

EUROPEAN PATENT APPLICATION

Application number: **83200813.0**

Int. Cl.³: **A 63 C 19/06**

Date of filing: **05.06.83**

Priority: **07.06.82 NL 8202286**

Applicant: **Forbo Tapijt B.V., Weteringpad 7, NI-3762 EN Soest (NL)**

Date of publication of application: **18.01.84**
Bulletin 84/3

Inventor: **Veen, Bernardus Maria, Straussiaan 10, NL-3733 JN Bilthoven (NL)**

Designated Contracting States: **AT BE CH DE FR GB IT LI LU NL SE**

Representative: **Mommaerts, Johan Hendrik, Dipl.-Phys., Octrooibureau Lux Willem Witsenplein 4, NL-2596 BK Den Haag (NL)**

A method for finishing artificial grass surfaces, and tools serving thereto.

A method for finishing an artificial grass surface, in which at the marking lines to be formed the artificial grass parts (2) are removed closely to the carrier (1), after which differently coloured artificial grass strips (2') are glued on the remaining carrier (1). Thereafter the artificial grass parts (2, 2') are raked up against the pile direction, and a narrow flow of weighting sand is introduced between the erected artificial grass parts. A tool for executing this method comprises a disc knife (9) supported on a carriage (7) and adapted to be driven at a high speed, and the cutting edge thereof can be led closeley along the carrier surface of an artificial grass surface; a blower (14) can be present for forming a cooling air flow taking along cuttings, and a nozzle (16) for applying glue can be present. An other tool comprises a raking knife (21) which is dispaceable along the carrier surface with a sand funnel (22) arranged above said knife.



A method for finishing artificial grass surfaces, and tools serving thereto. - - - - -

Ball games such as football, hand- and basketball, hockey, cricket, baseball and the like, are played on grass fields, and the quality of the grass surface and of the subsoil will have an influence on the behaviour of the ball, such as its bouncing and rolling.

A natural grass surface, if well kept, can be played on for not more than 250 h per year, and even in the best maintained fields the most heavily strained parts, in particular near the goals, will be bare at the end of the playing season.

10 This means that fields on which important matches are played should be considerably spared, so that besides such fields also training fields and playing fields for less important teams should be present. For amateur clubs, in particular in the case of commonly used fields, this will, generally, not be possible in view
15 of the cost and/or lack of available sites, so that the fields will be overburdened and will grow worse and worse in the course of a playing season. Sowing again and allowing a new grass surface to grow requires many weeks, generally during the summer months, so that, then, the fields are not available for summer games, and
20 sowing and, during dry periods, watering the fields becomes more and more expensive.

Because of these draw-backs of grass fields so-called artificial grass has been developed of late. This comprises webs, e.g. with a width of 4 m, of a carpet-like material, consisting of
25 a carrier or substrate made of planar plastic material with loops of strip-like parts of plastics having the colour of grass being inserted therethrough and being fixed in the plastics carrier by means of additional carrier material. The carrier can be slightly permeable for water. Said webs are juxtaposed on a suitable plane subsoil, consisting of compacted porous material such as granulated lava or the
30 like, the adjacent webs being glued on an underlying connecting strip. For improving the imitation of a natural grass surface as well as for keeping plane the artificial grass surface, weighting sand is provided between the artificial grass parts, which, in particular,
35 can also prevent the grass surface from locally shifting as a conse-

quence of sliding movements of the players.

Although the purchase and laying cost of such an artificial grass surface are rather substantial, the maintenance cost compared to those of a natural grass field are low since such fields are not 5 to be mowed and have only sparingly to be watered and rolled, and, moreover, the annual sowing is no longer required. Damages of the artificial grass surface can be repaired very quickly by means of corresponding pieces of artificial grass material, and the field will be playable again almost immediately. Spread over the years 10 the initial cost will, therefore, be earned back relatively quickly, and, additionally, artificial grass fields are playable for 3000 h or more per year without the interruptions caused by sowing, and have, therefore, a higher efficiency.

Because of the heavy straining of the grass surface by 15 strokes when used for playing hockey, and because of the fact that hockey fields are often used with a high utilisation degree, artificial grass surfaces have up till now been used mainly for hockey fields. Since artificial grass has come up to the expectations there, its use on fields intended for other games has now got started, 20 particularly for youth and school game fields which have, generally, a high utilisation degree and are heavily strained. Even tennis courts are now being equipped with artificial grass so as to obtain an imitation of the lawn tennis courts currently used in Great Britain and in some Commonwealth countries, and by a suitable choice 25 of the artificial grass, the sand weighting and the subsoil the desired ball behaviour can be obtained. The same holds for cricket, in which case an artificial grass surface is to be used only for the pitch. All this is of importance in view of international matches, since on artificial grass players can get accustomed to 30 natural grass, and will, then, be no longer at a disadvantage, which will also be the case inversely for those trained on natural grass who will find on artificial grass comparable conditions.

For such field games the playing area is defined and divided into sections by means of lines. In the case of natural 35 grass such lines are made with lime which is cheap and does not substantially damage the grass, which lines, depending on the utilisation degree, rain-fall etc., are to be renewed several times each season. However lime will not stick to artificial grass, but then stronger paints such as polyurethane paint can be used, which, in

the case of living grass, cannot be utilised. Since, however, the playability of artificial grass is more than ten times better than of natural grass, such lines will wear off faster accordingly. Renewing them is, however, much more expensive than in the case of 5 lime.

It has been proposed before to form such lines from differently coloured artificial grass, viz. by cutting out strips and glueing in corresponding strips of differently coloured artificial grass. This solution has not satisfied. For particularly 10 near said lines the greater part of the sliding movements of the players will take place, which will heavily strain the artificial grass surface, as a consequence of which the seams can come loose, the more so as the line strip is defined by two seams at a relatively short distance. Apart from the required repair work, an ob- 15 jection of a loose strip is that it is dangerous for the players as repair during a match is not possible, and a loose seam will quickly spread.

Another objection of the current methods for placing such artificial grass surfaces is that it is difficult to distribute the 20 weighting sand evenly, which is particularly important if in the artificial grass webs strips of a different material are to be included where for the reasons mentioned before weighting is particularly important.

It is an object of the invention to avoid these objections, 25 and to provide a method and tools for finishing artificial grass surfaces, such as forming bordering and partition lines, and for weighting the same with sand.

According to the invention, the artificial grass is shorn closely to the carrier layer at the lines to be formed, after which 30 strips of a differently coloured artificial grass material are glued on the remaining carrier, said material being preferably arranged with the same pile direction as the adjacent artificial grass material.

By not removing the original carrier, the coherence of the 35 webs is not disturbed, and by glueing a strip with its own carrier the strength is even increased there. It has appeared that such lines will not come loose from the surrounding material even when heavily strained.

In particular heat generation and melting of the artificial

grass resulting therefrom during shearing is prevented by using cooling air flows by means of which the cut-off plastics parts can be removed at the same time.

The differently coloured artificial grass is, preferably, 5 cut out from the webs in such a manner that the pile direction thereof corresponds to that of the adjacent webs.

In order to weight an artificial grass surface effectively, in particular in the vicinity of such lines, the sand is applied between the artificial grass parts by raking up the latter against 10 the pile direction by means of a knife, and to allow the sand to flow as a narrow flow between the artificial grass parts thus erected immediately thereafter.

It has appeared that the known cutting tools, in particular those with mutually slidable teeth, are not suitable for the 15 present purpose, since such tools get obstructed substantially immediately by the cuttings. The invention provides a tool for shearing off the pile material, comprising a carriage movable on wheels on which a disc knife which can be driven by a motor at a high speed, in particular of about 3000 min^{-1} , is supported, as well 20 as a blower for generating a strong air flow by means of which cut-off parts can be sucked away, and, at the same time, the vicinity of the cutting disc is cooled in such a manner that no substantial softening of the plastics will occur. The knife is arranged at such an inclination that its cutting edge is supported at a suitable 25 angle close to the upper side of the carrier, and its hub remains free from the shorn carrier so as to avoid additional friction and to provide an unobstructed passage of the cooling air.

Furthermore the invention provides a tool for applying the glue in the strip-shaped part of an artificial grass surface shorn 30 according to the invention, said tool comprising a slot-like nozzle having a width corresponding to the width of the shorn strip, which nozzle is connected to a glue container which is, in particular, pressurised, said nozzle preferably comprising an interrupted slot thus allowing to produce a plurality of parallel mutually separated 35 glue ridges which, when pressing a strip to be glued thereon, can flow out laterally.

Finally the invention provides a tool for applying sand on an artificial grass surface, in particular at the strips glued therein, which tool comprises a carriage provided with a knife

arranged transversely to the direction of motion, and having a lower edge directed towards the bottom, said knife being adapted to be brought into contact with the artificial grass parts in order to erect these parts against the pile direction, whereas
5 above this knife sand can be poured into the interspaces between the artificial grass parts erected by the knife.

The invention will be elucidated below by reference to a drawing, showing in:

Fig. 1 a diagrammatic cross-section from which the
10 structure of an artificial grass surface can appear;

Figs. 2A, B and C simplified diagrammatic representations for elucidating successive steps of the method according to the invention;

Fig. 3 a simplified diagrammatic representation of a tool
15 according to the invention for shearing an artificial grass surface;

Fig. 4 a simplified representation in perspective of a tool according to the invention for applying glue on a shorn artificial grass surface; and

20 Fig. 5 a diagrammatic representation of a tool according to the invention for applying weighting sand on an artificial grass surface.

In Fig. 1 a cross-section of a small part of an artificial grass web is diagrammatically shown. This web, having a width
25 of, for instance, 4 m, comprises a carrier 1 made of flexible plastics through which strands 2 of toughly resilient plastics strips resembling grass are inserted which, at the lower side, are anchored by means of an additional plastics layer 3. The carrier 1 is, generally, porous in such a manner that water can flow off to-
30 wards the subsoil. Such artificial grass surfaces are known.

In Fig. 2 the successive steps in providing wear resistant lines in such a grass surface are diagrammatically indicated. As shown at A at first the artificial grass parts 2 are cut off in a strip 4 with the desired line width and down to the immediate
35 vicinity of the carrier 1. How short the artificial grass is cut depends on the characteristics of the used tool and the regularity of the surface of the carrier 1 which should not be damaged.

Subsequently glue ridges 5 are provided on the shorn part as indicated at B, after which, as shown at C, a strip of a

similar artificial grass material having the same strip width but a different colour is pressed on the glue ridges 5, the latter being such that the glue will be spread out regularly and will not substantially be pressed outwards beyond the strip 6. The artificial 5 grass parts 2' of the strip 6 can, if necessary, be made a little shorter than the parts 2 of the grass surface proper, but longer parts 2' will wear faster so that, eventually, a uniform length will be obtained.

The strips 6 are cut from webs so that the pile direction 10 of the parts 2' will be equal to that of the parts 2 of the adjacent grass surface parts. In curved lines curve segments are cut from webs having the same direction as the grass surface webs in which said lines are to be provided. Cutting or shearing the artificial grass parts 2 is difficult since, during cutting, the plastics 15 becomes soft. Known cutting devices having mutually movable teeth, such as sheep shearing clippers, appear to get obstructed nearly immediately in practice since, by local heating, the plastics is softened and sticks to the teeth of the cutting device. Fig. 3 shows a tool according to the invention developed for the present 20 purpose which does not have these draw-backs.

The tool according to Fig. 3 comprises a carriage 7 with wheels 8 which, for instance, can be guided on guiding bars to be arranged along or on the grass surface, whereas in the case of curved lines the carriage can be maintained in the desired track 25 by means of a rod or wire attached to a pin driven into the ground in the centre of the curve. On this carriage a cutting disc 9 with a driving motor 10 is mounted, which assembly is preferably adjustable in such a manner that the cutting edge 11 of the disc is maintained at the desired height. The disc has such an inclination 30 that the bevel of the cutting edge 11 is substantially parallel to the carrier 1, and the hub 12 of the disc 9 remains free from the carrier so as to avoid additional friction leading to melting of the plastics. The cutting edge 11 is provided with suitable teeth.

The whole assembly is enclosed within a hood 13 which, 35 by means of a blower 14, is connected to a collecting vessel 15 for the cuttings. The blower can, for instance, be connected to the motor 10, but can also be provided with a motor of its own. Apart from sucking away the cuttings, the air flow thus produced will bring about cooling of the plastics material which comes into

engagement with the cutting disc 9, the inclination thereof being such that also from the side of the hub air can flow onward. The rotational speed of the cutting disc is preferably about 3000 min^{-1} .

The glue ridges 5 according to Fig. 2B can be applied by means of the nozzle 16 shown in Fig. 4, having a width corresponding to the width of the strip 4, the outflow openings 17 of the nozzle corresponding to the location and width of the ridges 5. The nozzle 16 is connected, by means of a hose 18, to a glue containing pressurised tank. The nozzle can, for instance, be held by means of a stick, and can be provided, if necessary, with one or more running wheels.

After applying line strips 6, the latter are rolled, if required, by means of roller so as to press them well in the glue ridges 5.

15 In order to weight the ready field with sand, in particular near the line strips 6, the artificial grass parts 2 and 2' are lifted, according to the invention, against the pile direction. These parts are, generally, pressed flat somewhat by rolling, which hinders the application of sand between these parts. Fig. 5 shows
20 a tool according to the invention designed for that purpose, provided with a carriage 19 with wheels 20. On this carriage a brushing knife 21 is mounted which is directed transversely to the direction of movement, and which, when the carriage 19 is moved against the pile direction, will erect the parts 2 and 2' pressed flat. Immediately
25 above this knife a sand funnel 22 with a slot-shaped spout 23 is present, by means of which the sand can be poured on the carrier 1 behind the erected parts 2 and 2'.

By means of the method and tools according to the invention it becomes possible now to form artificial grass fields
30 satisfying the severest requirements, and the operations required thereto are substantially simplified thereby which has a favourable influence on the price of an artificial grass field.

Claims

1. A method for finishing an artificial grass surface for a sports field, which artificial grass surface consists of a plurality of webs each consisting of a flat carrier with artificial grass parts resembling grass fastened thereto, characterised in that, at 5 marking lines to be formed, the artificial grass parts are removed down to the vicinity of the carrier, after which strips of a differently coloured artificial grass material are glued to the remaining carrier.

2. The method of claim 1, characterised in that the line 10 strips are arranged with the same pile direction as the adjacent artificial grass material

3. The method of claim 1 or 2, characterised in that during cutting of the artificial grass parts a cooling air flow which takes along the cut parts is maintained.

15 4. The method of claim 2 or 3, characterised in that straight strip parts and curved strip segments are cut from webs of artificial grass material having, in respect of these parts or segments, the same direction as the artificial grass webs in which these parts or segments are to be arranged.

20 5. The method of any one of claims 1..4, in which the artificial grass is weighted with sand, characterised in that the artificial grass parts are raked up against the pile direction, and immediately thereafter sand is led in a narrow flow between the erected artificial grass parts.

25 6. A tool for executing the method of claim 1, characterised by a carriage movable on wheels with a disc knife mounted thereon having a diameter corresponding to the strip width, which knife can be driven by a motor at a high speed, the cutting edge thereof being adapted to be led closely along the carrier surface of the arti- 30 ficial grass surface to be finished.

7. The tool of claim 6, characterised by a blower for leading a cooling air flow taking along the cuttings along the disc knife.

8. The tool of claim 7 or 8, characterised in that the disc knife is arranged at a slight inclination in respect of the hori- 35 zontal.

9. A tool for executing the method of claim 1, characterised by a slot-shaped nozzle having the width of the formed strip, which

nozzle is connected to a glue container and is adapted for applying glue on the carrier.

10. The tool of claim 9, characterised in that the nozzle slot is interrupted so as to enable to apply separated glue ridges on the carrier.

11. A tool for executing the method of claim 1, characterised by a movable carriage with a knife directed transversely to the direction of movement with a lower edge directed parallel to the bottom, above which knife a funnel with a slot-shaped spout is arranged.

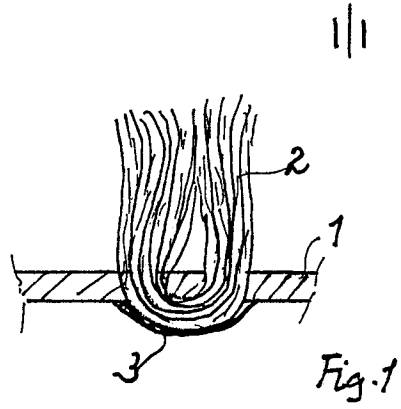


Fig. 1

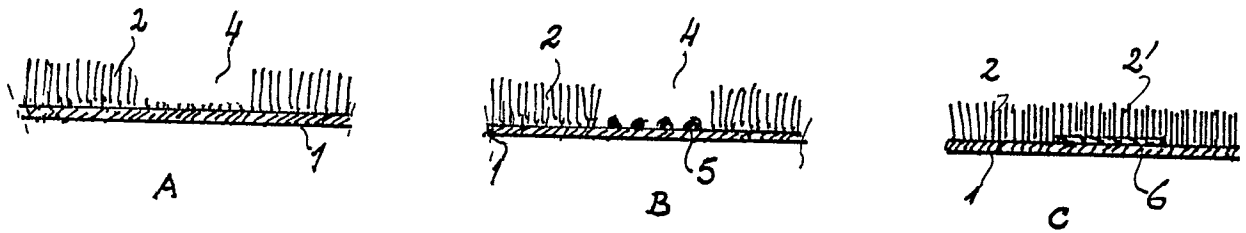


Fig. 2

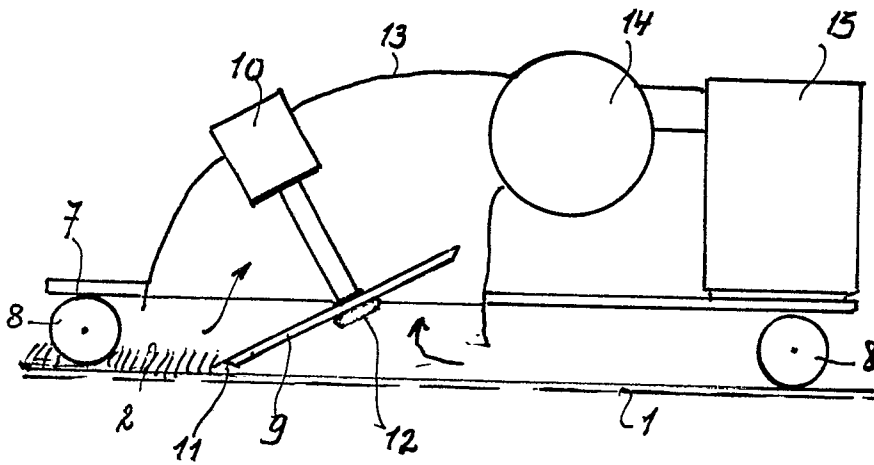


Fig. 3

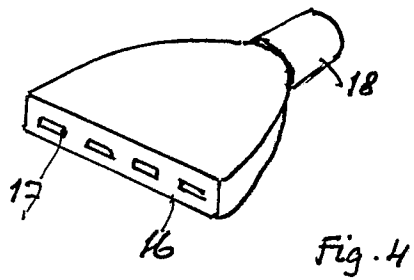


Fig. 4

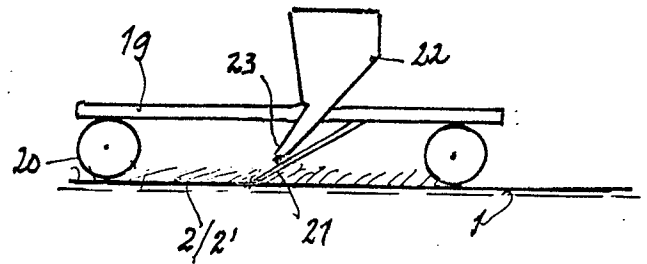


Fig. 5



DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	NL-A-7 908 346 (MEEUWISSEN, VLOEDMANS) -----		A 63 C 19/06
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			A 63 C E 01 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12-09-1983	Examiner SCHLESIER K.G.W.P.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			