

## IMPROVED GROUND COVERING

This invention is a temporary floor covering that facilitates, and allows the free-moving of individuals and/or machines/equipments on sandy or boggy grounds.

We know of such temporary floor coverings for those grounds, which can be spread out on the surface of the ground to allow the traffic of machines, for example.

The first drawing illustrates a partial side view of the previous work for such a covering structure. This structure that has been described by the hereby patent applicant WO 95/26435, is made of a weaved structure 1 formed with woofs 2, type mono-strand, arranged in a single layer and, warps 3, also arranged in a single layer.

The weave of the weaved structure is such that each warp 3 are intertwined with woofs 2 following, preferably and approximately, half of the intersections rows and columns of the weave. Warp 3 is left in the remaining intersections in order for each warp 3 to have a simple and tight weaved zone 4, and a loosened zone 5.

The alternation of tight interweaving zones 4 and zones 5, where warps are not in tension, leads to tightening of woofs 3, which creates on both surface of the fabric an embossed structure with veins.

The driving wheels of machines or tracked vehicles moving on the covered surface have a good grip on those grounds, allowing for a great moving speed.

These raised patterns also ensure a good grip of the structure itself on those covered grounds.

This grip, combined with the flexibility of the covering structure that allows to conform with the covered ground, prevents the structure to move under the weight of the machines moving on the surface and prevents from ruts.

More generally, the set-up of such covering structure allows to protect the ground from eventual erosion due to stalling and heavy traffic of machines/equipments.

This covering structure that gives excellent results for the traffic of machines/equipments on instable grounds can however be enhanced further.

We have indeed noticed that the several raised patterns of this structure form an uneven surface which, combined with its rigidity makes moving barefooted a difficulty.

In some cases, such barefooted moves can lead to bruising on feet.

Also, we observe a certain unhappiness about these structures from the beach goers which complain about its rigidity, and prefer moving around directly on the sand.

It would then be interesting to adapt those covering structures in order to facilitate individuals moving barefooted, but also equipments with small wheels like strollers. Those are indeed sensitive to the unevenness of the surface of the covering structure.

Furthermore, these covering structures have an openwork design to ensure the flow of water. And therefore do not allow the printing of visuals or messages on their surface.

Yet, it would be interesting to use these structures as information tools or advertising tools for sports or promotional events for instance.

Finally, these covering structures can blend with the ground, for example, if white on a snowy ground, or can be very indistinguishable for machines moving in the dark.

The risk of a bad move of the machine on such floor covering surface is then probable, the machine can be at any time immobilised.

It would then be necessary to mark the traffic routes defined by the floor covering structure, which involves supplementary means and the work of operators.

It will then be interesting to have a floor covering structure that has its own marking system to indicate the sides and allow a fast speed move on its surface in difficult traffic conditions.

The objective of the hereby invention is then to propose a ground covering structure, simply conceptualised and simple to operate, light and flexible that also allows individuals to move barefooted on its surface while keeping a good grip on the ground.

Another feature of the hereby invention is to offer a foldable covering structure to be used on the beach which allows at the same time individuals to

move barefooted on it, but also the traffic of equipments like wheelchairs for handicaps and boat or sea scooter towing.

For that purpose, the invention is a temporary floor covering for free-moving on sandy, boggy, muddy grounds including a weaved structure in warps disposed in a single layer. The weave of the said weaved structure being such that each warp are interweaved with the next woof, preferably and approximately, following the half of the rows and columns intersections of the weave, the warp being left in the remaining intersections, in such a way that each warp creates at least a simple and thigh weave zone and, followed by a loosened zone, the alternation of these different zones will lead to tightening of the woofs resulting in an important raised pattern on the fabric.

According to the invention, this covering includes flat threads positioned on at least one part of the width of the weaved structure and on at least one of its side. Each of these flat thread is clutched, regularly or not, by woofs placed on both ends of the raised patterns of the said side of the weaved structure.

We mean by "clutch", the connection of the flat thread with the original structure. In terms of floor covering structure, it becomes a drop.

We mean by "flat thread", a product extruded from a spinneret, that can be extended or not from which the transversal section is constant in its entire length whether it be oval, square, rectangular, flat and circular, or modified square and rectangle, meaning that it has two opposite sides forming a convex arch, the other two being rectilinear, equal and parallels.

These flat threads could be hollow and form, for instance, a flat tube-shaped section.

This hollow zone inside the flat thread is a good place that can allocate one or more extended elements such as warming elements for instance. By connecting these warming elements to an external energy source, it is then possible to melt, for example, ice or snow that could be in the traffic way of the temporary floor covering structure. The temperature of the heating element is of course situated below a temperature that could harm the thread of the coverage. The maximum temperature is then lower than 80°C.

Preferably, the flat thread is then made in a good thermal conductor material, like metal, in order to minimise loss of thermal radiations generated by the warming element.

At least, some flat threads of the floor covering can be flat threads that are transmitters or receivers of a signal. It could be, for instance, antennas that can receive magnetic waves but also send such waves. By connecting both ends of these flat threads to a transport line of the signal such as a coaxial cable, we can bring a signal received by the antenna to a receiver or in another way bring a signal given by an external transmitter to the floor coverage.

These flat threads can be from different sizes and form a network of antennas sending in signals of different frequency scales.

These flat threads can then be used, for example, to give geographic localisation signals of the floor covering to an helicopter operating in difficult weather conditions. These signals transmitted by the covering can allow the pilot, despite the bad visibility, to locate from a far the floor covering and to land on its surface.

We mean by "preferable and approximately", an equal amount of clutches and drops of each warp which is not absolute but can differ from 10 to 15% for instance, or even more, being understood that the more we are further away from the reality and the more the job will require adjustments.

Flat threads can have a length which is equal to the weaved structure or shorter. Their length is however longer than 3 evolutions of the weave of the weaved structure.

In general terms, the invention is a temporary floor covering that includes a weaved structure composed by warps in a single layer and woofs also positioned in a single layer. The said weaved structure including woofs placed above or below other woofs defines a principal plan. The first woofs forming bulges in the weaved structure, including flat threads positioned on one part, at least, of the width of the weaved structure on at least one side. Each of the said flat threads being clutched, regularly or not, by woofs placed at the ends of the raised patterns of the said side of the weaved structure.

There are different production modes of this temporary floor coverage, each having its advantages and each having numerous technical associations possible:

- Each flat thread is clutched only by woofs placed on the external side of the weaved structure,

We avoid therefore an entry of the flat threads in the weaved structure in order to cover the unevenness of the surface and form a smooth external surface.

Those woofs on the external side of the weaved structure are of course to be considered, not in comparison with the bulges of the weaved structure but locally, at the bulge where the flat thread is inserted.

- The flat threads are parallels and spaced out from one another,

This production mode allows to keep a flow of water and therefore an important permeability of the floor coverage. It allows also the passage of particles (dust, sand, soil...) leaving the surface of the coverage rather clean.

- The flat threads are at least partially flattened against the said structure weaved between two clutches,
- The flat threads are clutched, or tied, all the woofs  $n$  of the said structure weaved,  $n$  being  $\geq 8$ ,

Preferably, the number  $n$  matches the number of woofs in the weave evolution.

- Each flat thread being placed between two warps of the chain serving as guide, the flat threads have a height lower or equal to the diameter of these warps,

The flat thread is parallel to those two warps, those encircling tightly the flat thread on at least a part of its length and serving as a guide.

- These flat threads are made in a material chosen in a group including polyesters, polyamides, polypropylenes and polyethylene,

These materials have a rot-proof feature for temporary floor covering as well as a resistance to ultraviolet rays (UV).

Preferably, the flat threads can be made in biodegradable materials such as biodegradable plastic material, or oxodegradable plastic material. The biodegradable plastic material can be made out of starch.

The covering being entirely made with one of these biodegradable or oxodegradable plastic materials, or a combination of both, can therefore be auto destructible in a couple of weeks or months depending on the diameter of the warps and other woofs and according to the width of the flat threads.

- At least some flat threads include a covering highly reflective to reflect the light produced by the equipments moving on the covering and create a lighted passage way,

By positioning these flat threads on the sides of the covering, we allow the equipments that move on the surface to locate easily the track in difficult conditions such as darkness, fog, heavy rains,...

According to a variant, flat threads can be photo luminescent.

- At least some of the said flat threads can transmit and/or receive signals

The invention pertains also to the use of covering as described previously as a support for at least a temporary habitation on sandy, boggy or snowy grounds.

The presence of these flat threads on the surface of the weaved structure allows to reduce greatly the prints or marks on the temporary covering on a deformable surface such as a tent carpet.

The floor covering allows also to give a thermal isolation by creating a screen between the floor of the temporary habitation such as a tent and natural ground.

The invention will be described in further details in reference to the drawings in the appendix which represent:

- Picture 1: a drawing of a partial view of the covering structure of the previous work.
- Picture 2: a drawing of a temporary floor covering as per a first mode of production of the invention
- Picture 3: a side view of a floor covering according to the second mode of productions of the invention;
- Picture 4: a large view of the floor covering of picture 3 showing the way each flat thread is inserted in the covering structure of picture 1;
- Picture 5: the weave of the floor covering of picture 3;
- Picture 6: a drawing of the weave of picture 5 reduced to the woofs only, the warp 1 and the flat thread;
- Picture 7: a side view of a floor coverage according to the third mode of production of the invention;
- Picture 8: the weave of the floor covering of picture 7

Picture 2 shows a temporary surface covering for moving on sandy, boggy or muddy grounds according to a mode of production of the invention.

This covering includes a weaved structure made of warps 6 arranged in a single layer and woofs 7 arranged also in a single layer. These warps 6 and woofs 7 are preferably mono-strands in order to ensure that the weaved structure has the necessary rigidity. However, warps can be mono-strands or not.

Woofs 7 can have, for example a diameter from 30 to 200 hundredth of mm. Warps 6 have preferably a diameter slightly lower than those woofs 7. For instance, woofs 7 have a diameter of 80 hundredth of mm and warps 6 have a diameter of 65 hundredth of mm.

Warps 6 and woofs 7 are preferably made in a material chosen in a group including polyesters, polyamides, polypropylenes, starch based biodegradable plastic materials, oxodegradable plastic materials and polyethylene.

The weave of this weaved structure is such that each warp 6 is interweaved with woofs 7 following, preferably and approximately, half of the intersections of rows and columns of the weave, warp 6 being left in the remaining intersections, such that each warp creates at least a simple and tight weaved zone followed by a loosened zone. The alternation of the said different zones leads to tightening of woofs 7 creating an important raised pattern of the fabric. For a further detailed description of such weaved structure, we can refer to the patent application number WO 95/26435.

This temporary flooring coverage presents then on both its sides an embossed structure with veins formed by bulges and drops that related to the grip properties of the coverage of tires and tracked vehicles that may move on this coverage.

The coverage includes on one of its side of the flat threads 8 arranged of a side of the width of the weaved structure generating therefore a portion that has a smooth profile particularly adapted to walk barefooted and another portion that has an important raised pattern adapted for the traffic of vehicles/equipments.

Each flat thread 8 is only clutched, or connected by woofs 9, the most external to the weaved structure of the corresponding side which permits to cover at its best the drops of the weaved structure. The coverage then keeps its grip features on the ground.

The flat threads 8 can all be clutched by the same woof 7 or on the contrary by different woof 7 in order to create a gap in their link which can enhance the smoothness of the surface.

These flat threads 8 are parallel and spaced from one another to ensure a great permeability of the covering. At the same time, they constitute a barrier that limits the infiltration of foreign bodies in the weaved structure.

To avoid that flat threads have problems moving side ways on the weaved structure, each flat thread 8 is placed between two consecutive warps 6 that serve as guides for the flat thread 8.

The flat threads present then a height or thickness lower than the diameter of these warps 6 in order to maintain those flat thread 8 as trapped.

For instance, the warps 6 have a diameter of 65 hundredth of mm, the flat threads have a height of 42 hundredth of mm.

Furthermore, flat threads 8 are stretched in order to be at least partially flattened against the weaved structure between two clutches to avoid an eventual catch of this flat thread and a strong solicitation by tension for instance.

Those flat threads are made usually in polyester for external applications, however it can also be made in materials from the group including polyamides, polypropylenes, polyethylene and biodegradable or oxodegradable plastic materials.

For application on sandy grounds for instance, those flat threads 8 can be recovered beforehand with an anti-microbial agent before weaving of the covering.

The flat threads can also serve as an information or advertising tool. For that matter, they have at least a printable side.

In order to make such a covering, we can cut a support that is printed beforehand using a well known method, by cutting ribbons of the same width, for instance 3,5mm. We then assemble those ribbons or flat threads 8, and we roll these assembled ribbons 8 on a storage system for threads .

This thread storage system is then positioned on a machine-woven used for the fabrication of weaved structures. This weaving job includes its own alimentation system in warps 6 and woofs 7. The weaving job can therefore receive a cloth of threads that does not have the same properties as the weaved structure.

We build the weaved structure by integrating the printed ribbons. The weaving job includes a sensor connected to a processing structure. This processing unit sends order signals to a cutting tool to determine the length of the

flat thread 8, or assembled ribbons to insert. We then ensure that we do not spoil the visual by cutting the assembled ribbons in strips at the wrong place.

Flat threads 8 being slightly spaced from one another, for instance, d between 3 and 5 mm,  $\pm 10\%$ , we can see the visual of the floor covering as it is on the printed information support.

Of course, the printing of flat threads can be done by other well known methods and after the production of the temporary floor covering in order to insert the advertisement or information according to the demand.

Flat threads 8 can also include at least a layer of protection placed on at least one of the external surface after printing of the information or advertising message to protect the side(s) printed from external attacks.

The weaved structure described above can be connected to an auxiliary weaved structure including a cloth of warp and a cloth of woofs. The weaved structure is then superimposed on the auxiliary weaved structure and the connection between these two weaved structures is produced in order to constitute between both structures, from place to place, tube-shaped pockets oriented like the warps 6 or woofs 7.

The pockets are made from place to place, in regular or non-regular intervals. They can serve as a reception place for different elements .

This way, the pockets can receive, at the time of weaving or later, an extended element of rigidity, such as for instance, a bar of composite materials of a diameter of a dozen of millimetres.

The bars, for instance made of fibreglass and polyester resin and with a diameter of 25 mm, are kept trapped in the pockets between the two weaved structures and confer the covering with an accrued bearing capacity while reinforcing the bulging of zones where the bars are inserted.

The nature and the diameter of the threads of the auxiliary weaved structure can of course vary according to the applications planned.

For a description of the auxiliary structure and the connection of these weaved structures, we can refer to the patent application number WO 99/49116 by the hereby applicant.

Pictures 3 and 4 show a floor covering according to a second mode of production of the invention. Woofs 7, warp 6 and flat threads 6 have been

described previously, we will then describe the way each flat thread 8 is inserted in the covering structure of picture 1.

The flat threads 8 are identical and clutched, or connected by the same woof 7 on the width of the floor covering. Each flat thread is also regularly inserted in a weaved structure like shown in Picture 1.

Picture 4 shows as well that, in order to avoid the flat threads 8 to move sideways on the weaved structure, each flat thread 8 is surrounded on each sides by at least one warp 6, serving as a guide for this flat thread 8. The flat threads 8 are, also, flattened against the weaved structure.

Picture 5 represents the weave of the floor covering of picture 3. This weave conventionally represented, includes 10 warps numbered from 1 to 10, for 10 vertical columns and 26 woofs, numbered from 1 to 26, for twenty six rows for the weaved structure in which are inserted the flat threads. An eleventh vertical column represent the flat threads inserted identically in the weaved structure of Picture 1. For this eleventh column we have then a flat thread numbered 11.

At intersections of the rows and columns are represented in the way its known, in black, the warps or flat thread clutched, and in white, the warps or flat threads left in the remaining intersections.

Therefore, for instance, considering Picture 5 and 6, we notice that the weaved structure in which the flat threads are inserted, the warp no. 1 passes successively (and clutched) on the first 5 woofs (no. 1 to 5), then passes (and dropped) under the woof no. 6, re-passes by woof 7, then under woof 8, then on woof 9, and under n. 10 to 18, then on n.19, under n.20, on n.21, under n.22 and finally n.23 to 26.

In total, the warp n.1 is clutched thirteen times and dropped thirteen times.

Furthermore, as we can observe in Picture 6, the warp n.1 interweaves with woofs (numbered 1 to 26) following a simple and tight weave like canvas, in two zones named A, each preceded and followed by a zone named B where the warp is dropped. Each zone A or B covers several consecutive woofs.

We observe that , for each warp that the weave of Picture 5, an alternate series of zones A (weave type canvas) and B (warps dropped), the number of zones A and zones B can vary from a warp to the other.

The alternation of interweaved zones A and zones B where the warps do not strain therefore create big loosen parts provoking tightening of the woofs that

creates an important raised pattern of the weaved structure in which are inserted flat threads like shown in Picture 3 and 4.

The flat thread is only clutched or connected once by the woof n.4 leading to a drop on the weave of the floor covering. The flat thread evolves then above woofs n.1 to 3 and 5 to 26.

Picture 7 shows a side view of a floor covering according to a third mode of production of the invention and picture 8 is a schematic representation of the weave of the floor covering.

This floor covering presents an alternation of two flat threads numbered 11 and 12 inserted differently in a basic weaved structure.

The basic structure in which we insert, little by little, during the production of flat threads to obtain a floor covering of the invention includes 25 woofs and 10 warps in the evolution of the weave.

The weave of the floor covering includes then twelve vertical columns for which are put warps numbered 11 and 12. The weave includes 25 woofs, numbered from 1 to 25, for the twenty five rows of the basic structure in which the flat threads are inserted.

In watching Picture 7, we observe that the flat thread 11 is clutched twice. The result is illustrated in Picture 8 with the two drops in the weave evolution. From the picture 8, it passes successively (is clutched) on the three first woofs (no. 1 to 3), then passes (and drops) under woof 4, re-passes on woofs no.5 to 13, then under woof n.14, and passes again on woofs n.15 to 25.

On Picture 7, the flat thread 11 is then clutched by woofs 4 and 14,

In looking at Picture 7, we observe that the flat thread 12 is also clutched twice. The result is shown in Picture 8 with two drops for an evolution of the weave. On picture 8, the flat thread 12 passes successively (is clutched) on the 13 first woofs (no. 1 to 13), then passes (is dropped) under woof 14, re-passes on woofs n.15 to 20, then under woof n.21, and passes again under woofs n.22 to 25.

The result is that between woofs 4 and 14, the flat thread 12 is horizontal. This way it covers the drop of the basic weaved structure and confer with a planned aspect of this zone from an outside view of the floor covering.

CLAIMS

1. Temporary floor covering including a weaved structure form by warps (6) arranged in a single layer and woofs (7) also arranged in a single layer, the weave of the said weaved structure being such that each warp (6) interweaves with woofs (7) following, preferably and approximately, half of the intersections of rows and columns of the weave. Warp (6) being left in the remaining intersections, in such a way that each warp (6) has at least a simple and tight zone followed by a loosened zone. The alternation of the said different zones provokes tightening of the woofs (7) creating this way an important raised pattern on the cloth, distinguished by the fact that it includes flat threads (8) arranged on at least one part of the width of the said weaved structure on at least on of the sides. Each of the said flat thread (8) being clutched, regularly or not, by woofs (7) placed on the edges of the bulges of the said side of the weaved structure.
2. Covering according to claim 1 is distinguished by the fact that each of the said flat thread (8) is clutched only by the most outer woofs (9) of the said weaved structure.
3. Covering according to claim 1 and 2, distinguished by the fact that the said flat threads (8) are parallels and spaced from one another.
4. Covering according to any of the claim 1 to 3, distinguished by the fact that each of the said flat thread (8) is at least partially flattened against the said weaved structure between two clutches.
5. Covering according to any of the claims 1 to 4, distinguished by the fact that the flat threads (8) have a full or hollow side section.
6. Covering according to any of the claims 1 to 5, distinguished by the fact that the said flat threads (8) are clutched all n woofs (7) of the said weaved structure, n being  $\geq 8$ .
7. Covering according to any of the claims 1 to 6, distinguished by the fact that each flat thread being placed between two warp (6) serve as a guide, the said flat threads (8) have a height lower or equal to the diameter of the said warps (6).
8. Covering according any of the claims 1 to 7, distinguished by the fact that woofs (7) have a diameter ranging from 30 to 200 hundredth of mm

and the warps (6) have preferably a lower diameter as compared to the woofs (7).

9. Covering according to any of the claims 1 to 8, distinguished by the fact that the said flat threads (8) are made in a material chosen in the group including polyesters, polyamides, polypropylenes, polyethylene and biodegradable or oxodegradable plastic materials.
10. Covering according to any of the claims 1 to 9, distinguished by the fact that the said flat threads (8) have at least one printed side to serve as an information tool.
11. Covering according to claim 10, distinguished by the fact that the said flat threads (8) include at least a protection layer to protect the said printed side from external attacks.
12. Covering according to any of the claims 1 to 9, distinguished by the fact that at least some of the said flat threads (8) include a covering highly reflective to reflect the light produced by the equipments moving on the said covering and form a lighted passage way.
13. Covering according to any of the claims 1 to 12, distinguished by the fact that the said flat threads (8) are covered by an anti-microbial agent.
14. Covering according to any of the claims 1 to 13, distinguished by the fact that it includes an auxiliary weaved structure that includes a cloth of warp (6) and a cloth of woof (7). The said weaved structure being superimposed on the said auxiliary weaved structure and the connection between the two weaved structure being made in order to create between the two structures , from place to place, tube-shaped pockets oriented as per the warps (6) or woofs (7), the said pockets serving as a reception place of other elements.
15. Covering according to any of the claims 1 to 14, distinguished by the fact that at least some of the said flat threads (8) are able to send and/or receive signals.
16. Usage of the said covering according to any of the claims 1 to 15 as a support for at least a temporary habitation on sandy, boggy or snowy grounds.