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(54) **COLLAPSIBLE DEVICE FOR PLANT TRANSPORT AND STORAGE**

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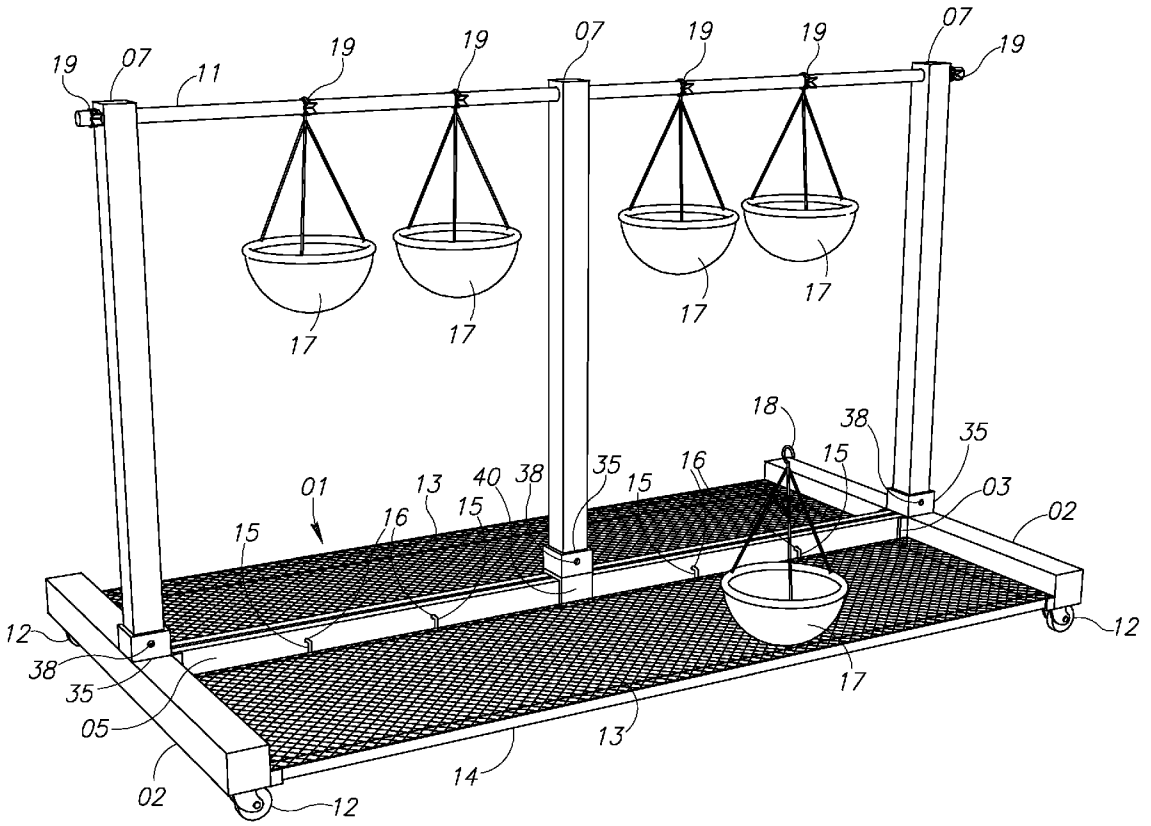
(57) **ABSTRACT**

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.



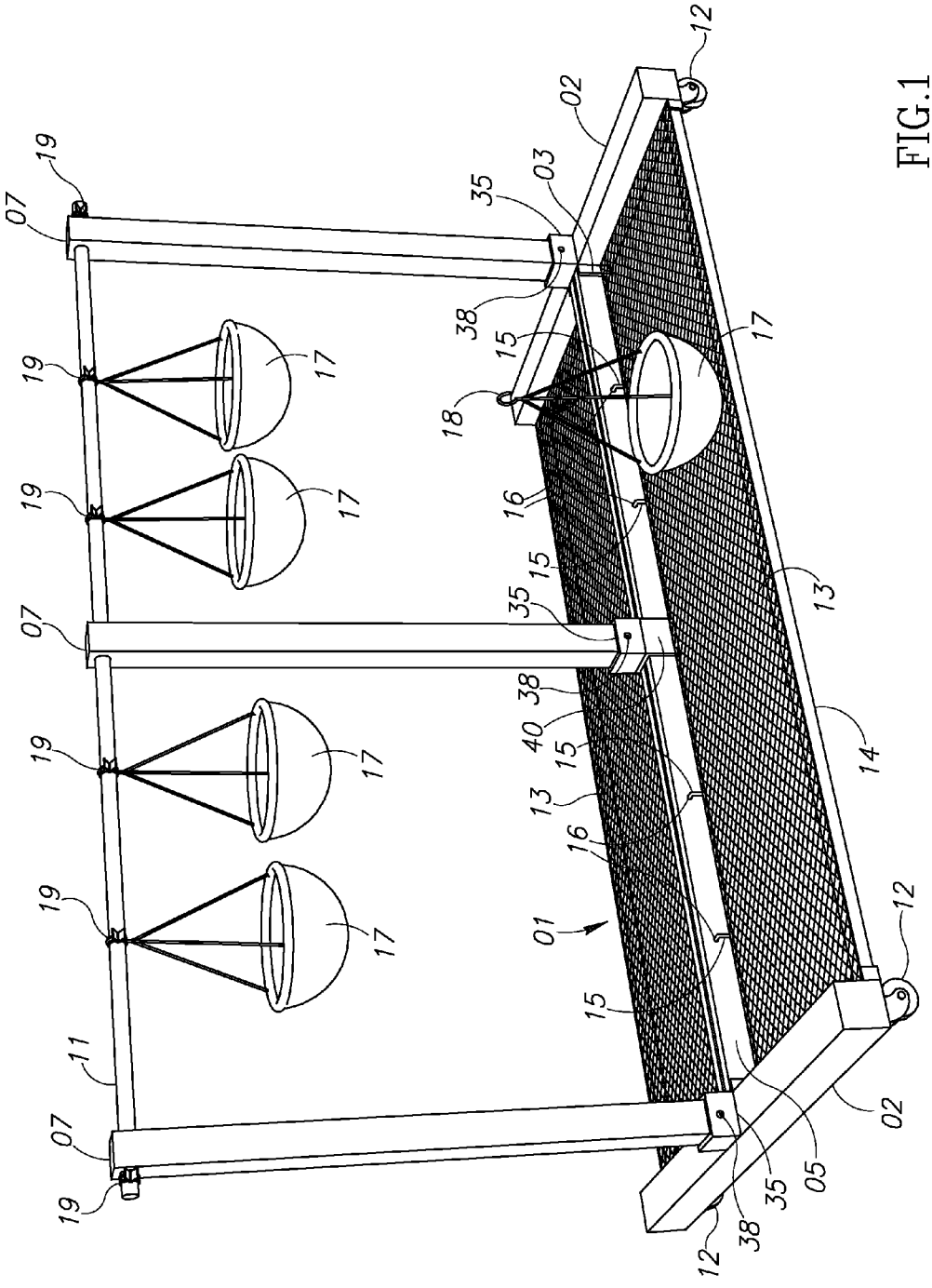
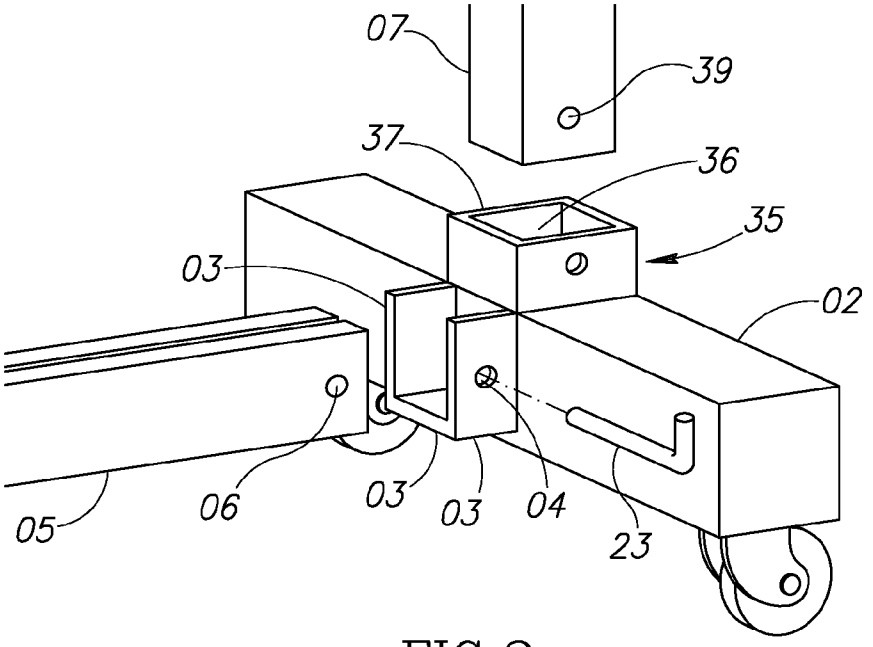


FIG.1


07
39
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36
35
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05

FIG.2

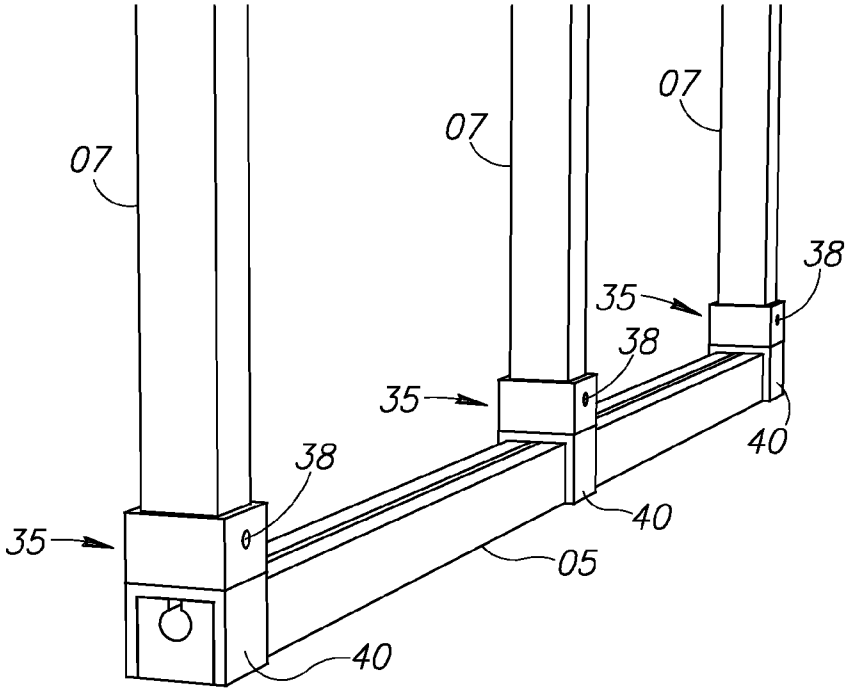
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FIG.3

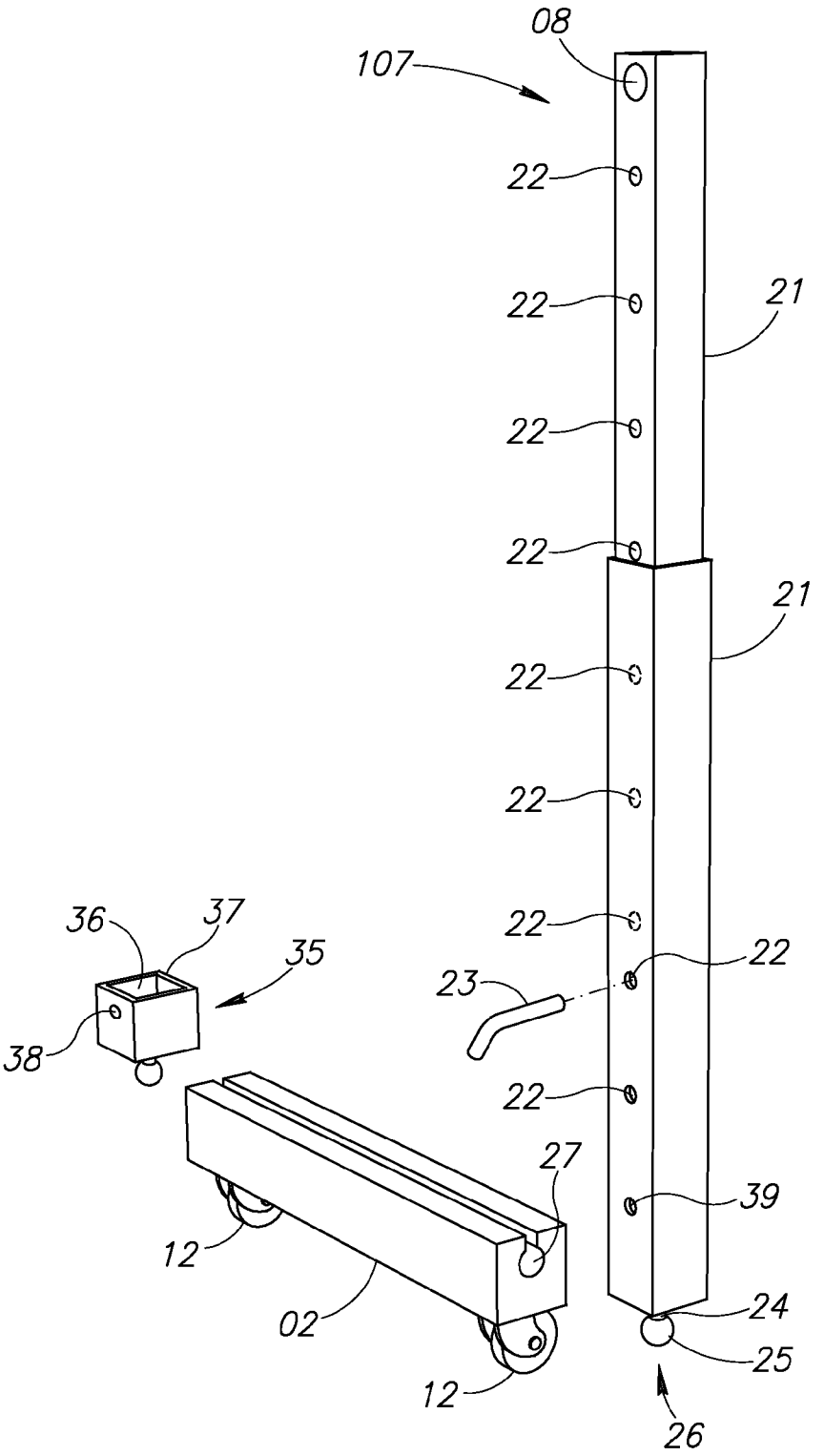
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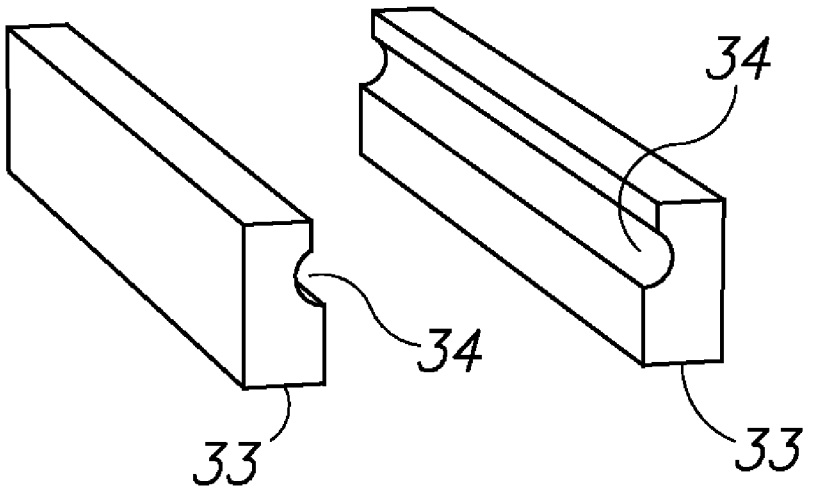
FIG.4



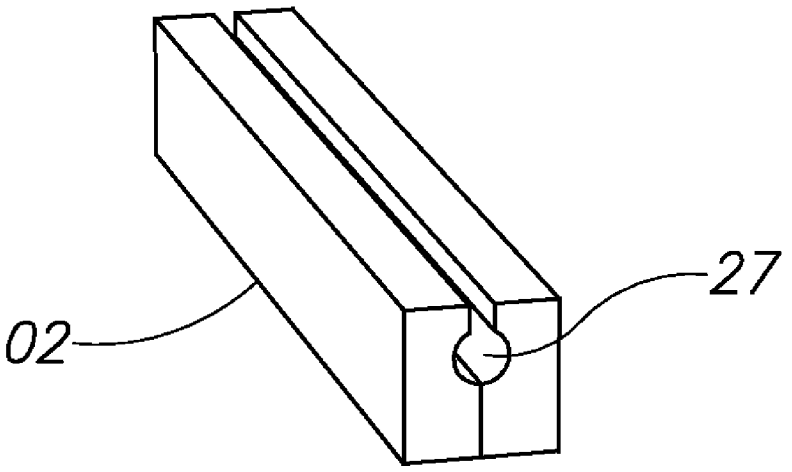


FIG.5

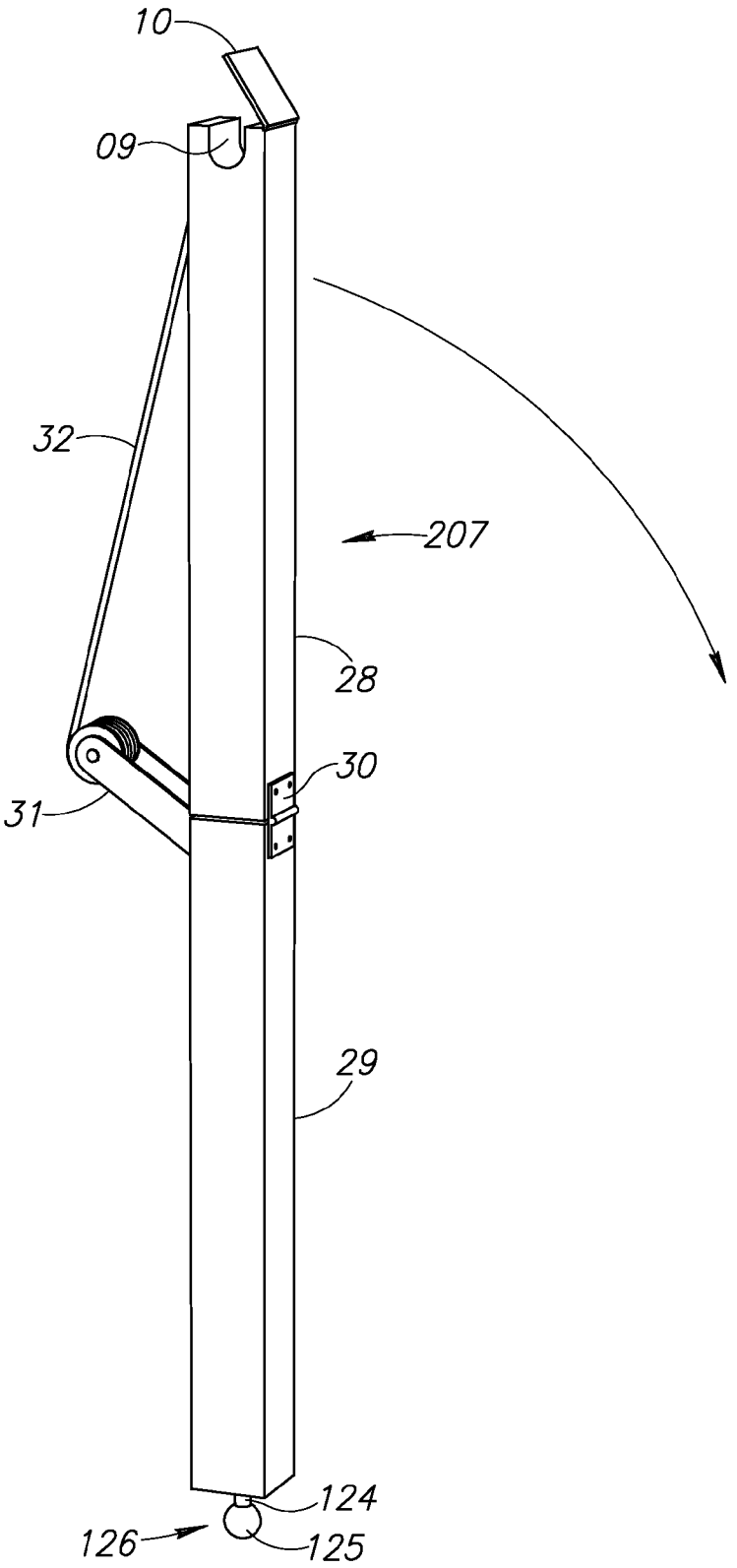


FIG.6

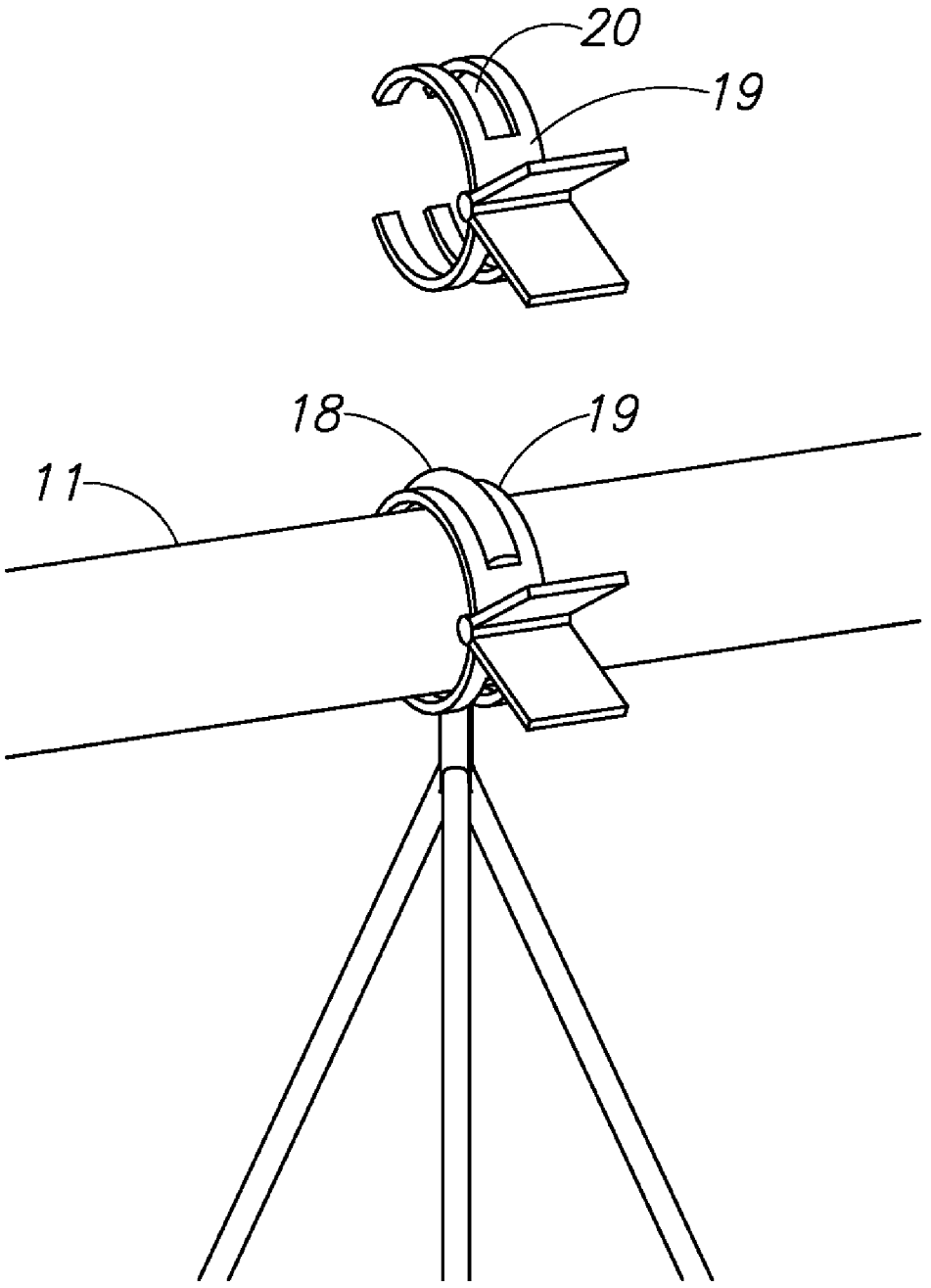


FIG.7

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 selective 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. 4,149,339. 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 a vertical support 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 proximately 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 stored at different 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 **30** 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-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 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**.

[0032] 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.

[0033] 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 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 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.

[0034] 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 plant **17** 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**. Sleeves **35** may also contain sleeve stabilizers **40** where the sleeves **35** are engaged to a base support member **02**.

[0035] 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**.

[0036] 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** such that 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.

[0037] 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 verticals 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.

[0038] 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.

[0039] 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**.

[0040] 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 third 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**.

[0041] 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.

[0042] 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 engaged. The hook is engaged to the plant support **11** in the slot **20** provided by 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.

[0043] 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 as new and desired to be secured by Letters Patent 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 supports 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 support;

said plant support detachably coupled to said vertical 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 **1** 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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