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(54) INSTALLATION FOR A HANGING CULTIVATION SYSTEM

ANLAGE FÜR EIN HÄNGENDES ANBAUSYSTEM

INSTALLATION POUR LE SYSTÈME DE CULTURE EN SUSPENSION

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(56) References cited:

ES-A1- 2 207 409

JP-A- 2006 254 890

JP-A- 2017 209 099

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Description

Object of the invention

[0001] The present invention refers to an installation for hanging plant cultivation systems, which is designed for cultivating plants on the hanging conduits of a general structure. The object of the invention is to provide an installation that makes it possible to efficiently cultivate plants, with the ability to raise and lower the plants as desired by the user in order to place them at the desired height, in accordance with the size of the plants, the humidity, temperature and suitable atmospheric conditions.

Background of the invention

[0002] Certain plant cultivations that remain hanged in the air in order to make it possible to grow and care for them require the plants to be raised as they grow so they do not drag on the ground, or alternatively so that they can be placed at a suitable height where the temperature, humidity and light conditions are optimal.

[0003] In any case, the installations known up to now have serious issues and drawbacks when it comes to raising the plants, which results in a costly task, not only from a financial point of view but also in regard to the operation itself, and more importantly, it does not meet the desired effectiveness.

[0004] The document ES 2 207 409 A1 briefly discloses a hydroponic growing system intended to be located in any conventional greenhouse, in which longitudinal rows of bags or any other type of container are used as a culture container for plants; it consists of a plurality of transverse bars, properly distributed, from which said bags are suspended with the collaboration of cables that are wound on said bars. These bars are driven simultaneously and synchronously by a motor through the corresponding transmission, so that the rotation of the bars determines the raising and lowering of the bags, the windings being adjacent ones oriented in the opposite direction, so that when a bag ascends, the adjacent ones descend, for better accessibility to the latter.

Description of the invention

[0005] The installation for the hanging cultivation system according to the invention as defined in claim 1 has a series of characteristics that result in significant and remarkable advantages and improvements over conventional installations.

[0006] More specifically, the installation of the invention is comprised of a general supporting structure made of props, bars, trusses, beams, etc., with the particularity that they include a plurality of conduits where the plants grown are going to be located, with these conduits being hung from the ends thereof by respective pairs of steel cables, which are linked by the upper ends thereof to rotary shafts, so that fixing or arranging the ends of these

suspension cables to the rotary shafts will make the pairs of conduits to go up and down simultaneously, which means that a pair of conduits, and therefore the plants associated with them, will go up following the direction in which the shafts rotate, and by contrast, another pair of conduits, and therefore the plants contained therein, will descend simultaneously, making it possible to cultivate plants at different growth rates and arrange them at a desired height depending on the size of the plants, the light conditions, temperature, humidity, etc., of the place where the installation is located.

[0007] The rotary shaft or shafts, on which the hanging cables of the conduits can be rolled up, are formed of sections joined together by means of connecting elements, with the particularity that these rotary shafts are actuated by means of a reducer, and they are connected to a main shaft actuated by a motor reducer using sprockets and chains, which are placed transversal to the rotary shafts, so that the motor reducer, which is considered the main driver, rotates the shafts connected to the suspension cables, making them roll/unroll in pairs in order to raise or lower the different conduits with the plants arranged on said conduits.

[0008] The rotary shafts will be attached to an upper horizontal beam of the general structure by means of bearings, tubular beams and fixing clamps.

[0009] In addition, the conduits have a collector for water collection on at least one of the ends thereof.

[0010] It should also be noted that the conduits have a truss structure that incorporates hooks on the unions thereof for the hanging cables of the conduits.

[0011] In this way, cultivation lines are established on the general supporting structure, making it possible to arrange pairs of conduits or alternatively groups of four pairs of conduits, forming alternate lines hung from the rotary shafts.

Description of the drawings

[0012] To complete the invention described below and in order to give a better understanding of the characteristics of the invention, according to a preferred embodiment thereof, this description is accompanied by a set of drawings in which the figures described below have been represented, for purely illustrative purposes and should not be construed as limiting:

Figure 1.- Shows a frontal elevation view of an installation for the hanging cultivation system designed according to the object of the invention, in which some conduits are aligned on a lower level and other conduits are aligned on a higher level than the aforementioned conduits.

Figure 2.- Shows a similar view as in the previous figure, but in this case, there are conduits distributed on three levels at different heights.

Figure 3:- Shows a perspective view of the installation of the invention.

Preferred embodiment of the invention

[0013] In light of the drawings described above, it can be observed how the installation for cultivating plants that is the object of the invention is designed to form part of a general supporting structure (1) made of props, bars, trusses, beams and other conventional structural elements, as represented on Figure 1.

[0014] This structure comprises at least one horizontal cultivation beam (2), the function of which will be explained later.

[0015] The installation of the invention is characterised in that it includes a plurality of conduits (3) where the plants (13) to be cultivated are going to be located, with these conduits being hung from the ends thereof by pairs of steel cables (4) connected to rotary shafts (5), which are supported by the cultivation beam (2) by means of a truss (6) and a bearing (7), as shown in the details of Figure 3, while the rotary shafts (5) are formed by sections joined together by means of connecting elements (8), as shown also on Figure 3.

[0016] Rotating and assembling the sections of the rotary shafts (5) is arranged in such a way that a series of hanging cables (4) are rolled in when rotating in one direction while others are rolled out in the same direction of rotation, causing some conduits (3) to be raised or lowered according to how the hanging cables (4) are arranged and attached.

[0017] These conduits (3) comprise a water collector (9) or funnel on one of the ends thereof, including a bar (10) as a supporting structure for each case, with an enveloping plastic or other suitable wrapping material that comprises a beam (11) and hooks (12) corresponding to the connecting areas in order to hang the steel cables (13) in case the assembly is too long and needs to be held at intermediate points, which will also be linked to intermediate rotary shafts, which are not represented in the example embodiments chosen.

[0018] The rotation of the rotary shafts (5) is carried out by means of a reducer (14) using sprockets and chains (15) that are actuated by a main rotation shaft (16), which is actuated by a motor reducer (17) that causes the main shaft (16) to rotate and consequently, by means of said chain-and-sprocket drive (15), actuates the reducers (14) and therefore rotates the rotary shafts (5), which results in raising and/or lowering the conduits (3) and the plants (18) associated to them.

[0019] In this regard, both the motor reducer (17) as well as the reducers (14) are mounted on convenient plates fixed to the general supporting structure (1).

[0020] Finally, it should be highlighted that the actuation motor reducer (17) incorporates an end position in order to allow the shaft connected to it to rotate in both directions.

Claims

1. Installation for hanging cultivation systems, comprising

a general supporting structure (1) made of props, bars, trusses, and struts, and a plurality of conduits (3) hung from the ends thereof by pairs of cables (4) for raising and lowering thereof, which can be rolled and unrolled on rotary shafts (5) and that are connected to the general supporting structure (1) and actuated by associated reducers (14), by means of a main shaft (16) with an actuation motor reducer (17), wherein the main shaft (16) of the actuation motor reducer (17) is transversal to the rotary shafts (5) hanging the conduits (3)

characterised in that the conduits (3) further comprise a supporting structure in form of a truss structure (10) with a wrapping material comprising a beam (11) and hooks (12) on unions thereof corresponding to connecting areas in order to hang steel cables (13) to hold the conduits (3) at intermediate points which are linked to intermediate rotary shafts.

2. Installation for hanging cultivation systems, according to claim 1 **characterised in that** it comprises sprockets and chains (15) for driving the rotation of the reducers (14) to the rotary shafts (5).

3. Installation for hanging cultivation systems, according to claim 1, **characterised in that** the conduits (3) are hung by pairs of steel cables connected to the rotary shafts (5), so that each conduit is linked to each pair of rotary shafts and rolls up in a direction different from the contiguous conduit, so that rotating said rotary shaft (5) in one direction or the other will cause contiguous conduits to separate or approximate vertically.

4. Installation for hanging cultivation systems, according to claim 1, **characterised in that** the rotary shafts (5) are formed by a successive series of sections of shafts joined by means of connecting elements (8).

5. Installation for hanging cultivation systems, according to claim 1, **characterised in that** the rotary shafts (5) are hung by means of bearings (7) and tubular trusses (6) of cultivation beams (2) arranged as horizontal beams of the general supporting structure (1).

6. Installation for hanging cultivation systems, according to claim 1, **characterised in that** each conduit (3) comprises a water collector on at least one of the ends thereof.

7. Installation for hanging cultivation systems, accord-

ing to claim 1, **characterised in that** the actuation motor reducer (17) and the reducers (14) are mounted on convenient plates fixed to the general supporting structure

8. Installation for hanging cultivation systems, according to claim 1, **characterised in that** the actuation motor reducer (17) incorporates an end position in order to allow the shaft connected to it to rotate in both directions,

Patentansprüche

1. Anlage für Hängekultursysteme, die Folgendes umfasst:

eine allgemeine Tragstruktur (1), die aus Stützen, Stangen, Stäben und Streben besteht und eine Vielzahl von Leitungen (3), die an den Enden davon durch Paare von Seilen (4) zum Heben und Senken davon aufgehängt sind, die auf Drehwellen (5) auf- und abwickelbar sind und die an die allgemeine Tragstruktur (1) angeschlossen sind und durch zugehörige Getriebe (14) mittels einer Hauptwelle (16) mit einem Antriebsgetriebemotor (17) angetrieben werden, wobei die Hauptwelle (16) des Antriebsgetriebemotors (17) quer zu den die Leitungen (3) aufhängenden Drehwellen (5) verläuft,

dadurch gekennzeichnet, dass die Leitungen (3) ferner eine Tragstruktur in Form einer Stabstruktur (10) mit einem Umhüllungsmaterial umfassen, einen Balken (11) und Haken (12) an den Verbindungen davon umfassend, die Anschlussbereichen entsprechen, um Stahlseile (13) zum Halten der Leitungen (3) an Zwischenpunkten aufzuhängen, die mit dazwischenliegenden Drehwellen verbunden sind,

2. Anlage für Hängekultursysteme gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sie Kettenräder und Ketten (15) für den Drehantrieb der Getriebe (14) zu den Drehwellen (5) umfasst.
3. Anlage für Hängekultursysteme gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Leitungen (3) durch Paare von Stahlseilen aufgehängt sind, die an die Drehwellen (5) angeschlossen sind, so dass jede Leitung mit jedem Paar von Drehwellen verbunden ist und sich in einer Richtung aufwickelt, die sich von der benachbarten Leitung unterscheidet, so dass die Drehung der Drehwelle (5) in der einen oder anderen Richtung bewirkt, dass benachbarte Leitungen sich vertikal trennen oder annähern.
4. Anlage für Hängekultursysteme gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Drehwellen (5)

durch eine aufeinanderfolgende Reihe von Wellenabschnitten gebildet werden, die mit Hilfe von Anschlusselementen (8) verbunden sind.

5. Anlage für Hängekultursysteme gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Drehwellen (5) mittels Lagern (7) und röhrenförmigen Stäben (6) von Kulturbalken (2) aufgehängt sind, die als horizontale Balken der allgemeinen Tragstruktur (1) angeordnet sind,

6. Anlage für Hängekultursysteme gemäß Anspruch 1, **dadurch gekennzeichnet, dass** jede Leitung (3) mindestens an einem ihrer Enden eine Wasserauffangvorrichtung umfasst,

7. Anlage für Hängekultursysteme gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Antriebsgetriebemotor (17) und die Getriebe (14) auf geeigneten Platten montiert sind, die an der allgemeinen Tragstruktur befestigt sind,

8. Anlage für Hängekultursysteme gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Antriebsgetriebemotor (17) eine Endposition besitzt, um die Drehung der daran angeschlossenen Welle in beide Richtungen zu ermöglichen.

Revendications

1. Installation de systèmes de culture suspendus comprenant une structure générale de soutien (1) constituée de supports, barres, treillis et étais ; et plusieurs conduites (3) suspendues de leurs extrémités par des paires de câbles (4) pour les monter et les descendre, qui peuvent être enroulées et déroulées sur des axes rotatifs (5) et qui sont raccordées à la structure générale de soutien (1) et actionnées par des réducteurs associés (14), par le biais d'un axe principal (16) avec un réducteur de moteur d'entraînement (17), dont l'axe principal (16) du réducteur de moteur d'entraînement (17) est positionné de manière transversale par rapport aux axes rotatifs (5) accrochant les conduites (3) **caractérisés par le fait que** les conduites (3) comprennent également une structure de soutien en forme de structure de treillis (10) avec un matériau enveloppant comprenant une poutre (11) et des crochets (12) dont les jonctions correspondant aux points de connexion afin de suspendre des câbles en acier (13) pour soutenir les conduites (3) à des points intermédiaires qui sont reliés aux axes rotatifs intermédiaires.

2. Installation de systèmes de culture suspendus conformément à la revendication 1, **caractérisés par**

des pignons et des chaînes (15) pour entraîner la rotation des réducteurs (14) sur les axes rotatifs (5).

3. Installation de systèmes de culture suspendus conformément à la revendication 1, **caractérisés par le fait que** les conduites (3) sont suspendues par des paires de câbles en acier connectés aux axes rotatifs (5) pour que chaque conduite soit reliée à chaque paire d'axe rotatif et enroulée dans une direction différente de la conduite contiguë pour que la rotation dudit axe rotatif (5) dans une direction ou dans l'autre fasse que les conduites contiguës se séparent ou se rapprochent verticalement. 5
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4. Installation de systèmes de culture suspendus conformément à la revendication 1, **caractérisés par le fait que** les axes rotatifs (5) sont constitués d'une série successive de sections d'axes fixés ensemble par des éléments de jonction (8). 15
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5. Installation de systèmes de culture suspendus conformément à la revendication 1, **caractérisés par le fait que** les axes rotatifs (5) sont suspendus par des moyeux (7) et des treillis tubulaires (6) de poutres de culture (2) placées sous la forme de poutres horizontales de la structure générale de soutien (1). 25
6. Installation de systèmes de culture suspendus conformément à la revendication 1, **caractérisés par le fait que** chaque conduite (3) comprend un collecteur d'eau sur au moins l'une de ses extrémités. 30
7. Installation de systèmes de culture suspendus conformément à la revendication 1, **caractérisés par le fait que** le réducteur (17) du moteur d'entraînement et les réducteurs (14) sont montés sur des plaques adaptées fixées sur la structure générale de soutien. 35
8. Installation de systèmes de culture suspendus conformément à la revendication 1, **caractérisés par le fait que** le réducteur du moteur d'entraînement (17) comprend une extrémité permettant à l'axe qui y est relié de tourner dans les deux directions. 40

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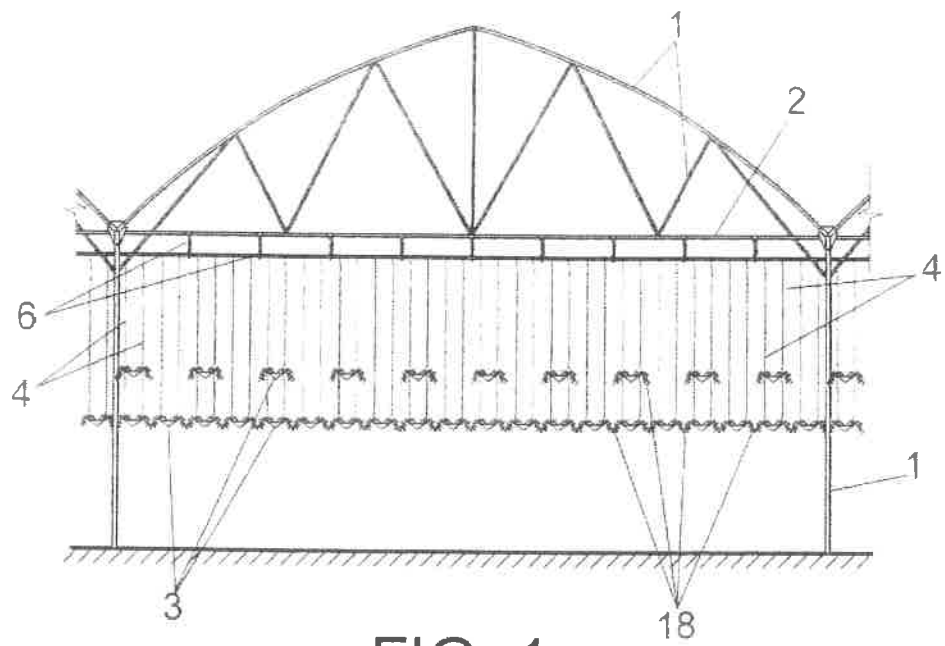


FIG. 1

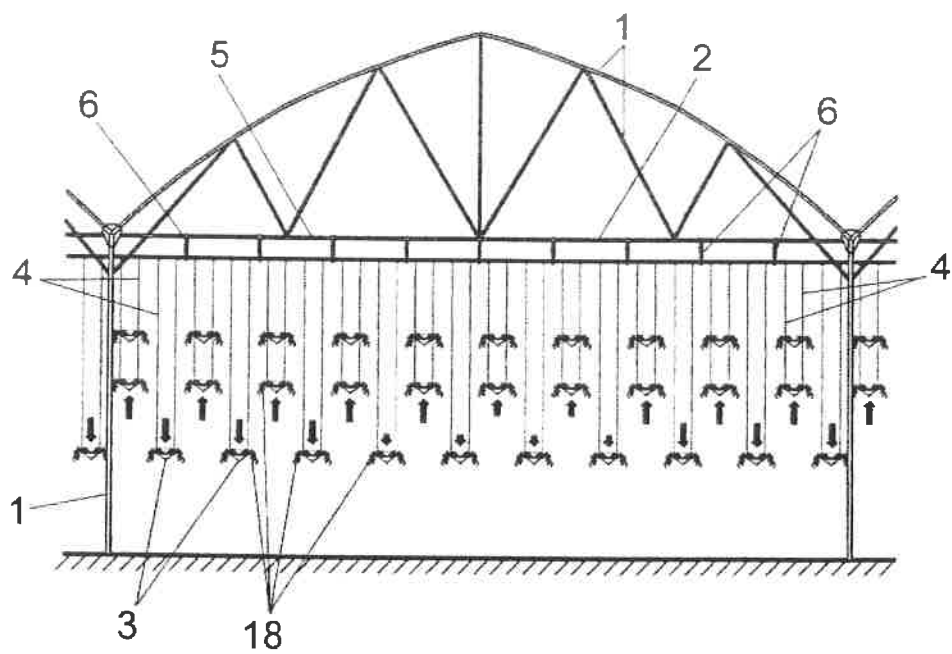


FIG. 2

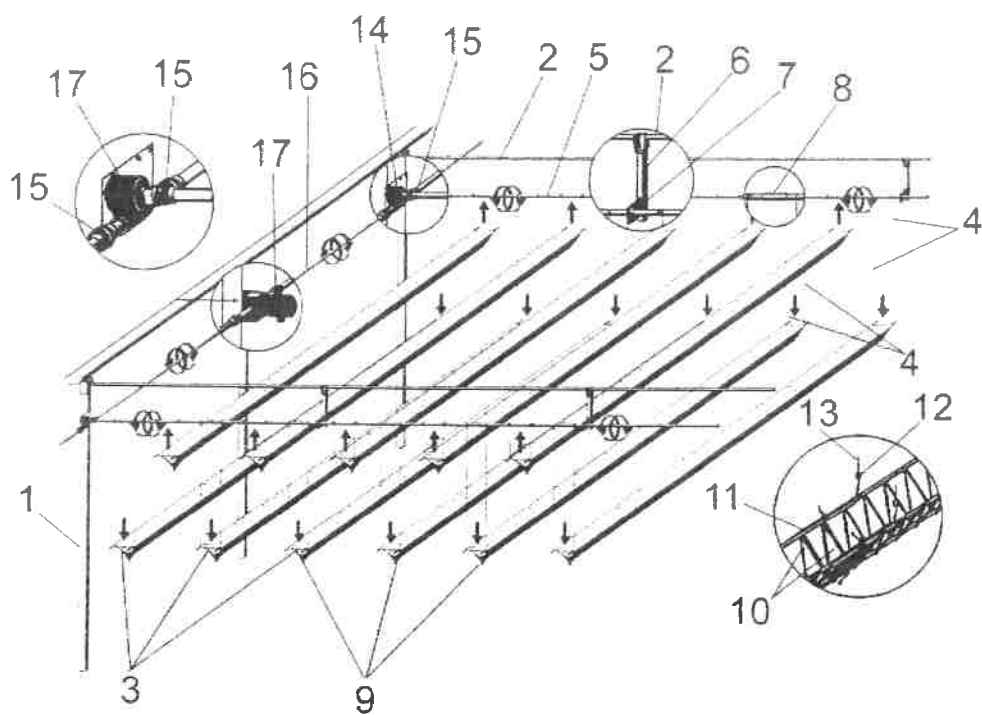


FIG. 3