RECYCLING OF ARTIFICIAL TURF

Inventor: Joseph Hinkel, Bettembourg (LU)

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ABSTRACT

Method and device for recovering synthetic turf installed on a surface, the synthetic turf comprising a backing in which are incorporated fibers and one or more infill particle layers, in which the synthetic turf is raised and continuously cut into strips, the strips cut in this manner are then lifted and progressively turned back to cause the infill particles to fall into the recovery tank, the strips then being relaid on the ground or wound up.
RECYCLING OF ARTIFICIAL TURF

FIELD OF THE INVENTION

[0001] The present invention relates to a method and an apparatus for recovering and recycling synthetic turf and in particular for recovering and recycling the synthetic turf covering laid on football pitches, tennis courts, playgrounds, golf courses or dog training grounds etc.

BACKGROUND

[0002] Synthetic turf has numerous advantages over natural turf for outdoor sports use. It is very easy to maintain and the playing surfaces can be used in all weathers and in any season.

[0003] Major sporting federations, such as FIFA have approved a certain number of synthetic turf surfaces on which even high level football matches may be played.

[0004] A playing surface with synthetic turf typically comprises a foundation with a drainage system, a permeable layer e.g. a permeable bituminous paving mix and optionally a resilient layer on which the artificial turf is laid. This artificial turf is composed of a backing, generally made of polypropylene, in which spaced rows of filaments or fibers are incorporated by tufting. An infill layer is spread between the filaments. This infill layer is generally made up of a first weighting layer, generally sand, onto which are then spread one or more additional layers for example comprising rubber granules or a mixture of sand and rubber granules. Synthetic turf is only infilled to a certain height such that the ends of the fibers extend beyond the infill layer. Synthetic turf is marketed for example by the companies POLYTAN, FIELD-TURF TARKETT etc. Synthetic turf is described in greater detail for example in patent application WO98/40559.

[0005] Although synthetic turf is durable, the service life of the turf does not generally exceed 10 to 12 years: the fibers will not be completely worn out, but they will no longer meet the very stringent technical requirements of sporting federations or the owners will no longer find them sufficiently attractive and the synthetic turf will therefore have to be replaced.

BRIEF SUMMARY

[0006] The invention is directed toward removal of the synthetic turf to clear the surface as quickly as possible without contaminating the underlying resilient/drainage or drainage layer.

[0007] This is achieved in one exemplary embodiment according to the invention by a method for recovering synthetic turf installed on a surface, the synthetic turf comprising a backing in which are incorporated fibers and one or more infill particle layers, in which the synthetic turf is raised and continuously cut into strips, the strips cut in this manner are then lifted and progressively turned back above the synthetic turf which is still in place and conveyed above an infill tank to cause the infill particles to fall into the recovery tank, the strips then being relaid on the surface or wound up.

[0008] The method makes it possible to recover synthetic turf installed on a surface with a drainage foundation without contaminating or clogging the drainage system. New synthetic turf may then be installed quickly without having to restore the drainage system.

[0009] The method therefore makes it possible to save time and cut the costs associated with cleaning the underlying drainage layer.

[0010] According to another aspect, the invention also proposes a device for recovering synthetic turf installed on a surface, the synthetic turf comprising a backing in which are incorporated fibers and one or more infill particle layers, characterized in that the device comprises means for lifting the synthetic turf from the surface, means for cutting the synthetic turf into strips, means for turning the strip of synthetic turf back above the synthetic turf which is still in place and conveying it above a recovery tank, means for removing the infill particles from the synthetic turf above the recovery tank, means for discharging the synthetic turf together with means for setting the recovery device in motion.

[0011] It should be noted that the cut strips are lifted and then turned back above the synthetic turf such that, if infill particles drop out of the synthetic turf during lifting and turning back and before reaching the recovery tank, they will fall onto the strip of turf which is still in place and there will be no risk of their contaminating the drainage foundation. This is because the device for recovering turf advances "backward" over the synthetic turf.

[0012] Contrary to the method and device described in document JP2000 008314 in which the cut strips are turned over and treated above the underlying drainage layer, the cut strips is turned over above the synthetic turf which is still in place and treated above the synthetic turf which is still in place. If particles fall out of the strip of turf before reaching the recovery tank, they will fall onto the synthetic turf and will be recovered together with the piece of synthetic turf onto which they fell when the latter piece is treated.

[0013] Turning over the strip of synthetic turf above the synthetic turf still in place and so carrying out the method "in reverse gear" requires less energy.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Other distinctive features and characteristics of the invention will be revealed by the detailed description of some advantageous embodiments given below by way of example, with reference to the appended drawings, in which:

[0015] FIG. 1: shows a schematic diagram of synthetic turf.

[0016] FIG. 2: shows a schematic diagram of a device for recovering synthetic turf.

DETAILED DESCRIPTION

[0017] The synthetic turf (1) as shown in FIG. 1 comprises a thin, flexible backing (3) with parallel rows (5) of fibers or filaments (7) which are vertical relative to the backing. The flexible backing (3) as shown in FIG. 1 may comprise two support layers (11, 13). The backing (3) is most often a woven polypropylene fabric.

[0018] The fibers or filaments, generally made of polypropylene, have a width of between 2 and 30 mm and a thickness of 60 to 150 microns. Their length depends on the use of the synthetic turf and is normally between 20 and 70 mm. The length is approximately twice the spacing (15) between the rows (5) of fibers (7). The fibers are attached to the backing by tufting. The ends of the fibers are generally mechanically fibrillated to provide an enhanced imitation of the appearance of natural turf. A particulate material (9) is placed on the backing (3) of the synthetic turf between the rows of fibers.
and the thickness (17) of this layer of particulate material (9) approximately corresponds to two thirds of the length (19) of the fibers (7).

[0019] As shown in FIG. 2, the device for recovering synthetic turf placed on the synthetic turf to be removed permits the in situ recovery of rolls of small and large width for example of around 3.5 m in order to clear the surface as quickly as possible without contaminating the underlying resilient/drainage and/or drainage layer. This is because it is important to ensure that the infill material is removed with the synthetic turf to prevent it from clogging the underlying drainage layer and preventing reuse of the surface for subsequent laying of synthetic turf.

[0020] The purpose of the winder/seperator for infill or other particles (sand and rubber) is to wind up the synthetic turf while it is not above the layer and to extract therefrom as much as possible or the entirety of the infill material into a tank (N) which is emptied while the machine is in motion or alternatively stationary via a moving bottom (A) then via a second elevator conveyor belt or by tipping, pneumatically or by any other discharge system. Alternatively, the synthetic turf strips are laid on the surface once the infill layer has been extracted.

[0021] In order to compel the infill materials to drop into the collection tank (N), the winder/seperator for infill particles is placed on the synthetic turf and advances “in reverse gear” or “backwards” over the synthetic turf. The synthetic turf is lifted, then turned back over the synthetic turf which remains in place and slides upside down over a curved metal sheet (B) or a revolving cylinder such that the entirety of the infill material is conveyed into the collection tank. Sliding upside down over a curved metal sheet or cylinder prevents the infill material from falling to the side of the recovery tank while the synthetic turf is being turned.

[0022] In order to facilitate this lifting of the synthetic turf, it will be cut by the machine on one or both sides by one or more stationary or mobile blades (C) cutting either from above, from below or from both directions. The blades (C) may have a vibrating or revolving action. It should be noted that any other system may alternatively be used, such as for example hot blades, laser, shears etc.

[0023] To ensure that the synthetic turf passing above the collection tank loses some or all of the materials, it will pass through a system of rollers (D) which are adjustable relative to one another and vary in number. Preferably, at least one of these rollers will have a vibrating, shaking, striking etc. action. If necessary, the work may be made more effective by the involvement of brushes (F) which revolve, alternate, vibrate, shake, and/or by jets of compressed air or any other system facilitating the release of the particles. A scraper (E) cleans the back of the rollers.

[0024] The reason for passing the turned over covering over small diameter rollers (G) is to enlarge its outer surface as far as possible so that the fibers of the synthetic turf spread apart to facilitate release of the infill materials.

[0025] The covering is then wound onto a tube (H) or a reel or any other driven system. Alternatively, if, for climatic reasons or due to the configuration of the synthetic turf, its cleanliness leaves something to be desired, it is relayed to the rear of the machine by being nipped between the rollers (I) such that it is exposed to the sun and rain and the cleaning operation may if necessary be begun a second time.

[0026] Thanks to an additional roller (J), the synthetic turf may be wound such that the strands face either inwards or outwards.

[0027] To begin winding, the synthetic turf may be taken up by straps which wind around the winding shaft, or by a runner system with a chain, belt or other connecting means between the covering on the ground and the winding shaft.

[0028] The synthetic turf cleaned and wound in this manner may straightforwardly be used as a geotextile to stabilize soil, to separate formwork layers for new civil engineering structures, to stabilize and protect embankments and slopes from erosion and other applications. It may readily and without causing excessive wear of the cutting elements also be shredded, chopped, cut into strips, circles etc. to stabilize grassed areas, roadways, horse riding tracks, paddocks, etc.

[0029] Without their ballast of sand and rubber, the rolls of synthetic turf or sheets emptied of their infill material are readily transportable to their place of storage and are easily put to their new use as a geotextile and may easily be unwound, even manually. The reels may also readily be unwound in a running water washing machine for 100% cleaning to permit recycling into other objects by melt extrusion, chopping or by passing them over a heated roller with the aim of welding the polypropylene fibers together to make them more resistant to indentation.

[0030] The machine may be driven by thermal, electric or hydraulic engine/motor, by a central motor or by separate motors or by a combination of the various systems (K).

[0031] All or some of the wheels of the machine (L) will be driven and/or steerable to enable displacement of the machine in all directions.

[0032] The motor(s)/engine(s) and the machine adjustment system may be located, for example, between the collection tank and the curved metal sheet, or at any other location.

[0033] The wheels of the machine are height adjustable independently of one another in order to optimize height adjustment relative to the curved metal sheet over which the synthetic turf slides as a function of the thickness of the covering to be wound up.

[0034] The reel of cleaned synthetic turf may be unloaded by tipping the retaining forks (M) of the winding shaft by a mechanical or manual or combined system or any other system, for instance it is conceivable to unwind it at the edge of the surface onto a larger reel or into a water or compressed air washing machine. The machine may also be relieved of its roll by a crane or any other lifting system.

1. A method for recovering synthetic turf installed on a surface, the synthetic turf comprising a backing in which are incorporated fibers and one or more infill particle layers, in which the synthetic turf is raised and continuously cut into strips, the strips cut in this manner are then lifted and progressively turned back above the synthetic turf which is still in place and conveyed above an infill tank to cause the infill particles to fall into the recovery tank, the strips then being relaid on the ground or wound up.

2. The method according to claim 1, wherein the strips are pressed against a curved metal sheet or a revolving cylinder before passing above the recovery tank.

3. The method according to claim 1, wherein the strips are turned a number of times above the recovery tank by passing over a system of rollers.

4. The method according to claim 1, wherein the strips are turned over small diameter rollers in order to spread the fibers apart and make it easier for the infill particles to fall out.
5. The method according to claim 1, wherein the strips are shaken and/or brushed while being turned above the recovery tank.

6. A device for recovering synthetic turf installed on a surface, the synthetic turf comprising a backing in which are incorporated fibers and one or more infill particle layers, the device comprising means for lifting the synthetic turf from the surface, means for cutting the synthetic turf into strips, means for turning the synthetic turf back above the synthetic turf which is still in place and conveying it above a recovery tank, means for removing the infill particles from the synthetic turf above the recovery tank, means for discharging the synthetic turf together with means for setting the recovery device in motion.

7. The device for recovering synthetic turf according to claim 7, wherein the means for lifting the synthetic turf from the surface comprise straps which wind around a winding shaft, a runner system with a chain, a system of belts enabling a connection between the synthetic turf laid on the surface and the winding shaft.

8. The device for recovering synthetic turf according to claim 7, wherein the means for turning the synthetic turf above a recovery tank comprise a curved metal sheet or a revolving cylinder against which the synthetic turf is pressed while being turned.

9. The device for recovering synthetic turf according to claim 7, wherein the recovery tank comprises a discharge system allowing the tank to be emptied.

10. The device for recovering synthetic turf according to claim 7, wherein the means for removing the infill particles from the synthetic turf above the recovery tank comprise a system of rollers of at least three rollers adjustable relative to one another.

11. The device for recovering synthetic turf according to claim 10, wherein the rollers have a vibrating, shaking or striking action.

12. The device for recovering synthetic turf according to claim 7, wherein the means for removing the infill particles from the synthetic turf comprise revolving, alternating, vibrating or shaking brushes.

13. The device for recovering synthetic turf according to claim 7, wherein the means for removing the infill particles from synthetic turf comprise nozzles for directing jets of compressed air onto the synthetic turf.

14. The device for recovering synthetic turf according to claim 7, in which the means for setting the recovery device in motion comprise a drive unit and wheels driven by said drive unit.

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