

FLOOD BARRIER SYSTEM

FIELD OF THE INVENTION

[0001] The present invention relates to a flood barrier system. The laterally acting pressure and downwardly acting pressure of the barrier can be controlled through a lever, having the advantages of convenient and fast operation.

BACKGROUND OF THE INVENTION

[0002] A flood barrier is generally used in areas where floods often occur. The flood barrier mainly includes two upright posts, a bottom plate arranged on the ground, a barrier panel between the upright posts and the bottom plate, and a tightening mechanism. The posts and the bottom plate are provided with watertight rubber strips. The barrier panel is pressed tightly toward the watertight rubber strips through the tightening mechanism to complete the installation.

[0003] A conventional tightening mechanism is to press the barrier panel through a pressing block, rotatable eccentric cam or quick-release member. In order to maintain a better watertight effect, the upper end and the side of the barrier panel are provided with the tightening mechanism. This means that it takes two operations to lock and fix the barrier panel, which is not conducive to set the flood barrier in an emergency.

SUMMARY OF THE INVENTION

[0004] The primary object of the present invention is to provide a flood barrier system, comprising a pair of posts, a pair of top seats, a bottom plate, and a barrier. The posts each have a rail therein. One side of the rail is provided with an upright rubber sealing strip. The top seats are installed to tops of the posts, respectively. The top seats each have a front plate, a rear plate, and a top plate connecting two ends of the front plate and the rear plate. The front plate and the rear plate each have a shaft receiving notch. The top plate has a lever receiving notch and a panel receiving groove. The bottom plate is installed to bottoms of the posts. The barrier is inserted from the panel receiving groove in the rail to lean against the bottom plate. One side of the barrier faces the upright rubber sealing strip. A panel tightening device is provided between the barrier and each of the posts.

[0005] The panel tightening device includes a main spindle, a connecting sleeve, a linking shaft, and an operating lever.

[0006] The main spindle has at least one groove axially arranged. At least one laterally acting pressure cam is sleeved on the main spindle. The main spindle is positioned in the corresponding post and located on another side of the barrier.

[0007] The connecting sleeve has a bottom that is axially installed to the main spindle and a top that has an axial groove adjacent to the lever receiving notch.

[0008] The linking shaft has one end extending along a radial direction of the connecting sleeve. Part of the linking shaft is exposed in the axial groove. Another end of the linking shaft is sleeved with a downwardly acting pressure cam.

[0009] The operating lever is installed to the linking shaft from the axial groove of the connecting sleeve. The operating lever, the linking shaft and the main spindle intersect in their extension directions and are perpendicular to each other.

[0010] The laterally acting pressure cam has a convex portion facing outward in a direction same as the extension direction of the linking shaft. The downwardly acting pressure cam is located above the barrier and has a convex portion facing away from the operating lever.

[0011] A tightening operation of the panel tightening device is to rotate the linking shaft about an axis of the main spindle so that the two ends of the linking shaft are respectively positioned in the shaft receiving notches of the front plate and the rear plate, and the operating lever is rotated about an axis the linking shaft to be positioned in the lever receiving notch.

[0012] Thus, the barrier can be pressed and tightened laterally and downwardly by operating the operating lever, having the advantages of convenient operation and quick installation.

[0013] Furthermore, the main spindle of the panel tightening device is sleeved with a plurality of retaining blocks. The main spindle is rotatable in the retaining blocks. One side of each retaining block is fixed to the post. The barrier includes a plurality of barrier panels that are vertically stacked one on top of the other. The width of each barrier panel is about equal to the distance between every adjacent two of the retaining blocks. A panel sealing strip is provided between every adjacent two of the barrier panels to increase the degree of tightness.

[0014] Furthermore, the posts each include a post body. The rail is insertedly connected to the post body. The barrier is insertedly connected to a track of the rail.

[0015] Furthermore, a surface of the convex portion of the downwardly acting pressure cam or/and the laterally acting pressure cam is provided with a round bar coaxial with the main spindle to reduce the friction when tightened.

[0016] Furthermore, a top of the barrier is provided with a pressing block under the downwardly acting pressure cam. A bottom of the barrier is provided with a bottom rubber sealing strip to increase the degree of downwardly acting pressure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is an exploded view of the flood barrier system provided by the present invention;

[0018] FIG. 2 is an exploded view of the post and the panel tightening device of the flood barrier system provided by the present invention;

[0019] FIG. 3 is an exploded view of the panel tightening device of the flood barrier system provided by the present invention;

[0020] FIG. 4 is an assembled view of the post and the panel tightening device of the flood barrier system provided by the present invention;

[0021] FIG. 5. FIG. 6 and FIG. 8 are schematic views showing the continuous operation of the panel tightening device of the flood barrier system provided by the present invention;

[0022] FIG. 7 is a cross-sectional view of FIG. 6; and

[0023] FIG. 9 is a longitudinal sectional view of FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings.

[0025] In the following description, the side of the post 10, 10A where the barrier 30 is installed is defined as the rear side, and the side of the post 10, 10A where the panel tightening device 20 is installed is defined as the front side, so as to facilitate the understanding of those skilled in the art.

[0026] Referring to FIGS. 1 to 4, a flood barrier system comprises a pair of posts 10, 10A, a bottom plate 15, and a barrier 30.

[0027] The overall width of the barrier 30 is defined between the posts 10, 10A. The posts 10, 10A each include a post body 11 that defines a rail mounting space 110 therein. A □-shaped rail 12 is insertedly connected to the post body 1. The inner side of the rail 12 is provided with a track 120 on which the barrier 30 is installed. An upright rubber sealing strip 14 is provided on the rear side of the rail 12. The bottom plate 15 is installed to the bottoms of the posts 10, 10A.

[0028] A pair of top seats 13 are sleeved on the rails 12 and located on the tops of the posts 10, 10A. The front side of the rail 12 is formed with a plurality of top seat locking holes 121 for insertion of the top seat locking screws 133, so that the top seats 13 are locked to the rails 12, respectively. The top seats 13 each have a front plate, a rear plate, and a top plate connecting two ends of the front plate and the rear plate, forming a □-shaped fixing structure. The front plate and the rear plate each have a shaft receiving notch 130, 130A located at the same height. The top plate has a lever receiving notch 132 and a panel receiving groove 131.

[0029] The barrier 30 includes a plurality of barrier panels, for example, a lower barrier panel 31, at least one middle barrier panel 32, and an upper barrier panel 33 as shown in FIG. 1. The barrier panels are inserted from the panel receiving grooves 131 of the top seats 13, and are stacked one on top of the other along the tracks 120. A bottom rubber sealing strip 34 is provided under the lower barrier panel 31 to abut against the bottom plate 15. A panel sealing strip 35 is provided between every adjacent two of the panels to increase the degree of tightness. Two ends of the upper edge of the upper barrier panel 33 are provided with pressing blocks 36.

[0030] Two panel tightening devices 20 are symmetrically installed between the barrier 30 and the respective posts 10, 10A. Taking the post 10 as an example, the panel tightening device 20 includes a main spindle 21, an operating lever 28 and a linking shaft 25 that are integrated through a connecting sleeve 24. The operating lever 28, the linking shaft 25 and the main spindle 21 intersect in their extension directions and are perpendicular to each other.

[0031] The main spindle 21 is sleeved with at least one retaining block 22. The retaining block 22 has a circular pivot hole 220 therein, so that the main spindle 21 is rotatable in the retaining block 22. The front side of the rail 12 is formed with a plurality of perforations 122. Locking screws 222 are inserted through the perforations 122 and locking holes 221 on the front side of the retaining block 22 to be fixed to the rail 12, so that the main

spindle 21 is positioned on the rail 12. The main spindle 21 has at least one groove arranged axially. (For example, grooves are formed by a plurality of spaced ribs arranged axially.) The main spindle 21 is sleeved with at least one laterally acting pressure cam 23. The laterally acting pressure cam 23 has a fitting hole 230 matching the groove of the main spindle 21. Thus, the main spindle 21 can be linked by the laterally acting pressure cam 23 to rotate. On the premise of being operable, the main spindle 21 may be formed with only one groove or rib. The fitting hole 230 of the laterally acting pressure cam 23 matches the wavy surface of the main spindle 21.

[0032] The bottom of the connecting sleeve 24 has a bolt hole 242 aligned with a through hole 210 at one end of the main spindle 21 for a bolt 243 to pass therethrough, so that the connecting sleeve 24 is coaxially arranged with the main spindle 21. The top of the connecting sleeve 24 has an axial groove 240. When the main spindle 21 is positioned, the axial groove 240 is adjacent to the lever receiving notch 132 of the top seat 13. The axial groove 240 formed on the top of the connecting sleeve 24 enables the connecting sleeve 24 to have a U-shaped wall. Two extension arms of the U-shaped wall are formed with radial perforations 241.

[0033] The linking shaft 25 sequentially defines a pivot shaft portion 250, a cam shaft portion 252 and a straddling shaft portion 253 that are coaxially arranged. The overall length of the linking shaft 25 is slightly greater than the width of the top seat 13. The pivot shaft portion 250 is inserted through the two radial perforations 241 of the connecting sleeve 24. At this time, part of the cam shaft portion 252 exposed to the axial groove 240 has a positioning hole 251 for positioning the operating lever 28. The cam shaft portion 252 of the linking shaft 25 has a hexagonal profile, and is inserted into a connecting hole 270 of a downwardly acting pressure cam 27, so that the downwardly acting pressure cam 27 and the linking shaft 25 rotate synchronously. The straddling shaft portion 253 is located on the outermost side. The components of the linking shaft 25 are positioned through a plurality of C-shaped retaining rings 26.

[0034] The other end of the operating lever 28 is provided with a grip 280 for the user to hold and operate the panel tightening device 20.

[0035] Taking the installation positions shown in FIG. 4 and FIG. 5 as an example, when the components of the panel tightening device 20 are installed, the operating lever 28, the linking shaft 25 and the main spindle 21 intersect in their extension directions and are perpendicular to each other. The operating lever 28 faces the front side and is positioned in the

shaft receiving notch 130. At this time, the convex portion of the laterally acting pressure cam 23 faces outward in a direction same as the extension direction of the linking shaft 25, and is located below the straddling shaft portion 253. The convex portion of the downwardly acting pressure cam 27 faces backward (away from the operating lever 28) and is located above the barrier 30.

[0036] The above arrangement allows the user to press and tighten the barrier laterally and downwardly by operating the operating lever 28.

[0037] FIG. 5, FIG. 6 and FIG. 7 illustrate that the barrier is pressed and tightened laterally. The user pulls the operating lever 28 backward with the main spindle 21 as the axis toward the barrier 30.

[0038] At this time, the operating lever 28 leaves the shaft receiving notch 130. The operating lever 28 pulls the connecting sleeve 24 from the axial groove 240 of the connecting sleeve 24 to rotate, and the main spindle 21 rotates with the retaining block 22 as the center. The connecting sleeve 24 rotates and drives the linking shaft 25 to rotate, so that the straddling shaft portion 253 is pushed into the shaft receiving notch 130A, and the downwardly acting pressure cam 27 is moved to the upper edge of the pressing block 36 of the barrier 30 (as shown in FIG. 6).

[0039] At this time, due to the synchronous rotation of the main spindle 21 and the laterally acting pressure cam 23, the front surface of the barrier 30 is squeezed, so that the rear surface of the barrier 30 is in close contact with the upright rubber sealing strip 14 to provide a watertight sealing effect on both sides of the panels of the barrier 30.

[0040] FIG. 6, FIG. 8 and FIG. 9 illustrate that the barrier is pressed and tightened downwardly. Through the above operations, the pivot shaft portion 250 and the straddling shaft portion 253 of the linking shaft 25 are respectively positioned in the shaft receiving notch 130, 130A of the front and rear plates of the top seat to obtain an axial support. The user pulls the operating lever 28 with the linking shaft 25 as the axis toward the upper end of the barrier 30.

[0041] At this time, the operating lever 28 is moved along the axial groove 240 into the lever receiving notch 132, so as to pull the linking shaft 25 to rotate.

[0042] At this time, the downwardly acting pressure cam 27 is linked by the linking shaft 25 rotate synchronously to squeeze the pressing block 36. The upper end of the barrier 30 is pushed downward by the pressing block 36, so that the bottom rubber sealing strip 34 at

the bottom of the barrier 30 is pressed against the bottom plate 15 to provide a watertight sealing effect on the bottom of the barrier 30.

[0043] In this embodiment, the main spindle 21 is sleeved with a plurality of spaced retaining blocks 22. The distance between every adjacent two of the retaining blocks 22 is about equal to the width of the corresponding barrier panel 31, 32, 33 of the barrier 30. At least one laterally acting pressure cam 23 is arranged between every adjacent two of the retaining blocks 22, so that each barrier panel 31, 32, 33 of the barrier 30 is pressed tightly, laterally.

[0044] In this embodiment, the surface of the convex portion of the downwardly acting pressure cam 27 or/and the laterally acting pressure cam 23 is provided with a coaxial round bar 231. Therefore, when the cam is linked by the main spindle 21 or the linking shaft 25, the friction between the cam 23, 27 and the barrier 30 can be reduced, which is more convenient for operation. However, the surface of the convex portion of the downwardly acting pressure cam 27 or/and the laterally acting pressure cam 23 may be provided with a rolling element, such as spheres, to achieve a similar effect.

[0045] Although particular embodiments of the present invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the present invention. Accordingly, the present invention is not to be limited except as by the appended claims.

WHAT IS CLAIMED IS:

1. A flood barrier system, comprising:

a pair of posts, each having a rail therein, one side of the rail being provided with an upright rubber sealing strip;

a pair of top seats, installed to tops of the posts respectively, the top seats each having a front plate, a rear plate and a top plate connecting two ends of the front plate and the rear plate, the front plate and the rear plate each having a shaft receiving notch, the top plate having a lever receiving notch and a panel receiving groove;

a bottom plate, installed to bottoms of the posts; and

a barrier, inserted from the panel receiving groove in the rail to lean against the bottom plate, one side of the barrier facing the upright rubber sealing strip, a panel tightening device being provided between the barrier and each of the posts, the panel tightening device including:

a main spindle, having at least one groove axially arranged, at least one laterally acting pressure cam being sleeved on the main spindle, the main spindle being positioned in the corresponding post and located on another side of the barrier;

a connecting sleeve, having a bottom that is axially installed to the main spindle and a top that has an axial groove adjacent to the lever receiving notch;

a linking shaft, having one end extending along a radial direction of the connecting sleeve, part of the linking shaft being exposed in the axial groove, another end of the linking shaft being sleeved with a downwardly acting pressure cam; and

an operating lever, installed to the linking shaft from the axial groove of the connecting sleeve, the operating lever, the linking shaft and the main spindle intersecting in their extension directions and being perpendicular to each other;

wherein the laterally acting pressure cam has a convex portion facing outward in a direction same as the extension direction of the linking shaft, the downwardly acting pressure cam is located above the barrier and has a convex portion facing away from the operating lever;

wherein a tightening operation of the panel tightening device is to rotate the linking shaft about an axis of the main spindle so that the two ends of the linking shaft are respectively

positioned in the shaft receiving notches of the front plate and the rear plate, and the operating lever is rotated about an axis the linking shaft to be positioned in the lever receiving notch.

2. The flood barrier system as claimed in claim 1, wherein the barrier includes a plurality of barrier panels, and the laterally acting pressure cam is plural and corresponds in number to the barrier panels.

3. The flood barrier system as claimed in claim 2, wherein a panel sealing strip is provided between every adjacent two of the barrier panels.

4. The flood barrier system as claimed in claim 1, wherein the posts each include a post body, the rail is insertedly connected to the post body, the barrier is insertedly connected to a track of the rail.

5. The flood barrier system as claimed in claim 1, wherein a surface of the convex portion of the downwardly acting pressure cam or/and the laterally acting pressure cam is provided with a coaxial round bar or rolling element.

6. The flood barrier system as claimed in claim 1, wherein the main spindle of the panel tightening device is sleeved with at least one retaining block, the main spindle is rotatable in the retaining block, and one side of the retaining block is fixed to the corresponding post.

7. The flood barrier system as claimed in claim 6, wherein the main spindle is sleeved with a plurality of retaining blocks, and the laterally acting pressure cam is disposed between every adjacent two of the retaining blocks.

8. The flood barrier system as claimed in claim 1, wherein a top of the barrier is provided with a pressing block under the downwardly acting pressure cam.

9. The flood barrier system as claimed in claim 1, wherein a bottom of the barrier is provided with a bottom rubber sealing strip.