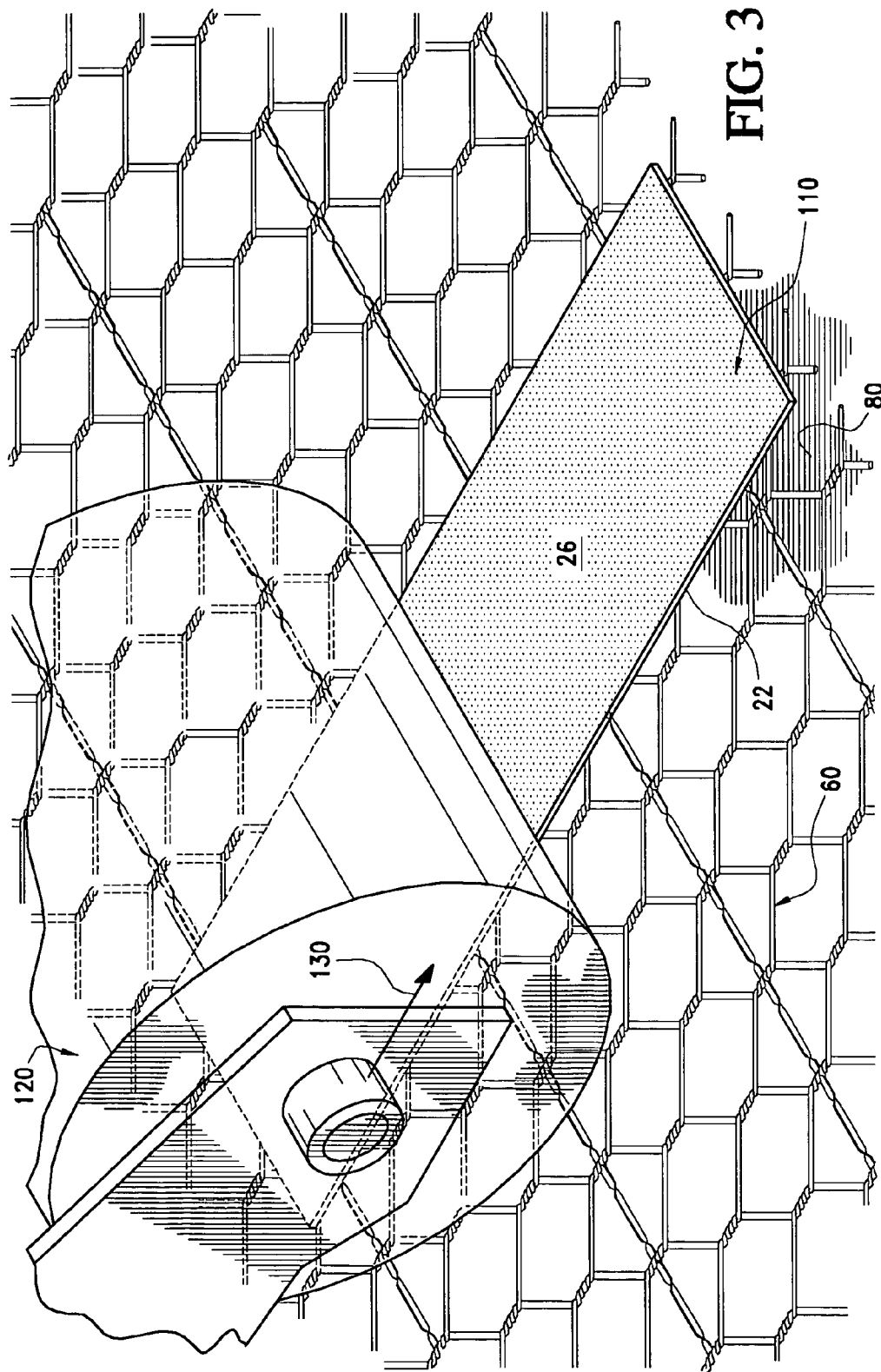
(19) **United States**(12) **Patent Application Publication****Diloreto**(10) **Pub. No.: US 2006/0053728 A1**(43) **Pub. Date: Mar. 16, 2006**(54) **METHOD FOR FIXING A REINFORCING MESH TO A BASE OR TO THE GROUND**(52) **U.S. Cl. 52/649.1**(76) **Inventor: Rinaldo Diloreto, Richmond, VA (US)**(57) **ABSTRACT**

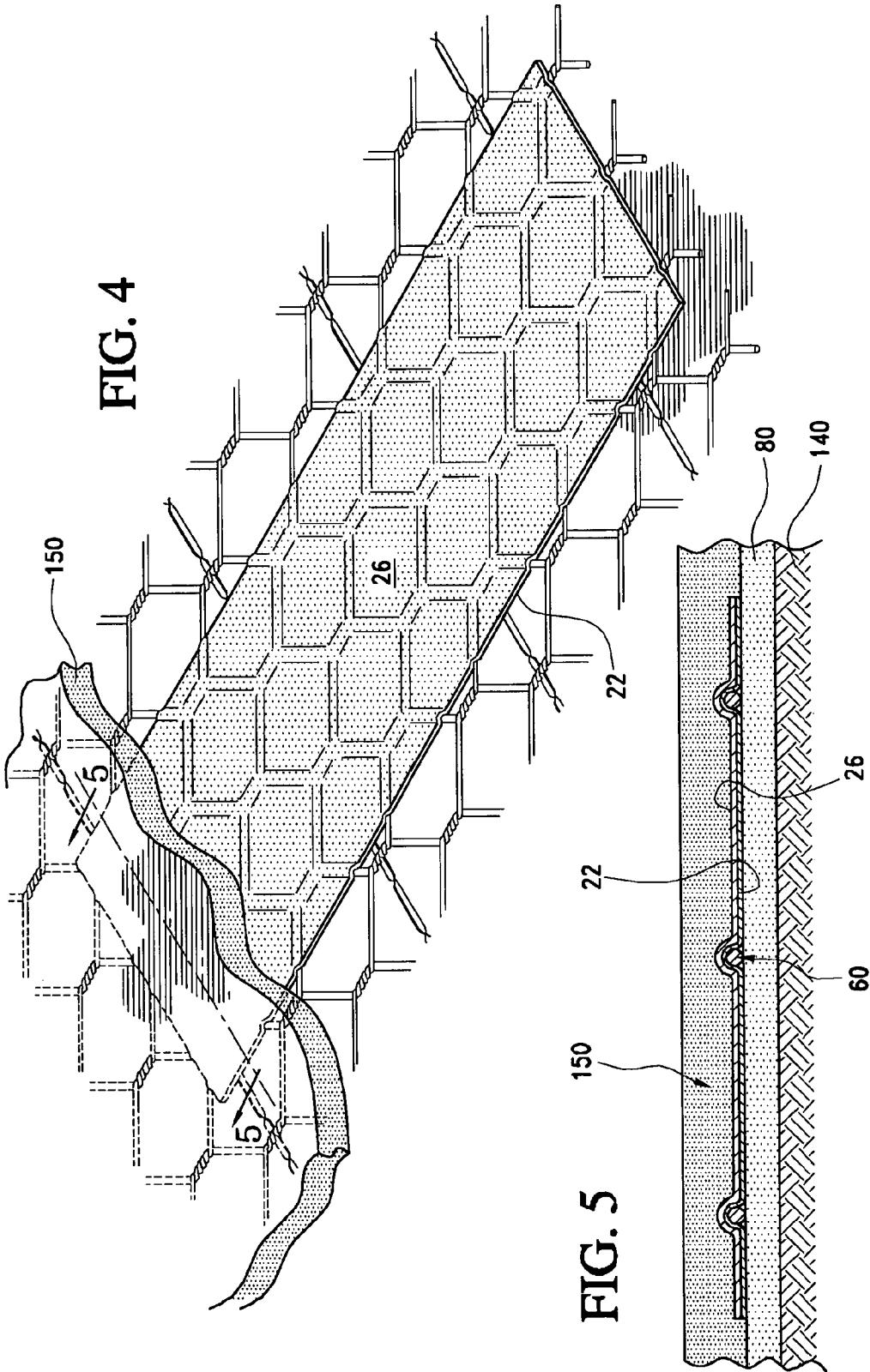
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Method of providing a reinforced substrate includes providing a base layer, providing a reinforcing mesh on the base layer and providing an adhesive strip. The adhesive strip includes an adhesive and a backing covering the adhesive. The adhesive strip is put on at least a portion of the reinforcing mesh, and force is applied to the adhesive strip to adhere the adhesive strip to the base layer and to the reinforcing mesh, so that the reinforcing mesh is secured to the base layer. The resultant reinforced substrate may include a reinforcing mesh having longitudinal and transverse wires which are surrounded by a solid adhesive on the adhesive strip to reduce or eliminate movement of the reinforcing mesh during the making of the reinforced substrate.

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METHOD FOR FIXING A REINFORCING MESH TO A BASE OR TO THE GROUND

FIELD OF THE INVENTION

[0001] The invention relates to a method for applying a substrate. More specifically, the invention relates to a method for securing a reinforcing element on a base or on the ground to reinforce a substrate. Even more particularly, the invention relates to a system and method for adhering a reinforcing element, such as a reinforcing mesh to the ground or to a base layer, such as a layer including a hydrocarbon-containing material or the like, and then adding a substrate which is thus reinforced.

BACKGROUND OF THE INVENTION

[0002] Reinforcing roads or surfaces, such as parking lots, with wire mesh is known.

[0003] A reinforcing mat or mesh which has been used for reinforcing the ground or a layer of the road that is made of asphalt, bitumen, or other hydrocarbon-containing material, and the like, includes the successful reinforcing mat sold by the N. V. Bekaert S.A. under the name MESH TRACK™. MESH TRACK™ includes a woven galvanized steel wire mat or mesh.

[0004] Methods of securing a reinforcing mat in such roads have been described in:

[0005] Published European Patent Application No. 0 429 106 to N. V. Bekaert S.A., published May 29, 1991; and

[0006] Published European Patent Application No. 0 505 010 to N. V. Bekaert S.A., published Sep. 23, 1992.

[0007] N. V. Bekaert S.A. is likewise the assignee of U.S. Pat. No. 6,168,118 to Vancraeynest et al., issued Jan. 2, 2001.

[0008] U.S. Pat. No. 4,074,948 to Heater, Jr., issued Feb. 21, 1978, entitled "Pavement Mat Process," is likewise known.

OBJECTS AND SUMMARY OF THE INVENTION

[0009] It is an object of the invention to overcome the drawbacks of the prior art systems, methods, and devices.

[0010] It is another object of the invention to provide a system and method of reinforcing asphalt and the like that is easier and faster to apply than the prior art.

[0011] A further object of the invention is to provide a method of attaching a substrate to an underlying base, such as a base of concrete or asphalt.

[0012] Another object of the invention is to provide a method of attaching a substrate, including a mesh, to an underlying base that uses a roll of material, such as asphalt, as an adhesive.

[0013] A further object of the invention is to provide a method of securing a reinforcing element, such as a mesh, to an underlying base that sufficiently secures the reinforcing element so that forces applied by an asphalt paving machine when applying asphalt over the reinforcing element do not move the reinforcing element, such as by lifting up the mesh.

[0014] It is another object of the invention to provide a system and method of reinforcing asphalt and the like that can be evenly and consistently applied.

[0015] It is a further object of the invention to provide a mesh or mat, such as a wire mesh, which can be embedded in a base layer, such as the ground or the existing asphalt layer, and which cannot be pulled through the securing material which secures the mesh to the existing layer.

[0016] Another object of the invention is to provide a system and method which require no on-site heating of a liquid or solid adhesive, nor the use of a liquid adhesive on-site, for example.

[0017] Yet another object of the invention is to provide a system and method of securing a reinforcing mesh or mat that are faster than known methods.

[0018] It is another object of the invention to provide a system and method of reinforcing a layer of asphalt on a base layer that includes a mesh configured and engineered so that even if the mesh is moved longitudinally or transversely under forces applied to a securing layer or element during installation, the securing layer will not loosen or come up, even if the mesh is moved relative to the base layer.

[0019] It is yet another object of the invention to provide a system or method of securing a mesh for reinforcing a layer of material, such as an asphalt material, which cannot be loosened, such as by substantially vertically applied forces pulling on an adhering mesh or an adhering layer which secures the mesh to an existing layer, such as by one, two, or more workers pulling up on the mesh and/or adhering mesh securing the reinforcing mesh to the existing layer.

[0020] It is another object of the invention to provide a system and method for securing a mesh to a layer, such as a layer of asphalt, which requires no curing time for such an adhesive layer.

[0021] Another object of the invention is to provide a method and system of securing a mesh for reinforcing a layer of material, such as a layer of asphalt, that require no fasteners, such as mechanical fasteners.

[0022] In sum, the invention is directed to a method for reinforcing a layer of material, such as an asphalt layer, including providing a bottom layer of material, providing a mesh on the bottom layer of the material, providing an adhesive strip of the type including a backing and an adhesive material on the backing, placing the adhesive strip on the mesh, applying a force to the adhesive strip sufficient to secure the adhesive strip sufficiently to the bottom layer and sufficiently to secure the mesh relative to the bottom layer, and then adding a top layer of material, such as an asphalt layer.

[0023] The invention likewise includes a reinforced layer of material, such as an asphalt material, including a base layer, a reinforcing mesh, an adhesive strip adhering the mesh to the base layer, and a top layer of material, such as asphalt.

[0024] The invention likewise includes a reinforcing element, such as a mesh which may be in the form of a metal, steel, galvanized steel, polymer grid, polymer reinforcing plastic, other plastics, and with or without additional materials, backings, layers, mesh configurations, and other inter-layer products.

[0025] It will be appreciated that relative terms such as up, down, top, bottom, left, and right, are for convenience only and are not intended to be limiting.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] **FIG. 1** is a top front perspective view of an adhesive strip which may be used for fixing a reinforcing mesh to a base layer or to the ground, according to the invention;

[0027] **FIG. 2** is a top front perspective view showing the first steps of the method for fixing a reinforcing mesh to a base layer or to the ground according to the invention, in which the adhesive strip of **FIG. 1** is being rolled out onto a reinforcing element, such as the illustrated reinforcing mesh;

[0028] **FIG. 3** is a top front perspective view of further steps according to the method for fixing a reinforcing mesh to a base layer or to the ground according to the invention, in which the adhesive strip of **FIGS. 1 and 2** is being further adhered to the reinforcing mesh and the base layer or the ground;

[0029] **FIG. 4** is a top front perspective view showing a still further step in the method for fixing a reinforcing mesh to a base layer or to the ground according to the invention, in which a further substrate, such as asphalt or another hydrocarbon-containing material is being applied to the secured adhesive strip which secures the reinforcing mesh to the base layer or to the ground, in accordance with the invention; and

[0030] **FIG. 5** is a front elevational cross sectional view of the reinforced substrate according to the invention, taken along 5-5 of **FIG. 4**.

DETAILED DESCRIPTION OF THE INVENTION

[0031] Turning to **FIGS. 1-5**, the system, method, and reinforced substrate according to the invention will be described in greater detail.

[0032] **FIG. 1** shows an adhesive strip **10** which may be used in accordance with the invention. Adhesive strip **10** may include an adhesive or reinforcing layer **14**. Adhesive layer **14** may include an adhesive or adhesive layer **22** provided on a substantially nonadhesive layer or backing **26**. Layer or backing **26** may be made of a fabric, such as a synthetic fabric, which may be a nonwoven synthetic fabric, such as a felt.

[0033] For convenience, and depending on the degree of "stickiness" or adhesive capabilities of adhesive layer **22** required, in use, a removable layer **30**, such as a peel-off backing **30**, may be provided on adhesive layer **26**. It will be appreciated that peel-off backing **30** may be provided on a side of adhesive layer **22** opposite to the side of adhesive layer **22** on which the backing **26** is provided. A leading edge **32** of backing **30** is shown partially peeled off.

[0034] In use, as shown in **FIG. 2**, initial steps **50** of securing, such as by adhering, a reinforcing element, such as a reinforcing mesh **60** may be seen.

[0035] Reinforcing mesh **60** may be in the form of a hexagonal mesh including longitudinal reinforcing elements

or wires **64** and transversely extending reinforcing elements or wire **68** extending transversely relative to longitudinal wire **64**.

[0036] First, a base, the ground, or other substrate **80** is provided or selected.

[0037] Then, the reinforcing mesh **60** may be placed on base layer **80**, such as by laying the reinforcing mesh **60** on top, as shown, or by rolling out the reinforcing mesh in the case where reinforcing mesh **60** is provided in rolls.

[0038] Depending on the manner in which reinforcing mesh **60** is supplied, reinforcing mesh **60** may or may not be further smoothed or "flattened out" on top of base layer **80**.

[0039] In order to secure mesh **60** relative to base layer **80**, the user then provides securing or adhering element or adhesive layer **10** on top of mesh **60** and base layer **80**; i.e. on the side of reinforcing mesh **60** opposite to base layer **80**, as will be readily appreciated from considering **FIGS. 2-5**, for example.

[0040] In the case where the adhesive layer or strip **10** is provided in the form of a roll **90**, backing **30** may be removed at the same time roll **90** is unrolled on top of reinforcing mesh **60** in order to secure mesh **60** to base **80**. That is, a free edge **94** of peel-off layer **30** may be pulled away from roll **90**, as shown, as roll **90** is unrolled in the direction of arrow **100**. Needless to say, adhesive layer **22** may face mesh **60**, as shown, during the unrolling process, depending on the intended use.

[0041] As will be appreciated from **FIG. 3**, in which the adhesive strip has been completely unrolled as a substantially flat strip **110**, the nonadhesive or substantially nonadhesive backing **26** will face upwardly away from mesh **60**.

[0042] If desired, the adhesive strip and, specifically, adhesive layer **22** thereof, may be pressed against reinforcing mesh **60** and bottom layer **80** with sufficient additional force to ensure that reinforcing element or mesh **60** is substantially prevented from being moved relative to base layer **80**. That is, the adhesive of adhesive layer **22** and the degree to which adhesive layer **22** is pressed against bottom **80** may be selected so that reinforcing strip is retained in a desired location and configuration relative to the other components, such as bottom layer **80**, and depending on the intended use, a top layer of material to be added onto bottom layer **80**, reinforcing mesh **60**, and reinforcing strip **14**, so that the method of providing a reinforced substrate may be completed in the desired fashion with the desired physical characteristics.

[0043] Thus, for example, the user may simply apply a downward force directing forces on top of backing **26** during the step of unrolling roll **90**, such as shown in **FIG. 2**, or the user may walk or otherwise apply downward forces on backing **26** to secure adhesive layer **22** to reinforcing mesh **60** and bottom **80**, or the user may, for example, apply even greater forces to strip **14**, such as by use of the wheel of a vehicle driving one or more times on top of backing **26** when backing **26** is in place as shown in **FIG. 3**, or the user may make use of a roller, such as illustrated by a roller **120** of **FIG. 3** being rolled in a direction **130** along and on top of backing **26** so that forces are applied downwardly on adhesive strip **14** to ensure that adhesive layer **22** is sufficiently

secured to base **80** and reinforcing mesh **60** to achieve the desired physical characteristics described above.

[0044] After sufficient downward forces have been applied to backing **26**, such as shown in **FIG. 4**, depending on the thickness of adhesive layer **22** and backing **26**, some or all of portions of reinforcing mesh **60** covered by strip **10** may be visible, owing to adhesive layer **22** having been forced down securely against reinforcing mesh **60** and base layer **80**.

[0045] The adhesive **22** may be selected so that adhesive strip may be applied to mesh **60** at ambient temperature; i.e., without preheating adhesive layer **22** on-site.

[0046] As will be appreciated by viewing **FIG. 4**, a further layer **150**, such as a hydrocarbon-containing layer, a bituminous layer, an asphalt layer, or a bitumen material, for example, may be provided on top of each of mesh **60**, base **80**, and adhesive strip **14**.

[0047] Further layer **150** may be provided as soon as desired on top of mesh **60**, base **80**, and strip **10**, thanks to there being no need to wait for adhesive layer **22** to cool, dry, or otherwise harden to adhere to mesh **60** and base layer **80**.

[0048] In the cross sectional view of **FIG. 5** it will be appreciated that base **80** may be an existing substrate, such as an existing asphalt layer, and the like, which has been provided on an existing ground layer or concrete layer **140**, for example.

[0049] The reinforcing mesh may be made of metal, such as galvanized steel, plastic, and other materials, and may be made in accordance with U.S. Pat. No. 6,168,118 to Vancraeynest et al., issued Jan. 2, 2001, which is incorporated herein by reference. The reinforcing mesh may be the reinforcing supplied by N. V. Bekaert S.A., such as PAVETRAC® mesh.

[0050] The adhesive layer or strip may be made to include an adhesive layer comprising asphalt or bituminous materials. The asphalt base compound may be extruded onto a geotextile backing; e.g. a nonwoven polypropylene fabric, and the non-stick backing layer may be a removable thin plastic layer. It is further contemplated that the nonwoven fabric may be a nonwoven (needle felt) polypropylene layer. The non-adhesive fabric backing may be thicker than the adhesive layer, depending on the intended use. The adhesive may be a solid selected to substantially surround wires of a reinforcing mesh, in use.

[0051] The adhesive strip may be as supplied under the name TracTac, a product of Pavetech International (see e.g. www.pavetech-intl.com).

[0052] While this invention has been described as having a preferred design, it is understood that it is capable of further modifications, and uses and/or adaptations of the invention and following in general the principle of the invention and including such departures from the present disclosure as come within the known or customary practice in the art to which the invention pertains, and as may be applied to the central features hereinbefore set forth, and fall within the scope of the invention or limits of the claims appended hereto.

What is claimed is:

1. A method of reinforcing a substrate to provide a reinforced substrate, the method comprising:

- a) providing a base layer;
- b) providing a reinforcing mesh on the base layer;
- c) providing an adhesive strip, the adhesive strip including a substantially solid adhesive and a backing substantially covering the adhesive;
- d) providing the adhesive strip on at least a portion of the reinforcing mesh;
- e) applying a sufficient force to the adhesive strip to sufficiently adhere the adhesive strip to the base layer and to sufficiently adhere the adhesive strip to the reinforcing mesh, and the reinforcing mesh being sufficiently secured to the base layer, so that before and during a step of providing the substrate on the base layer and the adhesive strip, the reinforcing mesh and the adhesive strip remain in place relative to the base layer; and
- f) providing the substrate on the adhesive strip and on the reinforcing mesh secured to the base layer by the adhesive strip to provide the reinforced substrate.

2. A method as in claim 1, wherein:

- a) the base layer includes an existing hydrocarbon-containing layer.

3. A method as in claim 2, wherein:

- a) the substrate includes a hydrocarbon-containing layer.

4. A method as in claim 1, wherein:

- a) the substrate includes a hydrocarbon-containing layer.

5. A method as in claim 4, wherein:

- a) the reinforcing mesh includes a metal mesh.

6. A method as in claim 5, wherein:

- a) the metal mesh includes a hexagonal mesh including longitudinal wires and transverse reinforcing wires extending transversely relative to the longitudinal wires.

7. A method as in claim 6, wherein:

- a) the backing of the adhesive strip includes a synthetic fabric, and the adhesive of the adhesive strip includes an asphalt layer.

8. A method as in claim 1, wherein:

- a) the backing of the adhesive strip includes a synthetic fabric, and the adhesive of the adhesive strip includes an asphalt layer.

9. A method as in claim 1, wherein:

- a) the adhesive strip is provided on the at least a portion of the reinforcing strip at ambient temperature.

10. A method as in claim 9, wherein:

- a) the adhesive strip includes a removable backing provided on the asphalt layer.

11. A method as in claim 1, wherein:

- a) the reinforcing mesh includes longitudinal and transverse reinforcing wires; and
- b) the step of applying a sufficient force to the adhesive layer includes applying a sufficiently strong force to

cause the substantially solid adhesive to substantially surround the longitudinal and transverse wires of the reinforcing mesh.

12. A method as in claim 1, wherein:

a) in said step of providing an adhesive strip, the adhesive strip is supplied in a roll, and the rolled adhesive strip is unrolled onto the reinforcing mesh.

13. A method as in claim 12, wherein:

a) in said step of applying a sufficient force, a roller is used to provide the sufficient force to adhere the adhesive strip to the base layer.

14. A reinforced substrate, comprising:

a) a base layer;

b) a reinforcing mesh on the base layer, the reinforcing mesh including longitudinal and transverse wires;

c) an adhesive strip, the adhesive strip including a substantially solid adhesive and a backing substantially covering the adhesive;

d) the adhesive strip being provided on at least a portion of the reinforcing mesh;

e) the adhesive strip adhering to the base layer and adhering to the reinforcing mesh, and substantially surrounding the longitudinal wires of the reinforcing mesh and adhering the reinforcing mesh to the base layer; and

f) the substrate substantially surrounding the adhesive strip and the reinforcing mesh secured to the base layer by the adhesive strip.

15. A reinforced substrate as in claim 14, wherein:

a) the base layer includes an existing hydrocarbon-containing layer.

16. A reinforced substrate as in claim 15, wherein:

a) the substrate includes a hydrocarbon-containing layer.

17. A reinforced substrate as in claim 14, wherein:

a) the substrate includes a hydrocarbon-containing layer.

18. A reinforced substrate as in claim 17, wherein:

a) the reinforcing mesh includes a metal mesh.

19. A reinforced substrate as in claim 18, wherein:

a) the metal mesh includes a hexagonal mesh.

20. A reinforced substrate as in claim 19, wherein:

a) the backing of the adhesive strip includes a synthetic fabric, and the adhesive of the adhesive strip includes an asphalt layer.

21. A reinforced substrate as in claim 14, wherein:

a) the backing of the adhesive strip includes a synthetic fabric, and the adhesive of the adhesive strip includes an asphalt layer.

22. A reinforced substrate as in claim 21, wherein:

a) the adhesive is substantially solid and adhesive at ambient temperature.

23. A method, as in claim 22, wherein:

a) the hydrocarbon-containing layer includes an asphalt layer which is substantially solid at ambient temperature.

24. A method of attaching a reinforcing mesh, the method comprising:

a) providing a base layer;

b) providing a reinforcing mesh on the base layer;

c) providing an adhesive strip, the adhesive strip including a substantially solid adhesive and a backing substantially covering the adhesive;

d) providing the adhesive strip on at least a portion of the reinforcing mesh;

e) applying a sufficient force to the adhesive strip to sufficiently adhere the adhesive strip to the base layer and to sufficiently adhere the adhesive strip to the reinforcing mesh, and the reinforcing mesh being sufficiently secured to the base layer, so that before and during a step of providing a substrate on the base layer and the adhesive strip, the reinforcing mesh and the adhesive strip remain in place relative to the base layer.

25. A method as in claim 24, wherein:

a) the base layer includes an existing hydrocarbon-containing layer.

26. A method as in claim 25, wherein:

a) the reinforcing mesh includes a metal mesh.

27. A method as in claim 24, wherein:

a) the backing of the adhesive strip includes a synthetic fabric, and the adhesive of the adhesive strip includes an asphalt layer.

28. A method as in claim 24, wherein:

a) the adhesive strip is provided on the at least a portion of the reinforcing strip at ambient temperature.

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