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(54) **ROOFING SYSTEM**

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(57) **ABSTRACT**

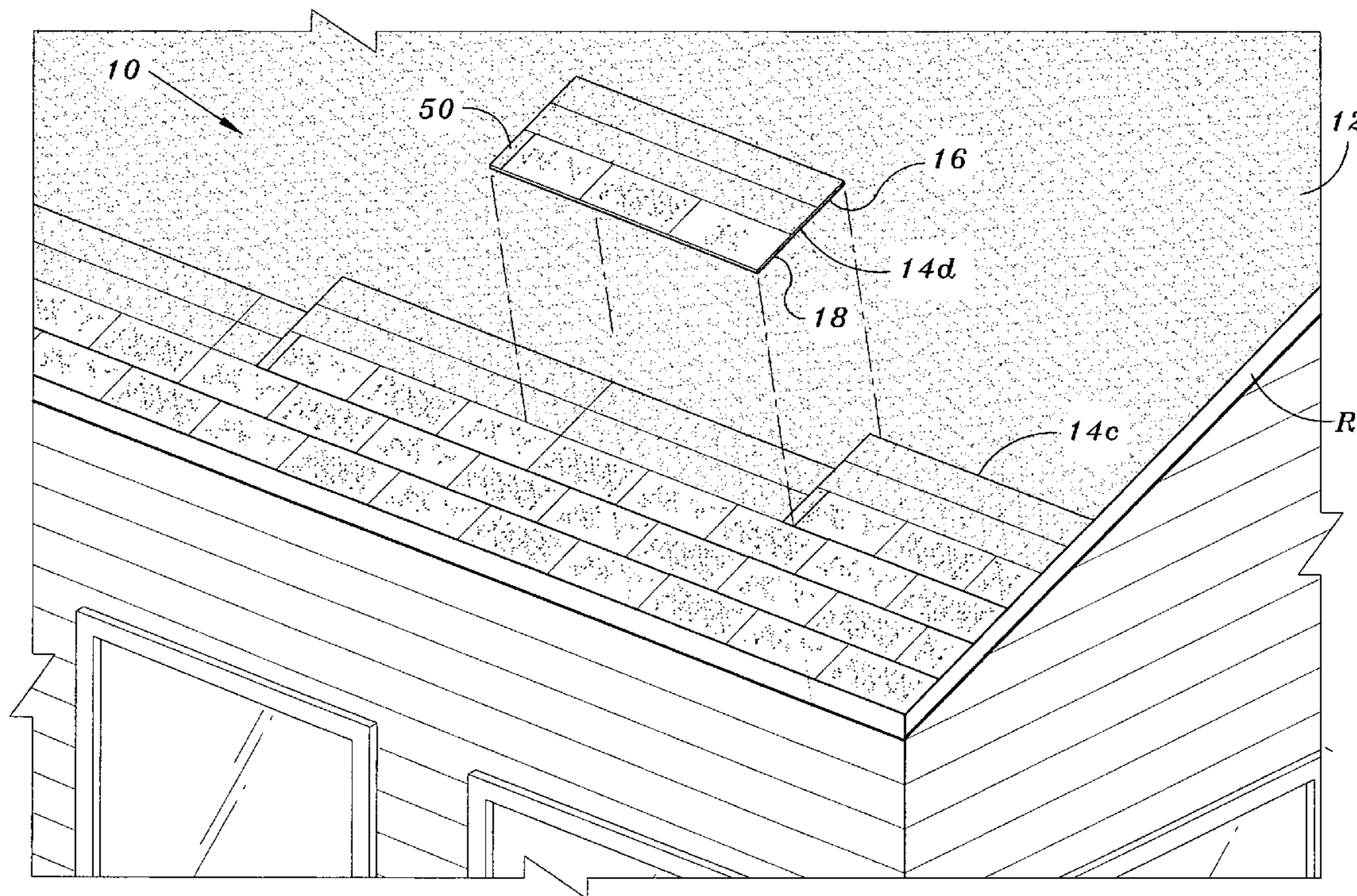
The roofing system is a system that allows for numerous shingles to be attached to the roof of a house without using nails, releasably interlocking the shingles to each other and also attaching the shingles to the surface of the roof. The roofing system includes at least a single foundation layer of readily releasable fastening material, such as hook and loop material, affixed to the roof, and a plurality of shingles releasably attached to the foundation layer. The shingles are overlapped onto each other in rows and held both to each other and the foundation layer. The shingles may additionally laterally overlap each other to provide a greater level of resistance to the elements.

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Related U.S. Application Data

(63) Continuation-in-part of application No. 10/999,002, filed on Nov. 30, 2004, now Pat. No. 7,219,476.



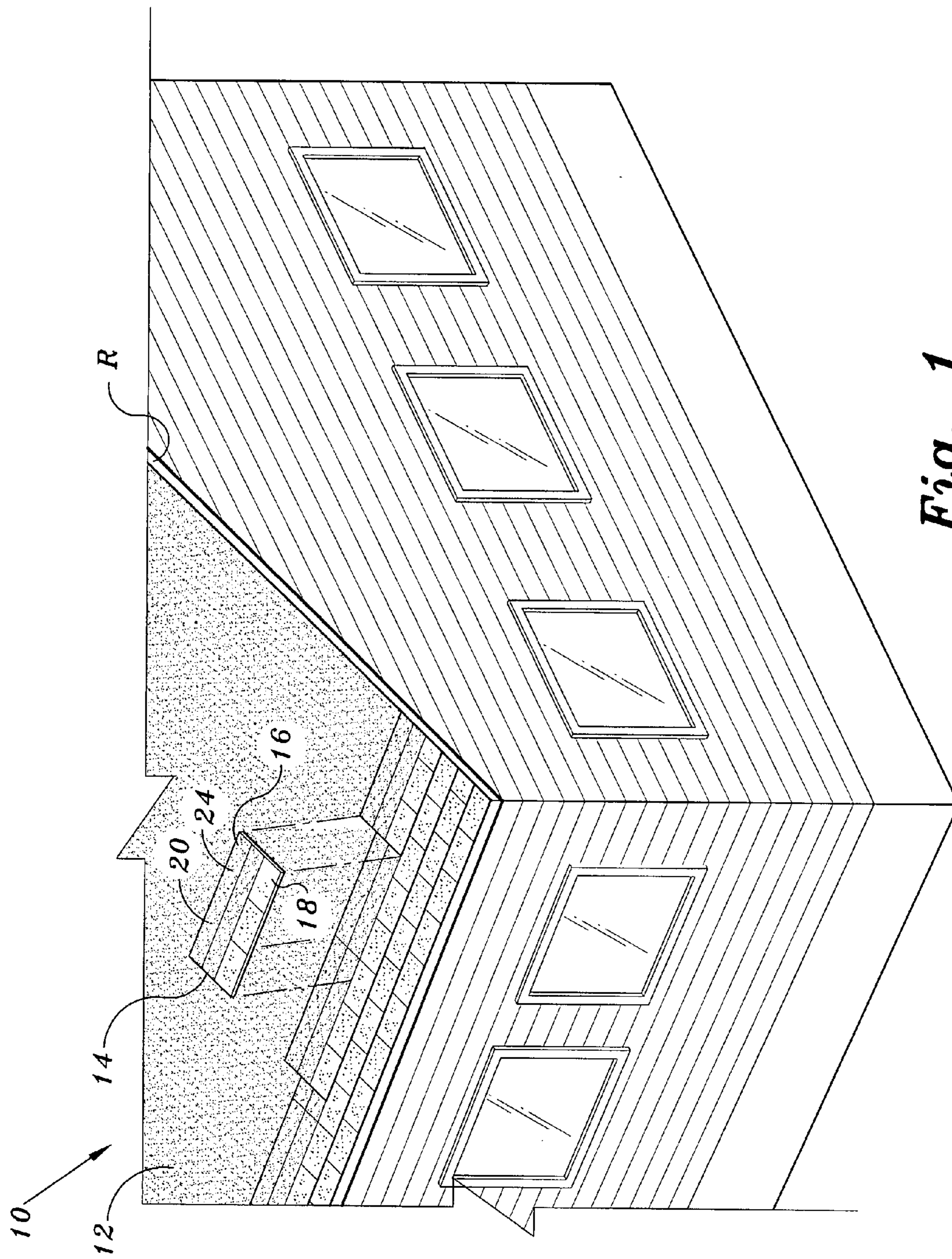
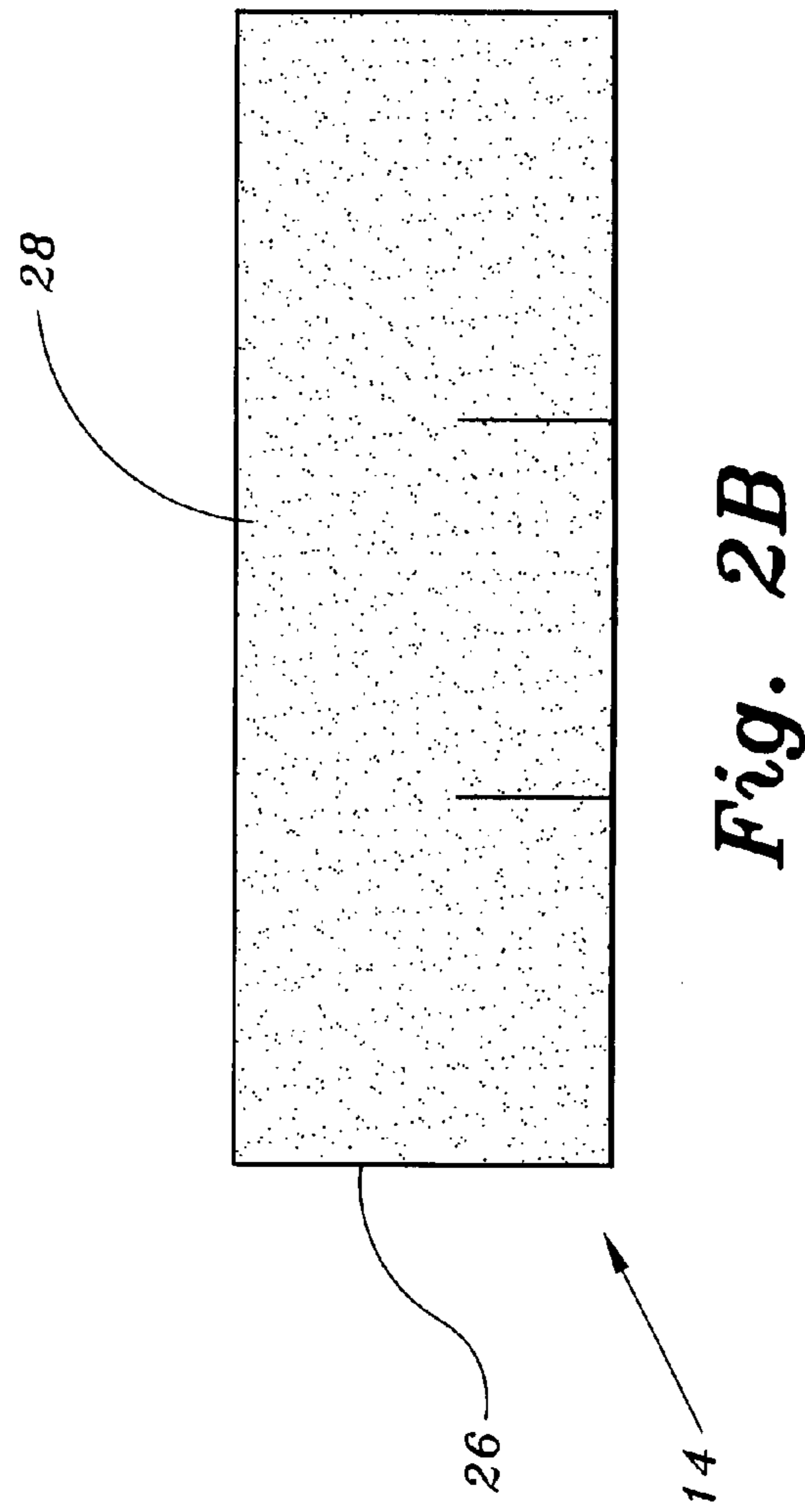
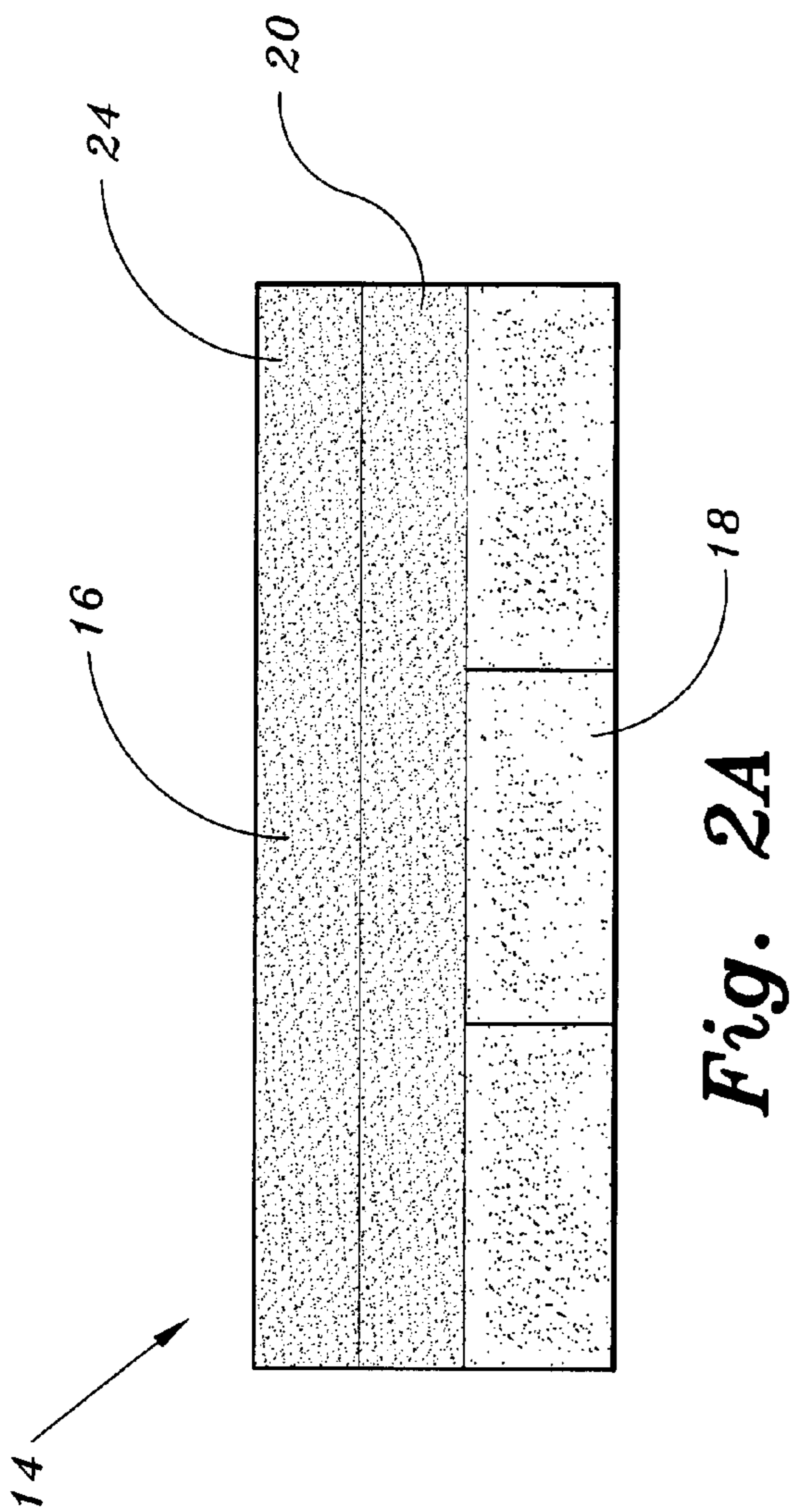


Fig. 1



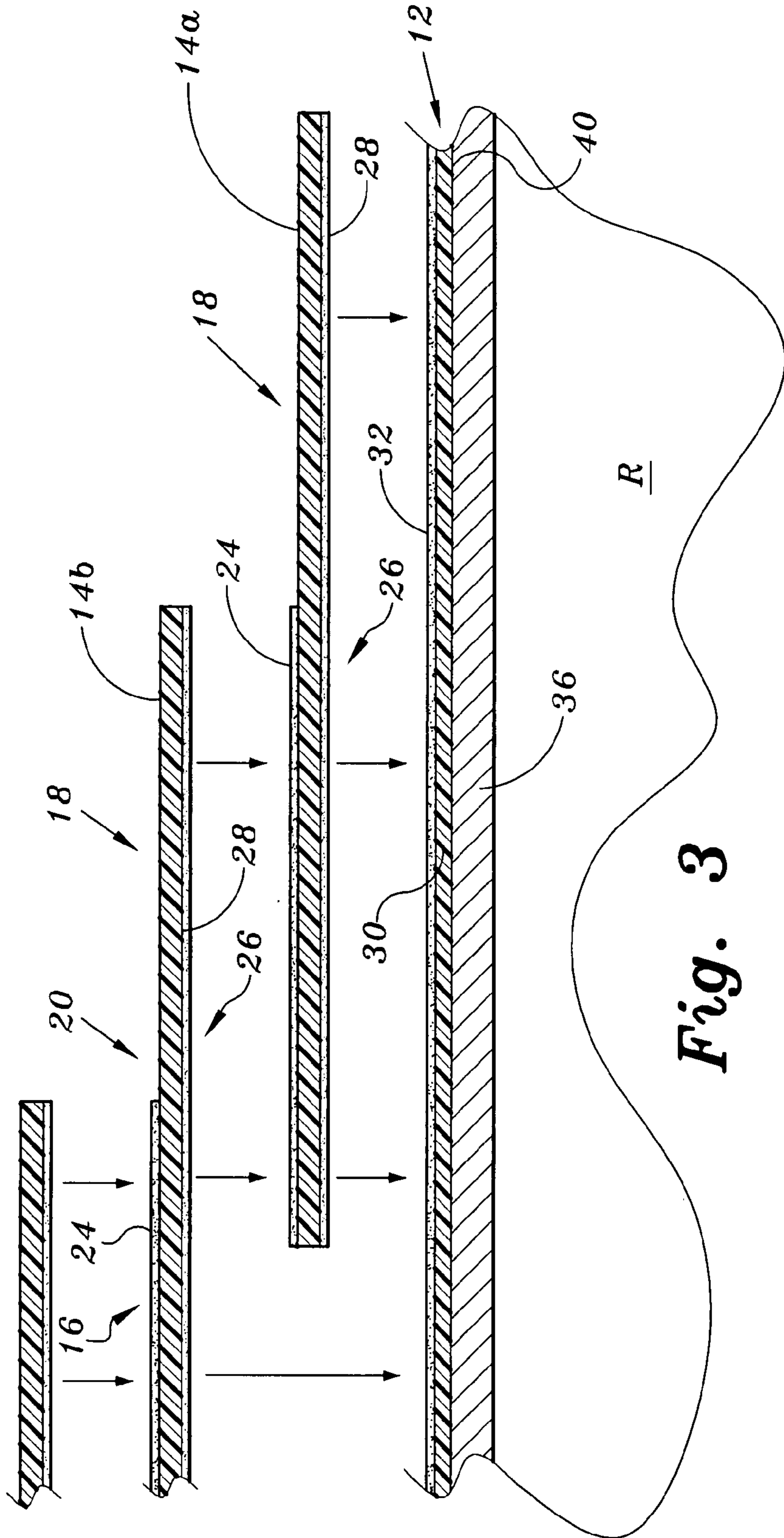


Fig. 3

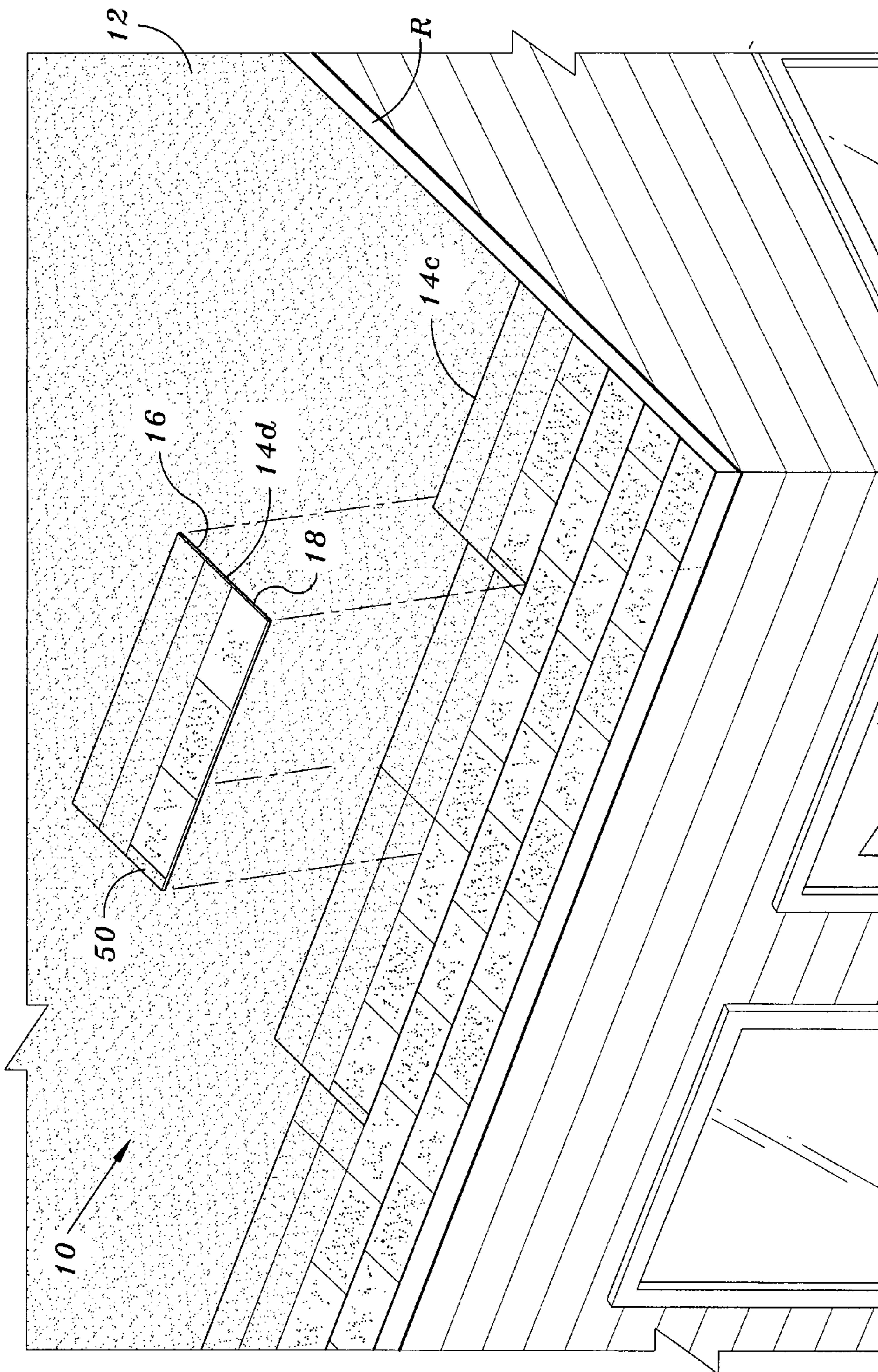


Fig. 4

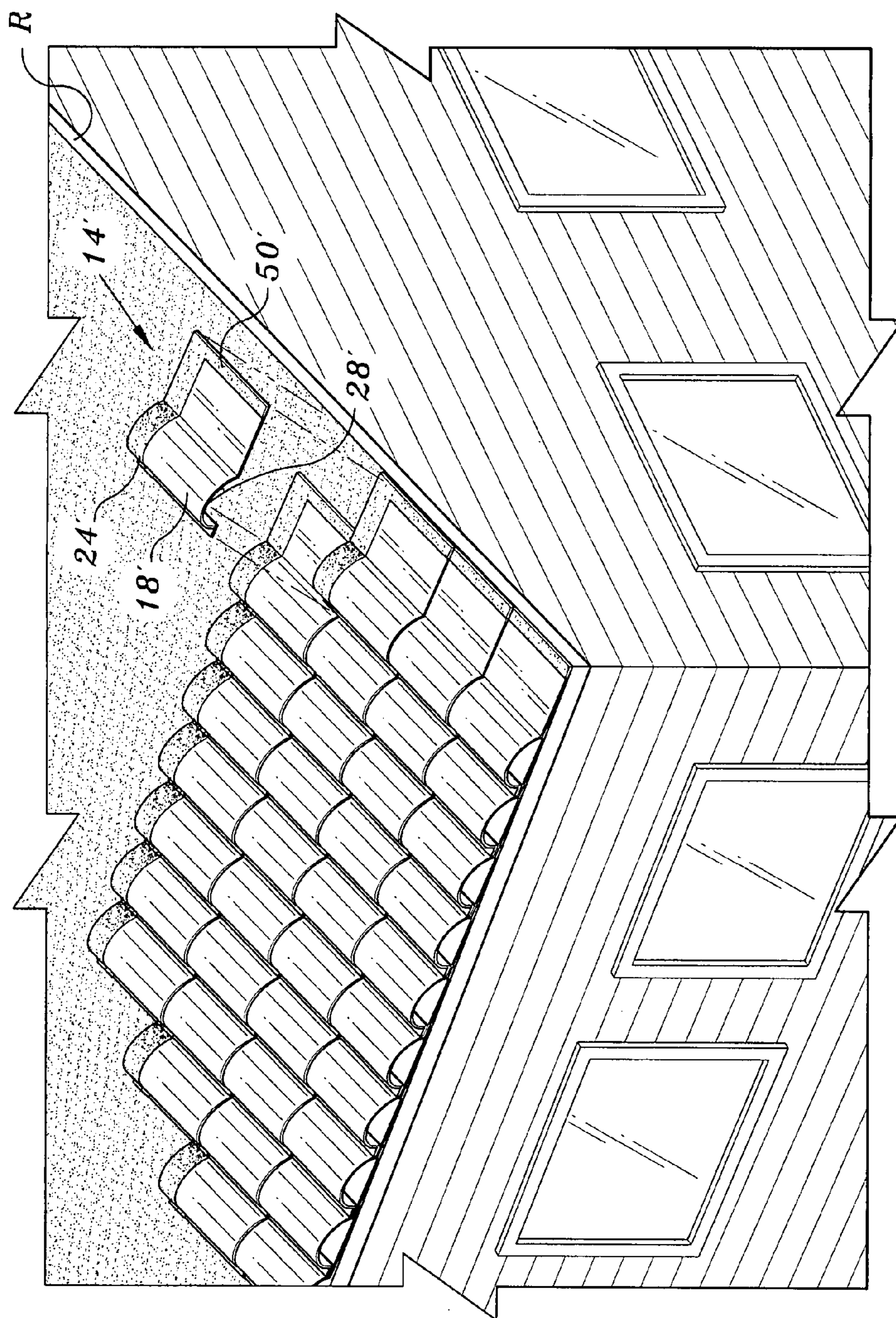


Fig. 5

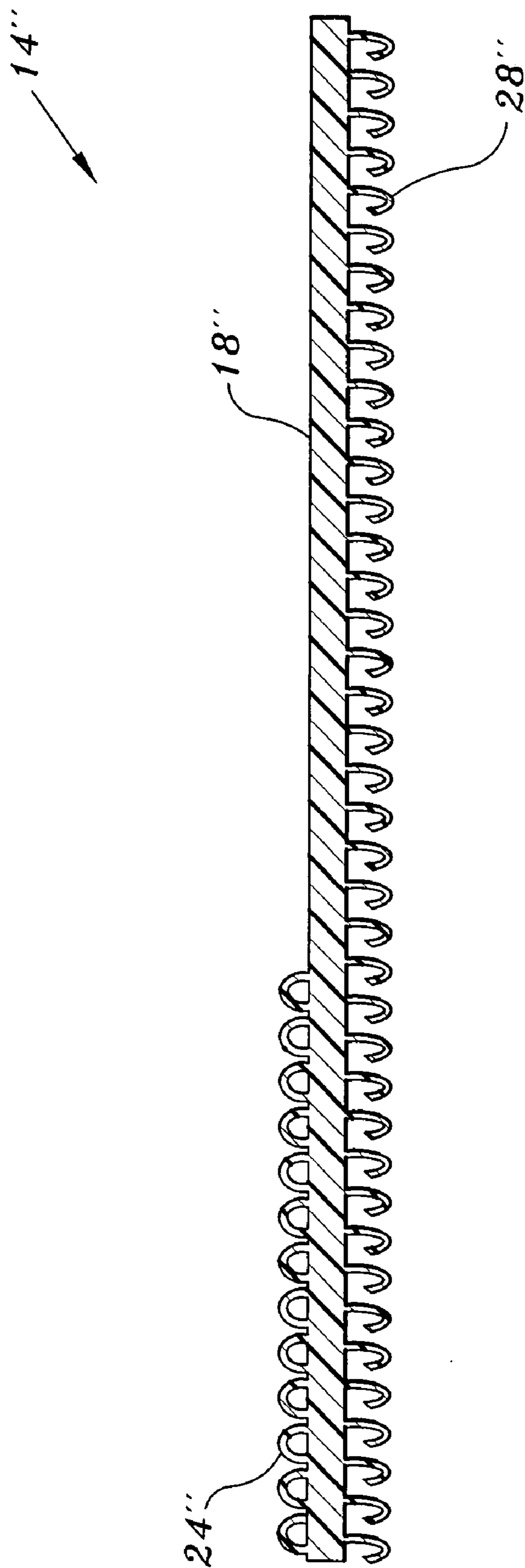


Fig. 6

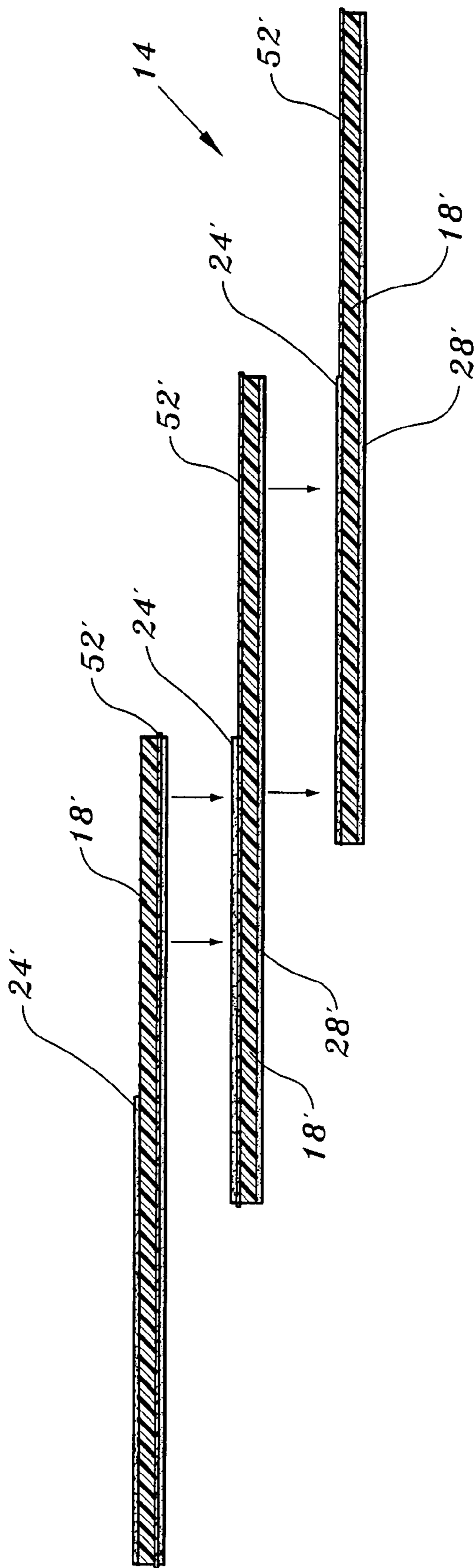


Fig. 7

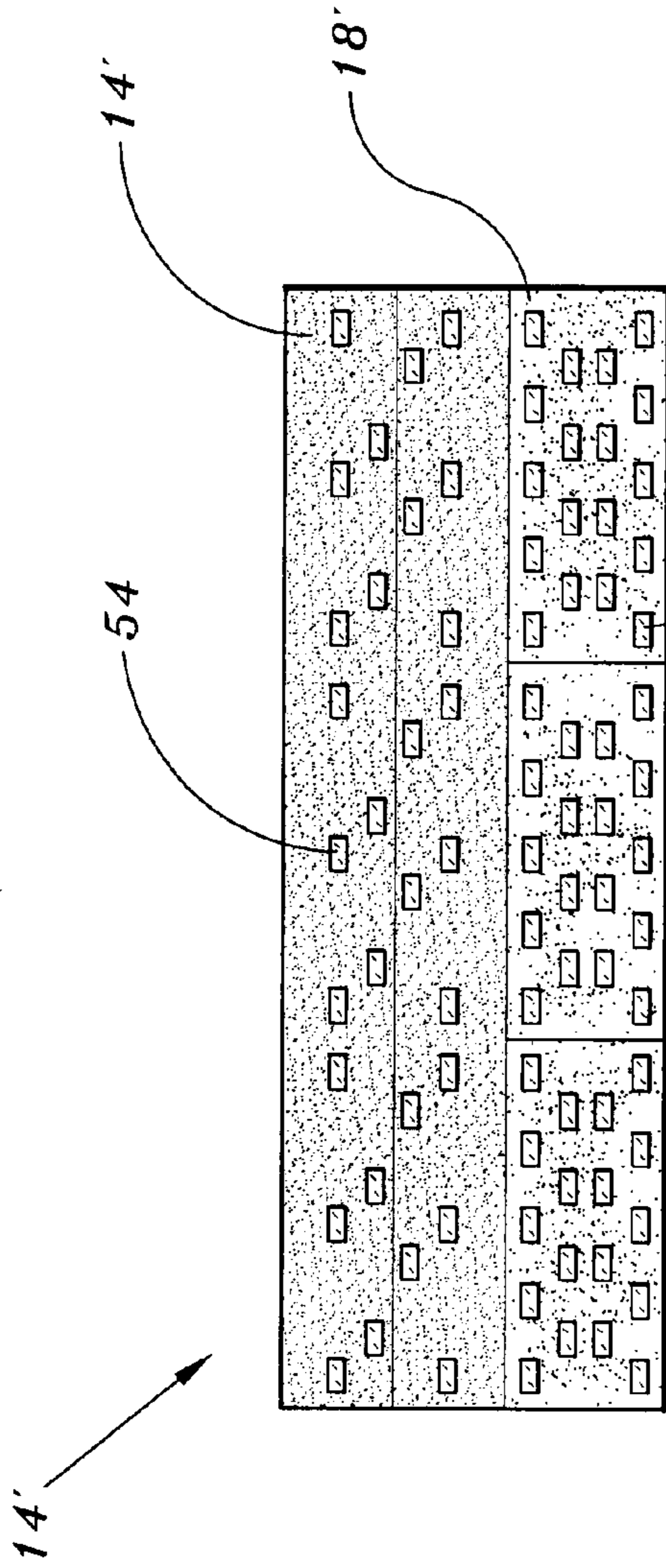


Fig. 8A

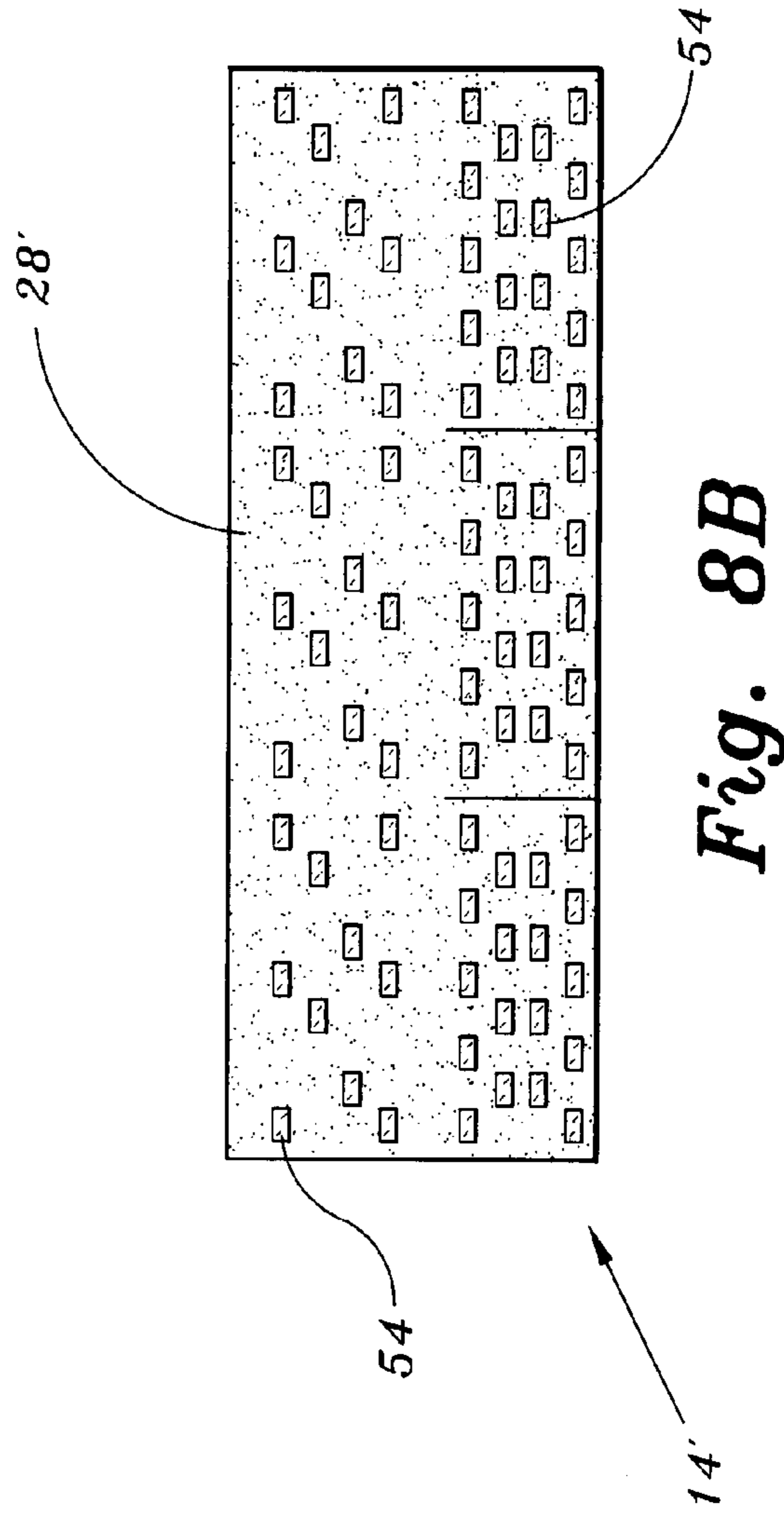


Fig. 8B

ROOFING SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This is a continuation-in-part of our co-pending application Ser. No. 10/999,002, filed Nov. 30, 2004.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to covering systems for structures, and particularly to a roofing system having shingles or other roof coverings attached to the roof without nails, thereby enhancing resistance to water, wind and ice damage.

[0004] 2. Description of the Related Art

[0005] As structures have evolved over the years, shingles have become the standard in protection of a structure's roof. Shingles are generally typically laid onto roofs using thousands of nails for every one thousand square feet of coverage. This method requires that installers secure these thousands of nails to the roof, which involves an inordinate amount of effort. The use of nails also means that once a shingle is laid, it is difficult to remove it if it is damaged. Further, each nail translates into thousands of potential leaks in the roof.

[0006] Therefore, a method of affixing shingles to a roof that does away with the use of nails would save a great deal of time and potential roof damage. However, it is essential that any nailless shingle-mounting system provide a very secure way to affix the shingles to the house, because wind, inclement weather, tearing, or curling of the shingles will result in an unprotected roof.

[0007] Accordingly, there is a need for a roofing system that does not use nails, but additionally secures the shingles tightly to the roof and also to each other if necessary. Thus, a roofing system solving the aforementioned problems is desired.

SUMMARY OF THE INVENTION

[0008] The roofing system allows for numerous roof coverings or shingles (hereafter designated as shingles) to be attached to the roof of a house without using nails. The shingles are tightly affixed to the roof with a series of fasteners releasably interlocking the shingles to each other and also attaching the shingles to the surface of the roof.

[0009] The roofing system includes in one embodiment a single foundation layer of readily releasable fastening elements, such as hook and loop fastening material and a plurality of shingles attached to the foundation layer. The foundation layer is attached to the roof either with an adhesive or with any other type of adherent. The foundation layer may be affixed to a water-resistant base sheet that is secured to the roof by adhesive or in any other manner. The shingles each have a roof attachment layer of readily releasable fastening elements, for example, hook and loop fastening material affixed to the entire bottom surface of the shingle. A first row of shingles is laid onto the foundation layer, securing the first row of shingles to the roof. On the upper portion of the top surface of each of the shingles is an overlap layer of readily releasable fastening elements, for

example, hook and loop fastening material. The lower portion of the top surface of the shingle is, when laid, the exposed material that protects the roof, and may be made of asphalt, fiberglass or the like.

[0010] A second row of shingles is set onto the first row of shingles so that the lower portion of the roof attachment layer of each shingle in the second row secures to the overlap layer of a shingle in the first row of shingles. The upper portion of the roof attachment layer of each shingle in the second row attaches to the foundation layer, allowing the second row of shingles to affix both to the roof and to the first row of shingles. This process continues until the roof is completely covered with the shingles and only the exposed lower portion of each row is visible.

[0011] The shingles may include a lateral strip of hook and loop fastening material on the lateral edge of each shingle. When the shingles are laid next to each other, a first shingle partially overlaps the lateral edge of an adjacent shingle. The roof attachment layer of the first shingle mates with the lateral strip of hook and loop fastening material of the second shingle. Thus, the laterally adjacent shingles are releasably held to each other, providing a tighter hold to the roof.

[0012] By interlocking laterally adjacent shingles to each other and locking rows of shingles to subsequent rows, and additionally to the foundation layer, the roofing system provides a high level of resistance against wind, tearing, curling, and the like.

[0013] In another embodiment, the fastening material is the shingle; that is, the fastening material and the shingle are a unitary, monolithic component of the roofing system. With this structure, a single-sided or double-sided fastening material shingle is possible.

[0014] In another embodiment, the shingles may have the exposed portion thereof comprised of a single or multiple materials that are supportive and/or decorative in nature. The supportive layer may be in single or multi-layers and may extend over the entire shingle or specified portions.

[0015] In yet a further embodiment, the exposed portion of the shingle may be provided with collector cells or filaments, for example, to aid in collecting and providing solar energy.

[0016] These and other features of the present invention will become readily apparent upon further review of the following specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is an environmental, perspective view of a roofing system according to the present invention, only a portion of the roof having shingles attached thereto to show details of the system.

[0018] FIG. 2A is a top view of one of the shingles of the roofing system according to the present invention.

[0019] FIG. 2B is a bottom view of one of the shingles of the roofing system according to the present invention.

[0020] FIG. 3 is a side view of the roofing system in section according to the present invention.

[0021] FIG. 4 is an environmental, perspective view of the roofing system according to the present invention with

shingles having interlocking hook and loop fastening strips, only a portion of the roof having shingles attached thereto.

[0022] FIG. 5 is an environmental, perspective view of a multi-dimensional roofing system.

[0023] FIG. 6 is a sectional view of a monolithic shingle.

[0024] FIG. 7 is a sectional view of a roofing system with additional supportive material.

[0025] FIG. 8A is a top view of a shingle with collector cells.

[0026] FIG. 8B is a bottom view of a shingle with collector cells.

[0027] Similar reference characters denote corresponding features consistently throughout the attached drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0028] The present invention is a roofing system that attaches shingles to a roof of a house without the use of nails. The roofing system, designated generally as 10 in the drawings, also interlocks the shingles to each other and to the roof surface.

[0029] FIG. 1 is an environmental, perspective view of the roofing system 10. The roofing system 10 includes a single foundation layer of readily releasable fastening elements, for example, hook and loop fastening material 12 and a plurality of shingles 14 attachable to the foundation layer 12. The shingles 14 are designed to interlock together in rows on a roof R, covering the entire roof R with shingles 14.

[0030] Before the shingles 14 are laid, the foundation layer 12 is affixed directly onto the roof R. The foundation layer 12 may be attached to the roof R with an adhesive, stapling or any other attachment device. Once a first row of shingles 14 is affixed to the foundation layer 12, a second row of shingles 14 is placed on top of the first row so that the rows overlap each other. The rows of shingles 14 are laid in such a way that the entire roof R is eventually covered by the shingles 14.

[0031] Turning now to FIGS. 2A and 2B, a top and a bottom view, respectively, of one of the shingles 14 is shown. FIG. 2A shows the top surface 20 of the shingle 14. The shingle 14 has an upper portion 16 and a lower portion 18. An overlap layer of readily releasable fastening elements, for example, hook and loop fastening material 24 is affixed to the upper portion 16 of the top surface 20 of the shingle 14. The lower portion 18 of the top surface 20 of the shingle 14 is, when laid, the exposed portion of the shingle 14. The lower portion 18 of the shingle 14 is made with asphalt, an asphalt composite, laminated fiberglass, or any other material suitable to protect the roof from the elements. The lower portion 18 of the shingle 14 may be continuous, sectioned into one or more tabs or may be any other desired configuration.

[0032] The roof coverings or shingles may also be formed as a continuous roll. This format is especially useful on low slope or flat roofs. After the foundation layer has been attached to the structure, the shingles are rolled thereover in a single pass. The next row is then rolled over the exposed portion in overlapping fashion similar to the single shingle placement method.

[0033] FIG. 2B shows the bottom surface 26 of the shingle 14. A roof attachment layer of readily releasable fastening elements, for example, hook and loop fastening material 28 is affixed to at least two-thirds to 100% of the entire bottom surface 26 of the shingle 14. When the shingle 14 is placed on the roof R, the roof attachment layer 28 affixes onto the foundation layer of hook and loop fastening material 12 that is attached to the roof R. The shingle 14 is therefore releasably mated with the foundation layer 12.

[0034] The roof attachment layer of hook and loop fastening material 28 covers the entire bottom surface 26 of the shingle 14, and therefore, when the shingle 14 is laid, provides a greater level of resistance against accidental tearing, inclement weather, and curling than if the bottom surface 26 had only a portion, e.g., the upper portion, covered with the hook and loop fastening material. Covering the entire bottom surface 26 of the shingle 14 with the roof attachment layer of hook and loop fastening material 28 provides a stronger hold against the roof R surface, and permits interlocking the shingles 14.

[0035] FIG. 3 shows a side view of the reinforced nailless roofing system 10 in section. The foundation layer 12 is a base sheet 30 to which hook and loop fastening material 32 is attached. The bottom surface of the base sheet 30 is coated with an adhesive 40. The foundation layer of hook and loop fastening material 12 is laid onto the surface of the roof R and secured to the roof with the adhesive 40. A backing 36 may be attached to the bottom surface of the foundation layer 12 in order to aid as a water barrier when the foundation layer 12 is laid. In this case, the adhesive 40 is coated onto the backing 36 before the foundation layer 12 and backing 36 are secured to the roof R. The backing 36 is made from a polymer, such as rubber, or any other water-resistant material.

[0036] After the foundation layer 12 is set onto the roof R, a first row of shingles 14a is laid on the foundation layer 12. The roof attachment layer of hook and loop fastening material 28 is attached to the entire bottom surface 26 of the shingle 14 and mates with the foundation layer 12 to fasten the shingle 14 to the roof R. A second row of shingles 14b is then laid onto the first row of shingles 14a. The lower portion 18 of the roof attachment layer of hook and loop fastening material 28 of the second row shingles 14b mates with the overlap layer of hook and loop fastening material 24 affixed to the upper portion 16 of the top surface 20 of the first row shingles 14a. The upper portion 16 of the roof attachment layer 28 of the second row shingles 14b mates with the foundation layer of hook and loop fastening material 12, allowing the second set of shingles 14b to be releasably attached both to the roof R and to the first row of shingles 14a. Thus, there is greater reinforcement of the shingles 14a and 14b to the house. Layers of shingles 14 are continually laid, row upon row, until the roof R is entirely covered with the shingles 14.

[0037] Turning now to FIG. 4, the shingles 14 of the nailless roofing system 10 are shown with a lateral strip of hook and loop fastening material 50 affixed to a lateral edge of the top surface 20 of the shingle 14. For example, the lateral strip 50 may be attached to the lower portion 18. After a first shingle 14c is laid onto the roof R, a second shingle 14d is laid adjacent to and overlapping a lateral edge of the first shingle 14c. The roof attachment layer 28 of the second

shingle **14d** mates with the lateral strip of hook and loop fastening material **50** of the first shingle **14c**. Thus, the laterally adjacent shingles **14c** and **14d** are releasably held to each other, providing a tighter hold to the roof **R**. By interlocking laterally adjacent shingles **14** to each other and locking rows of shingles **14** to subsequent rows and additionally to the foundation layer **12**, the roofing system **10** provides a high level of resistance against wind, tearing, curling, and the like.

[0038] Although one lateral strip is shown, a second lateral strip of hook and loop fastening material **50** may be affixed to the opposite lateral edge of the top surface of the shingle **14**. Although the shingle **14** is depicted as a planar component, it is recognized that the fastening material is applicable to other shapes. For example, as seen in FIG. 5, architectural shingles **14'** are formed as multi-dimensional, raised, curved structures. Regardless of the shape, the bottom surface **28'** would be covered with releasable fastening material, while the top surface includes an overlap portion **24'** having readily releasable fastening elements thereon and an exposed portion **18'**. An interlocking lateral strip **50'** may also be provided on at least one edge of the shingle.

[0039] While hook and loop fasteners have been shown, any other nailless fastener may be used to mate the shingles to the roof and to one another, including opposing magnets or magnetic sheeting, snaps, rivets, porous contacts, nano products, clasps, zippers, suction devices, pins, ionized material, snap-rivets, tape, zip ties, twist ties, organic material, or any other suitable material.

[0040] As seen in FIG. 2A, the top surface **20** includes an upper portion **16** comprising an overlap layer **24** and an exposed lower portion **18**. The overlap layer may be a single layer or two distinct horizontally extending sections. The fastening elements occupy from about one-fifth to about three-quarters of the top surface **20**. Therefore, in a typical shingle that is twelve inches wide, the fastening elements would occupy from about 2.4-9.0 inches of the top surface. Although the figures depict the fastening material as being continuous, it is recognized that the fastening material may be comprised of any shape, design, or pattern as long as it encompasses from about one-fifth to about three-quarters of the top surface and within one inch of the shingle edges or within one inch of another portion of the fastening material pattern or design. It is also contemplated that the fastening material can also be provided on the exposed layer, in any design or pattern including covering the entire exposed surface.

[0041] As seen in FIGS. 2A and 2B, the fastening material is affixed to the shingle. However, as seen in FIG. 6, the fastening material and shingle **14"** may be formed as a unitary, monolithic component wherein the fastening material **24"**, **28"** becomes, in effect, the shingle with an exposed lower portion **18"**. In either embodiment, there may be provided a layer or multiple layers of additional supportive material. Viewing FIG. 7, the additional supportive material **52'** has been shown in various styles. It is recognized that the additional supportive material **52'** may be similar on all shingles or made in a combination of styles. The additional supportive material may be water barrier material; tear resistant material; strengthening material; appearance enhancing material; or any other material for supporting the shingle. Examples of such material include but are not

limited to: asphalt, asphalt composites, laminated fiberglass, rubber compositions, and plastics. The supportive material may be partially or totally coextensive with the foundation layer or base sheet, or the bottom and/or top surfaces of the shingle.

[0042] As seen in FIGS. 8A and 8B, the shingles may be provided with miniature collector cells **54** or filaments to provide multiple collection points for solar energy or other transmitted energy sources. As long as the percentage of fastening material is maintained, the interlocking of the shingles to each other and to the foundation layer would not be effected by the number or size of the collector cells. Also, the number and/or size of the collector cells may be designed to occupy significant portions of the exposed portion **18'**.

[0043] As seen in FIG. 3, the foundation layer **12** is depicted as including a base sheet **30**, a backing sheet **36** of conventional water barrier material, adhesive **40** and fastening material **32**. It is recognized that foundation layer may be prefabricated by forming the layer on wood, wood composite, or other roof deck material. Other variations to the foundation may include: a) fastening material on both the bottom and top surfaces; b) multiple layers of additional supportive material between the top and bottom surfaces; and c) collector cells or filaments.

[0044] Although the roofing system has been depicted with a roof, it is recognized that it has application to other structures and non-structures.

[0045] It is to be understood that the present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

We claim:

1. A roofing system, comprising:

a foundation layer of readily releasable fastening elements adapted for being affixed to a roof;

a plurality of shingles, each of the shingles having a top surface, a bottom surface, an upper portion and a lower portion;

a roof attachment layer of readily releasable fastening elements comprising least two-thirds of the bottom surface of each of the shingles, the roof attachment layer releasably mating with the foundation layer; and

an overlap layer of readily releasable fastening elements comprising the upper portion of the top surface of each of the shingles, the overlap layer releasably mating with the roof attachment layer of an overlapping one of the shingles,

whereby the shingles are attachable to the foundation layer in rows with the lower portion of one row being releasably attached to the upper portion of an adjacent row of the shingles.

2. The roofing system according to claim 1, further comprising at least one lateral interlocking strip of readily releasable fastening elements on a lateral edge of each of the shingles, the roof attachment layer of one of the shingles releasably mating with the interlocking strip of another one of the shingles, whereby laterally adjacent shingles have releasably attachable, overlapping lateral edges.

3. The roofing system according to claim 2, wherein said interlocking strip is located on a lateral edge of the lower portion of the top surface of each shingle.

4. The roofing system according to claim 1, wherein at least the lower portion of each of the shingles is made from a material selected from the group consisting of asphalt, asphalt composite, laminated fiberglass, plastic, metal and ceramic.

5. The roofing system according to claim wherein each of the rows of shingles comprises a continuous layer.

6. The roofing system according to claim 1, wherein the foundation layer has a bottom surface, the bottom surface being coated with an adhesive adapted for securing the foundation layer to the roof.

7. The roofing system according to claim 1, further comprising a backing attached to a bottom surface of the foundation layer.

8. The roofing system according to claim 7, wherein the backing is made from a polymer.

9. The roofing system according to claim 1, wherein said readily releasable fastening elements comprise hook and loop material.

10. The roofing system according to claim 1, wherein said readily releasable fastening elements comprise magnetic material.

11. The roofing system according to claim 1, wherein the fastening elements of each of said shingles and foundation layer are affixed to the shingles and layer.

12. The roofing system according to claim 1, wherein the fastening elements of each of said shingles and foundation

layer are formed as a unitary, monolithic component with their respective shingles and layer.

13. The roofing system according to claim 12, wherein each of the shingles and foundation layer is formed by injection molding.

14. The roofing system according to claim 1, wherein the fastening elements are on the entire bottom surface of each of said shingles.

15. The roofing system according to claim 1, wherein at least one supportive layer is located between the top and bottom surfaces of each shingle.

16. The roofing system according to claim 14, wherein the supportive layer is coextensive with the entire top surface.

17. The roofing system according to claim 1, wherein the foundation layer has a top surface and a bottom surface and said readily releasable fastening elements are on each of said surfaces.

18. The roofing system according to claim 17, wherein at least one supportive layer is located between the top and bottom surfaces of said foundation layer.

19. The roofing system according to claim 1, further including means located on the top surface of each of said shingles for collecting transmitted energy.

20. The roofing system according to claim 1, wherein each of said shingles is multi-dimensional, curved structure.

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