STABILIZED PLINTH ASSEMBLY FOR A HYDROTHERAPY TREATMENT SYSTEM

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ABSTRACT

The stability of a hoist-controlled hydrotherapy plinth is enhanced by a unique two-point suspension system having rigid end supports pivotally coupled to the plinth's head and foot ends on its longitudinal axis. A spreader bar, parallel spaced above the plinth, interconnects and holds the end supports in their upright positions wherein they automatically lock to the plinth. The rigidity of the four-sided structure formed by the plinth, end supports and spreader bar stabilizes the plinth against rotation around its axis, thereby effectively precluding the possibility of a patient rolling or falling off of the plinth. When a hydrotherapy treatment is completed and the plinth is elevated above the water level in the hydrotherapy tank, drainage of the water captivated on top of the plinth is facilitated by a rigid panel at the plinth's foot end. The construction of the plinth assembly also readily lends itself to encapsulation with a flexible plastic sleeve or sheath to eliminate patient cross-contamination that may otherwise occur.

5 Claims, 7 Drawing Figures
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STABILIZED PLINTH ASSEMBLY FOR A HYDROTHERAPY TREATMENT SYSTEM

BACKGROUND OF THE INVENTION

A patient requiring hydrotherapy treatment is usually transferred to and lowered into a water-filled hydrotherapy tank by means of a plinth assembly controlled by a hoist mechanism. Unfortunately, the prior developed plinth assemblies are very unstable and even slight unbalances can cause them to tip or roll, sometimes resulting in the patient falling off and sustaining injury. Even though the patient may not actually fall off, oftentimes he is fearful of falling and experiences extreme anxiety due to the instability of the prior plinths.

This serious shortcoming has now been overcome. The plinth assembly of the present invention exhibits a degree of stability far surpassing that of any plinth assembly developed heretofore.

Another disadvantage of prior hydrotherapy plinths resides in the difficulty of draining captivated water therefrom at the conclusion of a hydrotherapy treatment. To explain, the depressions made in a plinth by a patient's weight produces pockets or pools of water when the plinth is raised to remove the patient from the tank. By raising the head end to tilt the plinth, the retained water is shifted downwardly toward the foot end and most of it drains off. Some water remains trapped at the foot end, however, and cannot be removed without excessive tilting. In accordance with another feature of the invention, the water drainage problem has been remedied. Complete drainage of all captivated water is easily and rapidly accomplished with considerably less tilting.

A further aspect of the invention pertains to the ease with which the plinth may be plastic encased to preclude cross-infections between patients. As disclosed in U.S. Pat. No. 3,730,176, issued May 1, 1973 to Robert C. Miller, and assigned to the present assignee, a plinth and its connections to a hoist mechanism may be covered or encased with waterproof sleeves, water-tight material, or made of plastic material, in order to completely isolate the submerged parts of the plinth assembly from any contact with a patient or with the water in a hydrotherapy tank. The water-tight barrier established by the sleeve prevents the transmission of bacteria between the plinth assembly and the patient and between the plinth assembly and the water and this in turn prevents the various patients using the plinth assembly from cross-infecting each other.

Most of the plinth assemblies developed heretofore do not lend themselves to encapsulation with flexible plastic sleeves. The present plinth assembly, on the other hand, can easily and quickly be covered with such a sleeve so that all of its submerged parts may be isolated from any water and patient contact.

SUMMARY OF THE INVENTION

The stabilized plinth assembly of the invention supports a patient partially immersed in a water-filled hydrotherapy tank, the plinth assembly being upwardly connected to and held by a hoist mechanism. The assembly comprises an elongated plinth which has a generally rectangular rigid open frame with head and foot ends. Flexible material is stretched across the frame to support a patient. A pair of elongated rigid end supports are pivotally coupled to the frame at respective ones of its two ends and on the plinth's longitudinal axis. Each end support is pivotable to an upright position wherein at least its lower portion is generally perpendicular to the plinth and wherein it is rigidly locked to the frame so that no relative movement therebetween may occur. An elongated rigid spreader bar is parallel spaced above the plinth and is coupled between and to the end supports to maintain the supports locked in their upright positions to enhance the stability, and thereby to preclude tipping, of the plinth when a patient is lying thereon. The stabilized plinth assembly also comprises means for upwardly connecting the ends of the spreader bar to the hoist mechanism.

DESCRIPTION OF THE DRAWINGS

The features of the invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with further advantages and features thereof, may best be understood, however, by reference to the following description in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a plinth assembly constructed in accordance with one embodiment of the invention;

FIG. 2 is a sectional view, partially broken away, of the plinth assembly taken along the plane of section line 2—2 in FIG. 1;

FIG. 3 is an elevation view, partially broken away and in section, of the plinth assembly of FIG. 1;

FIG. 4 is a fragmentary sectional view on an expanded scale and taken along the plane defined by the section line 4—4 in FIG. 1;

FIG. 5 is a fragmentary sectional view taken along section line 5—5 in FIG. 4;

FIG. 6 is the same view as FIG. 4 except that none of the parts are shown in section; and,

FIG. 7 is a sectional view taken along section line 7—7 in FIG. 6.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

The plinth itself, designated by reference numeral 10, has a generally rectangular rigid open frame 12 which, with the exception of castings at its ends, is formed of tubular shaped metal, preferably hardened stainless steel. Suitable flexible material 14, such as plastic-coated reinforced canvas, is stretched across and attached to frame 12 by means of plastic rope or lacings 15. For reasons to become apparent, the right end of plinth 10, as viewed in FIGS. 1 and 3, is the head end, while the foot end is on the left. A pair of elongated rigid end supports 18, 19 are pivotally connected to frame 12 at respective ones of its head and feet and on the plinth's longitudinal axis. When assembled as shown in FIGS. 1 and 3, each end support is held in generally upright position wherein it automatically locks to plinth 10. When not so held, each end support 18, 19 may be pivoted or swung to a generally horizontal position where it may be detached from the plinth frame.

To explain, each end support 18, 19 comprises a single metallic tube (20, 21 respectively), preferably made of hardened stainless steel, which is given a slight bend so that its lower portion, when in the upright position, is substantially perpendicular to plinth 10, the upper portion of each end support slanting inwardly toward the other.
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The lower end of each support 18, 19 is coupled to frame 12 in a very unique manner in order to effect (1) a pivotal connection when the support is between generally horizontal and upright positions, (2) a locked engagement when in its upright position, and (3) a detachable coupling when the support is generally horizontally oriented. In brief, this is achieved by providing, at the lower ends of supports 18 and 19, T-shaped configurations which are received at the two ends of frame 12 in cavities having T-shaped openings.

The specific construction of the couplings between the end supports and frame 12 will be easily understood by referring to Figs. 4–7 which illustrate in detail the lower end of support 18 and the head end of frame 12. Support 19 preferably connects to the foot end in a similar fashion. Hence, the following detailed explanation of the head end coupling also applies to the foot end coupling.

The T-shaped configuration at the lower end of support 18 is obtained by welding a separate T-shaped stainless steel casting 22 to the lower end of tube 20. The cavity in frame 12 for receiving T-shaped member 22 is formed in a separate casting 12a welded between sections of the stainless steel tube of which frame 12 is primarily constructed. The cavity is essentially cylindrical shaped (see Figs. 5 and 7) with a pair of right angle slots 25, 26 that provide a T-shaped opening for the cavity.

T-shaped casting 22 is cylindrical shaped where it telescopes into, and is welded to, tube 20. Except for a transition portion, the remainder of casting 22 is of the same thickness t (see Figs. 5 and 7) and is divided into short and long legs 22a, 22b respectively.

Note the particular manner in which the dimensions of the T-shaped opening of the cavity in casting 12a and the T-shaped member 22 interrelate. Specifically, the width of slot 26 (see Figs. 5 and 7) is slightly greater than the thickness t of leg 22b but considerably less than the height h of that leg. The height h is, of course, less than the diameter of the cylindrical shaped cavity in casting 12a. Note also that the top surface of leg 22b, as viewed in Figs. 4 and 5, has a curvature that conforms to the cylindrical wall of the cavity. The length of leg 22b is slightly less than the length of slot 26. As seen in Fig. 4, the end walls of the cavity are convex shaped. The length of the cavity, as measured between the convex end walls, is only slightly greater than the length of leg 22b so that leg 22b may be effectively jammed between the convex walls, thereby preventing any longitudinal movement of the leg.

With this arrangement, the only way that end support 18 can be assembled to plinth 10 is by initially aligning the lower portion of the support to be in the same general plane as the plinth. Specifically, support 18 must be positioned as shown in dashed construction in Fig. 5 which is actually about 10° from being perfectly co-planar with the horizontally disposed plinth. When so aligned, leg 22b may be inserted through slot 26 and in the cylindrical cavity. Unless end support 18 is appropriately lined up with slot 26, it cannot be inserted into the cavity and attached to frame 12. After insertion, support 18 is pivoted upwardly to its upright position wherein it rigidly and automatically locks to the frame so that no relative movement between the support and frame may occur. As mentioned, support 19 attaches to frame 12 in the same fashion. As a consequence, when support 19 is upright it will be rigidly connected to the frame and no relative movement between support 19 and frame 12 can take place.

The rigid locked interconnections between the end supports and the plinth contribute significantly to the plinth's stability. So long as end supports 18 and 19 are maintained in their upright positions, it is virtually impossible for plinth 10 to tip or rotate around its longitudinal axis. As shown in Figs. 4 and 5, when support 18 is held in its upright position leg 22b fits tightly between the convex end walls of the cavity and the curved top surface of leg 22b bears against the cylindrical wall of the cavity. As best shown in Fig. 7, the short leg 22a bears against or abuts the end wall 25a of slot 25. With that tight fitting coupling between casting 22 and the cavity in frame 12, support 18 is effectively fixed to frame 12, as is also the case with support 19 and the frame.

End supports 18 and 19 are held in tension in their upright positions by means of an elongated rigid spreader bar 28, preferably made of steel having a tubular cross-section, which is parallel spaced above the plinth and is coupled between and to the end supports. In this way, spreader bar 28 pulls the end supports toward each other to insure that leg 22a presses against wall 25a of slot 25 (see Fig. 7) and that the corresponding leg at the lower end of support 19 bears against a counterpart wall at the foot end. This is facilitated by a pair of self-locking hooks 31, 32 permanently attached to the ends of spreader bar 28 and detachably coupled to eyes 33, 34 affixed to the upper ends of supports 18, 19 respectively. Members 18, 19, 10 and 28 thus provide a rigid four-sided structure to stabilize plinth 10. The ends of the spreader bar are upwardly connected to a hoist mechanism by a pair of chains 35, 36 and an eye 37. Only hook 38 of the hoist mechanism is illustrated.

In operation, a patient requiring hydrotherapy treatment is placed on the hoist-controlled plinth and then moved over the water-filled hydrotherapy tank, after which the plinth assembly and patient are lowered into the water to the extent necessary to submerge the patient's body with the exception of his head which will be supported on a head rest or a pillow, not shown. Cross-bar 41, preferably formed of tubular steel and rigidly secured to tube 20 (such as by welding), may be held by an appropriate holding device on the side of the tank while the patient is being treated.

Water agitation, which of course is needed to achieve hydrotherapy treatment, may be effected in any suitable manner. For example, a water pump may be employed. Alternatively, pressurized air may be injected directly into the water. At the conclusion of the treatment, the hoist is operated so that the patient-bearing plinth is raised above the water level. Because of the depressions made in flexible material 14 by the patient, water pockets will exist on the plinth's top surface. This captivated or retained water may be shifted toward and run off at the plinth's foot end by raising the head end slightly and holding the plinth in its tilted position. This is facilitated by cross-bar 42, rigidly secured to tube 20, which may be supported by the same holding device that previously held bar 41.

To insure that all of the water retained on the top of the plinth is drained off, a rigid flat member 44, preferably in the form of a metal panel, is attached (preferably by welding) to frame 12 at its foot end. It lies underneath a portion of flexible material 14 to prevent that
portion from depressing or sagging under the weight of the retained water as it is shifted from the head to the foot end after the plinth is tilted. With this feature, relatively little tilting of the plinth causes the captivated water to flow toward the foot end and then over the un-depressed flexible material on top of panel 44 and finally off of the plinth at its foot end. In the absence of rigid member 44, the plinth would require substantially greater tilting in order to remove all of the pooled water. Minimum tilting is desired, of course, since the patient is still lying on the plinth.

The plinth assembly could be used in the manner described when the patient does not have any open wounds. When there are such wounds, for example severe burns, all of the elements in contact with the water, namely the internal surfaces of the tank and the submerged parts of the plinth assembly, should be sterilized beforehand so that the patient being treated does not become infected by any bacteria on the plinth assembly or tank surfaces. Sterilization of a plinth assembly is most difficult and oftentimes a supposedly sterilized plinth still bears infection-causing bacteria. Contamination prevention is best achieved in accordance with the aforementioned U.S. Pat. No. 3,730,176 which discloses the concept of covering or encasing the plinth and the submerged portions of the hoist connections with a disposable, flexible plastic sleeve.

The present plinth assembly readily lends itself to plastic encapsulation. This is accomplished by opening hooks 31 and 32 and then swinging end supports 18 and 19 outwardly so that they extend generally in the same plane as plinth 10. A plastic sleeve is then slipped over those three components so that only eyes 33 and 34 are uncovered. Thereafter, the end supports are pivoted to their upright positions and hooks 31 and 32 are reconnected. The ends of the plastic sleeve may be anchored to the top ends of supports 18, 19 respectively in any suitable fashion to insure that the sleeve ends will not sag but will always remain well above the surface of the water. For example, each sleeve end may be gathered together and tied to the associated end support by means of an appropriate tape. Alternatively, hooks 31 and 32 may also hook to the sleeve ends to hold them up.

Upon the completion of a hydrotherapy treatment, the plastic encased plinth assembly is raised above the water level, tilted and drained, and then transferred from the tank to permit removal of the patient. The plastic sleeve is subsequently disposed of since it will now be contaminated with bacteria from the patient just treated. The water, of course, is also drained and the internal surfaces of the tank must be sterilized. One convenient method of blocking bacteria transfer to and from the tank surfaces, without sterilizing those surfaces, is to drape or line the entire inside of the tank with a large sheet of flexible plastic film, as taught in U.S. Pat. No. 3,648,690, issued Mar. 14, 1972 to Robert C. Miller et al., and assigned to the present assignee. A new sleeve and new water will be used for the next patient so that no bacteria can be transferred from one patient to the next.

The invention provides, therefore, a unique plinth assembly having a very high degree of stability which virtually eliminates the possibility of side roll. Complete water drainage from the plinth's top surface may be easily and rapidly achieved. Moreover, encasing of the plinth assembly with a plastic sleeve may be accomplished with ease.

While a particular embodiment of the invention has been shown and described, modifications may be made, and it is intended in the appended claims to cover all such modifications as may fall within the true spirit and scope of the invention.

We claim:

1. A stabilized plinth assembly for supporting a patient partially immersed in a water-filled tank of a hydrotherapy treatment system, wherein the assembly is upwardly connected to and held by a hoist mechanism, comprising:
an elongated plinth having a longitudinal axis and including a generally rectangular rigid open frame with head and foot ends and across which frame flexible material is stretched to support a patient; a pair of elongated rigid end supports each of which is pivotally coupled to said frame at a respective one of its two ends and on the plinth's longitudinal axis, and each of which supports is pivotable to an upright position wherein at least its lower portion is generally perpendicular to said plinth, each of said end supports, when held in its upright position, being rigidly locked to said frame so that no relative movement therebetween may occur; an elongated rigid spreader bar parallel spaced above said plinth and coupled between and to said end supports to maintain said supports locked in their upright positions to enhance the stability, and thereby to preclude tipping, of said plinth when a patient is lying thereon; and means for upwardly connecting the ends of said spreader bar to the hoist mechanism.

2. A stabilized plinth assembly according to claim 1 in which said plinth includes, at the foot end of said frame and underneath said flexible material, a relatively rigid flat member to prevent water from pooling as the plinth assembly is raised above the water level in the tank and tilted with the head end higher than the foot end.

3. A stabilized plinth assembly according to claim 1 in which each of said end supports is also movable to an unlocking position wherein the lower portion thereof is generally coplanar with said plinth and in which position the end support may easily be detached from said frame.

4. A stabilized plinth assembly according to claim 3 in which the lower ends of said supports are T-shaped and in which said frame has cavities with T-shaped openings at the head and foot ends to permit the lower ends of said supports to be inserted into and detached from said frame only when the lower portions of said supports are generally coplanar with said plinth, said T-shaped lower ends being locked in said cavities when said supports are pivoted to their upright positions.

5. A stabilized plinth assembly according to claim 1 in which the support, pivotally coupled to the head end of said frame, has a cross-bar rigidly affixed thereto to facilitate holding of said plinth assembly in a tilted position.

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