Nov. 14, 1967 R. S. CURRA, JR 3,352,069

GYMNASIUM STAND WITH FOLDABLE SEATS

Filed May 25, 1964 3 Sheets-Sheet 1

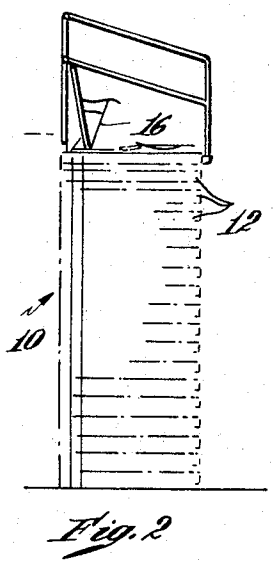


Fig. 2

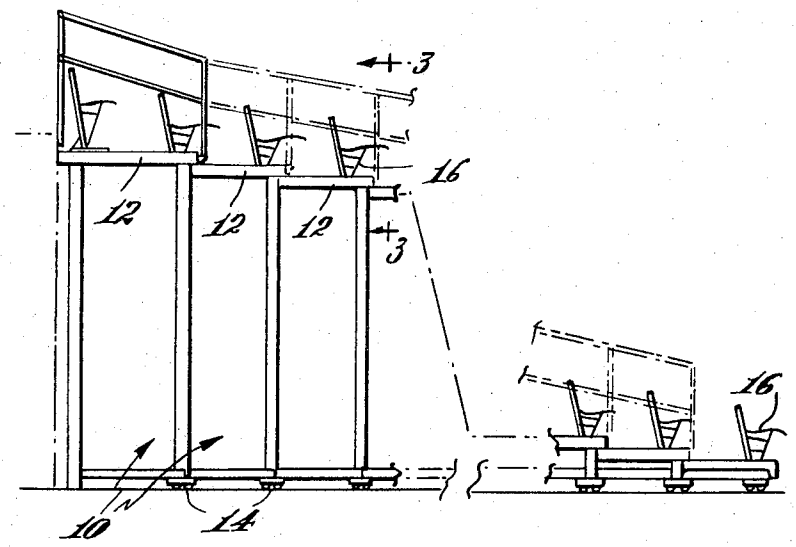


Fig. 1

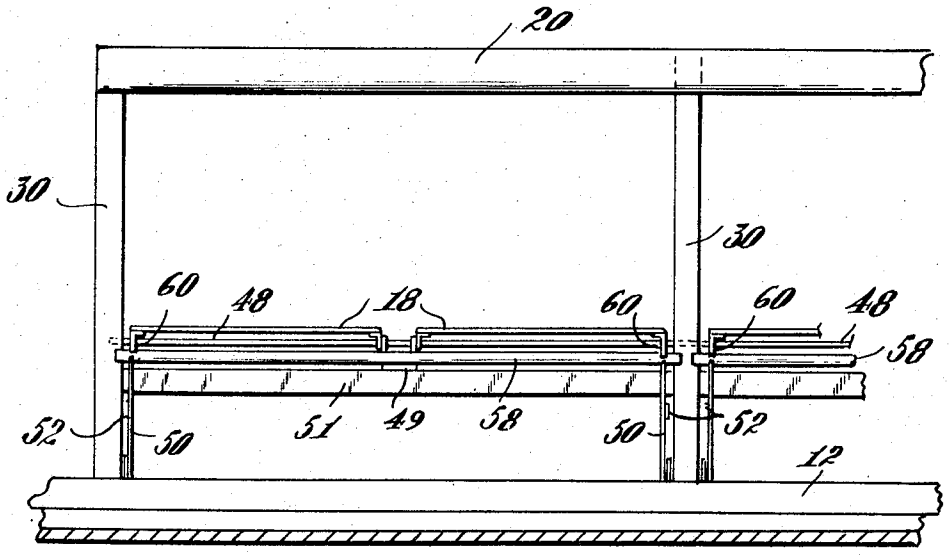


Fig. 3

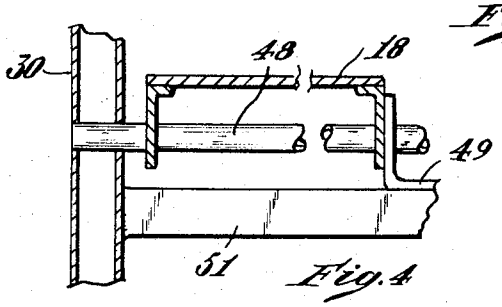


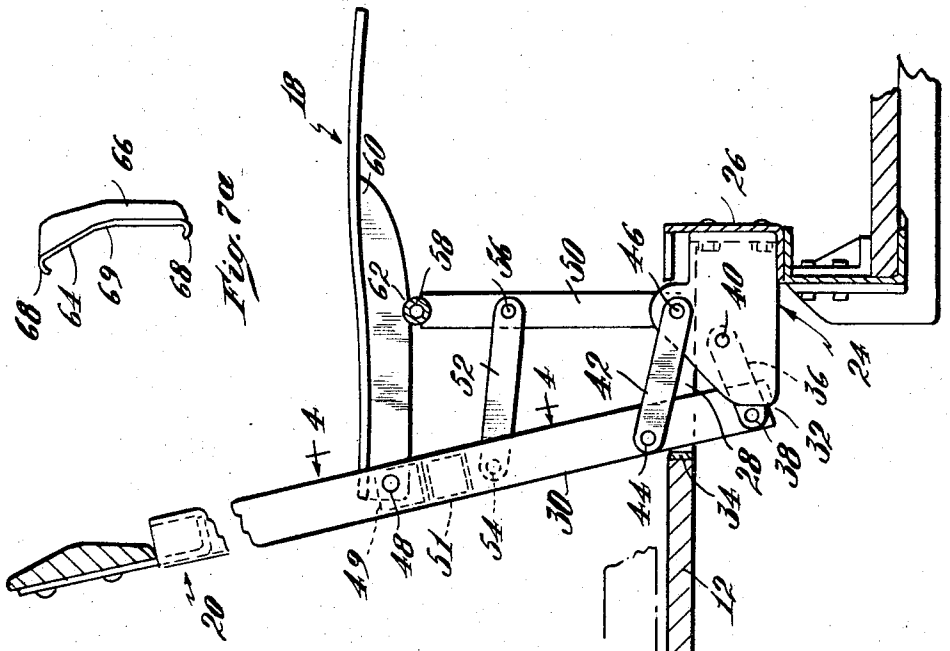
Fig. 4

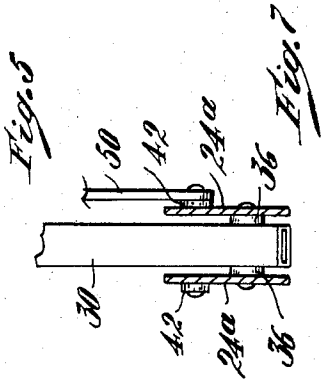
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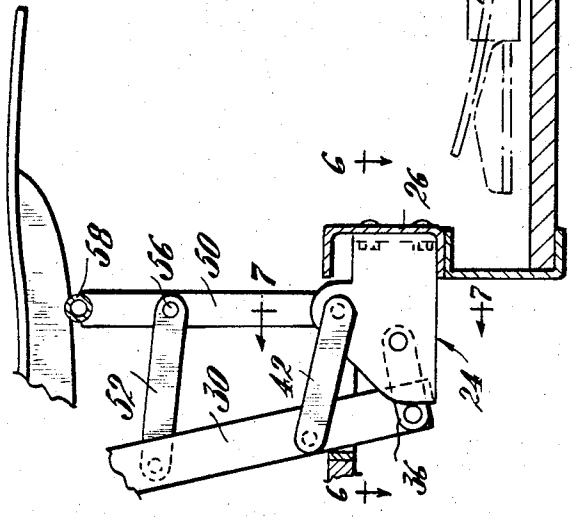
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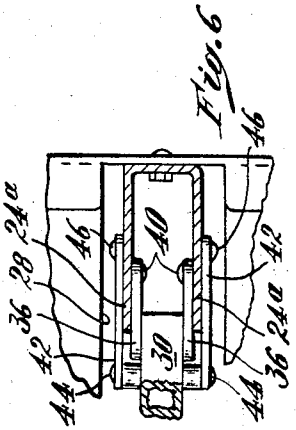
GYMNASIUM STAND WITH FOLDABLE SEATS

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GYMNASIUM STAND WITH FOLDABLE SEATS

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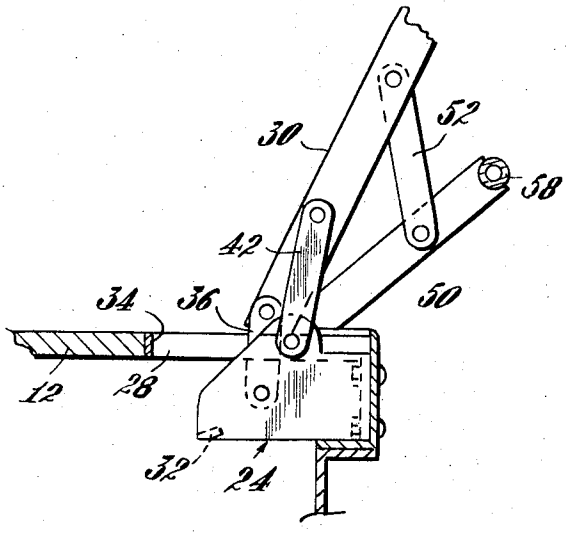


Fig. 8

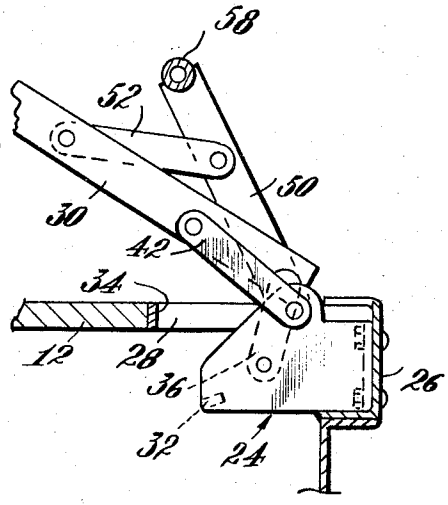


Fig. 9

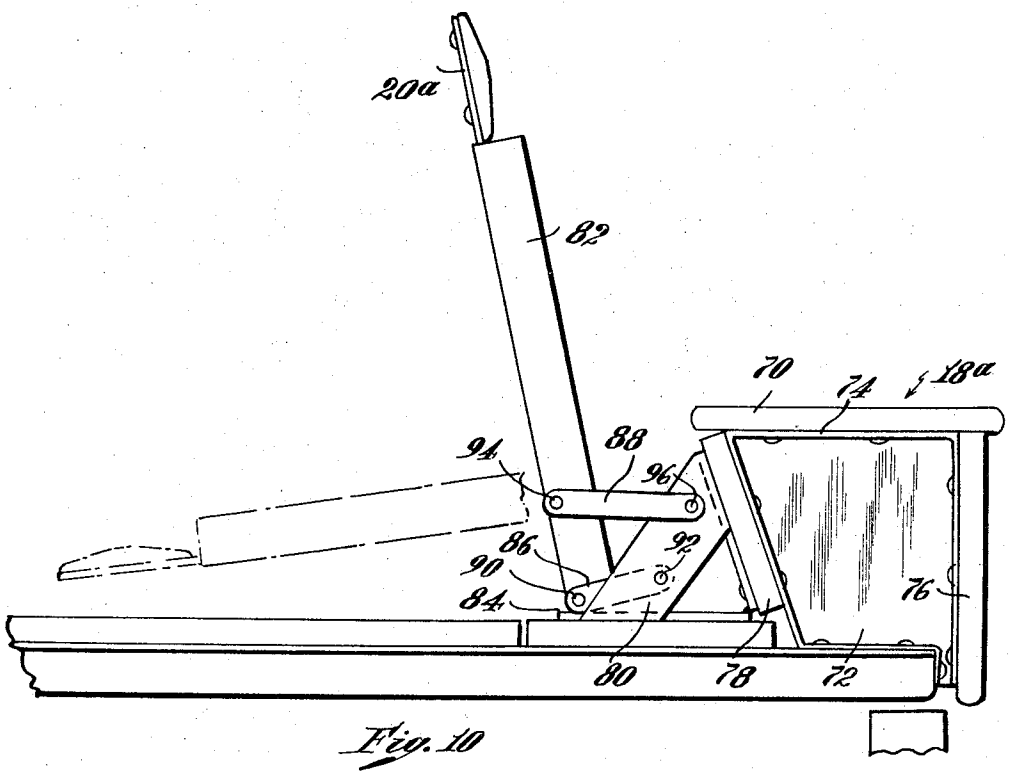


Fig. 10

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3,352,069

GYMNASIUM STAND WITH FOLDABLE SEATS

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Filed May 25, 1964, Ser. No. 369,665
11 Claims. (Cl. 52—9)

This invention relates to stands providing support for a plurality of rows of seats or benches arranged in stepped relation and more especially to stands of the kind used in auditoriums, gymnasiums, and the like, in which the stand is comprised of a plurality of relatively movable supporting structures which can be retracted, one within another, in telescoping relation in substantially vertical subjacent positions for storage against the wall of the building or extended in stepped relation for use.

The principal objects of the invention are to provide a stand of the foregoing kind with seat and seat back assemblies constructed and arranged to permit folding the backs and/or the backs and seats rearwardly onto the decks to a sufficiently compact arrangement of the component parts of the assemblies to lie entirely within the normal space between decks when the latter are stored in vertically subjacent relation to each other so that storage is possible without removing the seats.

As herein illustrated, the invention comprises, in combination with a stand having a plurality of supporting structures, supporting decks in vertically subjacent positions for storage and extended in stepped relation for use; seat and seat back assemblies mounted on the decks; and means supporting the seat backs for disposition in prone positions on the decks below the decks rearwardly thereof so that when the supporting structures are telescoped for storage the backs lie between decks. The aforesaid means comprises seat back supports spaced lengthwise of the stand in upwardly and rearwardly inclined positions relative to the seats, means on the supporting structures on which the lower ends of the seat back supports rest, and pairs of links connecting the lower parts of the seat back supports to the supporting structures comprising first links pivotally connected at their rear ends to the lower ends of the seat back supports and at their forward ends to the supporting structures at levels below their rear ends, and second links connecting the rear and forward ends to the seat back supports and supporting structures respectively, above the first links. The seat back supports are movable upwardly above the decks about the pivots at the forward ends of the links and rearwardly about the pivots at the rear ends of the links to prone positions on the decks. In one form of the invention, the seats are fastened to the decks and the forward ends of the links, supporting the seat back supports, are pivotally connected to brackets secured to the decks and the seats. Alternatively, there are brackets mounted on the supporting structures with portions below and above the decks, the forward ends of the links supporting the seat back supports are connected to the brackets and the seats are supported above the decks by means pivotally connecting their rear sides to the seat back supports and by legs pivotally connected at their lower ends to the brackets. The upper ends of the legs are situated substantially at the level of the pivots which connect the rear sides of the seats to the seat back supports and are located substantially midway between the front and rear sides of the seats. Bearing rods rest on the upper ends of the legs and the seats have at their undersides reinforcing parts which are notched so as to rest on the bearing rods. There are links connecting the seat back supports and the legs for movement of the latter with the seat back supports rearwardly onto the decks.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is an end elevation, broken away in part, showing a stand extended for use with a row of seats mounted on each of the stepped decks;

FIG. 2 is an end elevation of the stand showing the supporting structures telescoped in subjacent relation for storage against the wall of the building;

FIG. 3 is a fragmentary front elevation of one tier of seats taken on the line 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary elevation, partly in section, taken on the line 4—4 of FIG. 5, showing the details of a seat mounting;

FIG. 5 is an enlarged fragmentary elevation as seen from one end of the stand, partly in section, showing one deck in its entirety and portions of the decks forwardly and rearwardly thereof and with a seat and back assembly shown in its operative position and folded rearwardly onto the deck for storage;

FIG. 6 is a fragmentary plan view, partly in section, taken on the line 6—6 of FIG. 5;

FIG. 7 is an elevation, partly in section, taken on the line 7—7 of FIG. 5;

FIG. 7*a* is a vertical section taken through a seat back rest provided with a cushion;

FIG. 8 is a fragmentary elevation, partly in section, showing the first step in lifting the seat back supports from their normally operative position to a position above the deck;

FIG. 9 is a corresponding fragmentary elevation showing the seat back supports rotated rearwardly toward the deck; and

FIG. 10 is an elevation of a modified seat and seat back assembly.

Referring to the drawings (FIG. 1) there is shown a plurality of supporting structures **10** supporting at their upper ends decks **12** and being supported at their lower ends by wheels **14** for disposition of the supporting structures in vertically subjacent relation to each other, as shown in FIG. 2, against the wall of the building, or for extension, as shown in FIG. 1, for supporting a plurality of rows of chairs or benches **16** in stepped relation. Individual seats **18** may be mounted on the decks as shown in FIGS. 3 and 4 with a common seat back **20** for an entire row of seats, or continuous benches **18***a* and bench backs **20***a* may be used as shown in FIG. 10. The individual seats have the advantage that they may be lifted to permit easier access to rows of seats. Naturally, individual backs can be employed if desired.

In the preferred form of the invention, as shown in FIG. 5, the seat backs **20** and the seats **18** provide mutual support for each other and are supported on the decks **12** near their forward sides for movement from the upright position shown in FIG. 5 rearwardly onto the decks in substantially parallel relation therewith so as to lie completely between the planes of the decks when the latter are in their stored positions. The support for the backs is provided by means of brackets **24** fastened to the beams **26** which form the forward sides of the decks, the brackets being distributed at suitable intervals lengthwise of the stand to provide adequate support for an entire row of seats. Each deck **12** contains openings **28** lengthwise thereof for receiving the brackets **24** which are U-shape in horizontal section (FIG. 6) and have spaced parallel arms **24***a*—**24***a*. A seat back support **30** is mounted within each opening **28** with its lower end resting on lugs **32**—**32** (FIGS. 5, 8 and 9) formed on the arms **24***a*—**24***a* and with its back side resting against a shoulder **34** formed by the rear edge of the opening **28** in the deck, so that it inclines upwardly and rearwardly with respect to the deck. Links **36**—**36** are pivotally connected at their rear ends by a pin **38** to the lower end of the support **30** and at their forward ends by pins **40** to

the arms 24*a*—24*a* at a level above the pin 38. Second links 42—42 are pivotally connected at their rear ends by pins 44 to the back supports 30 and at their forward ends by pins 46 to the arms 24*a*—24*a* above the links 36—36 and as shown with the pins 44 above the level of the deck and the pins 46 substantially at the level of the deck. As thus mounted, it is evident that the back supports 30 can be lifted by pivotal movement of the links 36—36 and 42—42 about their forward ends to raise their lower ends above the level of the deck as shown in FIG. 8 and then may be rotated rearwardly about the pivot pins 38 and 44 (FIG. 9) to positions substantially parallel to the deck as shown in FIG. 5.

In this form of the invention the seats 18 are partially supported by the back supports 30 and to this end the rear sides of the seats are pivotally connected to the supports 30 by rods 48 (FIG. 3), the latter being long enough to extend lengthwise of two or more seats depending upon the arrangement of the seats. The rods 48 are supported at their ends by the supports 30 and intermediate their ends by brackets 49 (FIGS. 3 and 4) mounted on crossbeams 51. A crossbeam 51 is welded between each pair of supports 30.

Seat legs 50 (FIGS. 5 and 7) are mounted lengthwise of the stand within each of the openings 28 with their lower ends pivotally connected to the arms 24*a*—24*a* and with their upper ends substantially at the level of the rods 48 which connect the rear sides of the seats to the supports 30. Links 52 pivotally connected at their rear ends by pins 54 to the supports 30 and at their forward ends by pins 56 to the legs 50 hold the legs with their upper ends substantially midway between the front and rear sides of the seats. Bearing rods 58 are secured to the upper ends of the legs 50 and the seats are provided with spaced parallel, substantially perpendicular flanges 60—60 along their opposite sides containing notches 62—62 for engagement with the upper sides of the bearing rods 58.

The seats 18, as thus supported, may be folded upwardly into substantially parallel relation with the supports 30 either to permit occupants to move along the row of seats when they are in use or to dispose them in compact relation to the seat backs when they are folded backwardly for storage.

The seat backs 20 may be provided with cushion members (FIG. 7*a*) comprising shells 64 of sheet metal or the like, to one side of which are affixed yieldable pads 66. Each shell has at its upper and lower edges resilient flanges 68 which may be engaged with the longitudinal edges of the back 20.

The seats 18, while shown as providing for individual occupation, may be joined in twos or threes or may be continuous as in the form of a bench throughout the entire length of the stand.

An alternative seat assembly is shown in FIG. 10, embodying substantially the same structure in the back 20*a*, but having a seat 18 in the form of a bench fixed to the forward side of the deck. In this form only the back 20*a* is foldable rearwardly into engagement with the deck.

The bench 18*a* is comprised of horizontally disposed, longitudinally extending seat boards 70 secured at suitable intervals to the deck by bracket plates 72 having flanges 74 by means of which they are fastened to the deck and to the seat boards. Kick boards 76 are fastened to the flanges 74 at the forward sides of the bracket plates lengthwise of the benches and back boards 78 are fastened to the flanges 74 at the rear sides of the bracket plates so as to form a substantially closed-box-like structure. At suitable intervals lengthwise of the deck, bracket plates 80 are secured at their lower ends to the deck and at their upper ends to the rear side of the back boards 78.

The seat backs 18*a* are provided, as disclosed in the preferred form of the invention, with seat back supports 82. However, in contrast to the earlier described structure, the lower ends of the supports 82 rest directly on the deck or preferably on bearing plates 84 secured to the deck. The seat back supports 82 are supported in upright, rearwardly inclined positions relative to the deck by links 86 and 88. The links 86 are pivotally connected at their rear ends by pins 90 to the lower ends of the seat back supports 82 and are pivotally connected at their forward ends by pins 92 to the bracket plates 80 at a level above the pins 90. The links 88 are connected at their rear and forward ends by pins 94 and 96 respectively, to the seat back supports 82 and the bracket plates 80. As previously described with reference to the preferred form of the invention, the seat back supports may be raised relative to the deck by pivotal movement of the links 86 and 88 upwardly about their forward pivot pins and then rotated rearwardly about the pivot pins 90 and 94 to the prone position shown in dotted lines so as to be contained entirely within the space between the upper surface of the seat board 18*a* and the deck. The back rest 20*a* is secured lengthwise of the stand to the upper ends of the seat back supports 82.

While the collapsible seat and seat back assemblies are described herein in combination with a stand which has telescoping parts permitting it to be stored against the wall or to be extended for use, it is to be understood that collapsible seat and seat back assemblies of this kind may also be used with fixed stands, that is, those which do not have telescoping sections.

It should be understod that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. In combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped relation for use, seat and seat back assemblies mounted on the decks, means on the supporting structures on which the lower ends of the seat backs rest, and pairs of links connecting the lower portions of the seat backs to the supporting structures, comprising first links pivotally connected at their rear ends to the lower ends of the seat backs and at their forward ends to said supporting structures at a level above their rear ends, and second links connected at their rear and forward ends to the seat backs and supporting structures respectively, above the first links, said seat backs being movable upwardly about the pivots at the forward ends of the links and rearwardly about the pivots at the rear ends of the links to said prone position.

2. The combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped relation for use, of seats and seat backs mounted on the decks, and means supporting the seat backs for disposition in prone positions on the decks below the decks rearwardly thereof so that when the supporting structures are telescoped for storage the seat backs lie between decks, said means comprising seat back supports spaced lengthwise of the stand in upwardly and rearwardly inclined positions relative to the seats, backs secured to the upper ends of the seat back supports, the lower ends of the seat back supports resting on the decks, bracket members fastened to the supporting structures, and pairs of links connecting the lower portions of the seat back supports to the bracket members, comprising first links pivotally connected at their rear ends to the lower ends of the seat back supports and at their forward ends to the bracket members at a level above their rear ends, and second links connected at their rear and foward ends to the seat back supports and bracket members respectively, above the first links.

3. In combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped rela-

tion for use, of seats and seat backs mounted on the decks, and means supporting the seat backs for disposition in prone positions on the decks below the decks rearwardly thereof so that when the supporting structures are telescoped for storage the backs lie between the decks, said means comprising seat back supports spaced lengthwise of the stand in upwardly and rearwardly inclined positions relative to the seats, back rests secured to the upper ends of the seat back supports, the lower ends of the seat back supports resting on the decks, bracket members situated at the rear sides of the seats, said bracket members being fastened at their rear ends to the supporting structures and at their forward ends to the seats, and pairs of links connecting the lower portions of the seat back supports to the bracket members, comprising first links pivotally connected at their rear ends to the lower ends of the seat back supports and at their forward ends to the bracket members at a level above their rear ends so that the lines of center of the pivots at the rear and forward ends are situated substantially at right angles to the seat back supports, and second links secured at their rear and forward ends to the seat back supports and brackets respectively, at a level above the first links.

4. In combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped relation for use, of benches and bench backs mounted on the decks, and means supporting the bench backs for disposition in prone positions on the decks rearwardly of the benches below the upper sides of the benches so that when the supporting structures are telescoped for storage the backs lie between the decks, said means comprising braces secured to the supporting structures and benches at the rear sides of the benches, bench back supports spaced lengthwise of the stand at the rear sides of the benches in upwardly and rearwardly inclined positions relative to the benches with their lower ends resting on the decks, bench backs secured to the upper ends of the bench back supports, and links connecting the lower portions of the bench back supports to the braces, said links comprising first links pivotally connected at their rear ends to the lower ends of the bench back supports and at their forward ends to the braces above their rear ends, and second links secured at their rear and forward ends respectively, to the bench back supports and braces above the first links.

5. In combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped relation for use, seats and seat backs mounted on the decks, and means supporting the seat backs for disposition in prone positions on the decks below the decks rearwardly thereof so that when the supporting structures are telescoped for storage the seat backs lie between the decks, said means comprising bracket plates secured to the supporting structures with portions above and below the decks, seat back supports, means on the brackets below the decks on which the lower ends of the seat back supports rest, and pairs of links connecting the seat back supports to the bracket plates comprising first links pivotally connected at their rear ends to the lower ends of the seat back supports and at their forward ends to the bracket plates above the level of their rear ends but below the decks, and second links connected at their rear and forward ends to said seat back supports and bracket plates respectively, above the first links.

6. In combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped relation for use, seats and seat backs mounted on the decks, and means supporting the seat backs for disposition in prone positions on the decks below the planes of the decks rearwardly thereof so that when the supporting structures are telescoped for storage the backs lie between the decks, said means comprising bracket plates secured to the supporting structures with portions above and below the decks, lugs on the bracket plate, seat back supports supported at their lower ends on the lugs, shoulders on the decks above and rearwardly of the lugs against which the rear sides of the seat back supports rest, and pairs of links connecting the seat back supports to the bracket plates, comprising first links pivotally connected at their rear ends to the lower ends of the seat back supports and at their forward ends to the bracket plates above the level of their rear ends but below the decks, and second links pivotally connected at their rear ends to the seat back supports above the level of the decks and at their forward ends to the bracket plates substantially at the level of the decks.

7. The combination according to claim 6, comprising first means supporting the seats intermediate their front and rear sides and second means pivotally connecting the rear sides to the seat back supports, said first means being pivotally movable rearwardly with said seat back supports to said prone positions.

8. In combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped relation for use, seats and seat back assemblies mounted on the decks, and means supporting the seats and seat back assemblies for disposition in prone positions on the decks below the decks rearwardly thereof so that when the supporting structures are telescoped for storage the seat and seat back assemblies lie between decks, said means comprising first supports situated in upwardly and rearwardly inclined positions with respect to the decks with their lower ends resting on the supporting structures, first links connecting the lower portions of the first supports to the supporting structures for elevation to the levels of the decks and rearward pivotal movement to prone positions substantially parallel to the decks, means pivotally connecting the rear sides of the seats to the first supports above the decks, second supports situated in substantially vertical positions with respect to the decks with their upper ends supporting the undersides of the seats intermediate their rear and forward sides and their lower ends pivotally secured to the supporting structures, and links pivotally connected at their rear and forward ends respectively, to the first and second supports intermediate the undersides of the seats and the decks.

9. In combination with a stand having a plurality of supporting structures supporting decks in vertically subjacent positions for storage and extended in stepped relation for use, seats and seat back assemblies mounted on the decks, and means supporting the seats and seat back assemblies for disposition in prone positions on the decks below the planes of the decks rearwardly thereof so that when the supporting structures are telescoped for storage the seat and seat back assemblies lie between the decks, said means comprising bracket plates fastened to the supporting structures with portions below and above the decks, first supports situated in upwardly and rearwardly inclined positions with respect to the decks with their lower ends resting on the bracket plates, pairs of links connecting the lower portions of the first supports to the bracket plates for elevation of the lower ends of the first support above the levels of the decks, and rearward pivotal movement to prone positions substantially parallel to the decks, means pivotally connecting the rear sides of the seats to the first supports above the decks, second supports situated in substantially vertical positions with respect to the decks with their upper ends substantially at the levels of the pivot means connecting the rear sides of the seats to the first support and substantially midway between the front and rear sides upon which the seats rest, means pivotally connecting the lower portions of said second supports to the bracket plates substantially at the levels of the decks, and links pivotally connected at their rear and forward ends to the first and second

supports respectively, intermediate the seats and decks.

10. The combination according to claim **9**, wherein bearing parts are mounted at the upper ends of the second supports and the seats rest on said bearing parts.

11. The combination according to claim **9**, wherein bearing bars are secured to the upper ends of the second supports and the seats have stiffening flanges at their undersides which extend forwardly relative to their rear edges which contain notches for engagement with said bearing bars.

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