

596646

69208/87

FORM 1  
REGULATION 9

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-1973

APPLICATION FOR A PATENT

APPLICATION ACCEPTED AND AMENDMENTS

I/We A/S PLATON

MADE 19-2-90

of N-3670 Notodden, NORWAY

hereby apply for the grant of a Patent for an invention  
entitled:

DEVICE FOR STABILIZING BULK MATERIAL, ESPECIALLY SOIL MASSES

which is described in the accompanying complete specification.  
This Application is a Convention Application and is based on  
the Application(s) numbered: 86.0684 for a Patent or similar  
protection made in Norway on 24 February 1986.

My/Our address for service is:

GRIFFITH HASSEL & FRAZER  
71 YORK STREET  
SYDNEY N.S.W. 2000  
AUSTRALIA

DATED this 24th day of February, 1987.

A/S PLATON

By his/their Patent Attorneys

GRIFFITH HASSEL & FRAZER

TO: THE COMMISSIONER OF PATENTS  
COMMONWEALTH OF AUSTRALIA

FORM 8  
COMMONWEALTH OF AUSTRALIA  
PATENTS ACT 1952

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

In support of an application made by: A/S PLATON

for a patent for an invention entitled: "DEVICE FOR STABILIZING BULK MATERIAL, ESPECIALLY SOIL MASSES"

I, TORE MOGSTAD  
of Viggo Hansteensgt. 6  
3670 NOTODDEN Norway.

do solemnly and sincerely declare as follows:

1. I am authorised by the above mentioned applicant for the patent to make this declaration on its behalf.
2. The name and address of each actual inventor of the invention is as follows:

CARL ROLF HALLBERG of Olavasvei 29, N-3600 Kongsberg, Norway

and the fact(s) upon which the applicant is entitled to make this application are as follows:

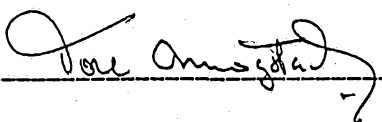
By virtue of Section 34(1)(fa) pursuant to a contract of employment between the inventor and the applicant.

3. The basic application as defined by Section 141 of the Act was made as follows:

Country NORWAY on 24th February 1986  
in the name(s) A/S PLATON

4. The basic application referred to in the preceding paragraph of this Declaration was the first application made in a Convention country in respect of the invention the subject of this application.

Declared at Notodden this 25 day of September 1989.

Signed: 

Position: Project Manager - New Products.

GRIFFITH HACK & CO.  
G.P.O. BOX 4164, SYDNEY N.S.W 2001  
AUSTRALIA

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(12) PATENT ABRIDGMENT (11) Document No. AU-B-69208/87  
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(54) Title  
SOIL STABILIZING DEVICE

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(56) Prior Art Documents  
CA 1161618  
US 2911794

(57) Claim

1. A device, especially for stabilizing bulk material, comprising initially relatively thin, substantially flat web, which in a first direction is provided with rows of consecutively arranged slits, which are staggered relative to each other, characterized in that in the area of one or more slits there is provided a bulge or embossing which during the stretching of the web serve for the undulating of the corresponding strip portion in its right direction relative to the other strip portions, so that the web after the stretching thereof forms oppositely undulating strips defining side by side arranged cells or pockets which can be filled with soil which is stabilized by the device.

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COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

Form 10

COMPLETE SPECIFICATION

FOR OFFICE USE

Short Title:

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This document contains the  
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Section 49.

and is correct for printing.

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

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Complete Specification for the invention entitled:

DEVICE FOR STABILIZING BULK MATERIAL,  
ESPECIALLY SOIL MASSES

The following statement is a full description of this  
invention, including the best method of performing it known to  
me/us:-

3252A:rk

Device for stabilizing bulk material, especially soil masses.

Field of the invention

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The present invention relates to a device, generally for stabilizing bulk material and more specifically for stabilizing soil masses, comprising a substantially elongated web which in mounted position defines a plurality of cells or

10 pockets.

The invention also relates to a method for stabilizing bulk material, especially soil masses.

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The invention also relates to a special use of such a device.

State of the art

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In connection with stabilizing soil masses and especially slopes, it is previously known various products. For example there may be used a net which is made from plastics or steel wire. These types of nets will function satisfactorily provided the slope is not too inclined and provided the soil masses are not influenced by heavy rain before the

25 planting of bushes or similar.

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Another type of device for stabilizing soil comprises plastics plates which are stretched in both directions after first having been provided with holes. Examples of such plates are known from Norwegian Patent Specifications 134995, 152611 and 152612. It is true that the stretching of the plates or the webs results in a net configuration which has a larger depth or thickness than usual flat wire

30 netting, but they do not provide an earth stabilizing effect in the form of stage-wise arranged pockets.

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Another product is disclosed in Finnish Patent Application 84109042.6 and Norwegian Patent Application 843270, and

comprises multi-edged cells which together define an element. These elements can be interconnected to cover a slope, the elements having a certain height, for example 90 mm., a fact which makes it possible for the elements to hold a substantial amount of soil also a slopy terrain. However, the production of such elements involves not only a larger quantity of plastics material but also a more costly production as such. Besides, the elements require a large volume during transport, a fact which involves higher transport expenses even if the elements to a certain degree can be stacked on top of each other.

Further, there are known so-called semi-stiff, three-dimensional geotextiles of honeycomb type made from non-woven polyester for stabilising the top layer of road embankments, river-banks and similar. This type of stabilising device can be transported in collapsed form and is easy to put into position on the place of use. However, the production of such geotextiles is very sophisticated and costly, the product itself being too soft for rendering a sufficient anchoring effect in the ground onto which it is to be mounted. Besides, the walls of the cell structure of the finished mounted geotextile will extend under a right angle from the plane of the ground, also when an inclined slope is the case, a fact which involves that the soil which has been filled into the cells and is to be stabilized, more easily will flow out of the cells or pockets due to heavy rain showers.

#### General description of the invention

The aim of the present invention is to provide a device for stabilizing bulk material, which ameliorates many of the problems associated with the prior art.

Accordingly, the present invention provides a device, especially for stabilizing bulk material, comprising initially relatively thin, substantially flat web, which in a first direction is provided with rows of consecutively arranged slits, which are staggered relative to each other, characterized in that in the area of one or more slits there



is provided a bulge or embossing which during the stretching of the web serve for the undulating of the corresponding strip portion in a predetermined direction relative to the other strip portions, so that the web after the stretching thereof forms oppositely undulating strips defining side by side arranged cells or pockets which can be filled with soil which is stabilized by the device.

Advantages of the preferred embodiment of the present invention are that:

1. It can be manufactured from relatively inexpensive raw material.
2. The speed of disintegration can be varied, from for example easily decomposable in connection with soil areas which are easily overgrown, to a disintegration which takes place over several years.
3. The process of manufacture can be simple and preferably based on prior art.
4. The device requires a small transport volume and the mounting on the site should be simple.
5. The device can have an inherent good faculty of anchoring.
6. The cells or the pockets which are formed during mounting can have walls which possibly can be regulated, and which preferably extend vertically independent of the inclination of the slope for optimal the stabilizing effect on the occurrence of heavy rain showers.

In the present invention, a flat web is taken as a basis for the present device, said web being provided with the above stated slits, and allowing for production in larger or lesser rolls for storage and transport. Thus, the web can be transported to the place of use in rolls



rendering a minimum transport volume. Only at the site, ie. after the web has been spread out on the ground and has been stretched in the direction transversely to the slits, there will be formed upwardly extending backs or walls, which in turn form pockets which stabilize the soil which after the stretching is filled into the pockets of the device. The web can then in advance have been cut in appropriate lengths depending on the landscape or the ground which is to be prepared for soil stabilizing.

During the mounting of the device, this is not subjected to any permanent deformation, since the soil masses which are filled into the pockets will keep the web in position in "stretched" condition.

Another special feature of the present device is related to the small thickness of the web, the stretching thereof implying that sharp lower edges appear along the undulating strips, and said sharp edges can easily be pressed into the ground when mounting the web on the site, a fact which entails a secure anchoring of the device even in steep slopes.

A further feature of the present device is to the fact that by various degrees of stretching there can be achieved various mutual angles between the wall portions of the undulated strips, and that various degrees of stretching can be used for various slope angles of the ground which is to carry the device. Various degrees of stretching will also give different sizes of the cells or pockets, giving larger possibility of selecting a device structure depending on the shape of the terrain.

Alternatively, the device may be placed on a support and serve as a guard for sand, snow or similar.

To achieve a correct direction of the undulation of the strips during mounting of the device according to the invention, the plastics web may during the production thereof while still being soft and hot, be subjected to an initial stretching transversely to the slits. This initial stretching may be effected so far that the individual strip portions have embedded thereinto a "thermal memory", or a



permanent initial plastic deformation which is to point out the direction in which the strip portions are to undulate during the final and complete stretching of the web on site.

5 For example, the "thermal memory" or the initial stretching may be effected in the area of the slits, for example by means of combined slitting and pressing rollers.

10 This small pre-stretching will give some bulging of the said strip portions, especially in the area of the slits, but the flexible web will still be substantially flat and can thus be tightly rolled up in rolls for storage and transport.

Possibly, the slits may at each end be provided with curved portions for resisting breakage when the web is stretched.

15 Further, the web may be laminated with a suitable woven or knitted cloth, especially for reinforcing the end portions of the slits.

20 Preferably the web is manufactured from plastics, for exam-

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ple polyethylen. Suitable additives to the plastics may vary the resistance against decomposition.

#### Brief description of the drawings

The invention will in the following be further disclosed with reference to the attached Figures illustrating embodiments and fields of application for the present stabilizing device.

Fig. 1 is a schematic plan view of a web forming the basis of an embodiment of the present device.

Fig. 1a is a section of a web according to the invention, whereas

Fig. 1b is an enlarged fraction of an area of the device according to Fig. 1a.

Fig. 2a is a perspective view illustrating the various phases of the stabilizing process in which the device according to the invention is to be used, the upper part of the Figure illustrating the device in mounted position, the center portion of the Figure illustrating the device covered with soil material, and the lower portion of the Figure illustrating the stabilized area after a growing season.

Fig. 2b is an enlarged fraction of the area indicated in Fig. 2a.

Fig. 3 illustrates on a larger scale a fraction of a section through the device according to Fig. 2a as seen in the direction III-III in Fig. 2a.

#### Description of preferred embodiments

In Fig. 1 which illustrates schematically a top view of a web which forms the basis of an embodiment of a device according to the invention used as a soil stabilizing device,

the web itself is designated by reference numeral 1, the web appropriately being manufactured through an extrusion or calender process of a plastics material to a web having a thickness from for example 0.1 to 6 mm. The thin substantially plane web 1 of preferably flexible plastics material is during the manufacturing provided with rows of consecutively arranged slits, for example by punching or slitting, the slits 2 in the first row being arranged substantially with even spacing, whereas the slits 2a of the adjacent row is arranged with the same spacing but staggered relative to the slits 2 of the first row. The next row of slits 2b are provided parallel to the slits 2 of the first row, and there is in this way provided a slit pattern which by an appropriate stretching of the web 1 creates oppositely undulating strips 3a, 3b, 3c etc., as this is specially apparent from Fig. 2a.

The plastics web which in Fig. 1 is designated by 1, is during the manufacturing thereof slitted or punched, so as to comprise a plurality of rows of slits 2, 2a, 2b etc., the number of rows being chosen according to the field of application of the finished manufactured web. Thus, the web can be manufactured in desired width and can be delivered as rolls or as individual web-shaped plates. In Fig. 1a there is shown a section of a web 1 which has been rolled or spread out on a support onto which the soil masses are to be stabilized. If the slits are made transversely to the production line direction of the web and the web is rolled up in this direction, a web which is rolled out on site will there be stretched in the longitudinal direction, i.e. in the same direction as the rolling out.

When the plastics foil or plastics web 1 has been rolled out or spread out on a support, for example a sloping ground 4, as this appears from Fig. 2a, there will by appropriate stretching of the web 1 as symbolized by the arrow P in Fig. 1a, be provided oppositely undulating strips 3a, 3b, 3c. These strips will have alternating concave and convex portions 5 and 6, respectively, as a result of the

slits 2,2a,2b, whereas at the interconnected web zones retained between the slits, here the zones 7, here will have a relatively straight form. In other words, there are provided side by side arranged or stage-shaped cells or pockets 8 which can be filled with soil which is stabilized by the device 1.

At the top of Fig. 2a there is shown a fraction of a web 1 which has been stretched transversely to the slits, and which has been placed on a sloping ground 4, for example of soil, or gravel, whereas in the middle of Fig. 2a it is shown how the cells or the pockets 8 have been filled with soil 9 which is stabilized by the device 1. The stretching gives the web 1 a substantially non-permanent deformation which however will be retained by the filling of soil mass 9. The upwardly extending backs or walls of the undulations 3a,3b, 3c do not only form pockets 8 but also render a favourable anchoring due to the sharp lower edges 10 which bury themselves fairly well into the ground, as this is especially illustrated in Fig. 2b.

Because the web 1 in its stretched condition can be pressed deeply into the ground, it will not slide even in steep slopes. This condition is even better illustrated in Fig. 3, in which the device 1 is pressed down into an especially steep hill 4a, and in which the walls of the undulations 3a,3b,3c will still extend vertically from the ground for the forming of cells or pockets 8 having vertical backs or walls. This vertical arrangement of the backs or the walls will aside from rendering a favourable anchoring also give an especially good stabilization of the soil 9 and the pockets during heavy rain.

As appearing from fig. 1b there may in the area of each slit 2,2a,2b etc. be arranged bulge or embossing 11, which during the stretching of the web 1 will aid in that the corresponding strip portion will undulate in the correct direction relative to other strip portions.

An alternative way to have the individual strip portion undulate in the correct direction during the stretching of the web on site, is to the fact that the plastics web when this is still soft and hot during the production thereof, is subjected to an introductory stretching in the area of the slits, as this is further disclosed in the preamble of the specification.

In Fig. 1a there is also illustrated a fixing peg 12 which during the spreading of the web 1 on a sloping ground 4, is inserted through a slit 2 below the upper strip 3a, the peg 12 at its lower end being provided with barbs 12a serving for the attachment to the ground, and which at its upper portion is provided with arms 12b for supporting the upper strip 2 when the web 1 is stretched out as illustrated in Fig. 2a.

At the bottom of fig. 2a it is shown how the landscape, in which is utilized the soil stabilizing device according to the invention, can appear after a growth season, the top of the soil 9 now being overgrown by a lawn 13 having its roots extending down into the soil 9.

It is to be understood that in the openings or the pockets 8 in the web 1 there can also be planted bushes or similar, all in dependence of the landscape which is to be shaped by means of the soil stabilizing device.

The material from which the web 1 is to be manufactured, can for example be a plastics material filled with carbon black, a fact which renders the plastics very resistant to decomposition. Possibly, the plastics may be manufactured without any fillers or be mixed with pigments making the web chemically unstable, a fact which involves that the plastics will disappear after some years out in nature.

If there is used a thicker plastics web as a soil stabilizing device it may be necessary to use mechanical power for the stretching thereof. This may in some cases be necessa-

ry, but the web is preferably manufactured as a flexible plastics web which can be stretched on site by means of manual force.

- 5 Possibly it may in connection with thicker plastics webs be used heat treatment, such that the plastics in its stretched condition will retain its stretched configuration, and the web could then be used for heavier stabilizing objectives, for example stabilizing temporary roads or areas,  
10 military airports or similar.

Alternatively, the present device can be mounted on a support to serve as a guard for sand, snow or similar.

- 15 In this connection it may be appropriate to use a somewhat thicker web which is stretched on a rack or rail or between poles which are located along a railway or a road being especially exposed for the accumulation of whirling snow or sand. By means of the present device the snow or sand particles could be guided so as to be collected in snowdrifts  
20 or sandheaps where they are apt to make the least damage, respectively are to least inconvenience.

- 25 It is to be understood that the device according to the invention also can be used as awning, for example for protection against sunshine, light, radiation etc.

- 30 Of course it can in this connection be used materials of various quality, colour, translucence etc. The device can then be pre-mounted on a frame which can be mounted in position on the site where it is to be used.

It is also to be understood that the device for stabilizing masses, especially soil masses, can be filled with other material than earth or soil masses. In connection with for example steep river banks etc, which are to be covered with concrete or similar curing materials, the device according to the invention can be mounted on the ground to be stabilized, and thereafter filled with example non-cured concrete which is supported by the pockets (8) formed by the present web (1). Thus, the mounted web will facilitate the spreading of the material to be cured and allow for an even distribution thereof due to the pocket configuration of the web.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A device, especially for stabilizing bulk material, comprising initially relatively thin, substantially flat web, which in a first direction is provided with rows of consecutively arranged slits, which are staggered relative to each other, characterized in that in the area of one or more slits there is provided a bulge or embossing which during the stretching of the web serve for the undulating of the corresponding strip portion in a predetermined direction relative to the other strip portions, so that the web after the stretching thereof forms oppositely undulating strips defining side by side arranged cells or pockets which can be filled with soil which is stabilized by the device.

2. Device as claimed in claim 1 characterized in that the substantially flat web is made from a flexible material.

3. Device as claimed in claim 1 or 2, characterized in that the web comprises a "thermal memory" or an introductory transverse stretching which is effected during the production of a plastics web, and which will initiate the direction in which the strips are to undulate during the final stretching on site.

4. Device as claimed in anyone of the preceding claims, characterized in that the "thermal memory" or the initial stretching may be effected in the area of the slits, for example by means of combined slitting and pressing rollers.

5. Device as claimed in any one of the preceding claims, characterized in that the oppositely undulating strips which are formed by the stretching of the web comprise undulating edge portions which can easily be pressed down into the ground and thereby ensure anchoring of the device on site.



6. Device as claimed in anyone of the preceding claims, characterized in that various degrees of stretching of the web renders various mutual angles between the wall portions of the oppositely undulating strips so that various degrees of stretching can be used in dependence of the sloping angle of the ground which is to carry the device.

7. Device as claimed in anyone of the preceding claims, characterized in that at the ends of the slits of the web there are provided curved portions to resist breakage when the web is stretched transversely relative to the slits.

8. Device as claimed in any of the preceding claims, characterized in that the web is laminated with a suitable woven or knitted cloth for further reinforcement of the end portions of the slits.

9. Device as claimed in any of the preceding claims, characterized in that the web is manufactured from plastics, for example polyethylen.

10. Method for stabilizing bulk material, especially soil masses, including the use of a relatively thin, substantially flat web which in a first direction is provided with rows of consecutively arranged slits, the web in suitable lengths being spread out on a flat or sloping ground which is to be soil stabilized, characterized in that there is used a web during its manufacture provided with bulges or like means which ensure a predetermined undulation of strips when said web is stretched in a second direction that the web after being spread out on the ground at its one longitudinally extending edge being attached to the ground by means of appropriate fixing means, and that the web thereafter is stretched in the second direction of the forming of oppositely undulating strips which in turn define side by side arranged cells or pockets which can be filled with soil which is stabilized by the device.



11. Method as claimed in claim 1, characterized in that the web used is made from a flexible material.

5 12. Method as claimed in claims 10 to 11, characterized in that the web after the stretching will have its lower edge portions of the individual undulated strips, pressed into the ground for anchoring of the device in the ground.

10 13. Method as claimed in anyone of claims 10 to 12, characterized in that the web on the site of use is stretched in the second direction for through non-permanent deformation to define said cells or pockets, the deformation being retained by the filling of soil in said cells or pockets.

15 14. Method for stabilizing bulk material, characterized in that there is used a relatively thin, substantially flat web, which in a first direction is provided with rows of slits, the web during its manufacture being provided with  
20 bulges or like means which ensure a predetermined undulation of strips when said web is stretched in a second direction, the web in a suitable length is attached to a rack along one of its end edges, and that the web is thereafter stretched  
25 in a second direction for the forming of oppositely undulating strips which in turn define side by side arranged cells or pockets serving to guard against whirling sand, snow or similar.

30 15. A method as claimed in claim 14, characterized in that the web used is made from a flexible material.

35 16. The use of a device as claimed in one of the claims 1 to 13 as an awning, for example for protection against sunshine, light, radiation etc.

17. Device for stabilizing bulk material substantially as herein described with reference to the accompanying drawings.



18. Method of stabilizing bulk material substantially as herein described with reference to the accompanying drawings.

DATED this 12th day of October, 1989

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A/S PLATON

By their Patent Attorneys

GRIFFITH HACK & CO.

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Fig. 1.

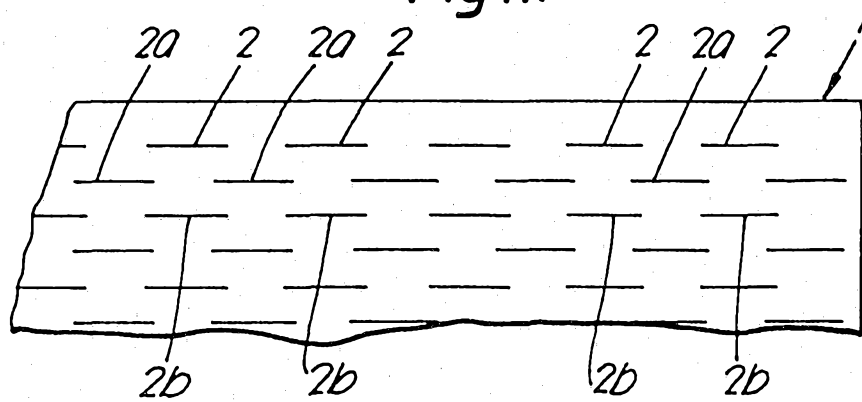


Fig. 3.

