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(54) **PROCESS OF MANUFACTURING ARTIFICIAL TURF**

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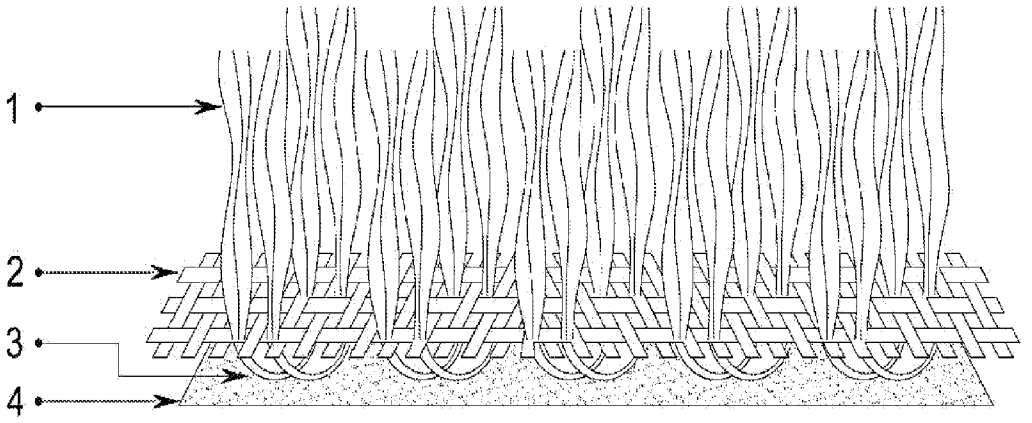
(57) **ABSTRACT**

The invention described herein pertains to carpeting of artificial turf used on sports fields, as decorative touches in gardens and areas with greenery as well as for other applications. It features a weaving process differentiated from those normally implemented by the current artificial turf industry, leading to multiple benefits that impact not only the fabricator but also the final user.



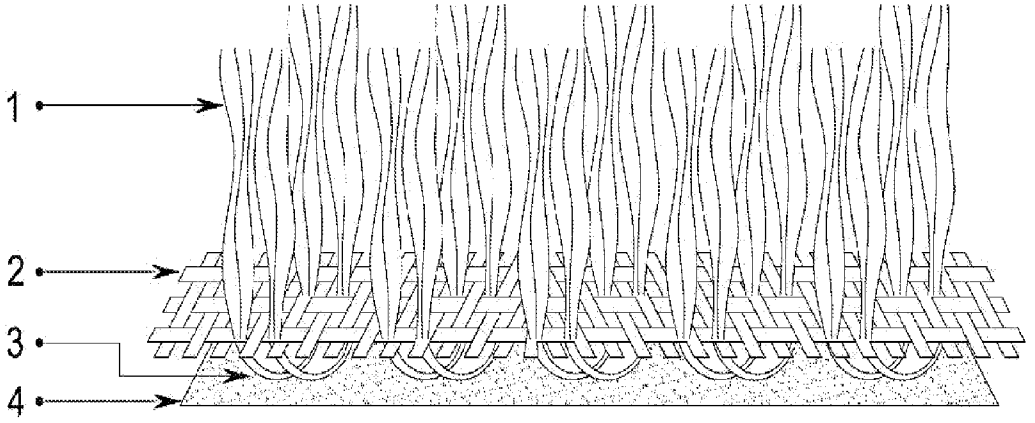


FIG. 1

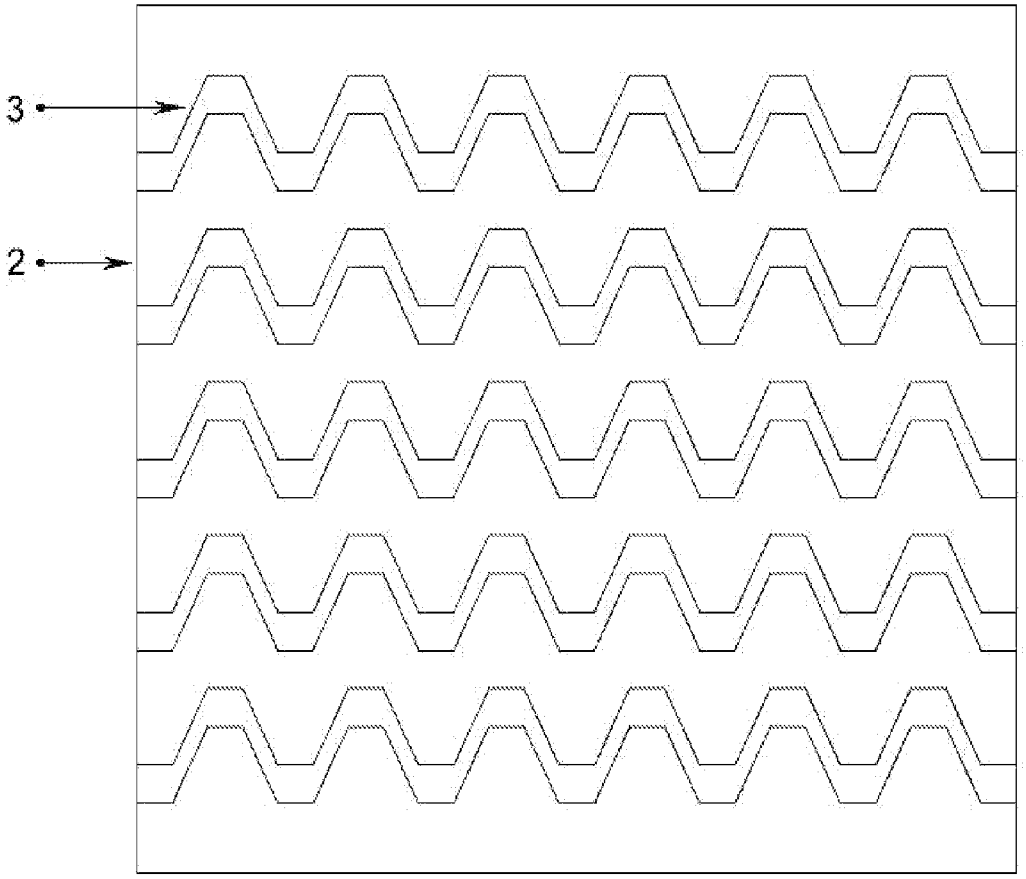


FIG. 2

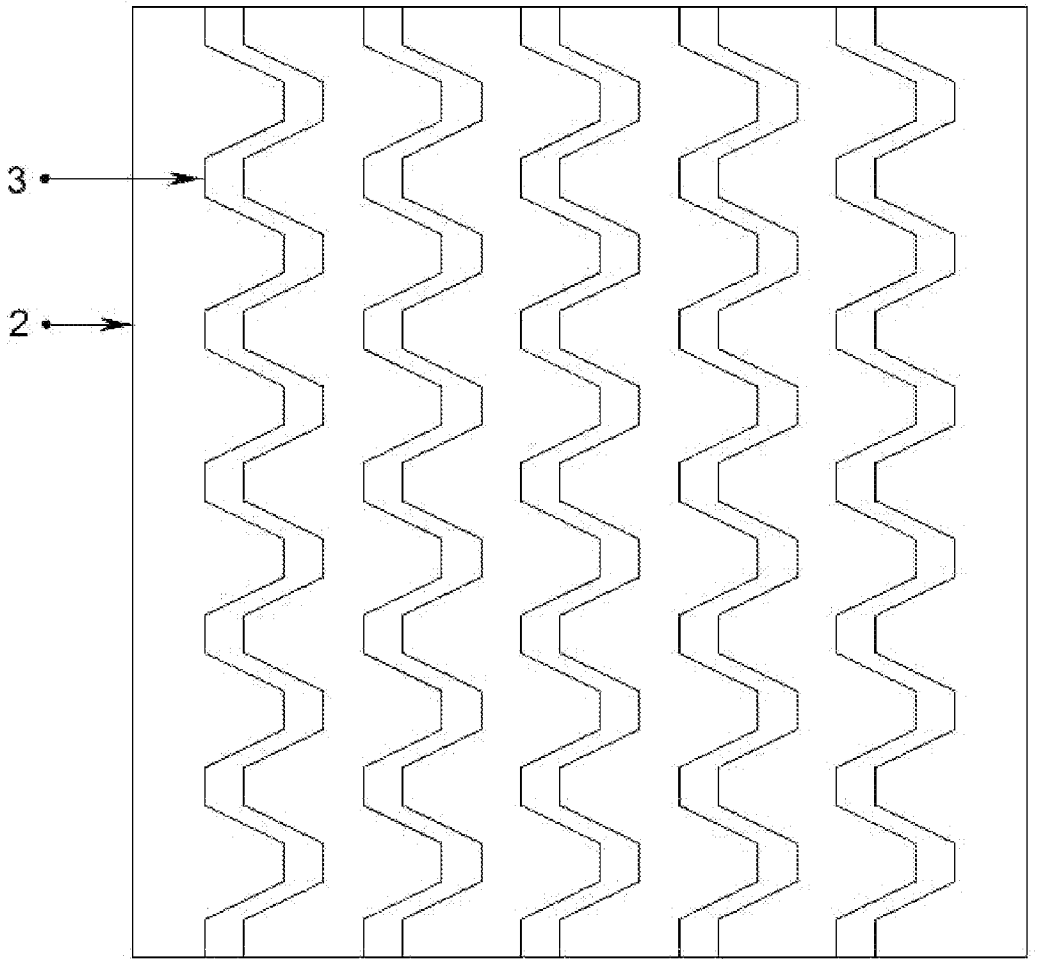


FIG. 3

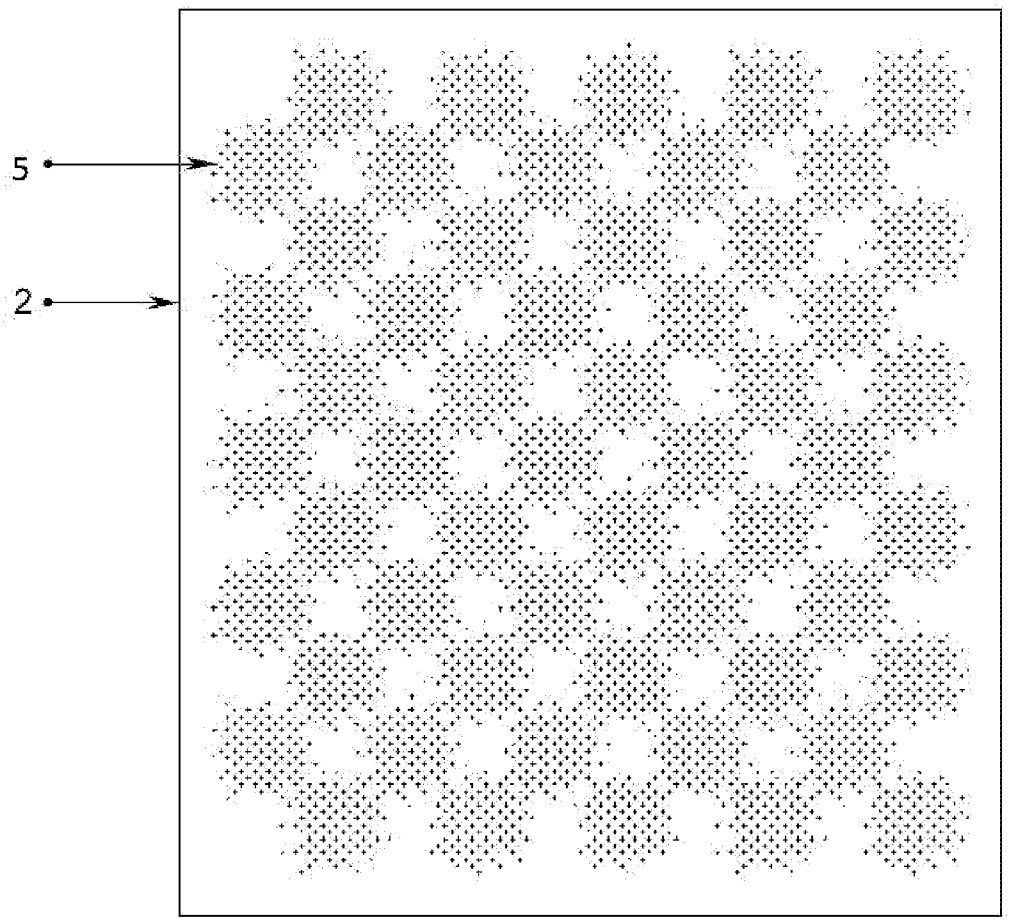


FIG. 4

PROCESS OF MANUFACTURING ARTIFICIAL TURF

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention pertains to carpeting of artificial turf featuring improvements in the weaving method. The product can be used covering sports fields, acting as decorative accents in gardens, greenery and for other applications. It is based on a weaving method different from that for the products normally assembled by today's artificial turf industry, leading to several improvements as much during fabrication as it does for the end user.

[0003] 2. Description of Related Art

[0004] Nowadays different methods are implemented in the manufacturing of artificial turf. To the extent that it has been possible, the industry has labored intensely perfecting the appearance and performance of its output resulting in more benefits for the consumer. Continuously, materials used for its fabrication as well as the structure and design are being improved. Most artificial turf surfaces display similar characteristics such as: color, synthetic materials, similar weaving and manufacturing methods and installation, among others.

[0005] The materials and processes applied to this type of product include chemical compounds that may enhance its resiliency, occasionally generating unusual properties. However, they still do not totally appear like real turf. They create a surface with a texture and layout much too regular, very different from the look of natural grass. Therefore, the purpose of this report is to analyze our covering of artificial turf that features improvements in the weaving method, and will be illustrated below with graphics along with its advantages which will make evident the improvements that, doubtlessly surpass today's technology with respect to artificial turf carpeting.

[0006] Nowadays, a tufting machine uses an array of needles, a thread-feeding mechanism called a "creel" and a line for the finish. Carpets are constructed using three basic elements: a) cloth fabricated with intertwined flat polypropylene strings; b) threads that resemble the stems and leaves of grass made of polyethylene, polypropylene or nylon, and c) a coating applied to the lower face that may be made of latex or polyurethane. These days, the steps of the weaving process follow this approach: the tufting machine fastens the threads upon the cloth which comes in rolls and the threads are kept on bobbins or spools.

[0007] The cloth is placed on a special accessory allowing the machine to pull it as it is weaving. Afterwards, the spools of thread are fitted to a creel according to the number of needles used by the machine. The threads are guided by individual polyethylene tubes from the bobbin to the tufting machine. The thread enters the machine via a feeding system with rollers until it reaches the needles. The thread is strung through the eye of the needle, ready for insertion through the cloth. The action of the tufting machine introduces the threads through the cloth and cuts them at a set length.

[0008] Once the carpet exits the machine, the former is inspected and the weave is repaired as necessary. Subsequently the product is rolled up, made ready for the final coating. Following the process described above, and when the carpet has exited the weaving operation, the product must be coated with latex or polyurethane in order to bond the threads thereby providing strength, protection and consistency. The final coating consists of applying a material composed of latex or polyurethane on the lower surface of the carpet. The carpet is guided to a moving belt and enters an area where the material (latex or polyurethane) is applied as a liquid. Afterwards it reaches the oven that cures the coating. The carpet continues along a moving belt and when it exits the oven, it is perforated for the purpose of draining water that falls upon it when in use. Then, the carpet keeps moving along the belt until the coating cools completely. Finally, it arrives at the inspection and packaging station where the quality is checked, the carpet is rolled up and it is wrapped inside a polyethylene plastic film.

SUMMARY OF THE INVENTION

[0009] The invention described herein pertains to carpeting of artificial turf used on sports fields, as decorative touches in gardens and areas with greenery as well as for other applications. It features a weaving process differentiated from those normally implemented by the current artificial turf industry, leading to multiple benefits that impact not only the fabricator but also the final user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The objective of the invention presented here will be better understood with the following descriptions of examples from real operations. The descriptions relate to the graphics attached herein, including:

[0011] FIG. **1** that shows an exploded view of the artificial turf carpeting, subject of this report.

[0012] FIG. **2** that shows the horizontal view of the improved weave of the artificial turf carpeting, subject of this report.

[0013] FIG. **3** that shows the vertical view of the improved weave of the artificial turf carpeting, subject of this report.

[0014] FIG. **4** that shows the view from above demonstrating the concentration of the aggregates of threads produced by this new weaving process.

[0015] FIG. **5** is a perspective view of the dispensing container of FIG. **1**, showing an outermost plastic bag being dispensed from the roll.

[0016] FIG. **6** is a perspective view of the dispensing container of FIG. **1**, showing an arresting tab of the dispensing container catching an adjacent inner plastic bag through its handle hole.

[0017] FIG. **7** is a perspective view of the dispensing container of FIG. **1**, showing the outermost plastic bag being removed from a bag roll while the adjacent inner plastic bag is caught on the arresting tab.

[0018] FIG. **8** is a top view of a portion of a roll of plastic bags according to one embodiment of the invention, showing two adjacent bags connected bottom-to-top by a separable perforation.

DETAILED DESCRIPTION OF THE INVENTION

[0019] As a consequence of the improved process of weaving (**3**) the artificial turf carpeting, subject of this report, a wide range of benefits are achieved given that this new weaving process (**3**) reduces the amount of thread (**1**) while presenting the appearance of a heavier turf. In addition, the pattern of stitches applied to the lower surface of the carpet (**4**), where the coating of latex or polyurethane is spread, presents a larger surface for contact with the finishing material due to the great majority of the stitches being arrayed diagonally. Therefore the adhesion to the threads is strength-

ened (**1**) compared to the bond obtained from a rectilinear or standard weave. Given the greater concentration of threads (**1**) in certain areas coupled with a distribution simulating the pattern of a chessboard (**5**), the appearance of a turf closer to reality is achieved since natural turf does not grow in furrows, but rather in a dispersed fashion. This new weaving process (**3**) eliminates the appearance of turf as though it were an "agricultural field intentionally seeded" marked by parallel green lines, and produces a more natural looking turf. Once the aggregates are in place, this same configuration allows for a greater retention of those aggregates due to the position of the threads (**1**). In addition, an excessive scattering of the aggregate materials is avoided when performing sweeping tasks. In an important way, this property helps to avoid the migration of the aggregates toward the zones of reduced activities in the field of play and the depletion of those materials at the areas bearing more traffic. This improvement in the weaving process (**3**) is favored for the surface of a sports facility by maintaining greater consistency and thereby enhancing performance of the sport. The intervals separating tufts of "grass", indicated in FIG. **4**, result in greater resiliency due to this improvement in the weaving process (**3**) associated with a suitable combination of threads (**1**). With this configuration of turf where a homogeneous dispersal of the thread lines (**1**) is built in, the players can depend on a uniform distribution of the turf and of the aggregates, and therefore better support yielding more natural running, jumping, stopping and turning. This design considerably reduces reflected light which helps to moderate vision fatigue for both players and the audience.

[0020] The fabrication of artificial turf carpeting presented in this report is carried out primarily by means of altering the configuration of the bank or array of needles compared to the standard in-line disposition of that formation, whereby one needle is installed along the same line as the following one, equidistant one from the other, whatever may be the separation between the needles. In this instance, the distance separating the needles in the standard disposition of needles measures ½". This results in a distance between needles on one side and the other of ½". By altering the configuration of the bank of needles in order to improve the weaving technique, 2 needles are placed ¼" apart, resulting in a gap of ¾" and 2 other needles are installed ¼" apart, and so on repeating the same pattern all along the entire length of the bank or array of needles. The tufting machine includes a special accessory that displaces the bank of needles horizontally causing the needles to penetrate the cloth in a normal or standard manner. At the next stitch, the bank of needles moves horizontally rightward for ½", resulting in a diagonal stitch. At the following stitch, the bank of needles keeps its place resulting in a straight stitch. With the next movement, the bank of needles moves horizontally leftward to a distance of ½" to exactly the same starting point producing a diagonal stitch in the other direction from the previous diagonal one. Completing the cycle, the bank maintains its place forming another stitch in a straight line. This successive motion of the cycle develops into a pattern resembling something like "SS SS SS . . . " material.

What is claimed is:

1. Artificial turf featuring improvements in the weaving process executed primarily by way of altering the configuration of the needles arrayed along a bank of needles compared to the standard configuration in a straight line on that bank, whereby one needle is installed in line with the next one equidistant one from the other, regardless of the separation between the needles. In this instance, the separation of the standard configuration in the bank of needles measures ½", meaning a separation between needles on one side and the other that measures ½". In order to implement the improvement of the weave, the alteration of the configuration on the bank of needles is achieved by separating 2 needles by a distance of ¼", leaving a gap measuring ¾" and by installing another 2 needles ¼" apart. The pattern is repeated along the entire length of the bank of needles. The tufting machine is fitted with a special accessory that causes the bank of needles to move horizontally in such a way that the needles penetrate the cloth in a normal manner. With the next stitch, the bank of needles is displaced horizontally rightward for a distance of ½" producing a diagonal stitch. With the following stitch, the bank of needles remains in place resulting in a straight woven stitch. For the next movement, the bank of needles is repositioned horizontally towards the left at a distance of ½", back to exactly the same starting point forming a diagonal stitch in the opposite direction from the previous one that was also generated diagonally. The bank's cycle is completed when the improved array of needles is kept in place resulting in yet another stitch in a straight line. The cycle of these successive shifts in position generates a pattern akin to "SS SS SS . . . . "

2. Artificial turf featuring improvements in the weaving process.

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