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CA 2579384 C 2010/02/09

(11)(21) 2 579 384

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2007/02/22

(41) Mise à la disp. pub./Open to Public Insp.: 2008/08/22

(45) Date de délivrance/Issue Date: 2010/02/09

(51) Cl.Int./Int.Cl. *F25C 3/02* (2006.01), *B32B 27/32* (2006.01), *B32B 5/22* (2006.01)

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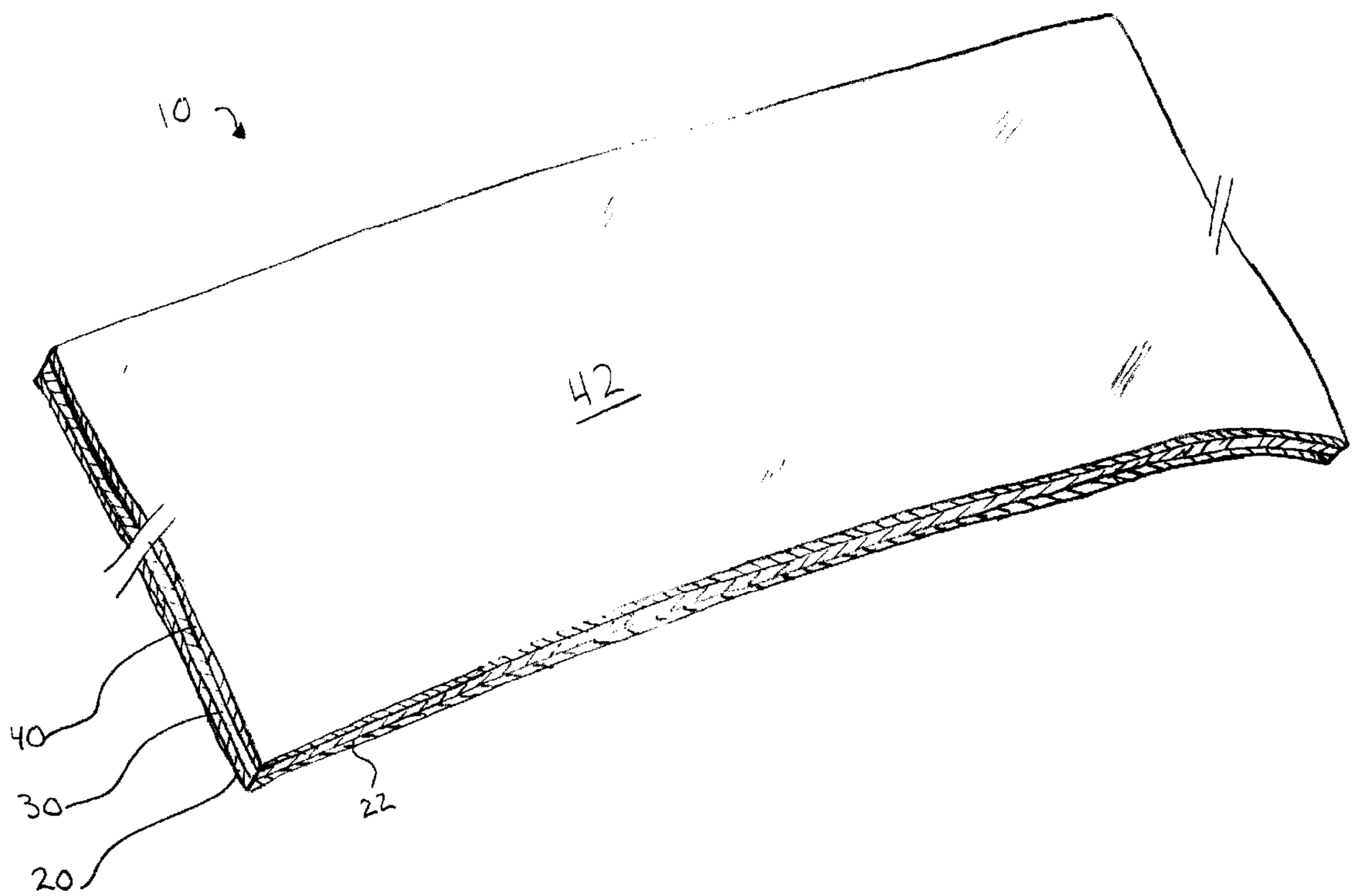
(54) Titre : COUCHE IMPERMEABLE A L'EAU POUR PATINOIRE, ET METHODE
(54) Title: METHOD OF AND WATER-IMPERMEABLE SHEET FOR ICE RINKS



(57) Abrégé/Abstract:
A method for increasing the ability of a water surface to cool and freeze is disclosed. The method includes the steps of providing a substrate surface adapted to support a layer of ice, and providing a water-impermeable flexible sheet on top of the substrate surface which supports the flexible sheet, the sheet including at least first, second and third layers. The first layer includes a heat reflective coating for reflecting heat transmitted from the substrate back into the substrate, a second or middle layer which may be an insulative layer, and a third or uppermost layer including a non-reflective coating to reduce heat absorption, and providing a layer of water or ice on top of the water-impermeable flexible sheet whereby the flexible sheet enhances or lowers the temperature of the water on the surface by reducing the temperature transmission through the substrate surface and the upper surface or layer providing non-reflective properties to reduce heat transmission therethrough.

ABSTRACT

A method for increasing the ability of a water surface to cool and freeze is disclosed. The method includes the steps of providing a substrate surface adapted to support a layer of ice, and providing a water-impermeable flexible sheet on top of the substrate surface which supports the flexible sheet, the sheet including at least first, second and third layers. The first layer includes a heat reflective coating for reflecting heat transmitted from the substrate back into the substrate, a second or middle layer which may be an insulative layer, and a third or uppermost layer including a non-reflective coating to reduce heat absorption, and providing a layer of water or ice on top of the water-impermeable flexible sheet whereby the flexible sheet enhances or lowers the temperature of the water on the surface by reducing the temperature transmission through the substrate surface and the upper surface or layer providing non-reflective properties to reduce heat transmission therethrough.

METHOD OF AND WATER-IMPERMEABLE SHEET FOR ICE RINKS

Field of the Invention

The present invention relates to a method of effecting freezing of a water layer on a water impermeable sheet, and more particularly for use with ice rinks.

Background of the Invention

The present invention relates to an improved method of increasing the ability of a water surface to cool and freeze by reducing the upward flow of ground temperature.

Typically, clear plastic or other similar liners or sheets are placed within a specific area to be flooded with a layer of water, so that the water sits on the top of the liner in order to prevent the water from escaping into the ground. The water is allowed to freeze in order to provide a surface for skating. Typically such sheets are one time use liners.

Summary of the Invention

In accordance with one aspect of the present invention, there is provided a method of increasing or enhancing the ability of a water surface to cool and freeze comprising the steps of providing a substrate surface adapted to support a layer of ice, providing a water-impermeable flexible sheet on top of a substrate surface with the substrate surface supporting the flexible sheet, wherein the sheet includes at least first, second and third layers, the first layer including a heat reflective coating for reflecting heat transmitted from the substrate back into the substrate and in juxtaposition with the substrate, the second layer preferably an insulating layer, and the third layer including a non-reflective coating to reduce heat absorption, providing a layer of water or ice on top of said water-impermeable flexible sheet whereby the flexible sheet enhances or lowers the temperature of the water on the surface of the flexible sheet by the reflective side of the sheet reducing the temperature transmission through the substrate surface

and with the upper layer of the flexible sheet providing non-reflective properties to the sheet in order to reduce transmission of heat therethrough and providing a source of coolant in direct or indirect communication with the layer of water in order to provide a frozen water layer on top of the water-impermeable flexible sheet.

In accordance with the above aspect, the first and third layers are intricately bonded to the second layer. Preferably, the second layer is of a polyethylene material, where the polyethylene material is a woven material.

In accordance with a further aspect the second layer may be of a foam or bubble type material, or a combination of the two.

Brief Description of the Drawings

Having thus generally described the invention, reference will now be made to the accompanying drawings, wherein:

Figure 1 is a perspective view of a water-impermeable multi layered sheet for use in ice rinks or bodies of water in accordance with the present invention; and

Figure 2 is an enlarged side view thereof.

Detailed Description of the Preferred Embodiments

The present invention is directed to a method and cover for protecting ice rinks or bodies of water which through the use of the cover or membrane, allow the water to freeze at a quicker rate or stay frozen longer. As will be understood by those of skill in the art to which the present invention pertains, the term ice rinks as referred to herein, may be indoor or outdoor rinks. Moreover, the present invention may be used in professional hockey rinks such as those used in stadiums, outdoor arenas or professional sports hockey arenas, or alternatively may be used by the general public when creating an outdoor hockey rink. As

noted above, a primary advantage of the present invention is the creation of ice at a quicker rate by reducing the upward flow of transmission of the inherent warmth or raised temperature of the ground or substrate.

With reference to drawing Figures 1 and 2, a cover for use with ice rinks, generally designated by reference numeral (10), includes a first, second and third layers, when viewed in an in use orientation, with the first or "bottom" layer positioned adjacent the ground or substrate surface and the third or "upper" layer adapted to receive a quantity of water thereon.

As illustrated, the first or bottom layer (20) is preferably of a membrane or sheet, one side (22) of which is of a reflective coating or similar surface or material. As illustrated, the reflective coating or surface is adjacent to, or in juxtaposition with the substrate or ground.

The middle layer (30) is preferably an insulating layer, and may be a woven polymer for strength and longevity, or in the form of insulating foam or bubble material, or a combination of the two. If no insulating layer is desired, a mesh weave may be used, such as a woven scrim of polyethylene, whereby this scrim or layer would provide additional support or strength to the overall structure.

The third or uppermost layer (40), includes a top surface (42) upon which the water is placed to be frozen. This top surface (42) is preferably of a non-reflective or similar colour. The upper layer (40) is solid (non-impermeable) so as to prevent water from seeping in to the ground. In other words, the upper layer (40) is waterproof and functions as a moisture or water barrier for the protection of the substrate underneath and allows the water to freeze or stay frozen longer.

As such, one of the main advantages or benefits by using the cover permits one to create ice or allow a body of water to quickly freeze or stay frozen longer by reducing the upward flow or transfer of heat from the ground. As such, the

ground temperature or warmth is reflected from the lower or bottom layer (20) back in to the ground or substrates. As such, less energy or power is required through the use of the cover (10), regardless whether the cover is used indoor or outdoor for ice rinks.

In accordance with a preferred embodiment of the invention, the present invention is particularly useful in covering a substrate or ground surface for use as an ice rink. In use, the cover with the reflective side of the first or bottom layer (20) facing the substrate is placed over the ground and water is allowed to freeze on top of the cover, as the cover is solid (non-porous). Suitable materials or structures known in the field may be used to construct and maintain the rink such that the water is confined. For example, a convention board structure or other similar apparatus (such as a wooden board rink structure) may be used with the sheet of the present invention to allow the water to freeze in place on the top surface of the cover or sheet (10).

When used as a ground cover for an ice rink or body of water which is to be frozen, the present invention generally referred to by reference numeral (10) is placed with the first layer (20), and its reflective or bottom layer surface (22) adjacent to or in contact with the substrate. A layer of water or ice is then placed or allowed to pool on top of the water-impermeable sheet (upper surface 42) such that the flexible sheet enhances or assists in lowering the temperature of the water on the surface of the sheet. This lowering of the temperature is permitted in that the reflective side of the sheet reduces temperature transmission through the substrate or ground surface while the upper layer of the flexible sheet provides non-reflective properties which reduces transmission of heat or absorption of heat into the cover. In a preferred embodiment the insulating or second (middle) layer (30) provides a temperature barrier to separate the potentially warmer ground surface or substrate temperatures from the colder or freezing temperatures of the water surface on the top of the flexible sheet.

The step of allowing the water layer of the top surface of the sheet or cover may be accomplished by allowing the water to freeze naturally (i.e., providing water to pool and freeze when outside or ambient air temperatures are below freezing) or by providing or reducing (i.e., manually or mechanically) the temperature of the water layer. Conventional or known means or techniques may be employed to freeze the water layer.

In an alternative embodiment, the upper and lower layers, separated by the middle or second layer, may be of an interwoven warp and weft strips that are impermeable to water. Such impermeability may be obtained by a coating on top of the interwoven warp and weft strips which form the mesh, such that the cover becomes solid to prevent the water on the top layer from seeping into the ground. The thickness of each layer may also be varied, depending upon the end use of the cover, materials used in the layers, coatings, etc.

As will be understood, the method and cover of the present invention may be used in arenas, or other professional arenas or hockey centres. Further, additional layers may be used if desired, made from similar or conventional material known or used in the particular field of use. Although embodiments of the present invention have been described hereinabove, those skilled in the art will understand that it is not limited thereto, and that numerous modifications may form part of the present invention insofar as they do not impart from the spirit, nature in scope of the claimed and described claimed invention.

WHAT IS CLAIMED IS:

1. A method of increasing or enhancing the ability of a water surface to cool and freeze comprising the steps of

providing a substrate surface adapted to support a layer of ice;

providing a water-impermeable monolithic flexible sheet on top of said substrate surface with said substrate surface supporting said flexible sheet, wherein the sheet consists of at least first, second and third layers integrally arranged in face to face relationship, the first layer including a heat reflective coating for reflecting heat transmitted from the substrate back into the substrate and in juxtaposition with the substrate, the second layer positioned between and in juxtaposition with said first and third layers, and the third layer including a non-reflective coating to reduce heat absorption;

providing a layer of water or ice on top of said water-impermeable flexible sheet whereby the flexible sheet enhances or lowers the temperature of the water or ice on the surface of said flexible sheet by said reflective side of said sheet reducing temperature transmission through said substrate surface and with said upper layer of said flexible sheet providing non-reflective properties to said sheet in order to reduce transmission of heat therethrough; and

allowing the layer of water on top of said water-impermeable flexible sheet to freeze to thereby provide a frozen water layer.

2. The method according to claim 1, further including the step of providing a source of coolant in direct or indirect communication with said layer of water.

3. The method according to claim 1 or 2, wherein said first and third layers are integrally affixed to said second layer.

4. The method according to claim 1, 2 or 3, wherein said second layer is an insulating layer.

5. The method according to any one of claims 1 to 4, wherein said second layer is of a polyethylene material.

6. The method according to claim 4, wherein said polyethylene material is a woven material.

7. The method according to any one of claims 1 to 4, wherein said second layer is a foam.

8. The method according to any one of claims 1 to 4, wherein said second layer is of a bubble type material.

9. The method according to claim 8, wherein said bubble type material includes foam.

10. The method according to any one of claims 1 to 6, wherein the first and second layers are of a low density polyethylene material.

11. The method according to any one of claims 1 to 10, wherein said first and third layers are of a mesh weave.

12. The method according to claim 11, wherein said mesh weave is made of a polyolefin.

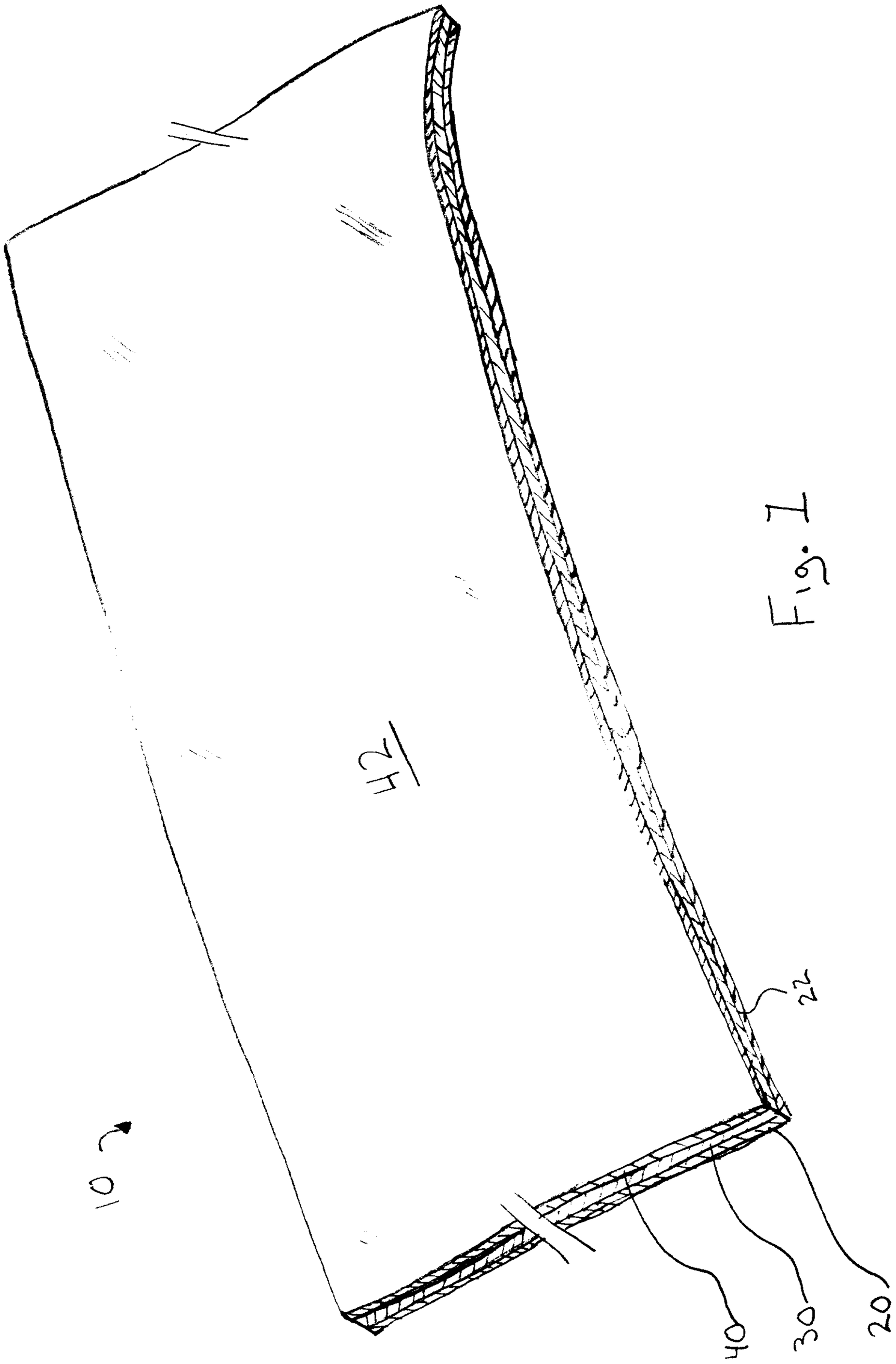


Fig. 1

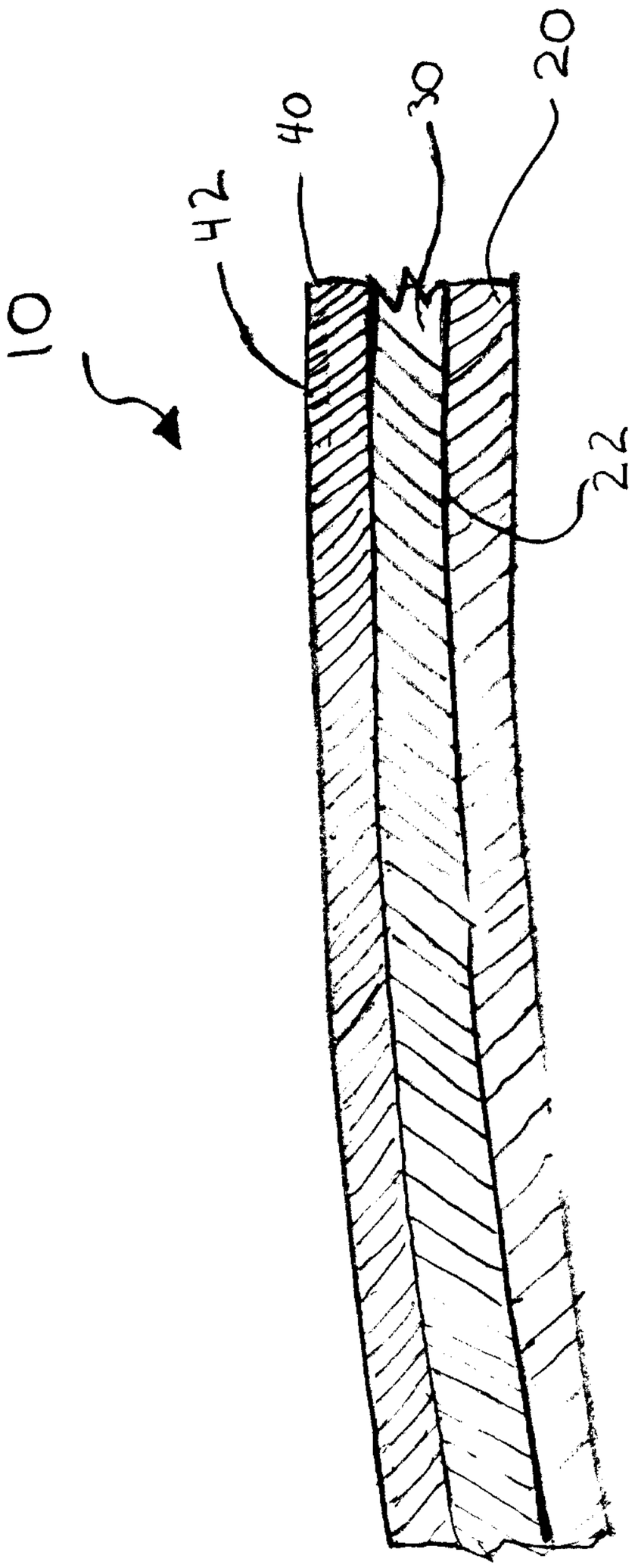
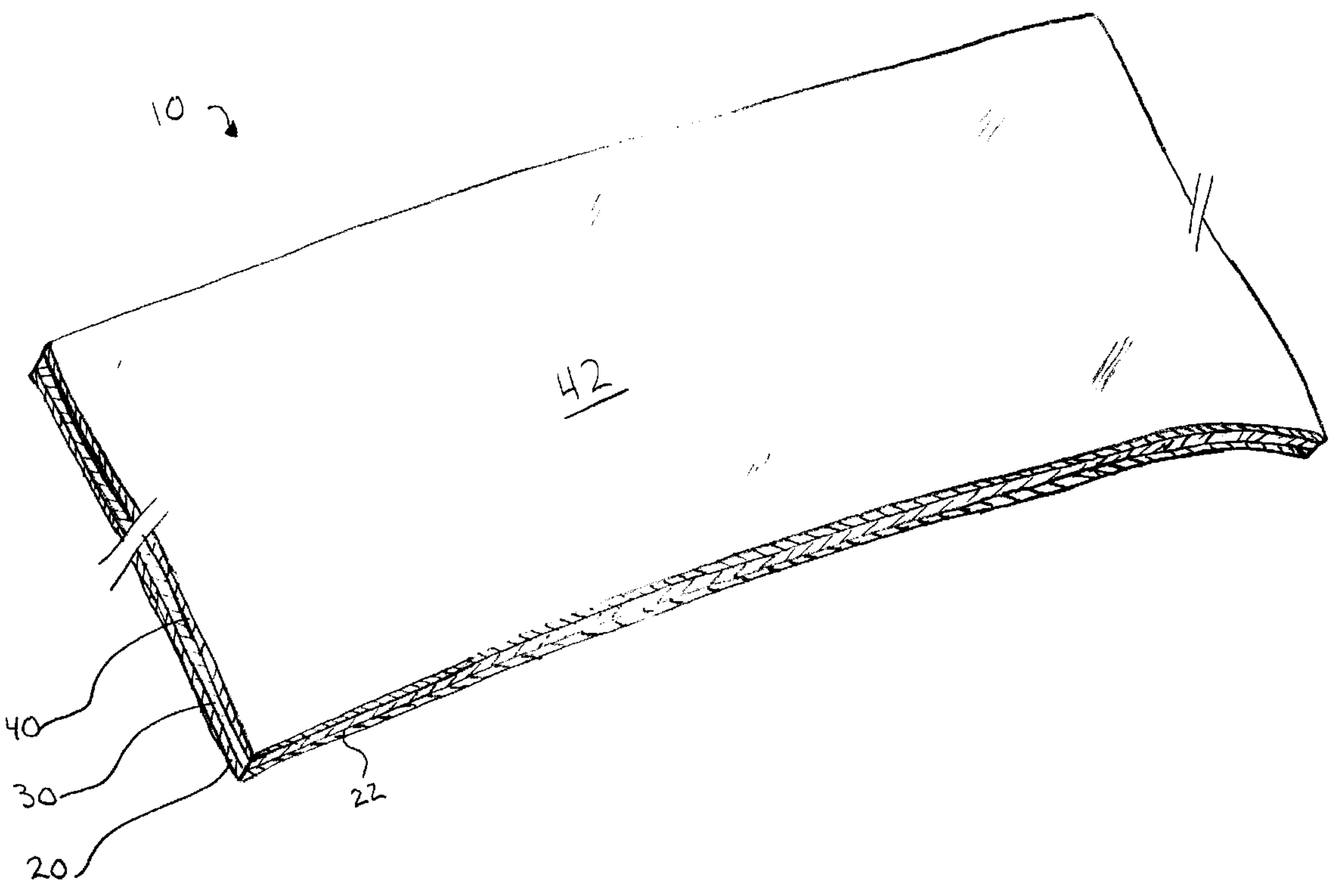


Fig. 2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