Lifting Stage for Aquacade

Field of the Invention

The present invention relates to a lifting stage, and more particularly, to a lifting stage for aquacade.

Background of the Invention

Modern shows require the scenes to fit the shows, and also require the scenes to change and move rapidly. Therefore, when an aquatic show is performed, a lifting stage in the water is needed to move underwater props to places within the sight of the audience, or the lifting stage needs to rise to the the water surface as required by the show, to provide a stage above the water surface for the performers.

For currently available domestic and overseas lifting stage, the transmission mechanisms are generally disposed in the water, most of which are hydraulic-driving. Such transmission mechanisms have the following potential dangers:

1. Water may be polluted due to leakge of hydraulic oil, which may further stop the performance of the show.

2. For the existing lifting systems, electricity may be used in the water as the transmission mechanism is disposed in water. Some of the existing lifting systems still lack a complete system for isolating water and electricity. Even if the driving mechanism is disposed out of water, when a driving mechanism transmits power to the transmission mechanism in the water, there may still be potential danger of leakage of electricity in the water in the event that the system for isolating water and electricity fails.

3. When the transmission mechanism is placed in water, there are problems of leakage of lubricating medium and corrosion of materials. The leakage of the lubricating medium will pollute the water. And if the corrosion of material is not properly solved, the transmission member may rust and its structural strength may be reduced, which causes potential security dangers. Thus, the transmission

mechanism needs to be repaired, thereby the performance of show may have to be stopped.

Summary of the Invention

The present invention provides a lifting stage for aquacade, which can reduce or avoide the aforementioned problems.

To solve the problems mentioned above, the present invention provides a lifting stage for aquacade, which is disposed in a pool, the pool comprises a water space located above the bottom of the pool for water storage and a foundation pit beneath the bottom of the pool for access of maintenance personnel and equipment installation, the lifting stage includes an actuating mechanism disposed in the foundation pit, a stage mechanism disposed in the water space, and a lifting rod passing through the bottom of the pool and connecting the actuating mechanism and the stage mechanism;

the stage mechanism includes a platform body, a supporting frame connected to the platform body, and a guiding device connected to the supporting frame and the bottom of the pool;

the actuating mechanism includes a guiding steel frame fixed to the bottom of the foundation pit, a guiding frame connected to the guiding steel frame and vertically movable along the guiding steel frame, and a driving motor coupled to the guiding frame;

the bottom of the pool comprises a hollow through-hole in which a sliding sleeve is disposed, and the lifting rod passes through the sliding sleeve to be connected to the supporting frame and the guiding frame, respectively.

Preferably, the sliding sleeve comprises a first sliding sleeve positioned in the water space and a second sliding sleeve positioned in the foundation pit, the first sliding sleeve is connected to the upper surface of the bottom of the pool through a first sealing assembly, and the second sliding sleeve is connected to the lower surface of the bottom of the pool through a second sealing assembly;

the first sealing assembly comprises a first base, a first supporting member, and a first positioning member, which are sequentially connected with each other by bolts, and the first base is fixedly connected to the upper surface of the bottom of the pool by bolts;

the first sliding sleeve comprises a first sliding sleeve cover, a first stopper, and a first sealing pad, which are sequentially connected with each other by bolts, the first sliding sleeve cover is fixedly connected to the first positioning member by bolts, and a first sealing member is disposed between the first sliding sleeve cover and the lifting rod;

the second sealing assembly comprises a second base, a second supporting member, and a second positioning member, which are sequentially connected with each other by bolts, the second base is fixedly connected to the lower surface of the bottom of the pool by bolts; the second sealing assembly further comprises an adjusting member, the second positioning member and the second supporting member clamp the adjusting member;

the second sliding sleeve comprises a second sliding sleeve cover and a second stopper, which are connected with each other by bolts, the second sliding sleeve cover is fixedly connected to the adjusting member by bolts, and a second sealing member is disposed between the second sliding sleeve cover and the lifting rod.

Preferably, a sleeve is disposed between the first sealing assembly and the second sealing assembly, and the sleeve covers the outside of the lifting rod, the first sliding sleeve cover and the second sliding sleeve cover.

Preferably, the second sliding sleeve cover has an inlet for drawing water, and the inlet is connected to a position below the second sealing member.

Preferably, a positioning block is provided on the second base and a positioning bolt is disposed on the positioning block for abutting against the second positioning member.

Preferably, at least two sealing rings are disposed between the first sliding sleeve cover and the lifting rod, at least one sealing ring is disposed between the first

stopper and the lifting rod, and at least two sealing rings are disposed between the second sliding sleeve cover and the lifting rod.

The lifting stage for aquacade provided in the present invention disposes the driving and transmission mechanisms in a dry foundation pit beneath the pool, so as to prevent the driving and transmission mechanisms from contacting water and thus eliminating water pollution due to leakge of the hydraulic oil into water, or the potential security danger of electric leakage in water, which is raised from using electricity in the water. In addition, the lifting stage for aquacade provided herein transmits power between the dry foundation pit and the water space of the pool only by using a lifting rod with a simple structure, therefore the problems of leakage of lubricating medium and corrosion of materials resulted from disposition of the transmission mechanism in water are avoided.

Brief Description of the Drawings

The following drawings are only intended to illustrate and explain the present invention, and are not intended to limit the scope of the invention.

Figure 1 is a structural diagram of a lifting stage for aquacade according to a specific embodiment of the present invention;

Figure 2 is an enlarged sectional view of section A of the lifting stage shown in figure 1;

Figure 3 is a partially enlarged sectional view of a first sliding sleeve of the lifting stage shown in figure 2;

Figure 4 is a partially enlarged sectional view of a second sliding sleeve of the lifting stage shown in figure 2.

Detailed Description of Embodiments

For a better understanding of the technical features, objects and effects of the

present invention, the specific embodiments of the present invention are illustrated with reference to the drawings. The same parts are designated by the same reference numerals.

The structure and principle of the lifting stage for aquacade according to the present invention will be described in detail hereinafter with reference to the drawings.

Figure 1 is a structural diagram of a lifting stage for aquacade according to a specific embodiment of the present invention. With reference to figure 1, the present invention provides a lifting stage for aquacade which is disposed in a pool. The pool comprises a water space 2 located above the bottom of the pool 1 for water storage, and a foundation pit 3 beneath the bottom of the pool 1 for access of maintenance personnel and equipment installation. The lifting stage includes an actuating mechanism 4 disposed in the foundation pit, a stage mechanism 5 disposed in the water space, and a lifting rod 6 passing through the bottom of the pool and connecting the actuating mechanism 4 and the stage mechanism 5.

The stage mechanism 5 includes a platform body 51, a supporting frame 52 connected to the platform body 51, and a guiding device 53 connected to the supporting frame 52 and the bottom of the pool 1, respectively.

The actuating mechanism 4 includes a guiding steel frame 41 fixed to the bottom of the foundation pit 3, a guiding frame 42 connected to the guiding steel frame 41 and vertically movable along the guiding steel frame 41, and a driving motor 43 coupled to the guiding frame 42.

The bottom of the pool 1 has a hollow through-hole in which a sliding sleeve is provided, the lifting rod 6 passes through the sliding sleeve to be connected to the supporting frame 52 and the guiding frame 42, respectively.

The actuating mechanism 4 of the lifting stage is disposed in the dry foundation pit 3 beneath the pool, so as to prevent the driving and transmission mechanisms from contacting water, and thus eliminating water pollution resulted from leakage of hydraulic oil into water, or the potential security danger of elecric

leakage in the water, which is raised from using electricity in the water. The lifting rod 6 can be stainless steel pipe. In this way, the lifiting stage transmits power between the dry foundation pit 3 and the water space 2 of the pool only by using the stainless steel pipe with a simple structure, thus avoiding problems of leakage of lubricating medium and corrosion of material due to the disposition of the transmission mechanism in water.

The platform body 51 is used to rise out of the water to carry performers and props during the show. The supporting frame 52 provides support of sufficient structural strength for the platform body 51. When there is no performances, the supporting frame 52 and the platform body 51 can fall down to the bottom of the pool 1 by lowering the lifting rod 6, so as to reduce the space occupation of the water space 2, thereby not affecting the application of the pool as a swimming pool or diving pool, and its other applications. The guiding device 53 can be one or more groups of foldable metal frames, which is used to ensure that the supporting frame 52 and the platform body 51 will not move laterally in the process of lifting and use.

The guiding frame 42 can move vertically along the guiding steel frame 41 under the driving of the driving motor 43, so that the lifting rod 6 can carry the supporting frame 52 and the platform body 51 to move vertically. The driving motor 43 can be flexibly installed, either fixed at the bottom of the foundation pit, or fixed to the guiding steel frame 41. And the driving motor 43 may be connected to the guiding frame 42 to drive the movement of the guiding frame 42 by setting assemblies such as brake, reversing speed reducer and transmission shaft.

A weight balancing assembly connected to the guiding frame 42 can be disposed on the guiding steel frame 41, so that the driving motor 43 of lower power can meet the requirement for driving the movement of the guiding frame 42.

Figure 2 is an enlarged sectional view of section A of the lifting stage shown in figure 1. Figure 3 is a partially enlarged sectional view of a first sliding sleeve of the lifting stage shown in figure 2. Figure 4 is a partially enlarged sectional view of a second sliding sleeve of the lifting stage shown in figure 2. With reference to

Figures 2-4, in a preferred embodiment, the sliding sleeve comprises a first sliding sleeve 7 disposed in the water space and a second sliding sleeve 8 disposed at the foundation pit. The first sliding sleeve 7 is connected to the upper surface of bottom of the pool 1 via a first sealing assembly 9, and the second sliding sleeve 8 is connected to the lower surface of the bottom of the pool 1 via a second sealing assembly 10.

The first sealing assembly 9 comprises a first base 91, a first supporting member 92, a first positioning member 93, which are sequentially connected with each other by bolts. The first base 91 is fixedly connected to the upper surface of the bottom of the pool 1 by bolts.

The first sliding sleeve 7 comprises a first sliding sleeve cover 71, a first stopper 72, a first sealing pad 73, which are sequentially connected with each other by bolts. The first sliding sleeve cover 71 is fixedly connected to the first positioning member 93 by bolts, and a first sealing member 74 is disposed between the first sliding sleeve cover 71 and the lifting rod 6.

The second sealing assembly 10 comprises a second base 101, a second supporting member 102, a second positioning member 103, which are sequentially connected with each other by bolts. The second base 101 is fixedly connected to the lower surface of the bottom of the pool 1 by bolts. The second sealing assembly 10 further comprises an adjusting member 104, the second positioning member 103 and the second supporting member 102 clamp the adjusting member 104.

The second sliding sleeve 8 comprises a second sliding sleeve cover 81 and a second stopper 82, which are sequentially connected with each other by bolts, the second sliding sleeve cover 81 is fixedly connected to the adjusting member 104 by bolts. A second sealing member 83 is disposed between the second sliding sleeve cover 81 and the lifting rod 6.

The sliding sleeve includes the first sliding sleeve 7 disposed in the water space and the second sliding sleeve 8 disposed at the foundation pit. The first sliding sleeve 7 is connected to the upper surface of bottom of the pool 1 via the first

sealing assembly 9. The second sliding sleeve 8 is connected to the lower surface of the bottom of the pool 1 via the second sealing assembly 10. Such configured, during the maintenance and overhaul of the lifting stage, it does not need to draw off water in the poll and the sliding sleeves or sealing assemblies can still be replaced. Therefore, the cost of maintenance and repairment can be significantly reduced.

The inner diameter of the first base 91 and the second base 101 can be consistent with that of the hollow through-hole at the bottom of the pool 1, so as to install the corresponding sliding sleeves or sealing assemblies. The first base 91 and the second base 101 can be fixedly connected to the bottom of the pool 1 by bolts that uniformly distribute along the circumference thereof.

The first supporting member 92 and the second supporting member 102 are used to adjust the installation position of the corresponding sliding sleeves, so that the corresponding sleeve can be at a easy-to-operate working position in the process of assembling.

Keeping the diameter of the hollow through-hole at the bottom of the pool 1 consistent, the lifting rods 6 of different diameters and corresponding sliding sleeves can be installed at the bottom of the pool 1 by the first positioning member 93 and the second positioning member 103.

The first sliding sleeve cover 71 and the second sliding sleeve cover 81 press the first sealing member 74 and the second sealing member 83 against the lifting rod 6, respectively. In this way, the water in the water space 2 can be prevented from leaking into the foundation pit 3 when the lifting rod 6 is lifting. The first stopper 72 and the second stopper 82 cooperate with the first sliding sleeve cover 71 and the second sliding sleeve cover 81, respectively, so as to restrict the position of the first sealing member 74 and the second sealing member 83, and to prevent the first sliding sleeve cover 71 and the second sliding sleeve cover 81 from escaping from their working position during the process of the lifting of the lifting rod 6. The escaping of the first sliding sleeve cover 71 and the second sliding sleeve cover 81 may cause water in water space 2 to leak into the foundation pit 3.

The first sealing pad 73 is disposed above the first stopper 72. Under the

gravity of the water, the first sealing pad 73 can better prevent the water in the water space 2 from leaking into the joint of the first sliding sleeve 7 and the lifting rod 6.

The second sealing assembly 10 further comprises an adjusting member 104. The second positioning member 103 and the second supporting member 102 clamp the adjusting member 104. When the maintenance of the lifting stage is conducted, the position of the adjusting member 104 can be flexibly adjusted by adjusting the position of the second positioning member 103, so that the verticality of the lifting rod 6 can be adjusted.

As shown in figure 2, in a preferred example, a sleeve 61 is disposed between the first sealing means 9 and the second sealing assembly 10, and the sleeve covers the outside of the lifting rod 6, the first sliding sleeve cover 71 and the second sliding sleeve cover 81. The sleeve 61 can be metal or plastic bellows. When the water in the water space 2 leaks from the joint of the first sliding sleeve 7 and the lifting rod 6, the sleeve 61 can store the leaked water and the water can leak down through the joint of the second sliding sleeve 8 and the lifting rod 6, to avoid infiltration and leakage of the water to the joint of each component of the second sealing assembly 10.

As shown in Figures 2 and 4, in a preferred example, the second sliding sleeve cover 81 has an inlet 811 for drawing water and the inlet is connected to a position below the second sealing member 83. When the water in the water space 2 leaks from the joint of the first sliding sleeve 7 and the lifting rod 6, the leaked water may continue to leak from the joint of the second sliding sleeve 8 and the lifting rod 6, which means that the leaking water will leak from the joint of the second sealing member 83 and the lifting rod 6. The inlet 811 will guide the water leaking from the joint of the second sealing mber 83 and the lifting rod 6 out of the second sliding sleeve 8. Moreover, a water diversing joint 84 can be disposed at the inlet 811, so that the leaking water can be collected and introduced by the pipe to the sump used for water storage in the foundation pit 3 and away from the actuating mechanism 4. Thus, the potential security danger of electric leakage and corrosion resulted from the water to the actuating mechanism 4 can be avoided.

As shown in figure 2, in a preferred example, a positioning block 105 is disposed on the second base 101, and a positioning bolt 106 is disposed on the positioning block 105 for abutting against the second positioning member 103. The second positioning member 103 and the second supporting member 102 clamp the adjusting member 104, thus the position of the second positioning member 103 can be adjusted more easily by the positioning bolt 106. Then the position of the adjusting member 104 can be adjusted, and the verticality of the lifting rod 6 can be adjusted accordingly.

As shown in figures 2-4, in a preferred example, at least two sealing rings 62 are disposed between the first sliding sleeve cover 71 and the lifting rod 6, at least one sealing ring 62 is disposed between the first stopper 72 and the lifting rod 6, and at least two sealing rings 62 are disposed between the second sliding sleeve cover 81 and the lifting rod 6. In this way, the sealing between the first sliding sleeve 7 or the second sliding sleeve 8 and the lifting rod 6 can be improved, and the water leakage from the water space 2 into the foundation pit 3 during the lifting of the lifting rod 6 can be reduced.

The lifting stage for aquacade provided in the present invention disposes the driving and transmission mechanisms in a dry foundation pit beneath the pool, so as to prevent the driving and transmission mechanisms from contacting with water and thus eliminating water pollution due to leakge of the hydraulic oil into water, or the potential security danger of electric leakage in water, which is raised from using electricity in the water. In addition, the lifting stage for aquacade provided herein transmits power between the dry foundation pit and the water space of the pool only by using a lifting rod with a simple structure, therefore the problems of leakage of lubricating medium and corrosion of materials resulted from disposition of the transmission mechanism in water are avoided.

A person skilled in the art will understand that, the present invention has been illustrated according to various embodiments. However, it does not mean that each of the embodiments only contains an independent technical solution. The way of illustration of the specification is only for clarity, and the specification shall be understood as a whole by a person skilled in the art. For the understanding of the

protection scope of the present invention, a person skilled in the art will understand that the technical solution involved in the embodiments can be combined with each other to form various embodiments.

The above description is only illustrative specific embodiments of the present invention, and is not intended to limit the scope of the invention. Any equivalent variations, modifications and combinations made by any skilled person in the art, without departing from the spirit and principles of the present invention, are still within the protection scope of the present invention.

Claims

1. A lifting stage for aquacade, which is disposed in a pool, wherein the pool comprises a water space located above the bottom of the pool for water storage and a foundation pit beneath the bottom of the pool for access of maintenance personnel and equipment installation, the lifting stage comprises an actuating mechanism disposed in the foundation pit, a stage mechanism disposed in the water space, and a lifting rod passing through the bottom of the pool and connecting the actuating mechanism and the stage mechanism;

the stage mechanism comprises a platform body, a supporting frame connected to the platform body, and a guiding device connected to the supporting frame and the bottom of the pool;

the actuating mechanism comprises a guiding steel frame fixed to the bottom of the foundation pit, a guiding frame connected to the guiding steel frame and vertically movable along the guiding steel frame, and a driving motor coupled to the guiding frame;

and wherein the bottom of the pool comprises a hollow through-hole in which a sliding sleeve is disposed, and the lifting rod passes through the sliding sleeve to connect to the supporting frame and the guiding frame, respectively.

2. The lifting stage of claim 1, wherein the sliding sleeve comprises a first sliding sleeve positioned in the water space and a second sliding sleeve positioned in the foundation pit, the first sliding sleeve is connected to the upper surface of the bottom of the pool through a first sealing assembly, and the second sliding sleeve is connected to the lower surface of the bottom of the pool through a second sealing assembly;

the first sealing assembly comprises a first base, a first supporting member, and a first positioning member, which are sequentially connected by bolts, and the first base is fixedly connected to the upper surface of the bottom of the pool by bolts;

the first sliding sleeve comprises a first sliding sleeve cover, a first stopper, and a first sealing pad, which are sequentially connected by bolts, the first sliding sleeve cover is fixedly connected to the first positioning member by bolts, and a first sealing member is disposed between the first sliding sleeve cover and the lifting rod;

the second sealing assembly comprises a second base, a second supporting member, and a second positioning member, which are sequentially connected by bolts, the second base is fixedly connected to the lower surface of the bottom of the pool by bolts; the second sealing assembly further comprises an adjusting member, the second positioning member and the second supporting member clamp the adjusting member;

the second sliding sleeve comprises a second sliding sleeve cover and a second stopper, which are sequentially connected by bolts, the second sliding sleeve cover is fixedly connected to the adjusting member by bolts, and a second sealing member is disposed between the second sliding sleeve cover and the lifting rod.

3. The lifting stage of claim 2, wherein a sleeve is disposed between the first sealing assembly and the second sealing assembly, and the sleeve covers the outside of the lifting rod, the first sliding sleeve cover and the second sliding sleeve cover.

4. The lifting stage of claim 2, wherein the second sliding sleeve cover has an inlet for drawing water, and the inlet is connected to a position below the second sealing member.

5. The lifting stage of claim 2, wherein a positioning block is disposed on the second base and a positioning bolt is disposed on the positioning block for abutting against the second positioning member.

6. The lifting stage of claim 2, wherein at least two sealing rings are disposed between the first sliding sleeve cover and the lifting rod, at least one sealing ring is disposed between the first stopper and the lifting rod, and at least two sealing rings are disposed between the second sliding sleeve cover and the lifting rod.

Lifting Stage for Aquacade

Field of the Invention

The present invention relates to a lifting stage, and more particularly, to a lifting stage for aquacade.

Background of the Invention

Modern shows require the scenes to fit the shows, and also require the scenes to change and move rapidly. Therefore, when an aquatic show is performed, a lifting stage in the water is needed to move underwater props to places within the sight of the audience, or the lifting stage needs to rise to the the water surface as required by the show, to provide a stage above the water surface for the performers.

For currently available domestic and overseas lifting stage, the transmission mechanisms are generally disposed in the water, most of which are hydraulic-driving. Such transmission mechanisms have the following potential dangers:

1. Water may be polluted due to leakge of hydraulic oil, which may further stop the performance of the show.

2. For the existing lifting systems, electricity may be used in the water as the transmission mechanism is disposed in water. Some of the existing lifting systems still lack a complete system for isolating water and electricity. Even if the driving mechanism is disposed out of water, when a driving mechanism transmits power to the transmission mechanism in the water, there may still be potential danger of leakage of electricity in the water in the event that the system for isolating water and electricity fails.

3. When the transmission mechanism is placed in water, there are problems of leakage of lubricating medium and corrosion of materials. The leakage of the lubricating medium will pollute the water. And if the corrosion of material is not properly solved, the transmission member may rust and its structural strength may be reduced, which causes potential security dangers. Thus, the transmission mechanism needs to be repaired, thereby the performance of show may have to be stopped.

Summary of the Invention

The present invention provides a lifting stage for aquacade, which can reduce or avoide the aforementioned problems.

To solve the problems mentioned above, the present invention provides a lifting stage for aquacade, which is disposed in a pool, the pool comprises a water space located above the bottom of the pool for water storage and a foundation pit beneath the bottom of the pool for access of maintenance personnel and equipment installation, the lifting stage includes an actuating mechanism disposed in the foundation pit, a stage mechanism disposed in the water space, and a lifting rod passing through the bottom of the pool and connecting the actuating mechanism and the stage mechanism;

the stage mechanism includes a platform body, a supporting frame connected to the platform body, and a guiding device connected to the supporting frame and the bottom of the pool;

the actuating mechanism includes a guiding steel frame fixed to the bottom of the foundation pit, a guiding frame connected to the guiding steel frame and vertically movable along the guiding steel frame, and a driving motor coupled to the guiding frame;

the bottom of the pool comprises a hollow through-hole in which a sliding sleeve is disposed, and the lifting rod passes through the sliding sleeve to be connected to the supporting frame and the guiding frame, respectively.

Preferably, the sliding sleeve comprises a first sliding sleeve positioned in the water space and a second sliding sleeve positioned in the foundation pit, the first sliding sleeve is connected to the upper surface of the bottom of the pool through a first sealing assembly, and the second sliding sleeve is connected to the lower surface of the bottom of the pool through a second sealing assembly;

the first sealing assembly comprises a first base, a first supporting member, and a first positioning member, which are sequentially connected with each other by bolts, and the first base is fixedly connected to the upper surface of the bottom of the pool by bolts;

the first sliding sleeve comprises a first sliding sleeve cover, a first stopper, and a first sealing pad, which are sequentially connected with each other by bolts, the first

sliding sleeve cover is fixedly connected to the first positioning member by bolts, and a first sealing member is disposed between the first sliding sleeve cover and the lifting rod;

the second sealing assembly comprises a second base, a second supporting member, and a second positioning member, which are sequentially connected with each other by bolts, the second base is fixedly connected to the lower surface of the bottom of the pool by bolts; the second sealing assembly further comprises an adjusting member, the second positioning member and the second supporting member clamp the adjusting member;

the second sliding sleeve comprises a second sliding sleeve cover and a second stopper, which are connected with each other by bolts, the second sliding sleeve cover is fixedly connected to the adjusting member by bolts, and a second sealing member is disposed between the second sliding sleeve cover and the lifting rod.

Preferably, a sleeve is disposed between the first sealing assembly and the second sealing assembly, and the sleeve covers the outside of the lifting rod, the first sliding sleeve cover and the second sliding sleeve cover.

Preferably, the second sliding sleeve cover has an inlet for drawing water, and the inlet is connected to a position below the second sealing member.

Preferably, a positioning block is provided on the second base and a positioning bolt is disposed on the positioning block for abutting against the second positioning member.

Preferably, at least two sealing rings are disposed between the first sliding sleeve cover and the lifting rod, at least one sealing ring is disposed between the first stopper and the lifting rod, and at least two sealing rings are disposed between the second sliding sleeve cover and the lifting rod.

The lifting stage for aquacade provided in the present invention disposes the driving and transmission mechanisms in a dry foundation pit beneath the pool, so as to prevent the driving and transmission mechanisms from contacting water and thus eliminating water pollution due to leakge of the hydraulic oil into water, or the potential security danger of electric leakage in water, which is raised from using electricity in the water. In addition, the lifting stage for aquacade provided herein transmits power between the dry foundation pit and the water space of the pool only

by using a lifting rod with a simple structure, therefore the problems of leakage of lubricating medium and corrosion of materials resulted from disposition of the transmission mechanism in water are avoided.

Brief Description of the Drawings

The following drawings are only intended to illustrate and explain the present invention, and are not intended to limit the scope of the invention.

Figure 1 is a structural diagram of a lifting stage for aquacade according to a specific embodiment of the present invention;

Figure 2 is an enlarged sectional view of section A of the lifting stage shown in figure 1;

Figure 3 is a partially enlarged sectional view of a first sliding sleeve of the lifting stage shown in figure 2;

Figure 4 is a partially enlarged sectional view of a second sliding sleeve of the lifting stage shown in figure 2.

Detailed Description of Embodiments

For a better understanding of the technical features, objects and effects of the present invention, the specific embodiments of the present invention are illustrated with reference to the drawings. The same parts are designated by the same reference numerals.

The structure and principle of the lifting stage for aquacade according to the present invention will be described in detail hereinafter with reference to the drawings.

Figure 1 is a structural diagram of a lifting stage for aquacade according to a specific embodiment of the present invention. With reference to figure 1, the present invention provides a lifting stage for aquacade which is disposed in a pool. The pool comprises a water space 2 located above the bottom of the pool 1 for water storage, and a foundation pit 3 beneath the bottom of the pool 1 for access of maintenance personnel and equipment installation. The lifting stage includes an actuating

mechanism 4 disposed in the foundation pit, a stage mechanism 5 disposed in the water space, and a lifting rod 6 passing through the bottom of the pool and connecting the actuating mechanism 4 and the stage mechanism 5.

The stage mechanism 5 includes a platform body 51, a supporting frame 52 connected to the platform body 51, and a guiding device 53 connected to the supporting frame 52 and the bottom of the pool 1, respectively.

The actuating mechanism 4 includes a guiding steel frame 41 fixed to the bottom of the foundation pit 3, a guiding frame 42 connected to the guiding steel frame 41 and vertically movable along the guiding steel frame 41, and a driving motor 43 coupled to the guiding frame 42.

The bottom of the pool 1 has a hollow through-hole in which a sliding sleeve is provided, the lifting rod 6 passes through the sliding sleeve to be connected to the supporting frame 52 and the guiding frame 42, respectively.

The actuating mechanism 4 of the lifting stage is disposed in the dry foundation pit 3 beneath the pool, so as to prevent the driving and transmission mechanisms from contacting water, and thus eliminating water pollution resulted from leakage of hydraulic oil into water, or the potential security danger of elecric leakage in the water, which is raised from using electricity in the water. The lifting rod 6 can be stainless steel pipe. In this way, the lifiting stage transmits power between the dry foundation pit 3 and the water space 2 of the pool only by using the stainless steel pipe with a simple structure, thus avoiding problems of leakage of lubricating medium and corrosion of material due to the disposition of the transmission mechanism in water.

The platform body 51 is used to rise out of the water to carry performers and props during the show. The supporting frame 52 provides support of sufficient structural strength for the platform body 51. When there is no performances, the supporting frame 52 and the platform body 51 can fall down to the bottom of the pool 1 by lowering the lifting rod 6, so as to reduce the space occupation of the water space 2, thereby not affecting the application of the pool as a swimming pool or diving pool, and its other applications. The guiding device 53 can be one or more groups of foldable metal frames, which is used to ensure that the supporting frame 52 and the platform body 51 will not move laterally in the process of lifting and use.

The guiding frame 42 can move vertically along the guiding steel frame 41

under the driving of the driving motor 43, so that the lifting rod 6 can carry the supporting frame 52 and the platform body 51 to move vertically. The driving motor 43 can be flexibly installed, either fixed at the bottom of the foundation pit, or fixed to the guiding steel frame 41. And the driving motor 43 may be connected to the guiding frame 42 to drive the movement of the guiding frame 42 by setting assemblies such as brake, reversing speed reducer and transmission shaft.

A weight balancing assembly connected to the guiding frame 42 can be disposed on the guiding steel frame 41, so that the driving motor 43 of lower power can meet the requirement for driving the movement of the guiding frame 42.

Figure 2 is an enlarged sectional view of section A of the lifting stage shown in figure 1. Figure 3 is a partially enlarged sectional view of a first sliding sleeve of the lifting stage shown in figure 2. Figure 4 is a partially enlarged sectional view of a second sliding sleeve of the lifting stage shown in figure 2. With reference to Figures 2-4, in a preferred embodiment, the sliding sleeve comprises a first sliding sleeve 7 disposed in the water space and a second sliding sleeve 8 disposed at the foundation pit. The first sliding sleeve 7 is connected to the upper surface of bottom of the pool 1 via a first sealing assembly 9, and the second sliding sleeve 8 is connected to the lower surface of the bottom of the pool 1 via a second sealing assembly 10.

The first sealing assembly 9 comprises a first base 91, a first supporting member 92, a first positioning member 93, which are sequentially connected with each other by bolts. The first base 91 is fixedly connected to the upper surface of the bottom of the pool 1 by bolts.

The first sliding sleeve 7 comprises a first sliding sleeve cover 71, a first stopper 72, a first sealing pad 73, which are sequentially connected with each other by bolts. The first sliding sleeve cover 71 is fixedly connected to the first positioning member 93 by bolts, and a first sealing member 74 is disposed between the first sliding sleeve cover 71 and the lifting rod 6.

The second sealing assembly 10 comprises a second base 101, a second supporting member 102, a second positioning member 103, which are sequentially connected with each other by bolts. The second base 101 is fixedly connected to the lower surface of the bottom of the pool 1 by bolts. The second sealing assembly 10

further comprises an adjusting member 104, the second positioning member 103 and the second supporting member 102 clamp the adjusting member 104.

The second sliding sleeve 8 comprises a second sliding sleeve cover 81 and a second stopper 82, which are sequentially connected with each other by bolts, the second sliding sleeve cover 81 is fixedly connected to the adjusting member 104 by bolts. A second sealing member 83 is disposed between the second sliding sleeve cover 81 and the lifting rod 6.

The sliding sleeve includes the first sliding sleeve 7 disposed in the water space and the second sliding sleeve 8 disposed at the foundation pit. The first sliding sleeve 7 is connected to the upper surface of bottom of the pool 1 via the first sealing assembly 9. The second sliding sleeve 8 is connected to the lower surface of the bottom of the pool 1 via the second sealing assembly 10. Such configured, during the maintenance and overhaul of the lifting stage, it does not need to draw off water in the poll and the sliding sleeves or sealing assemblies can still be replaced. Therefore, the cost of maintenance and repairment can be significantly reduced.

The inner diameter of the first base 91 and the second base 101 can be consistent with that of the hollow through-hole at the bottom of the pool 1, so as to install the corresponding sliding sleeves or sealing assemblies. The first base 91 and the second base 101 can be fixedly connected to the bottom of the pool 1 by bolts that uniformly distribute along the circumference thereof.

The first supporting member 92 and the second supporting member 102 are used to adjust the installation position of the corresponding sliding sleeves, so that the corresponding sleeve can be at a easy-to-operate working position in the process of assembling.

Keeping the diameter of the hollow through-hole at the bottom of the pool 1 consistent, the lifting rods 6 of different diameters and corresponding sliding sleeves can be installed at the bottom of the pool 1 by the first positioning member 93 and the second positioning member 103.

The first sliding sleeve cover 71 and the second sliding sleeve cover 81 press the first sealing member 74 and the second sealing member 83 against the lifting rod 6, respectively. In this way, the water in the water space 2 can be prevented from leaking into the foundation pit 3 when the lifting rod 6 is lifting. The first stopper 72

and the second stopper 82 cooperate with the first sliding sleeve cover 71 and the second sliding sleeve cover 81, respectively, so as to restrict the position of the first sealing member 74 and the second sealing member 83, and to prevent the first sliding sleeve cover 71 and the second sliding sleeve cover 81 from escaping from their working position during the process of the lifting of the lifting rod 6. The escaping of the first sliding sleeve cover 71 and the second sliding sleeve cover 81 may cause water in water space 2 to leak into the foundation pit 3.

The first sealing pad 73 is disposed above the first stopper 72. Under the gravity of the water, the first sealing pad 73 can better prevent the water in the water space 2 from leaking into the joint of the first sliding sleeve 7 and the lifting rod 6.

The second sealing assembly 10 further comprises an adjusting member 104. The second positioning member 103 and the second supporting member 102 clamp the adjusting member 104. When the maintenance of the lifting stage is conducted, the position of the adjusting member 104 can be flexibly adjusted by adjusting the position of the second positioning member 103, so that the verticality of the lifting rod 6 can be adjusted.

As shown in figure 2, in a preferred example, a sleeve 61 is disposed between the first sealing means 9 and the second sealing assembly 10, and the sleeve covers the outside of the lifting rod 6, the first sliding sleeve cover 71 and the second sliding sleeve cover 81. The sleeve 61 can be metal or plastic bellows. When the water in the water space 2 leaks from the joint of the first sliding sleeve 7 and the lifting rod 6, the sleeve 61 can store the leaked water and the water can leak down through the joint of the second sliding sleeve 8 and the lifting rod 6, to avoid infiltration and leakage of the water to the joint of each component of the second sealing assembly 10.

As shown in Figures 2 and 4, in a preferred example, the second sliding sleeve cover 81 has an inlet 811 for drawing water and the inlet is connected to a position below the second sealing member 83. When the water in the water space 2 leaks from the joint of the first sliding sleeve 7 and the lifting rod 6, the leaked water may continue to leak from the joint of the second sliding sleeve 8 and the lifting rod 6, which means that the leaking water will leak from the joint of the second sealing member 83 and the lifting rod 6. The inlet 811 will guide the water leaking from the joint of the second sealing mber 83 and the lifting rod 6 out of the second sliding sleeve 8. Moreover, a water diversing joint 84 can be disposed at the inlet 811, so

that the leaking water can be collected and introduced by the pipe to the sump used for water storage in the foundation pit 3 and away from the actuating mechanism 4. Thus, the potential security danger of electric leakage and corrosion resulted from the water to the actuating mechanism 4 can be avoided.

As shown in figure 2, in a preferred example, a positioning block 105 is disposed on the second base 101, and a positioning bolt 106 is disposed on the positioning block 105 for abutting against the second positioning member 103. The second positioning member 103 and the second supporting member 102 clamp the adjusting member 104, thus the position of the second positioning member 103 can be adjusted more easily by the positioning bolt 106. Then the position of the adjusting member 104 can be adjusted, and the verticality of the lifting rod 6 can be adjusted accordingly.

As shown in figures 2-4, in a preferred example, at least two sealing rings 62 are disposed between the first sliding sleeve cover 71 and the lifting rod 6, at least one sealing ring 62 is disposed between the first stopper 72 and the lifting rod 6, and at least two sealing rings 62 are disposed between the second sliding sleeve cover 81 and the lifting rod 6. In this way, the sealing between the first sliding sleeve 7 or the second sliding sleeve 8 and the lifting rod 6 can be improved, and the water leakage from the water space 2 into the foundation pit 3 during the lifting of the lifting rod 6 can be reduced.

The lifting stage for aquacade provided in the present invention disposes the driving and transmission mechanisms in a dry foundation pit beneath the pool, so as to prevent the driving and transmission mechanisms from contacting with water and thus eliminating water pollution due to leakge of the hydraulic oil into water, or the potential security danger of electric leakage in water, which is raised from using electricity in the water. In addition, the lifting stage for aquacade provided herein transmits power between the dry foundation pit and the water space of the pool only by using a lifting rod with a simple structure, therefore the problems of leakage of lubricating medium and corrosion of materials resulted from disposition of the transmission mechanism in water are avoided.

A person skilled in the art will understand that, the present invention has been illustrated according to various embodiments. However, it does not mean that each of the embodiments only contains an independent technical solution. The way of

illustration of the specification is only for clarity, and the specification shall be understood as a whole by a person skilled in the art. For the understanding of the protection scope of the present invention, a person skilled in the art will understand that the technical solution involved in the embodiments can be combined with each other to form various embodiments.

The above description is only illustrative specific embodiments of the present invention, and is not intended to limit the scope of the invention as defined by the pending claims, which may include equivalent variations, modifications and combinations made by any skilled person in the art, without departing from the principles of the present invention.

Claims

1. A lifting stage for aquacade, which is disposed in a pool, wherein the pool comprises a water space located above the bottom of the pool for water storage and a foundation pit beneath the bottom of the pool for access of maintenance personnel and equipment installation, the lifting stage comprises an actuating mechanism disposed in the foundation pit, a stage mechanism disposed in the water space, and a lifting rod passing through the bottom of the pool and connecting the actuating mechanism and the stage mechanism;

the stage mechanism comprises a platform body, a supporting frame connected to the platform body, and a guiding device connected to the supporting frame and the bottom of the pool;

the actuating mechanism comprises a guiding steel frame fixed to the bottom of the foundation pit, a guiding frame connected to the guiding steel frame and vertically movable along the guiding steel frame, and a driving motor coupled to the guiding frame;

and wherein the bottom of the pool comprises a hollow through-hole in which a sliding sleeve is disposed, and the lifting rod passes through the sliding sleeve to connect to the supporting frame and the guiding frame, respectively.

2. The lifting stage of claim 1, wherein the sliding sleeve comprises a first sliding sleeve positioned in the water space and a second sliding sleeve positioned in the foundation pit, the first sliding sleeve is connected to the upper surface of the bottom of the pool through a first sealing assembly, and the second sliding sleeve is connected to the lower surface of the bottom of the pool through a second sealing assembly;

the first sealing assembly comprises a first base, a first supporting member, and a first positioning member, which are sequentially connected by bolts, and the first base is fixedly connected to the upper surface of the bottom of the pool by bolts;

the first sliding sleeve comprises a first sliding sleeve cover, a first stopper, and a first sealing pad, which are sequentially connected by bolts, the first sliding sleeve

cover is fixedly connected to the first positioning member by bolts, and a first sealing member is disposed between the first sliding sleeve cover and the lifting rod;

the second sealing assembly comprises a second base, a second supporting member, and a second positioning member, which are sequentially connected by bolts, the second base is fixedly connected to the lower surface of the bottom of the pool by bolts; the second sealing assembly further comprises an adjusting member, the second positioning member and the second supporting member clamp the adjusting member;

the second sliding sleeve comprises a second sliding sleeve cover and a second stopper, which are sequentially connected by bolts, the second sliding sleeve cover is fixedly connected to the adjusting member by bolts, and a second sealing member is disposed between the second sliding sleeve cover and the lifting rod.

3. The lifting stage of claim 2, wherein a sleeve is disposed between the first sealing assembly and the second sealing assembly, and the sleeve covers the outside of the lifting rod, the first sliding sleeve cover and the second sliding sleeve cover.

4. The lifting stage of claim 2, wherein the second sliding sleeve cover has an inlet for drawing water, and the inlet is connected to a position below the second sealing member.

5. The lifting stage of claim 2, wherein a positioning block is disposed on the second base and a positioning bolt is disposed on the positioning block for abutting against the second positioning member.

6. The lifting stage of claim 2, wherein at least two sealing rings are disposed between the first sliding sleeve cover and the lifting rod, at least one sealing ring is disposed between the first stopper and the lifting rod, and at least two sealing rings are disposed between the second sliding sleeve cover and the lifting rod.