Sept. 11, 1962 F. E. BUSSE 3,052,929

POWER ACTUATED FOLDABLE BLEACHER ASSEMBLAGE

Filed Nov. 17, 1958 3 Sheets-Sheet 1

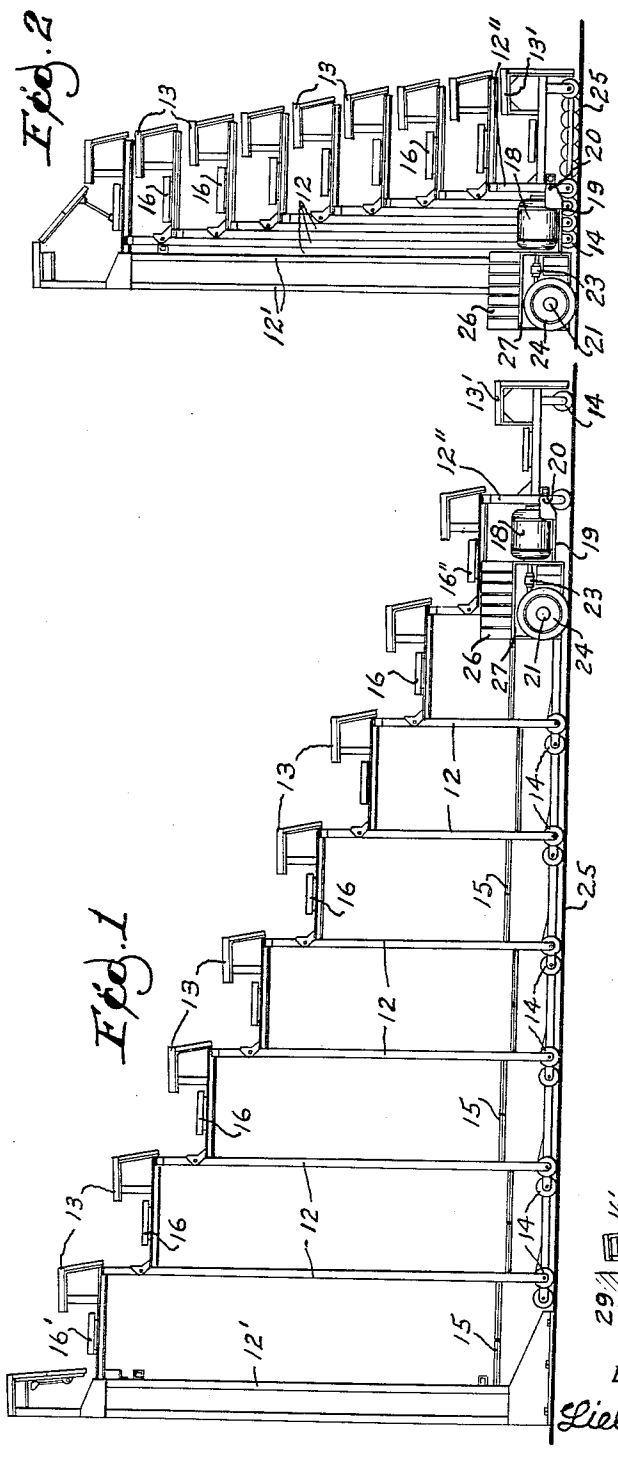


Fig. 1

Fig. 2

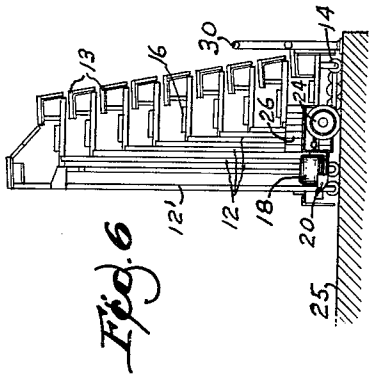


Fig. 6

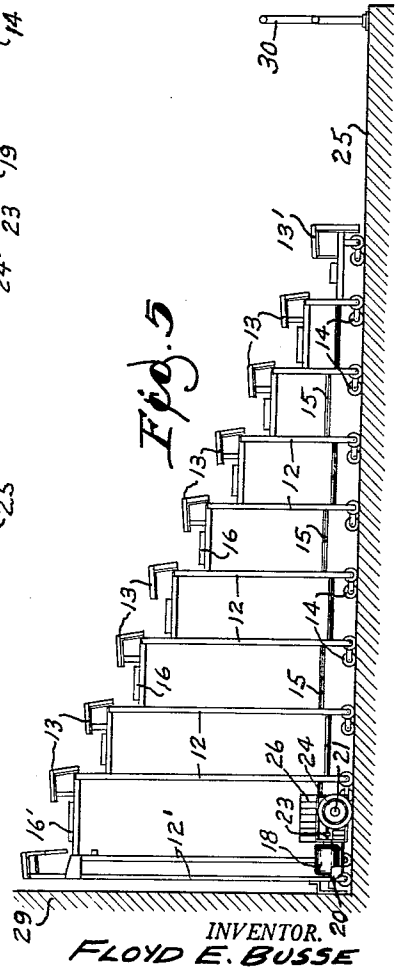


Fig. 5

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Fig. 3

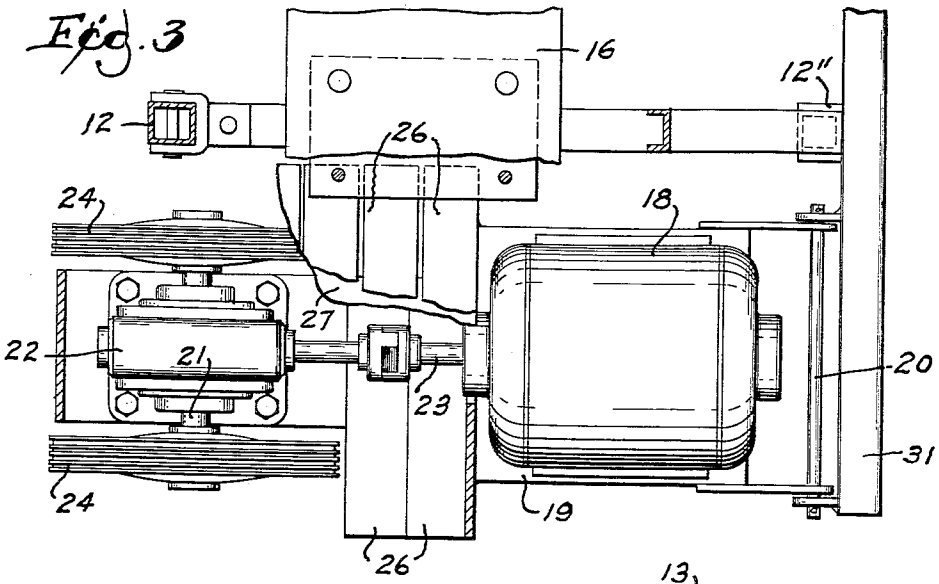
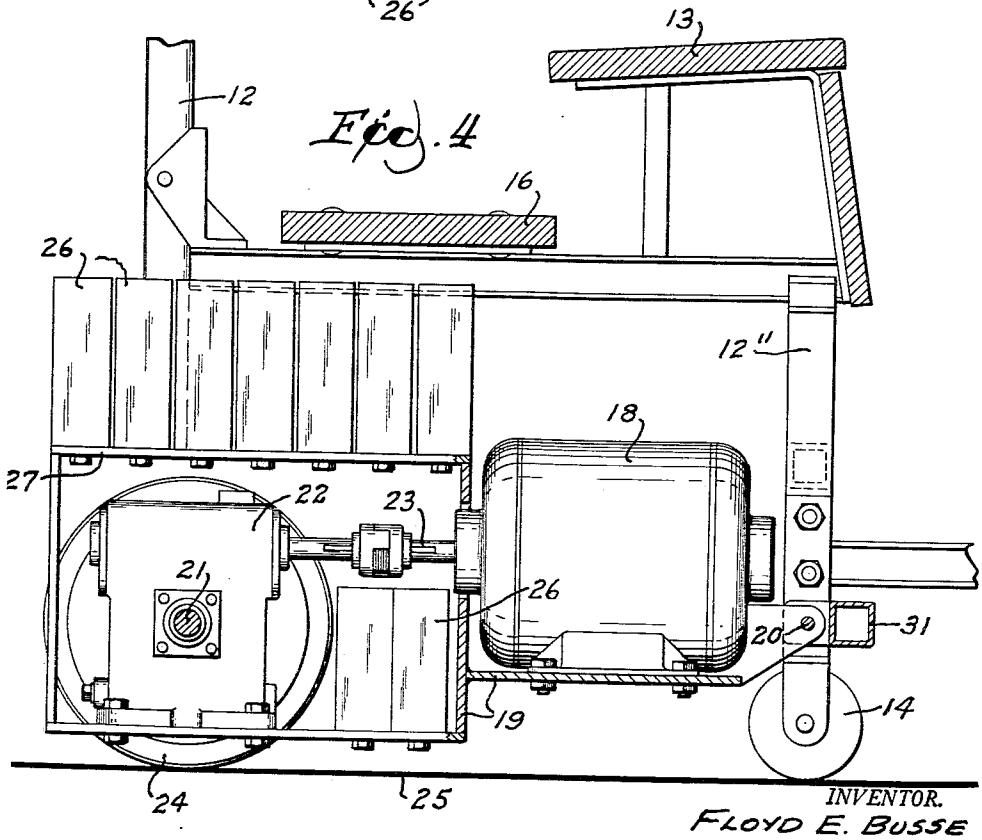


Fig. 4



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POWER ACTUATED FOLDABLE BLEACHER ASSEMBLAGE

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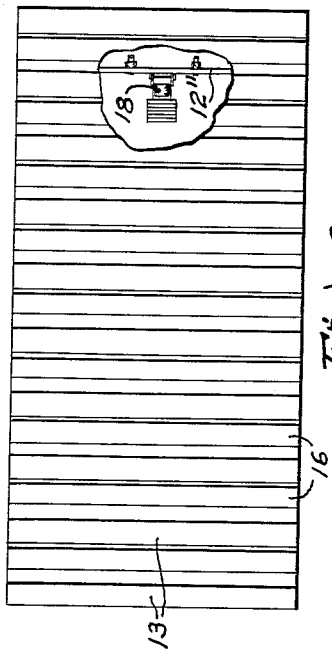


Fig. 8

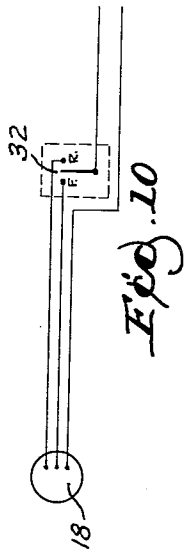


Fig. 10

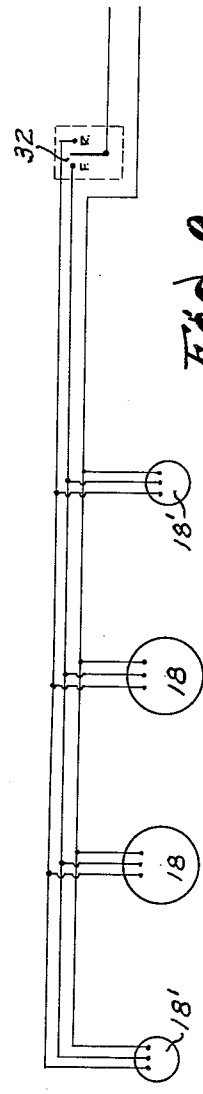


Fig. 9

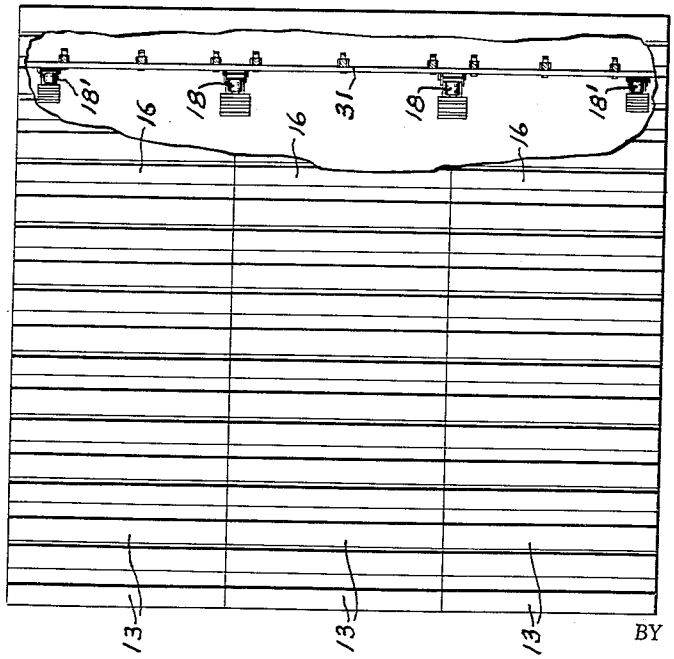


Fig. 7

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3,052,929

POWER ACTUATED FOLDABLE BLEACHER ASSEMBLAGE

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Filed Nov. 17, 1958, Ser. No. 774,254
3 Claims. (Cl. 20—1.126)

This invention relates in general to improvements in spectator bleacher structures, and it relates more specifically to improvements in the construction and operation of power actuated foldable bleacher assemblages, especially adapted for use in gymnasiums, auditoriums, or the like.

The primary object of the present invention is to provide an improved foldable and distendable bleacher in which a series of spectator seating supports are movable toward and away from each other by one or more powerful devices such as an electric motor.

Some of the more important and specific objects of the invention are as follows:

To provide a simple but highly flexible and efficient power-actuated foldable bleacher assemblage wherein one or more power units may be associated with diverse portions of the seat supports of a single or multiple group of bleacher sections, to rapidly nest or to distend the assemblage.

To provide an improved compact but powerful actuating motor for a foldable bleacher installation having successive transverse rows of upright seat supports of progressively decreasing height, and wherein the successive supports are interconnected by mechanism for transmitting movement to the adjacent supports of the series whenever motion is imparted to one of these supports.

To provide a bleacher comprising a succession of spectator seating supports of progressively diminishing heights adapted to be moved toward and away from each other, and in which the supports may be either folded for storage or spread apart for normal use while the entire bleacher assemblage may also be bodily displaced as a unit when in either folded or spread condition with the aid of the same power device.

To provide an improved power unit preferably associated with either the front or rear seat support of a foldable bleacher assemblage and which may be effectively utilized to fold or to unfold the supports with utmost safety and with minimum attention, and which also functions with delayed action to fold and unfold the bleacher seat supports and to bodily move the entire assemblage.

To provide an electrically-actuated unit for operating a foldable bleacher assembly, which provides an effective floor engaging friction drive for moving the successive seat supports of the bleacher toward and away from each other, and which may also be used to transport the assembly as a unit from place to place, the same unit moreover being adapted for multiple arrangement so as to cooperate with bleachers of different sizes and weights.

These and other still more specific objects and advantages of the invention will be apparent from the following description.

A clear conception of the features constituting the present improvement, and of the construction and operation of several foldable and bodily transportable bleacher assemblages embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

FIGURE 1 is a relatively diagrammatic side elevation of a foldable bleacher assemblage in distended condition and with the improved power unit applied to a front end portion thereof;

FIGURE 2 is a similar elevational view of the same

installation but showing the assemblage in nested or folded condition;

FIGURE 3 is an enlarged top view of one of the improved electric motor driven power units applied to a bleacher assemblage as in FIGURES 1 and 2;

FIGURE 4 is a similarly enlarged side view of the electric motor driven power unit shown and applied as in FIGURE 3;

FIGURE 5 is a diagrammatic side elevation of another foldable bleacher assemblage similar to that of FIGURE 1 and also in distended condition, but showing the improved power unit applied to the rear seat support which is backed up against a fixed wall;

FIGURE 6 is a similar elevation of the bleacher installation shown in FIGURE 5, but showing the assemblage folded and moved forwardly against a fixed stop railing;

FIGURE 7 is a fragmentary top view of a three section bleacher assemblage having a portion of the structure broken away to show an arrangement of several of the improved power units for actuating a multiple section assemblage;

FIGURE 8 is a top view similar to that of FIGURE 7, but showing the preferred location of the power actuating unit in a single section bleacher assemblages;

FIGURE 9 is an electrical wiring diagram applicable to the arrangement of power units as shown in FIGURE 7; and

FIGURE 10 is a similar diagram especially applicable to the single section bleacher of FIGURE 8.

While the bleacher assemblages shown herein are of the type disclosed in U.S. Patent No. 2,846,738, granted August 12, 1958, wherein the successive adjacent seat supports are interconnected by lazytongs for transmitting parallel movement of these supports toward and away from each other, it is not intended to restrict the use of the improved power units to such installations; and it is also contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the actual disclosure.

Referring to the drawings, each of the bleacher assemblages disclosed therein, comprises in general, successive transverse seating tiers defined by rows of relatively movable upright seat supports **12** of gradually diminishing height each provided with an upper spectator seat **13** and a footrest **16** as well as with lower supporting rollers **14**, the adjacent supports **12** being movable back and forth toward and away from each other to nest and distend the tiers and being interconnected by lazytongs **15** for maintaining the rows parallel to each other. Except for the rear support **12'**, each of the other supports **12** is provided with a rearwardly extending footrest platform **16** loctaed directly beneath its seat **13** and above the lazytongs **15** telescopically connecting it with the next adjacent support, and these lazytongs **15** are operable to cause all of the supports **12** to move toward and away from each other in succession when force is applied fore or aft against either the rear support **12'** or the front support **12''**. All of this bleacher structure is relatively old as shown in the above-identified patent.

The present invention deals more particularly with the improved power unit for applying such force to the supports **12'** or **12''**, and this unit is shown in detail in FIGURES 3 and 4 and comprises, an electric motor **18** mounted upon a base **19** which is swingably suspended from a pivot **20**, and has a transverse axle **21** journalled for rotation in its swinging end connected by speed reducing worm gearing housed within a casing **22** with the motor shaft **23**, the axle **21** being provided at its opposite ends with relatively large friction wheels **24** which are engageable with the floor **25**. The base **19** is freely swingable about the pivot **20** and may be weighted down with a suitable number of relatively heavy weights **26**,

some of which may be mounted upon a plate **27** forming a protective cover for the speed reducing gearing. The number and heft of the weights **26** may be varied so as to insure proper traction between the wheels **24** and the floor **25** dependent upon the weight of the bleacher supports **12**, **12'**, **12''**, and one or more of these power units may also be provided and installed as will be later explained.

Referring especially to FIGURES 1 and 2, in this installation as in FIGURES 3 and 4, the rear support **12'** is bolted to the floor **25** and the improved power unit is pivotally suspended from a front support **12''** to which the lowest front spectator seat **13'** and its support are rigidly attached. The pivot **20** of the motor base **19** is secured to the upright front beams of the support **12''**, and the entire power unit is protected by the seat **13** and footrest **16''** carried by the support **12''**. With the rear support **12'** fixed to the floor **25** and assuming the bleacher to be distended for normal use as in FIGURE 1, when the motor **18** is operated to rotate its shaft **23** in one direction the weighted friction wheels **24** will propel the support **12''** rearwardly thereby causing the lazytongs **15** to successively roll all of the intermediate supports **12** rearwardly into compact folded and telescoped condition as in FIGURE 2. Reverse operation of the motor **18** will obviously distend the assemblage in like manner by successively separating the seat supports **12**, **12'**, **12''** from nested storage condition as in FIGURE 2 into spread and usable condition as in FIGURE 1, thus providing a simple but effective drive for moving the roller supported seat supports **12**, **12''** in either direction relative to a fixed rear support **12'**.

Referring now to FIGURES 5 and 6, in this modification the same power unit shown in FIGURES 3 and 4 may be utilized but the entire bleacher unit is adapted to float upon the floor **25** between a stationary rear wall **29** and a fixed guard rail **30** with delayed action. In this installation the power unit is reversed and has its suspension pivot secured to the rear upright of the rear support **12'**, and the entire power unit is protected by the seat **13** and footrest platform **16'** of the adjacent support **12**. Also, while the weight of the front tier is generally sufficient to resist movement thereof during the folding operation, suitable means such as a brake and its actuating linkage shown and described in Patent No. 2,846,738 may be incorporated in the front or lowermost row to more positively resist movement of this row until the tiers are completely nested by the power actuating means.

Assuming the bleacher to be in extended condition and backed against the wall **29** as in FIGURE 5, when the electric motor **18** is actuated to rotate its shaft **23** in one direction, the bleacher starts to fold from the rear and this folding action will continue until the assemblage has been completely folded. If a brake or other means for resisting movement of the lowermost tier is utilized, such brake may now be released, and continued operation of the motor **18** will then cause the entire bleacher unit, in folded condition, to move toward the fixed rail **30** usually disposed at the edge of a balcony, as in FIGURE 6.

When this type of bleacher is prepared for occupancy, starting from the position shown in FIGURE 6, the seat supports start to separate from the rear and this action continues toward the front of the assembly until the entire bleacher has been unfolded with the front row of supports still against the railing **30**. Further operation of the motor **18** will then cause the entire structure to move bodily and in extended condition until the rear support **12'** either engages a wall **29** or sufficient space has developed in front of the assemblage to provide the necessary walkway, and the brake may then be reset when incorporated in the assemblage.

This bodily displacement of the entire bleacher assemblage in either direction is what is referred to herein as delayed action, and with this modified assemblage, the motor-driven power unit may also be utilized to bodily transport small bleacher assemblages from place to place.

In bleacher assemblages such as shown schematically in FIGURE 7 wherein several adjoining and interconnected rows of supports **12** and seats **13** are required, it is preferable to utilize several power units having motors **18** of different capacities in order to obtain the necessary traction for folding and expanding all of the rows simultaneously. A transverse bar **31** which spans all of the rows of bleacher supports, has motors **18** of relatively great capacity mounted thereon in the vertical planes of the ends of the adjoining rows, while motors **18'** of lesser capacity are mounted upon the opposite ends of the bar **31**. All of the motors **18**, **18'** are simultaneously operable and controllable by a single reversing switch **32** as depicted in the wiring diagram of FIGURE 9, and with the power units thus applied, the force for moving the bleacher supports **12** toward and away from each other will be uniformly applied to the entire assemblage.

In bleacher assemblages embodying a single row of seats **13**, or in cases where each of several adjoining rows must be indefendantly foldable and distendable, a single power unit comprising a motor **18** of proper capacity may be mounted centrally of each row as shown in FIGURE 8. The propelling motor **18** for each individual row may then be controlled by a separate electrical system having its own reversing switch **32** as in FIGURE 10, but all of these control switches may be located at a common remote control station so that they will be readily accessible for manipulation.

From the foregoing detailed description it should be apparent that the present invention in fact provides an improved foldable and distendable bleacher assemblage which is simple but durable in construction, and which is highly flexible in its adaptations. These bleachers may obviously be produced in relatively standard sections or rows adapted to be motivated by compact but powerful electric motor units either individually or simultaneously controlled and actuated. The delayed action obtainable with bleacher assemblages such as illustrated in FIGURES 5 and 6 is very important for use in many installations, and while the use of lazytongs **15** for transmitting motion to the successive seat supports **12** is not essential this type of motion transfer mechanism has been found highly satisfactory. The improved power units besides being well protected in the installations, may be weighted to provide proper traction for moving the seat supports **12**, and these units may also be produced in various capacities for cooperation with bleachers of different sizes. Not only is the power actuator completely housed, permanently stored and concealed from the view under and within the confines of the bleacher assemblage at all times and in any position thereof, but the need for a brake or other means for preventing displacement of the end tier on which the motor is mounted is entirely eliminated since the driven traction wheels **24** are positively coupled to the drive motor and are therefore locked when the motor is off to thereby provide sufficient resistance to movement at any position whether the assemblage be open, distended or partially distended.

It should be understood that it is not desired to limit this invention to the exact details of construction and operation of the foldable bleacher assemblages specifically shown and described herein, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. In a foldable bleacher assemblage having successive transverse tiers of spectator footrest and seat-carrying members of gradually decreasing heights terminating in end tiers and supported on laterally spaced uprights and interconnected for bodily movement thereof toward and away from each other into nested and extended positions, means for resisting movement of one of said end tiers, and a reversible power actuator mounted on a tier remote from said one end tier and positioned entirely be-

tween adjacent ones of the supporting uprights thereof below the footrests and seats and entirely within the confines of the bleacher regardless of the relative positions of the tiers, said power actuator including a driven ground-engaging wheel also positioned below said footrests and seats entirely within the confines of the bleacher for moving said transverse tiers selectively to said nested and extended positions.

2. In a foldable bleacher assemblage having successive transverse tiers of spectator footrest and seat-carrying members of gradually decreasing heights terminating in end tiers and supported on laterally spaced uprights and interconnected for bodily movement thereof toward and away from each other into nested and extended positions, means for resisting movement of one of said end tiers, a reversible motor mounted on a rigid supporting member connected to a tier remote from said one end tier between adjacent ones of the supporting uprights thereof below the footrests and seats and extending to a position entirely within the confines of the bleacher regardless of the relative positions of the tiers, and a ground-engaging drive wheel coupled to said motor and also positioned below said footrests and seats entirely within the confines of the bleacher for moving said transverse tiers selectively to said nested and extended positions upon operation of said motor.

3. In a foldable bleacher assemblage having successive transverse tiers of spectator footrest and seat-carrying members of gradually decreasing heights terminating in end tiers and supported on laterally spaced uprights and

interconnected for bodily movement thereof toward and away from each other into nested and extended positions, means for resisting movement of one of said end tiers, and a power actuator including a reversible motor and a ground-engaging drive wheel coupled thereto and both mounted on a common rigid support pivotally connected at one end to a tier remote from said one end tier between adjacent ones of the supporting uprights thereof and extending to a position below the footrests and seats and entirely within the confines of the bleacher regardless of the relative positions of the tiers, said ground-engaging drive wheel also being positioned below said footrests and seats entirely within the confines of the bleacher for moving said transverse tiers selectively to said nested and extended positions upon operation of said motor.

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