

PORTABLE SEATING AND LOCKING APPARATUS THEREFOR**Background**5 **1. Field of the Invention**

The present invention relates to a portable seated riser system and in particular, to a system having a locking device for securing portable theater style seating to a supporting deck.

10 **2. Prior Art**

Multiple use facilities such as arenas, stadiums, auditoriums and similar venues are used for multiple events that require different seating arrangements. Such facilities typically have permanently mounted theater style seats with a fixed backrest and pivoting seat portion along with arm rests. As ticket prices
15 for events can become quite high, it is desired to provide the high quality seating to provide maximum value to attendees, rather than less comfortable seating, such as folding chairs or benches.

Heretofore, portable seating has only been available as benches or folding chairs. The theater style seats have been limited to fixed mounts, typically
20 mounted into a permanent vertical wall of each of the tiers as the seats rise in a stadium or auditorium. A common area in which portable seats may be needed is in arenas that host multiple events such as hockey games, basketball games and concerts. Portions of the area that are occupied by the larger hockey rink when configured for hockey may be available for seating during other events. Such seats
25 may be placed on risers and are generally close to the stage or court. Such locations are close to the stage or court and are generally highly sought after and high priced. However, the seating options available are typically only benches or folding chairs. Therefore, purchasers pay a high price for a less comfortable seat that may not be in a riser configuration, and may not have good sight lines.

30 Since the theater type seating generally is configured to mount to a vertical surface at the rear, portable seating attaching to portable riser-type stages or decks provides design challenges. To create greater space in the aisles and to provide more seating in a smaller space while maintaining comfort for the audience, the theater type seats generally do not have a forward extending support, such as the
35 front legs of a folding chair. Supporting the theater style seats on portable staging and risers presents spacing limitations and hurdles for securing the seats. Providing a lock to the portable risers can be difficult, as the utility of the portable staging is decreased if there are permanent fixtures extending above the surface of the deck. In

addition, for safety reasons, the seats must be secured so that they cannot fall off of the back of the staging, as can occur with the rear legs of standard folding chairs. Therefore, the seating should be locked into position.

5 Providing a mechanism for locking to the portable staging can present several spacing obstacles in securing the seating to the rear portions of the staging. Often, a wall extends upward behind a portion of the portable staging. It is generally preferred to have the staging close to the wall so that less space is required and the seating at the rear of each stage deck to provide an aisle in front of the row of seats. However, a locking mechanism positioned at the rear of a deck faces space
10 limitations. In addition, in a riser type configuration, the tiers must be positioned close together. Therefore, there is typically little or no space between the rear of one tier and the front of the next tier. Although there may be an opening due to the difference in elevation of the decks, the spacing may be quite limited, placing further design constraints on any lock.

15 Other problems arise from the portability of such seats and seating configurations. The decking and staging should be easily portable and foldable for storage, and provide for elevational adjustment. It is preferred that such a system allow the staging to be used for other purposes and that the locking mechanism be totally removable from the staging. The locking and securing must provide enough
20 stability so that the audience feels comfortable in the seats. The lock systems should also be easily insertable and removable. However, when locking to the rear of a deck where access may be limited, it should be substantially self guiding and easily actuatable and removable. The locking system should also provide for automatically locking to the staging when the seats are in place so that accidental loosening of the
25 locking system is not possible and the seats are secure.

Since locking must normally be done on an under side of a deck or frame associated with a portable stage, positioning of a lock is difficult under the space limitations of a riser configuration. Positioning a retainer to engage the under side of a deck is difficult as it must be done remotely. In addition, once such an
30 engagement has been accomplished, disengaging the lock and retracting the locking device for removal in the spatial limitations of a riser configuration also present design challenges. If the locking device catches or hooks during removal, it may be difficult to access and correct the problem for retraction and removal.

It can be seen then that a new and improved portable seating system
35 is needed. Such a system should provide for supporting theater style seats in a riser type configuration. Such a system should provide for complete removal of the lock and support system as well as the seating from the portable staging of the risers. Such a system should be easily actuatable and provide secure attachment and support

for the seat. The lock and support system should also be easily operable in limited spaces associated with a riser type configuration. The present invention addresses these as well as other problems associated with providing quality portable seating.

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Summary

The present invention is directed to a portable seating and riser system, and in particular to a riser system providing support with removable theater type seating. Portable seating is utilized in spaces where permanent theater style seating is not possible, but comfortable seats for expensive tickets are needed.

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The system of the present invention has a riser type configuration wherein adjacent portable stages are placed in an ascending height configuration so that seats in the front are lower than seats in the rear. The portable stages preferably fold to a storage configuration when not in use, for more compact storage. The stages also support bridging decks configured in an end to end configuration between the stages having support frames. The bridging decks are supported at each end from a stage. As the framework below the bridging decks is eliminated, the system is lighter and more compact.

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Seating is provided with theater type seats having frame members at the sides and a fixed back. A typically padded seat portion pivots between a use position and a raised position to provide more access in the aisle. The seating is typically configured to mount into a vertical wall to the rear without requiring legs extending forward for support. With mounting at the rear to a vertical surface, there are several design hurdles that are encountered. Portable staging provides horizontal decks, but does not provide a vertical mounting surface. Moreover, if staging were to provide a vertical surface extending upward from the decks, the utility of the portable staging is compromised. Therefore, portable lock systems are utilized for mounting the seating to the stages at the rear edge of the stage decks in a removable configuration.

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The lock systems include a base forming a vertical slot for accepting a mounting plate or bar from the theater seating. The theater seats may be connected and placed as a single seat or placed in units of connected multiple seats. Locks are preferably for each of the outermost leg portions of the frame extending rearward from a seating unit.

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A first embodiment of the lock includes a retainer mounted on a linkage that extends behind and below the deck and frame of the stage. A retainer member hooks underneath the bottom of the frame to secure the lock to the portable stage. The linkage includes an actuator extending forward from the base and connecting to a middle link that extends downward to connect to the retainer. The

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actuator includes two bends with the rear section angled downward so that it pivots about the rear edge of the deck. The retainer is also pivotally mounted to a cover that extends upward to the rear of the base where it is pivotally connected. The lock can be slid rearward to extend slightly beyond the rear edge of the deck to fit into the low clearance from the rear, without requiring the worker to reach downward to actuate or secure the lock. The linkage is weighted and configured so that when slid rearward whereat the pivot of the rear of the base extends slightly beyond the back edge of the deck, the retainer member extends downward and below the frame with the hook extending forward beyond the front edge of the frame. Upon inserting a mounting plate of the theater seating into the slot in the base, the actuator member is pushed downward and the rear pivoted up, thereby raising the connecting link to the retainer and pulling the retainer member upward to secure to the frame. The lock is automatic with no tools being required.

To remove the lock, the theater seating is simply slid upward to disengage from the base. The weight of the linkage causes the retainer to move downward away from the frame to a disengaged position, but still extending under the frame. Sliding the lock forward causes the linkage to extend slightly rearward so that the hook portion of the retainer does not catch on the bottom of the frame. By pushing the actuator downward, the hook member is pulled up so that it may be slid over the rear edge of the deck without catching. This provides for easy insertion and removal of the lock without catching on edges of the frame or deck and without any tools.

A second embodiment of the seat lock engages the frame of the stage deck of the next higher deck, rather than the frame under the seat lock. The second lock includes a base with a second member vertically slidably mounted to the base. A hook extends from the rear of the base and is configured to extend under and engage the bottom of the frame behind the lock of the adjacent higher stage deck or a rear rail. The hook pivots about the base and is moved up and down as the second member is raised and lowered. As the second member is raised, the hook falls down with the lip of the hook extending under the frame of the adjacent deck. When the second member is lowered the hook is pivoted up to an engaging position with the frame.

The second seat lock also includes a stop mounted on the second member and engaging the base when engaged. The stop prevents the second member from being lifted, and therefor prevents the hook from disengaging the frame. The second lock includes an actuating tool to lift the second member. The lift tool engages a notch on the front of the second member and utilizes a mechanical advantage to easily lift the second member, thereby lowering the hook so that the

lock may be slid under or pulled from beneath the frame. The base includes vertically spaced apart mounting holes. The hook is mountable in one of the holes to correspond to the rise between the stage decks. This configuration provides for adjusting the spacing of the hook for accommodating different rises.

5 These features of novelty and various other advantages which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying
10 descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

Brief Description of the Drawings

Referring now to the drawings, wherein like reference letters and
15 numerals indicate corresponding structure throughout the several views:

Figure 1 shows an end elevational view of a portable seating riser system according to the principles of the present invention;

Figure 2 shows a front elevational view of the seating riser system shown in Figure 1;

20 Figure 3 shows a rear elevational view of a lock device for mounting theater seating to portable stages for the system shown in Figure 1;

Figure 4 shows a side elevational view of the lock device shown in Figure 3 on the upper surface of the stage prior to attachment;

25 Figure 5 shows a side elevational view of the lock device shown in Figure 3 positioned for attachment with the retainer member aligned with the stage frame;

Figure 6 shows a side elevational view of the lock device shown in Figure 3 in the locked position attached to the stage and supporting theater seating;

30 Figure 7 shows a side elevational view of the lock device shown in Figure 3 in a release position for removing the lock device;

Figure 8 shows an elevational view of the seating mounting plate;

Figure 9 shows a detail view of a bridging deck supported on adjacent stages;

35 Figure 10 shows a top plan view of a typical seated riser arrangement according to the principles of the present invention;

Figure 11 shows a side elevational view of a second embodiment of a seated riser and seat locking device according to the principles of the present invention;

Figure 12 shows a side elevational view of a second embodiment of a seat locking device according to the principles of the present invention with the lift tool removed and the locking device engaging the staging;

5 Figure 13 shows a side elevational view of the seat locking device shown in Figure 12 with the lift tool lowered and the locking device engaging the staging;

Figure 14 shows a side elevational view with portions removed of the seat locking device shown in Figure 12, with the lift tool actuated and the locking device positioned for engaging and locking to the staging;

10 Figure 15 shows a side elevational view with portions removed of the seat locking device shown in Figure 12 with the lift tool actuated for insertion of the locking device prior to engagement with the staging;

Figure 16 shows a side elevational view of the seat locking device shown in Figure 12 adjusted for engaging a riser having a first rise between stage
15 decks;

Figure 17 shows a side elevational view of the seat locking device shown in Figure 12 adjusted for engaging a riser having a second rise between stage decks greater than the first rise;

20 Figure 18 shows a side elevational view of the seat locking device shown in Figure 12 adjusted for engaging a riser having a third rise between stage decks greater than the second rise;

Figure 19 shows a side elevational view of the seat locking device shown in Figure 12 adjusted for engaging a riser having a fourth rise between stage decks greater than the third rise;

25 Figure 20 shows a top plan view of a seat mounting bar for the theater seats shown in Figure 11;

Figure 21 shows a perspective view of a lift tool for the seat locking device shown in Figure 12; and

30 Figure 22 shows a perspective view with portions removed of a safety rail mount for the seating riser arrangement shown in Figure 10.

Detailed Description of the Preferred Embodiment

Referring now to the drawings, and in particular to Figures 1 and 11, there is shown a portable riser seating system, generally designated 20. The system
35 20 includes portable stages 22, 24, 26 and 28 of various heights to form a riser system supporting theater type seating 30. The portable stages 22, 24, 26 and 28 and the removable seating 30 form a portable system 20 that provides rising rows of theater seating 30 for improved sight lines and comfort. For purposes of description,

only stage 22 will be described, however similar structure is found on the stages 24, 26 and 28 of other heights. Stage 22 includes an upper deck 50 supported on a framework 52 that may fold for storage, such as is well known in the art. Legs 54 are actuated by the folding framework and fold to the underside of the decks 50 in the storage position. The various stages 22, 24, 26 and 28 may be secured to adjacent stages with interlocking members 64 and 66, such as is shown in Figure 9 for bridging decks.

The system 20 is flexible and can be modified to accommodate different widths and different numbers of rows. A typical configuration is shown in Figure 10. The stages, or folding risers, are alternated with and support bridging decks between the stages. The seating is arranged to provide aisles for easy access to each seat.

Referring now to Figure 2, the seated riser system 20 also includes bridging decks 60 supported on a frame 62 for extended width risers. The ends of the bridging decks 60 attach to the individual stages 22 in an end to end relationship so that an extended stage surface is formed. Referring to Figure 9, the decks 60 are secured with interlocking members 64 and 66. With this arrangement, extended stage surfaces can be formed without requiring legs 54 below each bridging deck 60. This system saves money and is lighter to handle and requires less storage space.

Referring again to Figures 1 and 2, the theater seating 30 typically has several seats joined as a unit for mounting on the stages. Permanent theater seating often mounts to a vertical surface behind the theater seating in a stadium or arena. Seating units include frames 32 supporting a pivoting seat 34 that may be padded as well as a back 36. Arm rests 38 extend on either side of the seats 34 and backs 36 and may be shared between adjacent seats. The seat 34 typically is spring loaded or weighted so that it tilts slightly upward and must be pushed down to a use position by rotating about a pivot. The weight of the seat's occupant typically maintains the seat 34 in the lowered position. Legs 42 extend downward and rearward from the frame 32 and include mounting bars or mounting plates that extend vertically for automatically actuating a lock in a first embodiment, as explained hereinafter.

As shown in Figure 8, the mounting plate 44 may include a locator or retainer. Such as a ball detent 46 engaging recesses 48 formed in the seat support for holding the mounting plate 44 at a lowered or raised position. Although theater seating 30 is described generally, other configurations are also possible that fall within the principles of the present invention.

Referring to Figures 1 and 3-7, a first embodiment of a seating lock 100 is configured for supporting the seating 30 and mounting to a stage 22. The lock 100 may be permanently attached to the legs 42 of the seating or a mounting bar

with a sliding actuator or separate actuator. The lock 100 includes a base 102 and a seat support 104 forming a slot 106 that receives the mounting plate 44 that actuates the lock 100 and automatically secures to the stage 22. In a preferred embodiment, the seat support 104 has recesses or holes 48 formed through the seat support 104 at sides of the slot 106 configured for receiving the detent 46 and holding the mounting plate 44 at a specific height. A linkage, generally designated 108 provides actuation and locking to the frame 52 at the rear edge of the stage 22.

The linkage 108 for the lock 100 includes an actuator member 110 having a first portion 112 accessible from the front of the lock 100 and extending at an angle upward to easily grasp and actuate. The first portion 112 connects to a middle portion 114 that extends rearward to a third portion 116. The third portion 116 hingedly connects to a pivot 150 at a middle link 120. The middle link 120 includes a slight bend and extends downward behind the deck 50 and frame 52 and hingedly connects at a second pivot 152 to a retainer 140. The retainer 140 has a lip portion 142 forming a receiver section with a profile configured for accepting the lower portion of the stage frame 52. The retainer 140 also connects to a cover member 130 at a third pivot 154. The cover member 130 includes an engagement surface 132 that curves and is configured for aiding and maintaining the linkage in position for automatically locking and unlocking as the lock is positioned and actuated for removal. At an upper end, a right angled portion 134 extends forward and includes a fourth pivot 156 hingedly connecting to the rear of the base 102.

To set up the riser seating system 20, the raised stages 22, 24, 26 and 28 are unfolded and placed in an ascending arrangement, as shown in Figure 1. Depending on the seating requirements, bridging decks 60 may be added, as shown in Figure 2. Although only two stages 22 and the bridging deck 60 are shown, additional bridging decks 60 and stages 22 may be added to form an enlarged extended seated riser system, such as shown in Figure 10. The adjacent stages 22, 24, 26 and 28 may be connected to one another to form a riser unit. Once the stages have been erected, the locks 100 are placed on the various stages and spaced apart so as to receive the mounting plates 44 from the seating 30. If the locks 100 are permanently attached as a part of the legs 42 or on the mounting bar 160, the seating units 30 are placed to be attached to the locks 100 in the position shown in Figure 4. The seating 30 may be arranged with units having multiple seats with each seating unit having two seating locks 100. To place the locks 100, they are positioned with the base on top of the deck 50 as shown in Figure 4. When placed in this position, the lock 100 can be slid backward until the linkage 108 extends downward with the retainer element 140 self aligning to the position shown in Figure 5. Referring again to Figure 4, the lock 100 is arranged with the linkage extending rearward and the

actuator 110 weighted so that it is in a raised position at its forward portion. The middle link 120 forces the retainer 140 to have the lip 142 extending downward.

As the lock 100 is slid rearward to the position shown in Figure 5, the middle link 120 and cover 130 extend downward and slightly rearward. Due to the bend in the middle link 120 and the engagement surface 132, only slightly more than two inches of clearance is required between the rear of the deck 50 and a vertical wall or other staging 24 for the linkage 108 to operate. The linkage 108 is weighted and configured so that when pushed sufficiently rearward, the retainer 140 extends with the lip projecting forward beyond the front edge of the frame 52. As the first pivot 150 is positioned to the rear of the stage deck 50, the actuator 110 rests against the rear edge of the deck 50 on the third section 116. This causes the actuator 110 to extend upward with the middle section 114 spaced apart from the lock base 102.

When positioned as shown in Figure 5, the lock 100 may receive a mounting plate 44 from the seating 30 and automatically secure the seating to the frame 52. As shown in Figure 6, when the mounting plate 44 is lowered into the slot 106, the plate 44 engages the upper surface of the actuator 110 and the lower edge of the plate 44 rests on the lower end of the slot 106. This action pivots the actuator link 110 about the rear edge of the deck 50, thereby raising the first pivot 150.

Raising of the first pivot 150 pulls the middle link 120 upward, thereby pulling the second pivot 152 upward and raising the retainer 140 so that the lip 142 extends in front of and around the frame member 52 so that the lock engages the stage 22. As shown in Figure 6, in this position, the linkage 108 is secured in the locked position so that the lock 100 cannot be removed. The seating 30 is positioned so that the seat occupant and the center of gravity of the seating is in front of the lock base 102.

However, as the lock 100 is secured at the rear, any forward torque is negated by the linkage 108 with the retainer 140 secured to the frame 52. Engagement of the seating 30 to the lock 100 is easily accomplished as the mounting plate 44 simply slides downward into the slot 106 and engaging an upper surface of the actuator 110 to automatically engage with no tools being required.

When the seating 30 and locks 100 are to be removed, the seating units 30 may be easily extracted from the lock by pulling the seating 30 directly upward so that the mounting plate 44 slides out of the slot 106. When the tab 46 disengages the top of the actuator 110, the lock 100 and linkage 108 is weighted to revert back to the position shown in Figure 5. At this position, the retainer 140 disengages from the front of the frame member 52. By simply pulling the entire lock 100 forward, the linkage 108 will pivot on the upper rear corner of the deck 50 with engaging surface 132 of the cover moving the bottom of the cover 130 and the retainer 140 upward and rearward. However, as the lip 142 extends downward,

continuing to pull the lock forward would cause the lip 140 to catch on the rear of the deck 50. To avoid catching, when the retainer 140 is partially raised behind the frame 52, the actuator 110 is pulled forward so that the middle link 120 pulls the forward portion of the retainer 140 forward and upward. This causes the lip 142 to extend upward behind the engaging surface 132 as shown in Figure 7, so that further movement of the lock 100 forward causes the linkage 108 to ride on the engagement surface 132 while the retainer 140 is pulled upward to engage the cover 130, clearing the rear edge of the deck 50.

The lock 100 may simply be pulled forward or lifted off. The lock 100 can be positioned for receiving the seating 30 in a few seconds and also pulled away from the rear of the stage 22 in a few seconds without using any tools. The lock 100 attaches identically to the riser system decks at multiple different rises between the decks 50. In addition, the positioning of the elevated staging usually results in a wall or other stage being placed adjacent the rear of the deck and extending above the deck 50. This prevents easy access so that workers may not be able to extend their hands downward behind the stage to access any type of securing mechanism. However, such access is not required with the present invention. The present invention also provides for the operator grasping the linkage by the front of an actuator 110 that is fully exposed and easily accessible. Moreover, the engagement of the lock 100 is automatic upon insertion of the seating 30 into the lock 100. The lock 100 also provides for operating in very tight spaces with little rearward clearance required.

Referring now to Figure 11, the seated riser system 20 is shown with seating 30 mounted on a second embodiment of a lock 200. The locks 200 are similar to locks 100 and support the seating 30 locking on the decks 50 in front of the seats 30. However, the locks 200 lock to the frame 52 of the deck 50 immediately behind the seating 30 rather than to the frame 52 of the deck 50 below the seating 30, as compared in Figures 1 and 11. As the lock 200 locks to the rear, a safety rail 170 includes a frame member for locking the last row of seating 30 in the highest deck 28, as shown in Figure 22. Such risers would typically include a safety rail 170 for security and safety reasons. Additional modifications and cost is therefor not incurred to accommodate the locks 200.

Referring now to Figure 12, the lock 200 includes a base 202 that rests at the rear stage deck 50 on which it sits and is pushed up against the next stage deck 50 and engaging the frame 52 of the adjacent higher deck 50. The base 202 includes a forward extending lower portion that angles slightly upward and rearward and a riser portion at the rear. A low friction pad 250 may be mounted on the under side of the base 202 to provide for easier sliding on the surface of the stage decks 50,

which often have an anti-skid surface. A hook member 204 extends out the rear of the base 202 and is pivotally mounted thereto about a hinge or pivot point 212. The vertical position of the hook 204 may be adjusted to accommodate different rises between stage decks 50, as explained hereinafter. A second movable link 206 is
5 slidably mounted to the base 202 and moves between a lowered position, shown in Figure 12, and a raised position, as shown in Figures 14 and 15. A tool 300 is utilized for lifting the second member 206 and actuating the hook 204 by pivoting off the upper angled surface off the base 202. As shown in Figures 12, 13 and 20, the second member 206 is locked in position by a stop 208. Stop 208 rotates about a
10 pivot 242 mounted on the second member 206 and includes an L-shaped portion 240 extending down to retainer 246. The retainer 246 extends below and engages a bolt or other projection 244 acting as a stop. The stop 208 is weighted so that gravity acts to position the stop 208 in an engaged position until actuated by the lift tool 300, as explained hereinafter.

15 Referring to Figures 14 and 15, the second slidably mounted member 206 includes a notch 210 with a lip 238 for receiving an engagement rod 312 on the lift tool 300. The second member 206 includes slots 230 providing for vertical movement relative to the base 202, sliding between a lowered position and a raised position, and sliding on bolts or screws 232. At the rear of the second link 206, a
20 lower engagement surface 236 interacts with the hook 204 to provide actuation and movement between an engaged and disengaged position. The lower engagement surface 236 may be on a spacer block 248 to accommodate different vertical hook mounting positions for various riser heights, as explained hereinafter. The hook 204 includes a upper engagement surface 216 interacting with the surface 236 of the
25 second member 206. The hook 204 includes a lip 218 forming a channel 220 for receiving the frame member 52.

Referring now to Figure 21, the lift tool 300 includes a handle 302 extending substantially horizontally at the top of frame upright portions 306. A cross member 308 provides additional support. The lift tool 300 includes a pivot
30 portion 304 which can also act as an axle and may be mounted to wheels 310. An engagement rod 312 extends substantially horizontally and is configured for inserting into the notch 210 of the second embodiment of the locks 200. The engagement rod 312 extends to a width that can engage two of the locks 200 spaced apart for seating units of two theater seats 30 at the same time for insertion and
35 removal of the locks and seats by a single worker.

Referring now to Figure 20, the seats 30 may be mounted as single seats, double units, or more and include a mounting bar 160 which typically mounts to the base 202 of the second embodiment of the lock 200. The bar 160 may also be

utilized for accepting the mounting plate 44 of the first embodiment of the seating lock 100. The mounting bar 160 receives the legs 42 of the theater seating 30. It will be appreciated that each theater seating manufacturer may provide a different method of mounting. The mounting bar 160 provides for adapting to each of the various kinds of mounting. For example, the bar may accept U-bolts, legs may directly bolt to a face of the bar 160, or insert over the top of the bar 160. The mounting bar 160 may be configured to extend at each end and engage in the next adjacent mounting bar so that the seating 30 may be maintained at a predetermined spacing, as shown in Figure 10.

Referring now to Figures 16-19, the present invention provides for adapting to different rises between decks 50. Depending upon the configuration of the arena from which the seating system 20 is needed, different rises providing different site lines may be needed. Typical rises include 5-inch, 6-inch, 7-inch and 8-inch rises. These are depicted in Figures 16-19, respectively. The present invention provides for adapting to different heights with each of the embodiments 100 or 200. For the first embodiment of the lock 100, as the rise changes, the linkage 108 does not need to be reconfigured as the frame member 52 will be maintained at the same distance below the stage deck 50 and the base 102. The spacing between the frame 52 and the next lower deck 50 does not affect the configuration locks 100.

For the second embodiment 200, shown in Figures 16-19, as the rise changes between the deck receiving the seating 30 and the adjacent higher deck at the rear of the seating 30, the position of the hook 204 must be able to accommodate height changes. To facilitate such differences, mounting holes 214 are vertically space apart at the rear of the base 202. The holes 214 are vertically staggered in increments corresponding to standard rises. By moving the pivot 212, the position of the hook 204 is vertically moved. Therefore, as shown in Figure 16, for rise A, the hook 204 is mounted in the lowest mounting hole 214. In Figure 17, the orifice is moved upwards to a 6-inch rise B in the middle orifice 214. For a 7-inch rise C shown in Figure 18, or 8-inch rise D, shown in Figure 19, the pivot 212 must be moved to the topmost mounting hole 214. In addition, for an 8-inch rise, a spacer member 222 is attached to the hook 204 with a bolt or other fastener 223. The spacer member 222 forms a lip and channel for receiving the frame member 52 in a configuration similar to the hook 204.

In addition to the position of the hook 204, the engagement surface 236 must be maintained to engage the top of the hook at surface 216. As shown in Figures 14 and 15, when the lock 200 is set for a rise of 5 or 6 inches, corresponding to one of the bottom two orifices 214, the engagement surface must be positioned

below a spacer block 248. The engagement surface 236 must be moved down by inserting the spacer block 248 to engage the surface 216 of the hook 204 at these low rises. As shown in Figures 14 and 15, a 1-inch block or other height corresponding to the standard spacing between the orifices 214 is inserted. When the staging 20 is
5 configured for the lowest rise, corresponding to the configuration shown in Figure 16, a higher spacer 248 corresponding to the distance between top and bottom mounting orifices 214 is inserted, often two inches.

When the staging 20 is set for a greater rise, such as shown in Figure 18, no spacing member is required when the engaging surface 236 is at the bottom of
10 the rear portion of the sliding member 206. For the greatest rises, since the hook 204 is modified with the spacer 222, the relative position between the hook 204 and the sliding member 206 is the same as for a 7-inch rise, as shown in Figures 18 and 19. Therefore, no modification is needed to the sliding member 206 to accommodate a change in rise between a 7-inch or 8-inch rise. Although intervals of one inch have
15 been described, it is readily apparent that other increments may be used by having different spacers 248 and/or different distances between the mounting orifices 214.

Referring now to Figure 22, there is shown a preferred mounting for a seating safety rail 170 extending on sides and the rear of the seating system 20. A set screw 172 inserts into an internally threaded sleeve 174 on a mounting plate 176
20 attached to outer tubing 178 mounted to a stage, and into an orifice 182 in a plate 184 of the mounting leg 180 of the rail 170 to prevent removal of the rail 170. The set screw or bolt 172 acts as a lock between the mounting leg 180 and the outer tubing, so that the rails 170 cannot be pulled upward without first removing the set screw or other bolt 172.

25 To insert and engage the lock 200, the tool 300 is placed on the base 202 with the pivot portion 304 on the upper surface of the base 202 and the engagement rod 312 engaging the notch 210, as shown in Figure 15. Insertion of the engagement rod 312 into the notch 210 pushes the stop 208 out of engagement with the projection 244. This movement allows the second member 206 to be raised.
30 The tool 300 is then pivoted so that engagement rod 312 and the second member 206 are lifted. The lifting of the second member 206 pivots the hook 204 down. When the hook 204 is lowered, the lock 200 is pushed rearward while the tool 300 is pivoted and the second member 206 is lifted. The hook 204 may be slid beneath the frame 52 so that the lip 218 is behind the frame 52, as shown in Figure 14. When
35 the hook 204 is positioned, the engagement rod 312 is lowered, thereby lowering the second member and pivoting the hook 204 up into engagement with the frame 52. When the tool 300 is disengaged from the second member 206, the bottom of the frame 52 extends into the channel 220 with the hook 218 extending behind the frame

to prevent the lock 200 from being pulled outward, as shown in Figure 13. When the tool 300 is removed, as shown in Figure 12, the lock 200 stabilizes the seating 30 so that it cannot pivot forward and tip over.

To remove the lock 200, the engagement rod 312 is inserted into the
5 notch 210 and pivoted up to lift the second member 206. This motion pivots the hook 204 down so that the lip 218 is lower than the bottom of the frame 52, as shown in Figure 14. The lock 200 is then pulled forward with the second member 206 lifted and the hook 204 lowered, as shown in Figure 15. When the lock 200 is moved so that the hook 204 is forward of the frame 52, the engagement rod 312 is
10 lowered. The lock 200 is disengaged and the seating 30 and lock 200 may be removed from the stage system 20.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the
15 invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.



What is claimed is:

1. A portable seating apparatus, comprising:
a support structure including a frame supporting a horizontal deck portion;
a portable theater seat having support means at a lower rear portion;
5 a removable mount attaching to the support structure and locking onto and
under the frame, the mount removably attaching to the support means.
2. A portable seating apparatus according to claim 1, wherein the mount
includes a housing configured for receiving a complementary portion of the theater
10 seat support means.
3. A portable seating apparatus according to claim 1, wherein the mount
includes an actuator linkage remotely actuating an engaging portion.
- 15 4. A portable seating apparatus according to claim 3, wherein the actuator
includes a handle portion.
5. A portable seating apparatus according to claim 1, wherein the mount
includes a retainer engaging an underside of the frame.
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6. A locking apparatus for supporting an article to a deck, the deck having a
frame below the deck, the locking apparatus comprising:
a removable receiver adapted for mating with an article to be secured;
a retainer member adapted for engaging the frame and securing the receiver
25 to the deck;
a linkage attached to the hook member and moving the hook member into
and out of an engaged position;
an actuator handle for actuating the linkage.
- 30 7. A locking apparatus according to claim 6, wherein the receiver defines a slot
adapted for receiving a complementary member.
8. A locking apparatus according to claim 7, wherein insertion of the
complementary member engages the handle and locks the retainer member to lock
35 the receiver to the deck and support the article.
9. A locking apparatus according to claim 8, wherein the complementary
member comprises a plate.





10. A locking apparatus, for locking to an outer edge of a frame, comprising:
a base mounting to a first surface above the frame;
a cover pivotally mounted to the base and extending over the outer edge of the frame;
- 5 a retainer pivotally mounted to the cover and engaging an underside of the frame;
a first link pivotally mounted to the retainer; and
an actuator pivotally mounted to the first link and extending above the first surface.
- 10 11. A locking apparatus according to claim 10, wherein the base is positioned so that the cover extends downward beyond the outer edge of the frame.
12. A locking apparatus according to claim 11, wherein the retainer is positioned
- 15 and configured to extend below the frame.
13. A locking apparatus according to claim 12, wherein the retainer includes a finger portion extending up proximate an inner edge of the frame.
- 20 14. A locking apparatus according to claim 10, wherein the actuator comprises an angled first end portion extending down toward the first link.
15. A locking apparatus according to claim 14, wherein the actuator includes an angled second end extending up.
- 25 16. A locking apparatus according to claim 10, wherein the actuator extends through a passage formed through the base.
17. A support apparatus, for locking a first member to a deck having a frame, the
- 30 apparatus comprising:
a support housing, including a receiver portion;
a complementary member mounted to the first member engaging the receiver portion and supported by the receiver portion;
a retainer adapted for engaging an underside of the frame and adapted for
- 35 locking to the frame;
a linkage connecting to the retainer, whereby the retainer engages the underside of the frame upon actuation of the linkage;





wherein the complementary member engages the linkage upon insertion into the receiver portion and automatically actuates the linkage.

wherein the slot is positioned over the linkage and wherein insertion of the complementary member into the slot engages the actuator and pulls the first end of the actuator up, thereby pulling the first link and the retainer up.

18. A portable seated riser system, comprising:

a plurality of riser stages including decks and supporting frames, the stages having a plurality of heights and arranged in an ascending configuration;

10 a plurality of portable theater seats;

a plurality of locks mountable to the frames for removably securing the theater seats to the riser stages.

19. A seated riser system according to claim 18, further comprising bridging
15 decks supported at each end on riser stages having the same height to form an extended stage surface.

20. A seated riser system according to claim 18, further comprising means for
20 connecting the riser stages.

21. A seated riser system according to claim 18, wherein the locks removably
engage an underside of the supporting frames.

22. A seated riser system according to claim 18, wherein upon engagement of the
25 seats with the locks, the locks automatically secure to the stages.

23. A locking system for locking a seat leg to a deck system having a frame
member to the rear of the deck, the system comprising:

a base member configured for supporting a seat leg;

30 a second member vertically slidably mounted to the base member, and
having an engagement portion at a rear of the second member;

a retainer member pivotally mounted to a rear of the base member, and
including a complementary portion engaging the engagement portion of the second
member, wherein lowering the second member pivots the retainer member up and
35 raising the second member allows the retainer member to pivot down.

24. A locking system according to claim 23, wherein lock further comprises an
actuator tool for lifting second member relative to the base.





25. A locking system according to claim 23, wherein the retainer member comprises a hook portion defining a channel.
26. A locking system according to claim 23, wherein the base member defines a plurality of mounting positions, and wherein the retainer is mountable at a plurality of different heights to the base member.
27. A locking system according to claim 26, wherein the second member includes a removable spacer for maintaining the spacing of the second member and the retainer member.
28. A locking system according to claim 24, wherein the second member defines a notch for accepting the actuator tool.
29. A method of locking seating to a riser structure, the riser structure having a deck, and a frame member above and to the rear of the deck, the method comprising the steps of:
- providing a lock adapted for engaging the seating, the lock having a base and a hook pivotally mounted at a rear of the lock, a link sliding substantially vertically on the base and engaging the hook;
 - providing a lift tool having a lift rod adapted for insertion under a portion of the second member;
 - positioning the lock on the deck in front of the frame member;
 - inserting the lift tool under a portion of the link;
 - pivoting the lift tool to raise the lift rod and the link, thereby lowering the hook;
 - sliding the lock rearward until the hook extends under the frame member;
 - and
 - pivoting the lift tool to lower the lift rod and the link, thereby raising the hook into engagement with the frame member.

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AMENDED CLAIMS

[received by the International Bureau on 5 December 2000 (05.12.00);
original claims 1 – 29 replaced by new claims 1 – 16, (3 pages)]

1. A locking apparatus for mounting an article to a deck, the deck having a frame, the locking apparatus comprising:
 - a removable mount adapted for supporting the article to be secured;
 - 5 a retainer member adapted for engaging the frame and securing the mount to the deck;
 - a linkage attached to the retainer member and moving the retainer member into and out of an engaged position;
 - an actuator for actuating the linkage.
- 10 2. A locking apparatus according to claim 1, wherein the mount includes a housing configured for receiving a complementary portion of a theater seat support.
3. A portable seating apparatus according to claim 1, wherein the actuator
15 includes a handle portion.
4. A locking apparatus according to claim 1, wherein the mount includes a retainer engaging an underside of the frame.
- 20 5. A locking apparatus according to claim 1, wherein insertion of a complementary member engages the handle and locks the retainer member to lock the mount to the deck and support the article.
6. A locking apparatus according to claim 5, wherein the complementary
25 member comprises a plate.
7. A locking apparatus according to claim 1, wherein the frame extends below the deck.
- 30 8. A locking apparatus according to claim 1, wherein the frame extends above the deck.
9. A locking apparatus according to claim 8, wherein the actuator comprises a removable tool.
- 35 10. A locking system for locking a seat leg to a deck system having a frame member to the rear of the deck, the system comprising:
 - a base member configured for supporting a seat leg;

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a second member vertically slidably mounted to the base member, and having an engagement portion at a rear of the second member;

a retainer member pivotally mounted to a rear of the base member, and including a complementary portion engaging the engagement portion of the second member, wherein lowering the second member pivots the retainer member up and raising the second member allows the retainer member to pivot down.

11. A locking system according to claim 10, wherein lock further comprises an actuator tool for lifting second member relative to the base.

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12. A locking system according to claim 10, wherein the retainer member comprises a hook portion defining a channel.

13. A locking system according to claim 10, wherein the base member defines a plurality of mounting positions, and wherein the retainer is mountable at a plurality of different heights to the base member.

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14. A locking system according to claim 13, wherein the second member includes a removable spacer for maintaining the spacing of the second member and the retainer member.

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15. A locking system according to claim 11, wherein the second member defines a notch for accepting the actuator tool.

16. A method of locking seating to a riser structure, the riser structure having a deck, and a frame member above and to the rear of the deck, the method comprising the steps of:

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providing a lock adapted for engaging the seating, the lock having a base and a hook pivotally mounted at a rear of the lock, a link sliding substantially vertically on the base and engaging the hook;

30

providing a lift tool having a lift rod adapted for insertion under a portion of the second member;

35

positioning the lock on the deck in front of the frame member;
inserting the lift tool under a portion of the link;
pivoting the lift tool to raise the lift rod and the link, thereby lowering the hook;

sliding the lock rearward until the hook extends under the frame member;
and



pivoting the lift tool to lower the lift rod and the link, thereby raising the hook into engagement with the frame member.



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