COLLAPSIBLE DEVICE FOR PLANT TRANSPORT AND STORAGE

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ABSTRACT

The plant transport and storage device is useful for moving and storing a plurality of plants. The device is capable of rapid and assembly and collapse. The device has a base support member, a base beam, a vertical support, and a plant support. Optionally, the device includes a lift and selective height adjustment.
FIG. 5
FIG. 7
COLLAPSIBLE DEVICE FOR PLANT TRANSPORT AND STORAGE

FIELD OF THE INVENTION

[0001] The present invention relates to a device for support and transport of potted plants, more specifically to a device for transport and storage of plants which is readily assembled and collapsed.

BACKGROUND OF THE INVENTION

[0002] As a result of the concern for the environment and ecology, more individuals have resorted to growing and maintaining plants. The increased interest in growing plants has lead to more home gardening, home landscaping, and small-scale nurseries. Due to the increased interest in growing plants, there is an increased need to transport and store plants. Because of the various species of plants, large and/or voluminous plant and related plant matter, transporting plants can involve high volumes and significant mass.

[0003] In a home or small-scale nursery environment, labor can be scarce, thus there is a need for a device that reduces labor in transport and storage of plants. In a home or small-scale nursery environment, space may also be scarce. Accordingly, there is a need for a device which is configurable to maximize the use of space when storing plants. In addition, there is a need for a device which is collapsible when not in use, with minimal use of tools. Traditional shelving fails to address these issues because it is relatively immobile and lacks select height and volume adjustment.

[0004] The art attempted to address some of these concerns in U.S. Pat. No. 4,194,319. The potted plant support discloses a device for supporting potted plants, but its support structure limits the means to hold the large mass of plants for today's home landscaping and plant nurseries' needs. Additionally, it does not disclose a means to transport the potted plants which it supports.

[0005] The art also attempted to address some of these concerns in U.S. Pat. No. 4,449,539. However, the hanging plant holder discloses a flexible material joined together to contain a plant. The holder can then be supported using a curtain rod or other suitable horizontal support. The disclosed structure requires the plant to be placed in the flexible material container instead of a typical container for plants used in home gardening, landscaping, or plant nurseries.

[0006] It is the object of this invention to address these concerns.

SUMMARY OF THE INVENTION

[0007] The plant storage and transport device is comprised of at least two base support members, a base beam, wheels, at least two vertical supports, and a plant support. The components are detachably joined, enabling assembly and operation of the device with limited labor and tools.

[0008] It is an object of this invention to provide a device to transport and store a plurality of plants.

[0009] It is another object of this invention to provide a device to reduce labor in the transport and storage of plants.

[0010] These and other features, aspects, and advantages of the invention will become better understood with reference to the following description, appended claims, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective view of a device embodying features of the present invention.

[0012] FIG. 2 is a perspective view of a portion of a version of a base frame according to the current invention.

[0013] FIG. 3 is a perspective view of a version of vertical supports joined to a base beam.

[0014] FIG. 4 is a perspective view of a version of vertical supports and base support member of the current invention.

[0015] FIG. 5 is a perspective view of a base support member according to the current invention.

[0016] FIG. 6 is a perspective view of a version of a vertical support and base support member of the current invention.

[0017] FIG. 7 is a perspective view of a portion of a plant support with an engaged plant.

DETAILED DESCRIPTION OF THE INVENTION

[0018] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure.

[0019] One embodiment of the plant transport and storage device is comprised of a base frame 01, a plurality of vertical supports 07 107 207, and a plant support 11. The base frame 01 is comprised of a plurality of base support members 02, a base beam 05, and wheels 12.

[0020] The base support member 02 is a rigid length of material adapted to support the load of the horizontal base beam 05, the vertical support 07 107 207, the plant support 11, and material being supported and transported by the device of the current invention. The base support member 02 is dimensioned to provide support and stability during transport and storage. Further, the base support member 02 is dimensioned to provide support and stability during manual or lift-assisted engagement of plants 17 to the plant transport and storage device. The base support member 02 contains a plurality of shoulders 03 to receive a base beam 05. At least one of the shoulders 03 surfaces contain an aperture 04 adapted to securely join the base beam 05 to the base support member 02.

[0021] The base beam 05 spans the base support members 02 to form the base frame 01. The base beam 05 has apertures 06 on each end to enable secure joinment to the base support members 02. Additionally, the base beam 05 is adapted to receive at least one vertical support 07 107 207. The base beam 05 is dimensioned to provide support and stability for the device. Further, the base beam 05 contains an aperture 06 on its ends for receipt of a lock 23. The base beam’s 05 dimensions may be modified to provide a base frame 01 suitable for differing numbers and volumes of plants 17.

[0022] To form the base frame 01, one end of the base beam 05 is engaged to a shoulder 03 of a first base support member 02, aligning an aperture 04 of the shoulder 03 with an aperture 06 of the base beam 05. A lock, such as, but not limited to a pin is applied to the aligned, continuous aperture to securely join the base beam 05 to the base support member 02. The same process is performed on the second end of the base beam 05 with a second base support member 02.

[0023] Optionally, high strength mesh 13 may be joined to the base frame 01, providing additional surface for plants 17 or the like, while also supporting the application and shedding of water or nutrients to plants 17 that are engaged to the device. The mesh 13 is supported and joined to the base frame 01 with catches 15 which are preferably woven into the periphery of the mesh 13. The base beam 05 and base support members 02 have apertures 16 to receive the catches 15. A
mesh support beam 14 spans the base support members 02 and also has apertures to receive the catches 15. [0024] Wheels 12, preferably casters, are joined to the base frame 01 proximate the ends of the base support members 02. Some or all of the wheels 12 may be pivotally joined to the base frame 01 such that the wheels will align themselves with the direction of travel during plant transport. The wheels 12 are composed of material suitable for smooth and rough surfaces and are dimensioned to operate on smooth and rough surfaces. [0025] A vertical support 07 107 207 extends generally vertically or upright from the base frame 01, providing support for the plant support 11 and the plants 17 and other load depending therefrom. Generally, the vertical support 07 107 207 is composed of rigid material and is capable of supporting the plant material depending from the plant support 11. [0026] The vertical support 07 107 207 has a structure to receive a plant support 11. In one version, the structure is an aperture 08, positioned opposite the end which is joined to the base frame 01, dimensioned to receive the plant support 11 (discussed below). In another version, the structure is comprised of a groove 09 in the vertical support 07 107 207 combined with a latching device 10, positioned opposite the end which is joined to the base. The groove 09 is dimensioned to receive a plant support 11. [0027] Alternatively, the vertical support 07 107 207 may be further comprised of a plurality of connected segments 21, forming a single vertical support 107. Each of the individual segments 21 is a length of rigid material with a plurality of proximally spaced apertures 22 along its length. Each individual segment 21 is dimensioned successively smaller. The individual segments 21 are then telescopically connected. The height of the vertical support 107 can be adjusted by aligning the apertures 22 of the individual segments 21 and applying a selector 23, such as a pin 23, to the aligned apertures 22. This configuration of a vertical support 107 permits maximization of plant storage space by allowing plants 17 to be vertically stacked or spaced heights. In a given fixed space, one plant transport and storage device with engaged plants 17 may be configured at one height and a second plant transport and storage device with engaged plants 17 at a different configured height may be stored, hence the full volume of the fixed space is utilized. [0028] Alternatively, the vertical support 07 107 207 may be further comprised of a plurality of connected segments, forming a single vertical support 207. An upper vertical segment 28 is a rigid member. A lower vertical segment 29 is a rigid member. The upper 28 and lower segment 29 are hingedly 30 joined. A lock or other means can exist proximate the joint such that the joined segments 28 29 are biased towards an upright position. Thus in the biased position, there would be a 0° angle at the axis formed where the upper and lower vertical segments 28 29 are joined. Preferably, the hinge 30 is operable to allow an approximate 90° range of motion. Thus, the upper vertical segment 29 would include an operable position which is substantially orthogonal from its normal biased position when it is near the maximum angle of its preferable range of motion. Additionally, in this state, the upper vertical segment 28 is substantially parallel with the plane formed by the base frame 01. [0029] Opposite the hinged joint, a lift 31 is attached to the joined segments 28 29 to reduce labor during engagement and elevation of plants 17 to the device. One type of lift 31 that may be used in the device is a pulley 31. The pulley 31 is attached to the lower vertical segment 29. A cable 32 extending from the pulley 31 is fixed to the upper vertical segment 28, proximate the end furthest from the hinged joint. The pulley 31 does not operate while a cable lock is engaged, maintaining the joined segments 28 29 in an upright position. Additionally, the length of the cable 32 is preferably limited such that the upper vertical segment 28 does not rotate more than about 90° from its upright position. A crank (not pictured) is attached to the pulley 31 which is operable to retract the cable 32 into the pulley 31, thus causing the upper vertical segment 28 to return to its normal upright position where it is substantially contiguous with the lower vertical segment 29. Although, a simple non-powered mechanical lift 31 is depicted, one skilled in the art would appreciate that other lifts may be substituted. For example, the lift 31 may comprise a motor to provide the force to return the upper vertical segment 28 to its upright position. [0030] The vertical support 07 107 207 can be joined to the base frame 01 using one of several structures, each joining structure supporting the rapid assembly and collapse of the plant transport and storage device while maintaining the necessary structure to bear the load of plant mass and the like. In one structure, the joining structure is comprised of a continuous piece of rigid material with a bend and mechanical fasteners. The bent piece has a plurality of apertures, each aperture operable to receive a mechanical fastener. The mechanical fastener can include, but is not limited to, bolts or screws. Preferably quick connect and release mechanical fasteners are employed. With this joining structure, one portion of the bent piece is engaged to the vertical support 07 107 207 and the other portion of the bent piece is engaged to the base beam 05. The mechanical fasteners are applied to the vertical support 07 107 207 and base beam 05 through the apertures, thus joining the vertical support 07 107 207 to the base. [0031] An alternate structure for joining the vertical support 07 107 207 to the base is comprised of a protruding shape 26 126 depending distally from an end of the vertical support 07 107 207 and a complementary channel 27 corresponding to the protruding shape 26 126 to securely join the vertical support 07 107 207. The depicted protruding shape 26 126 is comprised of a generally cylindrical stud 24 124 projecting from the vertical support 07 107 207. A spherical section 25 125 is fixed to the distal end of the cylindrical stud 24 124. The base support member 02 has a complementary channel 27 which is dimensioned to receive the protruding shape 26 126 and thus anchor the vertical support 07 107 207. In the depicted channel 27, the complementary channel 27 is defined by a cylindrical groove section extending longitudinally the length of the base support member 02. Adjacent and atop the generally cylindrical groove section of the channel is a generally rectangular cross-sectional groove section. The dimension of the groove narrows proximate the surface of the base support member 02, providing a locking structure to securely join the vertical support 07 107 207 to the base frame 01. The protruding shape 26 126 and the complementary channel 27 are preferably dimensioned to provide a secure high strength joint. Moreover, the protruding shape 26 126 and the complementary channel 27 are preferably dimensioned such that the lower surface of the vertical support 07 107 207 abuts the upper surface of the base support member 02, where the load borne by the vertical support 07 107 207 is transmitted to the abutting surfaces as well as the joining structure. To join the vertical support 07 107 207 with the base frame 01 with this joining structure, the protruding shape 26 126 of the vertical support 07 107 207 is aligned with corresponding channel of the base support member 02. The vertical support 07 107 207 is then engaged to the base support member 02. One skilled in the art would appreciate that the protruding shape 26 126 and the complementary channel 27 may be altered to change the joint characteristics. Optionally, the complementary channel 27 may exist on the base beam 05, thus allowing the vertical support 07 107 207 to be secured to the base frame 01 at the base beam 05 instead of a base support member 02.
In an alternate version of the base support member 02 with a complementary channel 27, the base support member 02 is further comprised of a plurality of mateable pieces 33 which are mechanically fastened, making the device further collapsible while maintaining structure. Each mateable piece 33 is shaped such that the complementary channel 27 is formed when the mateable pieces 33 are engaged and fastened. Mateable pieces 33 may also be used to form a complementary channel 27 in a base beam 05 as well as the base support member.

An additional alternate structure for joining the vertical support 07 107 207 to the base is comprised of a sleeve 35 and a channel. The sleeve 35 is defined by a hollowed periphery 37. The sleeve cavity 36 and the sleeve periphery 37 are dimensioned to receive a vertical support 07 107 207. A protruding shape 26 126, similar to that described above, depends distally from the surface of the sleeve 35 opposite the opening. The depicted protruding shape 26 126 is comprised of a generally cylindrical stud 24 124 projecting from the sleeve 35. A spherical section 25 125 is fixed to the distal end of the cylindrical stud 24 124. The base support member 02 has a complementary channel 27, similar to the complementary channel 27 described above, which is dimensioned to receive the protruding shape 26 126 and thus anchor the vertical support 07 107 207. In the depicted channel, the corresponding channel is defined by a cylindrical groove section extending longitudinally the length of the base support member 02. Adjacent and atop the cylindrical groove section of the channel is a generally rectangular cross-sectioned groove section. The dimension of the groove narrows proximate the surface of the base support member 02, providing a locking structure to securely join the vertical support 07 107 207 to the base frame 01. The protruding shape 26 126 and the complementary channel 27 are preferentially dimensioned to provide a secure high strength joint. Moreover, the protruding shape 26 126 and the complementary channel 27 are preferably dimensioned such that the lower surface of the sleeve 35 abuts the upper surface of the base support member 02, where the load supported by the vertical support 07 107 207 is transmitted to the abutting surfaces as well as the joining structure.

The sleeve 35 optionally contains a plurality of sleeve stabilizers 40 to provide stability by limiting longitudinal movement of the vertical support 07 107 207 while engaging the base beam 05 to the device or transporting plants. The sleeve stabilizers 40 are panels which project from the sleeve in a plane generally parallel to the protruding shape 26 126. Each sleeve stabilizer’s 40 dimension corresponds to the dimension of the base beam 05 to which it is engaged. The sleeve stabilizer 40 closely abuts a surface of the base beam 05 such that when engaged to the base beam 05, there is minimal distance between the sleeve stabilizer 40 and the base beam 05. Sleeve 35 may also contain sleeve stabilizers 40 where the sleeves 35 are engaged to a base support member 02.

To join the vertical support 07 107 207 with the base frame 01 with this joining structure, the protruding shape 26 126 of the sleeve 35 is aligned with the complementary channel 27 of the base support member 02. The sleeve 35 is then engaged to the base support member 02. Next, the vertical support 07 107 207 is engaged to the opening 36 provided by the sleeve 35. Optionally, the complementary channel 27 may exist on the base beam 05, thus allowing the vertical support 07 107 207 to be secured to the base via the base beam 05.

Additionally or alternatively, the joining structure may comprise an aperture 39 proximate the end of the vertical support 07 107 207 which is to be engaged to the sleeve 35. The sleeve 35 has a similarly dimensioned aperture 38 which is parallel to the aperture 39 on the vertical support 07 107 207. The aperture is substantially continuous when the vertical support 07 107 207 is engaged to the sleeve 35. A lock 23, such as a pin 23, is applied to the continuous aperture to further secure and strengthen the vertical support 07 107 207 without using additional tools or difficult to manufacture components. In this joining structure, the sleeve 35 may be directly joined to the base support member 02 or base beam 05. For additional joint structure, this joining structure may be combined with the protruding shape 26 126 and complementary channel 27 joint structure.

The plant support 11 is a rigid length of material operable to support plants 17 or the like. The plant support 11 is joined to the vertical support 07 107 207 such that the plant support 11 is generally parallel to the plane formed by the base frame 01. Where the vertical support 07 107 207 contains an aperture 08 for the plant support 11, the plant support 11 is coupled to the vertical supports 07 107 207 by engaging the plant support 11 through the apertures 08 of the vertical supports 07 107 207, thus the plant support 11 spans the vertical supports 07 107 207. The plant support 11 is secured at its ends with a plant clamp 19 to prevent lateral movement during plant storage and transport. The plant support 11 may be secured by the depicted plant clamp 19 or other means in the art. Where the vertical support 07 107 207 contains a groove 09 for the plant support 11, the plant support 11 is coupled to the vertical supports 07 107 207 by engaging the plant support 11 to the channels 09 of the vertical support 07 107 207 and closing the latch 10 over the groove 09, thus the plant support 11 spans the vertical supports. Again, the plant support 11 is secured at its ends to prevent lateral movement during plant storage and transport. Plants 17 are engaged directly to the plant support 11 or preferably to a plant clamp. The plant clamp is a structure adapted to receive hanging potted plants and restrict the movement of a plant 17 during transport. The depicted structure is an article which may be adjustably positioned on the plant support 11 and has a slot 20 to receive the plant hanger 18 and restrict a plant’s movement during transport and storage.

Optionally, the base support member 02, the base beam 05, the vertical supports 07 107 207, the mateable pieces 33, and the plant support 11 have a grip to aid handling and assembly.

To use the embodiment, the first step is to assemble the device, starting with the base frame 01. The base beam 05 is joined to a first base support member 02, aligning an aperture 06 on the base beam 05 with an aperture 04 on the shoulder 03 of the first base support member 02. A selector is placed in the aligned apertures to securely join the base beam 05 to the first base support member 02. Next, the base beam 05 is joined to a second base support member 02, aligning an aperture 06 on the base beam 05 with an aperture 04 on the shoulder 03 of the second base support member 02. A selector is placed in the aligned apertures to securely join the base beam 05 to the second base support member 02. The wheels 12 are joined to the now assembled base frame 01.

The protruding shape 26 126 of a first sleeve 35 is aligned with the complementary channel 27 of the first base support member 02 and the first sleeve 35 is engaged to the first base support member 02. A first vertical support 07 107 207 is engaged to the opening 36 provided by the first sleeve 35, aligning the aperture 39 of the vertical support 07 107 207 with the aperture 38 of the first sleeve 35. A pin 23 is received in the aligned apertures to securely join the first sleeve 35 to the first vertical support 07 107 207. Next, a protruding shape 26 126 of a second sleeve 35 is aligned with the complementary channel 27 of a second base support member 02 and the second sleeve 35 is engaged to the second base support member 02. A second vertical support 07 107 207 is engaged to the opening 36 provided by the second sleeve 35, aligning the
aperture 39 of the second vertical support 07 107 207 member with the aperture 38 of the second sleeve 35. A pin 23 is received in the aligned apertures to securely join the second sleeve 35 to the first vertical support 07 107 207. Next, the protruding shape 26 126 of a third sleeve 35 is aligned with the complementary channel 27 of the base beam 05 and the third sleeve 35 is engaged to the base beam 05. A vertical support 07 107 207 is engaged to the opening 36 provided by the third sleeve 35, aligning the aperture 39 of the third vertical support 07 107 207 member with the aperture 38 of the third sleeve 35. A pin 23 is received in the aligned apertures to securely join the third sleeve 35 to the third vertical support 07 107 207.

To complete the assembly of the embodiment, a plant support 11 is placed across the groove 09 of the vertical supports 07 107 207, spanning the vertical supports 07 107 207. The plant support 11 is latched 10 into the groove 09 of each vertical support 07 107 207 and the plant support 11 and plant clamps 19 are joined to the plant support 11 proximate both its ends.

To store and transport the plants 17, the first step is to engage the plants 17 to the plant support 11. First, the lock of the retractable cable is released to allow the end of the upper segment of the vertical support 207 to rotate to closer to the ground, where minimal labor is necessary to engage a plant 17 to the device. A plant clamp 19 is placed on the plant support 11 where a hook 18 affixed to a plant 17 will be engaging the plant support 11 and the plant clamp 19. The crank is used to retract the cable and return the vertical support 207 to its upright position. The plants 17 can now be transported or stored.

While the foregoing detailed description has disclosed several embodiments of the invention, it is to be understood that the above description is illustrative only and not limiting of the disclosed invention. It will be appreciated that the discussed embodiments and other unmentioned embodiments may be within the scope of the invention.

Having thus described the invention, what is claimed is as follows:

1. A device for storing and transporting one or more potted plants comprising:
   a base frame, at least two vertical supports, a plant support, and wheels;
   said base frame comprised of at least two base support members and at least one base beam, said base beam detachably joined to said base support members, whereby said base support members are spanned by said base beam;
   said vertical support detachably joined to said base frame and extending upwardly towards said plant support, whereby said vertical supports are adapted to bear the load of said plant support;
   said vertical supports adapted for receiving said plant supports, whereby said vertical supports are spanned by said plant support.

2. The device of claim 1 wherein said vertical support member is comprised of a plurality of telescopically connected segments, each of said segments having a plurality of apertures, whereby the height of said vertical support is selectively adjusted by applying a selector to said apertures.

3. The device of claim 1 wherein said vertical support is comprised of an upper vertical segment and a hingedly connected a lower vertical segment.

4. The device of claim 3 wherein said vertical support is further comprised of a lift joined to said vertical support.

5. The device of claim 4 wherein said lift is comprised of a pulley having a cable joined to said vertical support.

6. The device of claim 1 wherein said vertical support further comprises a protruding shape and said base support member further comprises a complementary channel, whereby said complementary channel is adapted for receipt of said protruding shape.

7. The device of claim 6 wherein said base support member is further comprised of a plurality of mateable pieces, whereby joining of said plurality of mateable pieces form said complementary channel.

8. The device of claim 1 wherein said vertical support further comprises a protruding shape and said base beam further comprising a complementary channel, whereby said complementary channel is adapted for receipt of said protruding shape.

9. The device of claim 8 wherein said base beam is further comprised of a plurality of mateable pieces, whereby joining of said plurality of mateable pieces form said complementary channel.

10. The device of claim 1 further comprising a sleeve, said sleeve having a protruding shape; said base support member further comprising a complementary channel, whereby said complementary channel is adapted for receipt of said protruding shape.

11. The device of claim 10 wherein said base support member is further comprised of a plurality of mateable pieces, whereby joining of said plurality of mateable pieces form said complementary channel.

12. The device of claim 11 further comprising a sleeve, said sleeve having a protruding shape; said base beam further comprising a complementary channel, whereby said complementary channel is adapted for receipt of said protruding shape.

13. The device of claim 12 wherein said base beam is further comprised of a plurality of mateable pieces, whereby joining of said plurality of mateable pieces form said complementary channel.

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