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A. J. CONN ET AL

3,001,243

FOLDING BLEACHERS

Filed June 5, 1957

FIG. 1

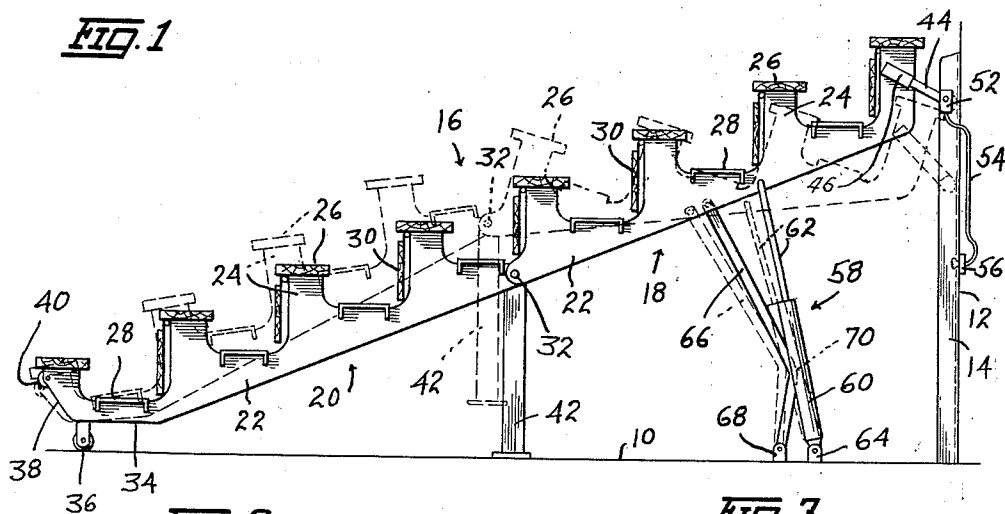


FIG. 2

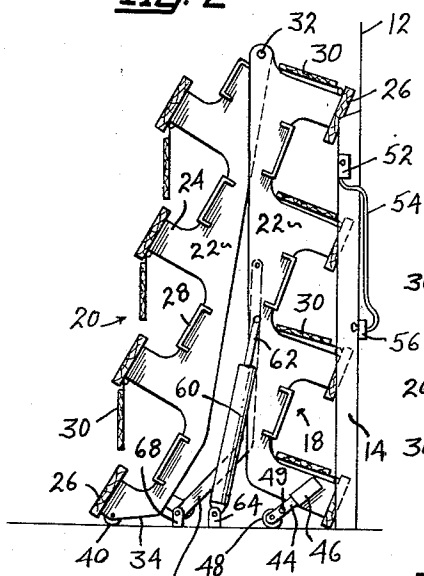


FIG. 3

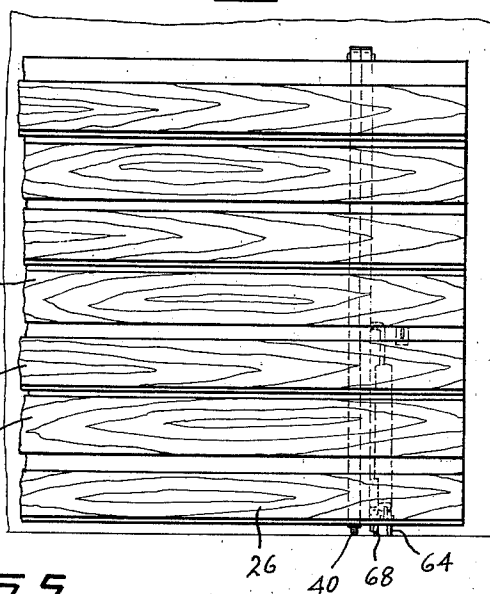
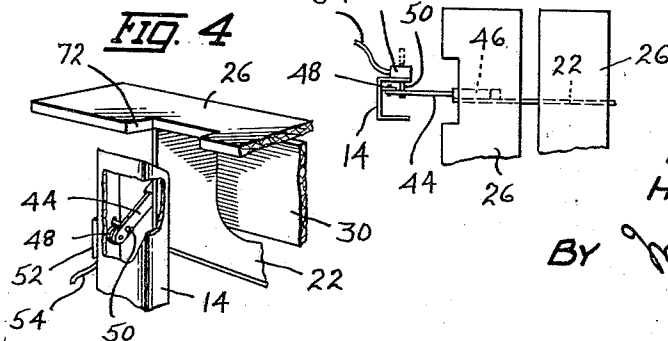


FIG. 5



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1

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FOLDING BLEACHERS

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9 Claims. (Cl. 20-1.126)

Our invention relates to improvements in bleacher seats and more particularly to such seats as may be used indoors in gymnasiums or the like.

One of the important objects herein is the provision of a multiple bleacher unit hingedly attached in alignment from front to rear to afford increased seating capacity with said units capable of folding or jack-knifing so as to be moved adjacent and parallel to each other in a vertical position for purposes of storage.

Another object contemplated is the provision of novel locking means to hold the bleachers against movement when in operable position.

A still further object of this invention is to provide a multiple bleacher unit of the above class that is extended in a stepped relationship when in use and when not in use can be folded so that the bleacher units are vertically disposed parallel and adjacent each other and parallel and adjacent a wall.

Other objects and advantages of this invention reside in the details of construction and correlation of the various parts and will be apparent as the description proceeds.

This invention consists of novel parts and combination of parts to be hereinafter described whereby the objects set forth are attained, as pointed out in the claims, and illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevational view showing a preferred embodiment of this invention in extended or inclined position ready for use,

FIG. 2 is a side elevational view thereof showing the bleachers in folded position when not in use,

FIG. 3 is a fragmentary front view of these bleachers when in folded position,

FIG. 4 is a fragmentary perspective view showing these bleachers relative to a wall attached support, and,

FIG. 5 is a top plan view of FIG. 4.

Referring to the drawings the numeral 10 designates a floor surface bordered by the wall 12. An upright channel or support 14 is disposed adjacent the wall 12 and is suitably secured thereto. A number of supports 14 will be used and will be suitably spaced for proper support relative to the length and weight of the bleachers indicated generally at 16, and there will be at least one such support 14 at each side of the bleachers.

Bleachers 16 are formed in two sections 18 and 20 which we shall refer to respectively as the rear and forward sections for purposes of description. Sections 18 and 20 are substantially of like construction so that like parts can be given like numerals. These sections present the usual stepped relationship for bleacher seats of this type and include spaced stringers 22 formed with spaced risers 24 to receive the stringer-like seats 26 and with the lower foot rests 28 intermediate risers 24. On the forward side of each riser 24 (the wall 12 being considered as at the rear) there is hingedly depending from a point below the front of seat 26 a kick board 30 of the same material preferably as seats 26.

Bleachers 16 when in use are inclined from their upper point adjacent wall 12 to the floor 10 and the rearward end of the forward section 20 is pivotally attached as by a pin 32 to the forward end of the rear section 18 so that the two sections 18 and 20 form one complete bleacher assembly with a greater seating capacity than presently

2

constructed single section movable type bleachers. The forward end of the forward section 20 has the surface 34 adapted to be parallel to floor 10 when in use and carries a wheel or roller 36 for movement over the floor as will be later described. From surface 34, the bottom of section 20 is inclined upwardly towards the front as at 38 and carries a roller 40. At each pivot point 32 there is pivotally depending a foot or leg 42 which rests on floor 10 at times to serve as a support for the bleachers when in use.

On the rear riser portion 24 on one or more stringers 22 of rear section 18 we have placed the guide arm 44 that is spring loaded in housing 46 for longitudinal reciprocation and carries a wheel or roller 48 on its outer end for movement against and within channel 14 at times as seen in FIG. 5. Arm 44 is angularly disposed extending from housing 46 on riser 24 downwardly to channel 14. Near wheel 48 on arm 44 we provide a transverse hole 49 for receiving a latch bolt 50 at times operated by a solenoid 52 that is wired 54 for actuation to preferably a key operated switch 56 mounted in any convenient place on support 14 or the wall 12.

Lifting mechanism designated generally at 58 (FIG. 1) is designed to retract sections 18 and 20 into a jack-knifing position shown in FIG. 2 for storage adjacent the wall 12 and this is accomplished in the following manner. A two way acting hydraulic jack including the cylinder 60 and plunger rod 62 which operates in a well known manner has the cylinder 60 pivotally attached to a floor mounted bearing 64, and the outer end of rod 62 is pivotally anchored to stringer 22 on the rear section 18 at a point intermediate the rear of such stringer and its longitudinal center. Bearing 64 is disposed forwardly of wall 12 intermediate such wall and leg 42. A rigid bar link 66 is pivotally attached at one end to the floor attached bearing 68 and is similarly attached to stringer 22 on section 18 at a point somewhat forwardly of the attaching point thereon of rod 62. Bearing 68 is also slightly forward of bearing 64. Link 66 is provided near bearing 68 with a rearwardly extending crook or dog leg bend 70. Since link 66 will move past cylinder 60 at times as will later appear, we have spaced the bearings 64 and 68 laterally so that rod 62 and link 66 can be attached to respective opposite sides of the stringer 22.

As shown in FIG. 1, bleachers 16 are extended in inclined position; leg 42 is resting on the floor 10, rod 62 is extended from the cylinder 60 and latch bolt 50 is engaged through the guide arm 44 as an additional safety factor against accidental movement of the bleachers. To fold the bleachers for storage, bolt 50 is retracted by actuating solenoid 52 with switch 56; hydraulic pressure from a source not shown since details of the same are well known is applied to cylinder 60 for retracting rod 62. As the downwardly pulling force of rod 62 is exerted on stringer 22, the upper end of bar 66 acts as a fulcrum whereby the rearward end of section 18 starts downwardly with wheel 48 moving in channel 14 and the forward end of section 18 begins to rise as appears in the broken lines of FIG. 1. This action tilts section 20 upwardly as shown and as rod 62 is further retracted, rollers 36 on section 20 will move toward the wall 12 until sections 18 and 20 have jack-knifed with their respective bottom sides adjacent and with stringers 22 in a substantially vertical plane and adjacent wall 12 as shown in FIG. 2.

As seen in FIG. 1, the pivoting of section 18 on the upper connection of link 66 will result in a temporary forward movement of section 18 as seen in the broken lines and this is compensated for in bar 66 by the bend 70 and in the spring loaded mounting of guide arm 44. With the bleachers folded as seen in FIG. 2 they will stay in this position by virtue of their own weight but as an addi-

tional safeguard against accidental movement, hydraulic pressure can be maintained, if desired. To extend the bleachers for use, pressure in cylinder 62 is applied to extend rod 62 and once the inertia of the bleachers is overcome, they will return to extended position by virtue of their weight, although hydraulic pressure is maintained for control and braking. With the bleachers fully extended bolt 50 is returned to its locked position. It is pointed out that the top seat 26 on bleacher section 18 is notched as at 72 (FIG. 4) corresponding to each support 14 so as to provide clearance for the seats when they move downwardly as described and shown in the broken lines of FIG. 1.

It will be understood that the phraseology employed herein is for the purpose of description and not for limitation and that modifications and changes in the construction and arrangement of this invention can be made within the scope of what is claimed, without departing from the spirit and purpose thereof. It is thus intended to cover by the claims, any modified forms of structure or mechanical equivalents which may be reasonably included within their scope.

We claim:

1. Folding bleachers, comprising, a wall attached upright support, a bleacher assembly including a front and rear section each having stringers carrying seats and foot rests, said sections pivotally connected to each other to present an inclined bleacher assembly with seats in stepped relation when in use, the rear of said rear section releasably attached to said support near the top thereof, the forward end of said forward section carrying a roller for movement over a floor, means for supporting said sections at their point of pivotal connection, a fulcrum bar pivotally connected at one end to said rear section intermediate said wall and the pivotal connection of said sections and designed at its other end for fixed pivotal connection to a floor, and power means operatively connected to said rear section intermediate said wall and said fulcrum bar for tilting the forward end of said rear section upwardly and the rear end thereof downwardly whereby the rear of said forward section is tilted upwardly and the forward end thereof moves on said roller toward said rear section to a point where said stringers are vertically disposed and said sections are adjacent and parallel to each other.

2. Folding bleachers, comprising, a pair of seat carrying bleacher sections pivotally connected to present a combined bleacher assembly disposed on an inclined plane downwardly from rear to front with the seats in stepped relationship, and means for moving said assembly at its pivotal connection into a jack-knifing position whereby said sections can be vertically disposed and adjacent each other, said means including a pair of floor attached bearing members, a hydraulic jack having a cylinder and two way acting plunger rod disposed intermediate the rear of said combined bleacher assembly and the pivotal connection of said bleacher sections and having the outer end of said rod pivotally attached to one bleacher section and the opposite end of said cylinder pivotally attached to one of said bearing members, and a rigid link serving as a fulcrum means disposed intermediate said hydraulic jack and the pivotal connection of said bleacher sections and pivotally connected at respective ends to the other bearing member and to said same bleacher section as said rod.

3. Folding bleachers, comprising, forward and rear seat carrying bleacher sections pivotally connected to present a combined bleacher assembly disposed on an inclined plane downwardly from rear to front with the seats in stepped relationship, an upright wall attached support, a retractable wheeled guide arm on the rear of said rear bleacher section engageable with and movable in two vertical directions respectively on said support, rollers on the forward end of said forward bleacher section for movement over a floor, a fulcrum bar pivotally con-

nected at one end to said rear section intermediate said wall and the pivotal connection of said sections and designed at its other end for fixed pivotal connection to a floor, and means operatively connected to said rear section intermediate said fulcrum bar and said support for moving said assembly at its pivotal connection into a jack-knifing position whereby said sections can be vertically disposed and adjacent each other.

4. A device as defined in claim 3 including locking means to hold said arm immovable relative to said support at times.

5. A device as defined in claim 3 including a transverse opening in said guide arm, a solenoid operated latch bolt on said support, and said latch bolt disposed to traverse said opening at times.

6. Folding bleachers, comprising, a pair of seat carrying bleacher sections pivotally connected to present a combined bleacher assembly disposed on an inclined plane downwardly from rear to front with the seats in stepped relationship, and means for moving said assembly at its pivotal connection into a jack-knifing position whereby said sections can be vertically disposed and adjacent each other, said means including a pair of floor attached bearing members, a hydraulic jack having a cylinder and two way acting plunger rod disposed intermediate the rear of said combined bleacher assembly and the pivotal connection of said bleacher sections and having the outer end of said rod pivotally attached to one bleacher section and the opposite end of said cylinder pivotally attached to one of said bearing members, a rigid link serving as a fulcrum means disposed intermediate said hydraulic jack and the pivotal connection of said bleacher sections and pivotally connected at respective ends to the other bearing member and to said same bleacher section as said rod, and said link provided with a bend intermediate its ends and extending in a direction toward the rear of said bleacher assembly when extended for use.

7. Folding bleachers, comprising, front and rear seat carrying bleacher sections pivotally connected to present a combined bleacher assembly disposed on an inclined plane downwardly from rear to front with the seats in stepped relationship, and means for moving said assembly upwardly at its pivotal connection into a jack-knifing position whereby said sections can be vertically disposed and adjacent each other, said means including a fulcrum bar and a hydraulic jack each pivotally secured at respective opposite ends to the floor and to said rear section with said fulcrum bar intermediate said hydraulic jack and the pivotal connection of said bleacher sections.

8. Folding bleachers, comprising forward and rear seat carrying bleacher sections pivotally connected to present a combined bleacher assembly disposed on an inclined plane downwardly from rear to front with seats in stepped relationship, a leg depending from the point of pivotal attachment of said sections for resting on a floor, a vertical support, the rear of said rear section vertically slidably arranged relative to said support, rollers on the forward end of said forward section for movement over a floor, a fulcrum bar pivotally connected at respective opposite ends to the floor and said rear section intermediate said leg and said support, and means to tilt said rear section on said fulcrum bar so that the rear of said rear section slides downwardly on said support to the floor, the point of pivotal connection between said sections moves upwardly and said rollers move over said floor toward said support to bring said sections to a vertical position in parallel relationship with each other.

9. Folding bleachers comprising forward and rear bleacher sections disposed end to end and pivotally connected together at adjacent ends normally to present a combined bleacher assembly disposed on an inclined plane downwardly from rear to front, seats supported on said sections in stepped relation, a fulcrum supporting said rear section intermediate the front and rear ends thereof for turning about a generally horizontal axis, a re-

5

reciprocating power actuator disposed beneath said rear section with one end pivotally connected to the rear section at one side of said fulcrum, means for anchoring the other end of said actuator, said actuator being operable to turn said rear section about said axis in a direction to lower the rear end thereof and to raise the pivotal connection between said two sections thereby to turn said rear section to a vertical position with the seats carried thereby facing rearwardly, said forward section turning in the opposite direction to a vertical position alongside said rear section with the seats facing forwardly, an element connected to said rear section, a stationary guide engaging said element and operable to guide the rear end of the rear section downwardly in a substantially vertical

5

10

6

direction upon turning of the section by said actuator, and means supporting said fulcrum for rearward shifting with said rear section whereby said two sections, said axis and the pivotal connection between the sections move rearwardly as the sections turn to their vertical positions.

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