

【DESCRIPTION】

【Invention Title】

TREE-PLANTING STRUCTURE DEVICE

【Technical Field】

5 The present invention related to a tree-planting structure device used in various types of structures such as a building outer wall, a slope or foothill of a mountain, a median strip, and a guard rail.

【Background Art】

10 Recently, a retaining wall of a mountain slope around a road may be constructed by using soil bags for growing plants to express an environmentally friendly landscape of the road. The soil bags are rarely have a special coupling structure to be stably constructed unlike existing
15 retaining wall blocks. Thus, the related art such as Korean Patent Registration No. 10-0561696, and Korean Patent Registration No. 10-1131556 discloses a technique for structurally stabilizing a retaining wall structure when the construction is performed by using the soil bags.

20 A road guard such as a median strip and a guard rail is formed to have various shapes and materials according to the traffic volume of the road, the average speed of vehicles passing the road, and the environment around the road. In the case of the retaining wall, an inclined
25 surface may be formed to stack the soil bags thereon by

cutting or filling a mountain slope, a cutting area, or the like. However, the road guard such as a median strip and a guard rail which is already installed is impossible to change a thickness or shape. Accordingly, the above-described soil bag construction technique for retaining wall may be rarely applied to the road guard such as the median strip and the guard rail.

Korean Patent Registration No. 10-1088719 discloses a four-season greening median strip configured to plant plants thereon. However, because the above related art cannot be applied to the median strip already installed at the center or outer side of the road and may be applied only to a place where a new road is constructed, the feasibility of installation is remarkably lowered. Because a new median strip is required to be installed after the existing median strip is removed in order to apply the related art to a place on which the median strip is already installed, the construction cost is remarkably increased.

【Disclosure】

20 【Technical Problem】

The present invention provides a device for stably tree-planting various structures such as a concrete outer wall of an apartment, a foothill having a slope, and a structure installed at the center of a road.

25 【Technical Solution】

The tree-planting structure device of the present invention includes: a fixing net (10) formed to have a size adapted to cover a part of a guard, a ground, or a building outer wall, and having an array of a plurality of meshes; 5 an anchor (20) coupled to the guard, the ground or the building outer wall to fix a position of the fixing net (10); a plurality of stacking pouches (40) fastened to the mesh constituting the fixing net (10), in which each of the stacking pouches is filled with soils for growing plants 10 and stacked while coming into contact with the fixing net (10); and a hook (60) serving as a member for fastening the stacking pouch (40) to the mesh of the fixing net (10) and connecting the stacking pouch (40) to the fixing net (10).

【Advantageous Effects】

15 According to the tree-planting structure device of the present invention, the stacking pouches are stacked along at least one surface of the fixing net in a state that the road guard is covered with fixing net, and the fixing net is anchored by using the anchor, such that seeds contained 20 in the stacking pouch can be naturally germinated, thereby tree-planting various structures such as concrete walls and foothills. In addition, any type of existing concrete structures, foothills and road guards can be afforested.

【Description of Drawings】

25 FIGS. 1 and 2 are cross-sectional views showing tree-

planting structure devices according to an embodiment of the present invention.

FIG. 3 is a perspective view of the tree-planting structure device shown in FIG. 1.

5 FIGS. 4 and 5 are enlarged views of an anchor 20 shown in FIGS. 1 to 3.

FIG. 6 is a view showing a stacking pouch constituting a tree-planting structure device of the present invention.

10 FIG. 7 is a plan view showing a stacking pouch of the present invention.

FIG. 8 is a sectional view showing a stacking pouch of the present invention.

FIG. 9 is a view showing a hook 60 of the present invention.

15 FIG. 10 is a view showing a state of a stacking pouch coupled to a fixing net by using a hook according to the present invention.

20 FIG. 11 is a view showing a state of stacking pouches connected to each other in a horizontal direction according to the present invention.

FIG. 12 is a perspective view showing a connecting plate for fixing stacking pouches therebetween in a tree-planting structure device of the present invention.

25 FIG. 13 is a sectional view of a connecting plate of the present invention.

FIG. 14 is a view showing a state of using a connecting plate of the present invention.

FIG. 15 is a view showing an example of a water supply pipe used in the tree-planting structure device of the present invention.

FIG. 16 is a view showing a state of using a water supply pipe of the present invention.

FIGS. 17 to 19 are views showing states of a tree-planting structure device of the present invention which is installed at a foothill.

FIGS. 20 and 21 are views showing states of a tree-planting structure device of the present invention which is installed on a concrete outer wall.

FIG. 22 is a view showing a state of a tree-planting structure device of the present invention which is installed on a rock cliff.

【Best Mode】

【Mode for Invention】

Hereinafter, the embodiment of the present invention will be described in detail with reference to the accompanying drawings.

FIGS. 1 and 2 are cross-sectional views showing tree-planting structure devices according to an embodiment of the present invention. FIG. 3 is a perspective view of the tree-planting structure device shown in FIG. 1.

FIGS. 1 and 2 show tree-planting structure devices installed in different types of road guards. The road guards are marked with "R" in FIGS 1 to 3.

Referring to FIGS. 1 to 3, the tree-planting structure device according to an embodiment of the present invention may include a fixing net 10, a plurality of anchors 20, a plurality of stacking pouches 40, filling soils 50, a plurality of hooks 60, a plurality of connecting plates 70, a protecting pouch 30, and a water supply pipe 80.

As shown in FIG. 3, when the tree-planting structure device of the present invention is installed/constructed, grasses or flowers germinated from the protecting pouch 30 and the stacking pouch 40 grow up in several weeks or months later as shown in FIGS. 1 and 2.

The protecting pouch and stacking pouch used in the present invention are formed of a geotextile material having durability and a textile for enabling water to pass and flow through the protecting pouch and the stacking pouch and germinating the seeds. In addition, the protecting pouch and the stacking pouch may contain fine soil particles, planting seeds to be germinated, and the like.

The fixing net 10 has a flexible grid form, and covers a building outer wall, a foothill, a road guard installed in the center or outer side of the road which are required

to be afforested by using a plurality of stacking pouches. Accordingly, because the fixing net 10 has the flexible grid form and is installed by using a scheme to cover a structure such as the road guard, the fixing net can be
5 modified and installed to be suitable for the shape of the road guard regardless of shapes of the road guard as shown in FIGS. 1 and 2.

The fixing net 10 serves to fix the stacking pouches 40, and the worker may determine a position and an area to be
10 afforested while variously changing a size of the fixing net 10. The fixing net 10 may be implemented by using a geogrid sheet formed of synthetic resin, a mesh formed of metal, or the like. For example, the fixing net 10 may be manufactured by perforating a flat-type sheet formed of
15 synthetic resin such as polyethylene, polyamide, and polyester, or by weaving fibers formed of synthetic resin such as polyethylene, polyamide, and polyester.

FIGS. 4 and 5 are enlarged views of an anchor 20 shown in FIGS. 1 to 3. FIG. 4 is a perspective view of the anchor
20 20, and FIG. 5 is a view showing a state of using the anchor 20. The anchor 20 is formed in a "U" shape, and serves to fix the fixing net 10 to the building outer wall, the foothill, or the road guard.

For example, in a state that both ends of the fixing
25 net 10 are pulled to tighten the fixing net 10, the both

ends of the fixing net 10 are disposed at positions spaced apart from lower ends of the structure such as the road guard, and then the anchors 20 are passed through the ends of the fixing net 10 and coupled to surfaces of the road or ground, respectively.

In addition, an inclination of the fixing net 10 covering the road guard is adjusted by adjusting the position to which the anchor 20 is fixed, so that an overall shape of the tree-planting structure device can be determined.

As shown in FIG. 4, both ends of the anchor 20 having the "U" shape may be formed in a screw shape to improve the bonding strength with the surface of the road or ground. As shown in FIG. 5, the ends of the anchor 20 pass through two meshes at both ends of the fixing net 10 and are stuck in the surface of the road or ground, so that both ends of the fixing net 10 can be fixed to the surface of the road or ground.

When the both ends of the fixing net 10 are positioned farther away from the road guard, the inclination of the fixing net 10 becomes gentler, and when the both ends of the fixing net 10 are fixed closer to the road guard, the inclination of the fixing net 10 becomes steep.

The fixing net 10 is required to be installed at the foothill in order to tree-plant the foot having a gentle

slope, in which the fixing net 10 may be gently installed along the slope of the foothill. Herein, the anchor 20 for fixing the position of the fixing net may include a steel pipe anchor or a grouting anchor.

5 In addition, the fixing net 10 is required to be installed on an outer wall which is almost vertical in order to install the tree-planting structure device on an outer wall formed of concrete or bricks as in an apartment or a house. In addition, the anchor 20 may have a material
10 and a shape such as a concrete nail that can be coupled to a rigid structure.

 According to the present invention, the protecting pouch 30 may be used if necessary in addition to the stacking pouches used for the afforestation to prevent some
15 exposure of the structure. The protecting pouch 30 is a bag containing soils for growing plants, in which the protecting pouches 30 are stacked in a row on the top of the road guard along the longitudinal direction of the road guard, thereby covering the top of road guard. As shown in
20 FIGS. 1 to 3, after the fixing net 10 covers on the protecting pouches 30 stacked in a row on the top of the road guard, the both ends of the fixing net 10 are fixed to the surface of the road or ground around the road guard, thereby covering the road guard. Each protecting pouch 30
25 may be formed of a geotextile material having a mesh size

that allows water and nutrients for growing the plants to pass through while preventing soil particles therein from passing through. Seeds are sowed or vegetations are planted in the soils contained in the protecting pouch 30, such
5 that plants such as grasses can grow up after coming up from spaces between the meshes of the stacking pouch 40.

Because the road guard is mainly formed of a material such as concrete and metal, the top of the road guard may be sharp. Because the road guard is continuously vibrated
10 due to vehicles passing the road, the fixing net 10 may be damaged by friction on the top of the road guard when the fixing net 10 comes into direct contact with the top of the road guard. Particularly when the fixing net 10 is formed of synthetic resin, the fixing net 10 may be easily damaged
15 by the friction on the top of the road guard. The protecting pouch 30 is inserted between the fixing net 10 and the top of the road guard, thereby serving to prevent the fixing net 10 from being damaged by the sharp top of the road guard. As a result, an aged deterioration of the
20 tree-planting structure device caused by the vibration rarely occurs even though the road guard is vibrated by the vehicles passing the road, so that the maintenance and repair is almost unnecessary for a long time.

FIG. 6 is a view showing a stacking pouch constituting
25 a tree-planting structure device of the present invention.

FIG. 7 is a plan view showing a stacking pouch of the present invention. FIG. 8 is a sectional view showing a stacking pouch of the present invention.

The stacking pouch 40 of the present invention is a bag containing the soils for growing plants, in which the stacking pouch 40 is formed on a portion of a side thereof with a protrusion 44 protruding to have a predetermined thickness, and the protrusion 44 is formed therein with a hook connection hole 45 to which a hook is coupled.

Because the hook connection hole 45 is formed in every stacking pouch 40, the hook is coupled between the stacking pouches 40 arranged on the same horizontal plane or on the left and right sides, such that the connections and positions between the stacking pouches can be solidly fixed. Of course, the stacking pouch 40 is coupled to the fixing net 10 by using the hook connection hole 45 formed in the stacking pouch 40 and the hook.

Although FIG. 6 shows that the stacking pouch 40 has the protrusions 44 formed on three sides of the stacking pouch, the area or number of portions where the protrusion 44 are formed may be variously changed.

In addition, at least one of the hook connection hole 45 may be formed at various positions in the protrusion 44 of the stacking pouch 40. In addition, the hook connection hole 45 may not be formed in the protrusion 44, and the

hook connection hole 45 may pass through a body of the stacking pouch 40 or the hook connection hole 45 may be formed in another member attached to the stacking pouch 40.

When the stacking pouches 40 are coupled to the fixing
5 net 10 by using the hooks and the hook connection holes, the stacking pouches 40 may be vertically stacked and may be horizontally stacked.

When the road guard, such as the median strip, is installed at a center of the road, the stacking pouches 40
10 may be stacked on two sides of the fixing net 10 as shown in FIGS. 1 to 3.

When the road guard, such as the guard rail, is installed at an outer side of the road, the stacking pouches 40 may be stacked on only one side of the fixing
15 net 10 facing the road.

As shown in FIG. 2, After the stacking pouches 40 are placed on the surface of the road or ground while horizontally coming into close contact with each other by the length of the road guard so as to form the lowest layer
20 of the stacking pouches 40, the stacking pouches 40 may be stacked in a matrix form by repeating a scheme of vertically stacking the same number of stacking pouches 40 on a plurality of stacking pouches 40 in one layer.

As same as each protecting pouch 30, each of the
25 stacking pouches 40 may be formed of a geotextile material

having a mesh size that allows water and nutrients for growing the plants to pass through while preventing soil particles therein from passing through.

As shown in FIG. 7, after a rectangular sheet formed of the geotextile material is folded in half, two of the three sides other than one folded side are sewed, so that the stacking pouch 40 including the protrusion 44 may be fabricated. Then, after the stacking pouch 40 fabricated in the above manner is filled with contents, the remaining side is sewed, so that the fabrication of the stacking pouch 40 may be completed. When the stacking pouch 40 is fabricated in the above manner, three protrusions (blades) in the form of a double layer are formed.

Although at least one hook connection hole is formed in each of the three protrusions 44 of the stacking pouch 40, the hook connection hole may not be formed in each of the protrusions. The hook connection holes 45a and 45b of two longitudinal protrusions among the three protrusions in the stacking pouch 40 may be used for fastening the stacking pouch to another stacking pouch 40, and the hook connection hole 45c in one transverse protrusion may be used for fastening the stacking pouch to the fixing net 10. When the fastening between the stacking pouches 40 is unnecessary due to the gentle inclination of the fixing net 10, the two longitudinal protrusions of the stacking pouch 40 may be

omitted.

In the embodiment, the number of the hook connection holes in each protrusion of the stacking pouch 40 is insignificant, and each of the blades of the stacking pouch 40 may have one hole or may have three holes as shown in FIG. 7. However, when each protrusion on the stacking pouch 40 has more hook connection holes, the stacking pouch 40 may be smoothly fastened to the fixing net 10 or another stacking pouch 40 by using a hole at a more suitable position among multiple connection holes of the stacking pouch 40. Thus, multiple hook connection holes may be formed in each protrusion of the stacking pouch 40 within the durability of each protrusion of the stacking pouch 40. When a vehicle deviating from the road collides with at least one of the stacked stacking pouches 40 as described above, the at least one stacking pouch 40 colliding with the vehicle is dented or moved due to an impact caused by the collision with the vehicle, and the impact due to the collision with the vehicle is absorbed during the above process. Accordingly, the stacking pouches 40 absorb the impact due to collision with the vehicle, so that the impact of the vehicle colliding with the tree-planting structure device according to an embodiment of the present invention can be reduced, thereby preventing or alleviating injuries to a vehicle driver and damages to the vehicle.

Seeds are sowed or vegetations are planted in the soils contained in the stacking pouch 40, such that the plants such as grasses can grow up after coming out from the meshes of the stacking pouch 40. As the plants in the protecting pouch 30 and stacking pouch 40 grow up, the tree-planting structure device according to an embodiment of the present invention is covered with the plants. Accordingly, a tree-planting landscape on the road guard can be created by using the tree-planting structure device covered with plants, the fatigue on the driver's eyes can be reduced, and the radiant heat of the road is reduced, such that a pleasant road environment can be established.

As shown in FIG. 8, the contents of the stacking pouch 40 may be a mixture of plant growing soils 41, a plurality of elastic members 42 for preventing the consolidation of soils in the stacking pouch 40, and a plurality of absorbers 43 for absorbing water in a rainy season and supplying the water to roots of the plants in a dry season. Alternatively, the contents inside the stacking pouch 40 may be a mixture of the plant growing soils 41 and the elastic members 42, or may be a mixture of the plant growing soils 41 and the absorbers 43. The elastic members 42 may be embodied by using rubber chips obtained by crushing a waste tire. The absorbers 43 may be embodied by using water absorbing polymer crystals widely used for pots

or the like.

The soils in the stacking pouch 40 are gradually compressed while the water therein is discharged to the outside due to the load of the other stacking pouches 40 stacked thereon, and the soils are finally denatured into hard soils rarely having water. Accordingly, when denatured into the hard soils rarely having water, the soils 41 inside the stacking pouch 40 are unsuitable for growing the plants, and rarely absorb the impact due to the collision with the vehicle. The vibrations of the road guard caused by the vehicle passing the road are transferred to the elastic members 42 inside the stacking pouch 40, and the elastic members 42 are slightly vibrated at an amplitude larger than that of soil particles due to the elasticity of the elastic members 42. When the elastic members 42 such as rubber chips are uniformly distributed in the soils inside the stacking pouch 40, the soil particles around the elastic members 42 are scattered by the vibration of the elastic members 42, thereby preventing agglomeration between the soil particles.

As shown in FIG. 8, when the elastic member 42 has a container shape, the elastic members 42 each having a concave surface arranged upward in the stacking pouch 40 may temporarily store rain water during the rainy season and supply the water to roots of the plants during the dry

season. The absorber 43 is designed to have the absorptivity lower than the absorptivity of the root of the plant, such that the water contained in each of the absorbers 43 may be absorbed by the roots of the plants
5 positioned close to the absorber 43. Meanwhile, the elastic member 42 increases the elasticity of the stacking pouch 40, such that the effect of absorbing the impact due to the collision with the vehicle can be improved. Preferably, the elastic members 42 and the absorbers 43 may uniformly
10 distributed in the soils 41 inside the stacking pouch 40 in order to maximize the above-described effect.

However, because the stacking pouch 40 is not required to buffer the external impact when the tree-planting structure device is constructed on an outer wall of a
15 building or house formed of concrete, or a cliff or foothill formed of rocks, the stacking pouch 40 may be filled with soils and plant seeds without the elastic members 42. Meanwhile, according to the present invention, the stacking pouch 40 may be coupled to the fixing net 10
20 by using the hook, the stacking pouches arranged in the horizontal left and right directions also may be coupled to each other by using the hook, and the stacking pouches arranged in the vertical up and down directions may be coupled to each other by using a connecting plate described
25 later.

A first coupling between the stacking pouch and fixing net, a second coupling between the stacking pouches arranged on the same horizontal plane, or a third coupling between the stacking pouches arranged up and down may be
5 selected according to the construction environment or the inclined angle of the structure. When all of the first to third couplings are selected for the construction, positions of the stacking pouches will be strongly fixed.

Meanwhile, the filling soils 50 may further be used in
10 order to fill fine spaces between the stacking pouches 40. In this case, the filling soils 50 serve to additionally supply water and nutrients insufficient in the stacking pouch 40 to grow the plants. As mentioned above, although the fixing net 10 serves to temporarily fix the stacking
15 pouches 40, the fixing net 10 may be collapsed downward due to the load of the stacking pouches 40 when multiple stacking pouches 40 are continuously stacked. The filling soils 50 maintains the original shape of the fixing net 10 determined by using the anchor 20 despite the load of the
20 stacking pouches 40, so that the tree-planting structure device having the shape designed by the designer of the tree-planting structure device can be constructed.

In a state that the road guard is covered with fixing net 10 and the fixing net 10 is fixed by using the anchor
25 20, the space between the stacking pouches 40 and the road

guard are filled with the filling soils 50 while the stacking pouches 40 being stacked along the sloped surface of the fixing net 10, such that the tree-planting structure device covering the previously installed road guard may be
5 completed. Thus, the tree-planting structure device according to an embodiment of the present invention can be installed on any type of road guard already installed. Accordingly, the tree-planting structure device according to an embodiment of the present invention can be installed
10 on any type of road guard, and the stacking pouches 40 primarily absorb and the filling soils 50 secondarily absorb the impact due to the collision with the vehicle, so that injuries to the vehicle driver and damages to the vehicle can be prevented or remarkably alleviated.

15 In addition, the filling soils 50, like the contents inside the stacking pouch 40, may be a mixture of at least one of elastic members for preventing the consolidation of soils in the filling soils 50, and a plurality of absorbers for absorbing water during a rainy season and supplying the
20 water to roots of the plants during a dry season, and plant growing soils.

When the composition ratio of the elastic members and the absorbers is higher among the contents of the stacking pouch 40 and the components of the filling soils 50, the
25 soil consolidation prevention effect, the water supply

effect, and the impact absorption effect may be improved. However, when the composition ratio of the elastic members and the absorbers is high, the plants may not normally grow because the amount of soils required for growing the plants
5 is reduced. In the embodiment, the ratio of the soils to the total volume of each stacking pouch 40, which provides the plant growing environment, is higher than the ratio of the soils to the total volume of the filling soils 50, such that the plants can grow normally, and the soil
10 consolidation prevention effect, the water supply effect, and the impact absorption effect may be improved.

FIG. 9 is a view showing a hook 60 of the present invention. FIG. 10 is a view showing a state of a stacking pouch coupled to a fixing net by using a hook according to
15 the present invention. FIG. 11 is a view showing a state of stacking pouches connected to each other in a horizontal direction according to the present invention.

Each of the hooks 60 is formed in an "O" shape, one side of the hook 60 is inserted into the hook connection
20 hole of the stacking pouch 40, and an opposite side of the hook 60 is inserted into the mesh of the fixing net 10, so that the stacking pouch 40 is fastened to the fixing net 10.

Preferably, the hook 60 may be formed of a non-corrosive material such as aluminum and plastic. The hook
25 60 may be embodied as an "O"-type lock hook as shown in FIG.

9, or may be embodied as another "O"-type hook such as a cable tie. Accordingly, each of the stacking pouches 40 may be moved due to the impact caused by the collision with the vehicle within a range proportional to the sizes of the meshes in the fixing net 10 and the size of the inner space of the hook 60 inserted into at least one hole of the stacking pouch 40.

As shown in FIGS. 1 to 3, when the vehicle collides with at least one of the stacking pouches 40 leaning against and sequentially stacked on the inclined surface of the fixing net 10, the stacking pouch 40 colliding with the vehicle is pushed and moved by the vehicle. When the sizes of the meshes in the fixing net 10 and the size of the inner space of the hook 60 are larger, the range where the hook 60 moves in the meshes of the fixing net 10 becomes large, and thus the stacking pouch 40 may move within a wider range. Accordingly, each stacking pouch 40 may be moved in the process of collision with the vehicle, thereby absorbing most of the impact due to the collision with the vehicle, so that damages to the tree-planting structure device, such as burst of the stacking pouch 40 and tearing of the fixing net 10 due to the collision with the vehicle, can be remarkably reduced.

Particularly, even though the stacking pouch 40 is moved by the impact due to the collision with the vehicle,

the stacking pouch 40 can be prevented from being separated from the tree-planting structure device, because the stacking pouch is merely moved within a range proportional to the sizes of the meshes in the fixing net 10 and the size of the inner space of the hook 60 inserted into at least one hole of the stacking pouch 40. As a result, the tree-planting structure device according to an embodiment of the present invention can maintain overall shape thereof despite collision with the vehicle.

FIG. 12 is a perspective view showing a connecting plate for fixing stacking pouches therebetween in a tree-planting structure device of the present invention. FIG. 13 is a sectional view of a connecting plate of the present invention. FIG. 14 is a view showing a state of using a connecting plate of the present invention.

The connecting plate 70 has a disk shape having at least one conical projection on both sides thereof, and arranged in the vertical direction, thereby serving to combine the stacking pouches placed in the vertical relation with the stacked position. In other words, the connecting plate 70 is disposed between the two stacking pouches 40 adjacent to each other in the vertical direction among the stacking pouches 40 in the stacked row, and the projections 71 formed on an upper surface and a lower surface of the connecting plate 70 are inserted into the

stacking pouches, thereby implementing the connection between the stacking pouches and the connecting plate.

The connecting plate 70 may be formed of a non-corrosive material such as aluminum and plastic.

5 As the connecting plate 70 is pressed by the load of the stacking pouches 40 placed thereon, the conical projections 71 on the lower surface of the connecting plate 70 are press-fitted into the stacking pouch 40 located below the connecting plate 70, so that the stacking pouches
10 40 in each column are connected to each other. Accordingly, when the stacking pouches 40 in each column are integrally moved, the connections between the upper and lower stacking pouches 40 prevent the separated stacking pouches from being separated from each column even though some of the
15 stacking pouches 40 in each column are separated from the fixing net 10 due to breakage of the hook 60 or the fixing net 10, so that the stability of the tree-planting structure device according to an embodiment of the present invention can be remarkably improved.

20 As shown in FIG. 12, three conical projections are formed on each sides of the connecting plate 70. In the embodiment, the number of the conical projections is insignificant. One or two conical projections may be formed on each sides of the connecting plate 70, or the different
25 number of conical projections may be formed on each sides.

However, the stacking pouch 40 may be torn when the size of the conical projection is excessively large, and the stacking pouches 40 in each column may be weakly connected to each other when the size of the conical projection is
5 excessively small. Accordingly, it is preferable that the connecting plate 70 is formed on the both sides thereof with a larger number of conical projections having a small size.

FIG. 15 is a view showing an example of a water supply
10 pipe used in the tree-planting structure device of the present invention. FIG. 16 is a view showing a state of using a water supply pipe of the present invention.

The water supply pipe 80 is formed in a perforated pipe shape, and may be provided on the protecting pouches 30
15 stacked in a row on the top of the road guard, or may be installed at a place for spraying water toward the stacking pouches. The water supply pipe 80 serves to supply water required for the growth of plants to the protecting pouches 30 and the stacking pouches 40 as necessary. As shown in
20 FIG. 15, the water supply pipe 80 may be embodied as a perforated pipe having holes formed in a row in a longitudinal direction thereof, or may be embodied as a perforated pipe having holes formed in two rows on both sides in the longitudinal direction thereof. Each hole of
25 the water supply pipe 80 may be a hole which is simply open

in a side wall, or may be a nozzle type hole such as a sprinkler.

Because the road may be very dry for a long time due to the radiant heat, some plants cannot survive with only rain water. According to the embodiment, water required for the growth of plants is supplied to the protecting pouches 30 and the stacking pouches 40 through the water supply pipe 80 mounted on the protecting pouches 30 arranged in a row at the top of the road guard, such that the plants can be prevented from withering away during the dry season. Particularly, in the embodiment, the water supply pipe 80 in the form of the perforated pipe is mounted on the protecting pouches 30 without installing complicated irrigation facilities, such that water can be supplied to the protecting pouches 30 and the stacking pouches 40, and thus the plants can be prevented from withering away due to lack of water at a very low cost.

As shown in FIG. 16, after the fixing net 10 covers the protecting pouches 30 on which the water supply pipe 80 is mounted so as to place the warp threads of the fixing net 10 on the holes of the water supply pipe 80, the both ends of the fixing net 10 are fixed to the surface of the road or ground around the road guard, thereby covering the road guard. The water discharged through the holes of the water supply pipe 80 flows down through the warp threads of the

fixing net 10 placed on the holes of the water supply pipe 80 and reaches the stacking pouches 40.

The road guard may be installed on a road in an area where the water cannot be supplied to the water supply pipe 80 through irrigation facilities or the like. A water tank for receiving and storing rain water in the rainy season is installed around the road guard, such that the water can be supplied to the water supply pipe 80 from the water tank. In this case, because the amount of water flowing through the water supply pipe 80 is insufficient, a scheme such as a sprinkler to spray water to the stacking pouches 40 may not be suitable. According to the embodiment, the water discharged through the holes of the water supply pipe 80 flows down through the warp threads of the fixing net 10 and is supplied to all of the stacking pouches 40, so that the growth of plants may not be hindered even though the amount of water flowing through the water supply pipe 80 is very small.

FIGS. 17 to 19 are views showing states of a tree-planting structure device of the present invention which is installed at a foothill.

Referring to FIGS. 17 to 19, when a place to afforest by planting plants such as flowers and trees is a foothill 1, the above-described fixing net 10 is positioned thereon, and the fixing net 10 is fixed by using a grouting anchor.

In addition, the stacking pouches 40 are sequentially stacked on the fixing net 10 by using the hooks, wherein the hook is coupled to the hook connection hole formed in the stacking pouch 40. In addition, the connecting plate
5 may be interposed between the stacking pouches arranged up and down. The stacking pouches arranged left and right are coupled to adjacent stacking pouches arranged left and right by using the hooks, and the hooks may not be used if necessary.

10 FIGS. 20 and 21 are views showing states of a tree-planting structure device of the present invention which is installed on a concrete outer wall.

Referring to FIGS. 20 and 21, the tree-planting structure device of the present invention also may be used
15 even when an outer wall of a building structure such as an apartment and a house is required to be tree-planted. Although the above building structure has the inclined surface which is almost 90 degrees, the fixing net 10 is fixed to the concrete outer wall by using concrete nails
20 classified as one of the anchors, and the stacking pouches are connected to the fixing net 10 by using the hooks.

Because the outer wall of the building structure such as the apartment and the house is almost vertically constructed, the stacking pouches are coupled to the fixing
25 net 10 by using the hooks, the stacking pouches arranged

right and left are coupled to each other by using the hooks,
and the stacking pouches arranged up and down are connected
to each other by using the connecting plate 70, such that
the bonding strength between the stacking pouches is
5 increased.

In addition, seeds germinated in the stacking pouches
gradually expand roots even though the tree-planting
structure device is constructed on the above building
structure, so that the binding strength between the
10 stacking pouches may be stronger. Actually, the stacking
pouches do not fall down or collapse even when the tree-
planting structure device is installed on the building
outer wall. FIG. 22 is a view showing a state of a tree-
planting structure device of the present invention which is
15 installed on a rock cliff.

As shown in FIG. 22, the tree-planting also can be
applied to a rock cliff in a manner that the fixing net 10
is fixed to the cliff formed of rocks by using anchors such
as concrete nails, and the stacking pouches are fixed to
20 the fixing net 10 by using the hooks.

【Industrial Applicability】

The present invention may have the industrial
applicability in that the tree-planting structure device of
the present invention can be installed in an outer wall of
25 an apartment or house, a foothill, a road guard, or the

like, and a desired place can be easily and conveniently
afforested by using the tree-planting structure device.

5

【CLAIMS】

【Claim 1】

A tree-planting structure device comprising:

5 a fixing net (10) having a size adapted to cover a part of a guard, a ground, or a building outer wall, and having an array of a plurality of meshes;

an anchor (20) coupled to the guard, the ground or the building outer wall to fix a position of the fixing net (10);

10 a plurality of stacking pouches (40) fastened to the mesh constituting the fixing net (10), in which each stacking pouch serves as a sack containing soils for growing plants, and is stacked on the fixing net (10) while coming into contact with the fixing net (10); and

15 a hook (60) serving as a member for fastening the stacking pouch (40) to the mesh of the fixing net (10) and connecting the stacking pouch (40) to the fixing net (10).

【Claim 2】

20 The tree-planting structure device of claim 1, wherein one side of the hook (60) is connected to a hook connection hole formed in one side of the stacking pouch (40), and an opposite side of the hook (60) is connected to the mesh of the fixing net (10).

25

【Claim 3】

The tree-planting structure device of claim 1, wherein the stacking pouch is formed at a side surface thereof with a protrusion (44) protruding by a predetermined thickness,

5 the protrusion (44) of the stacking pouch is formed therein with a hook connection hole (45) having a size allowing the hook (60) to pass therethrough, and the stacking pouches disposed adjacent to each other in lateral or left-right directions are interconnected by the hook
10 (60).

【Claim 4】

The tree-planting structure device of claim 1, further comprising a connecting plate (70) serving as a member for
15 mutually connecting stacking pouches vertically adjacent to each other among the stacking pouches, wherein

 the connecting plate (70) is formed on one surface thereof with a projection press-fitted into the upper stacking pouch, and formed on an opposite surface thereof
20 with a projection press-fitted into the lower stacking pouch.

【Claim 5】

The tree-planting structure device of claim 4, wherein
25 the projections formed on the connecting plate (70) have a

conical shape.

【Claim 6】

The tree-planting structure device of claim 1, further
5 comprising filling soils (50) disposed between the guard
and the fixing net or between the ground and the fixing net
to support the stacking pouches.

【Claim 7】

10 The tree-planting structure device of claim 1, further
comprising a plurality of protecting pouches (30) serving
as a member disposed on the guard along a longitudinal
direction of the guard and containing soils for growing
plants, wherein

15 the fixing net (10) is configured to cover the guard
and the protecting pouches (30).

【Claim 8】

The tree-planting structure device of claim 7, further
20 comprising a water supply pipe (80) disposed on the
protecting pouches (30) to allow water to flow therein.