June 18, 1963 R. J. LAPPIN ETAL 3,094,186

FOLDING BLEACHER AND OPERATOR THEREFOR

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Fig. 1.

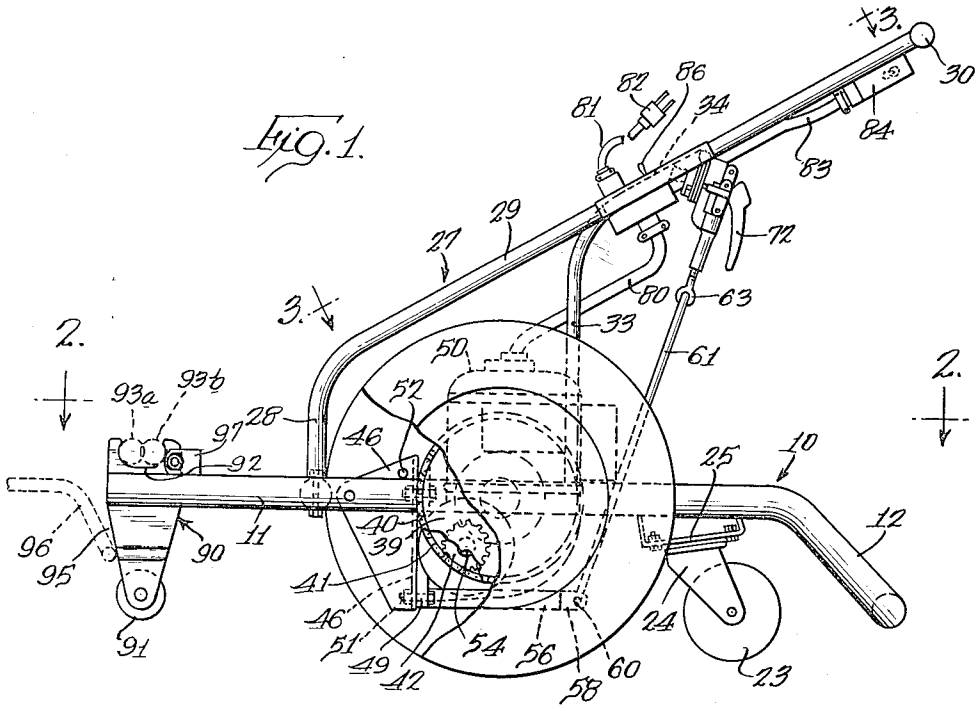



Fig. 2.

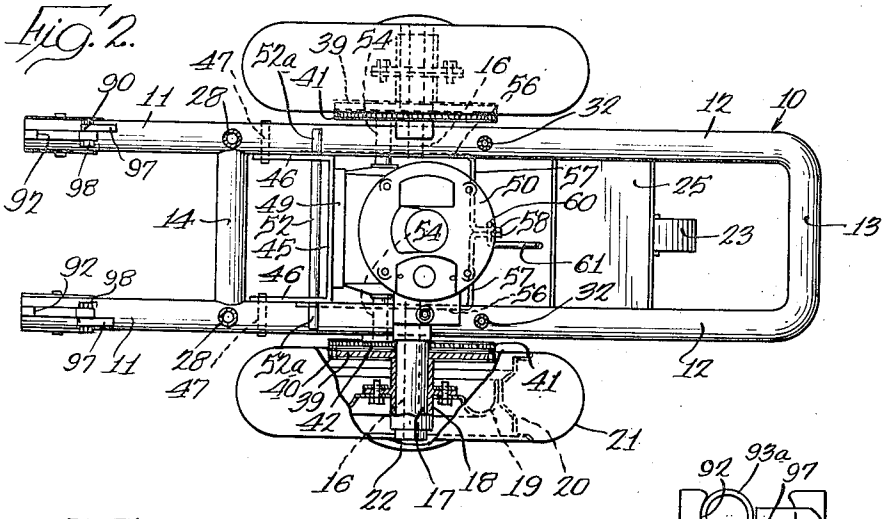



Fig. 6.

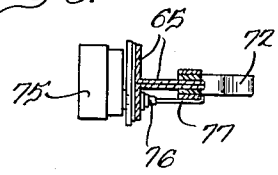
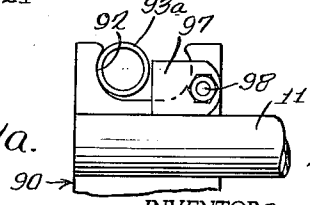



Fig. 1a.




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Fig. 3.

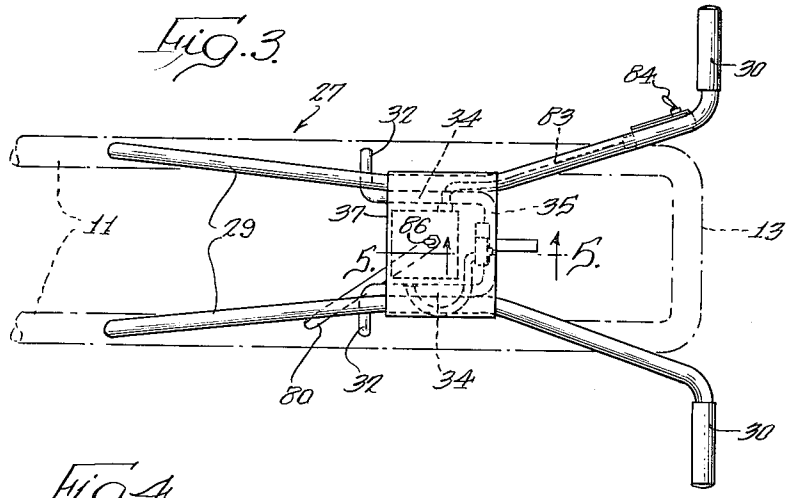



Fig. 4.

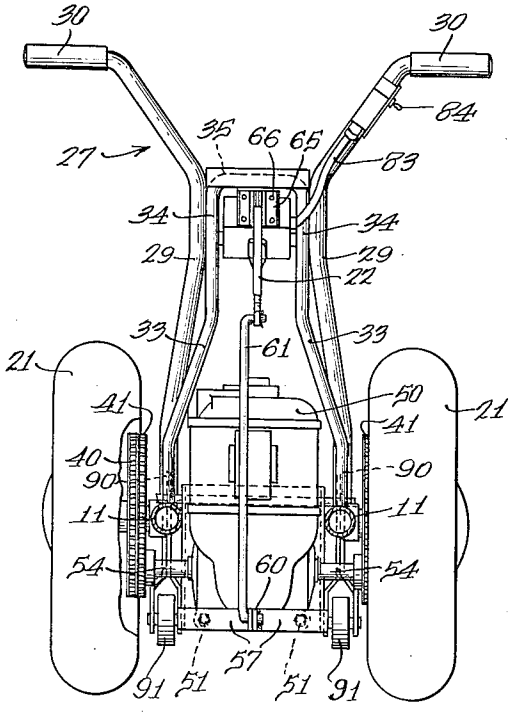
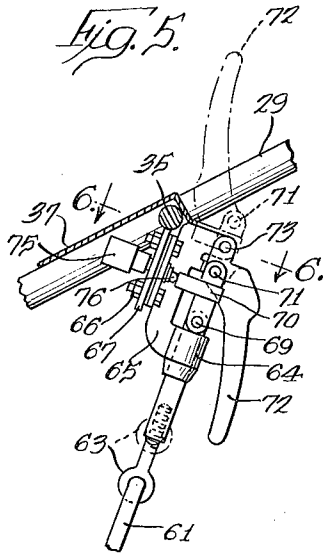



Fig. 5.




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Fig. 7.

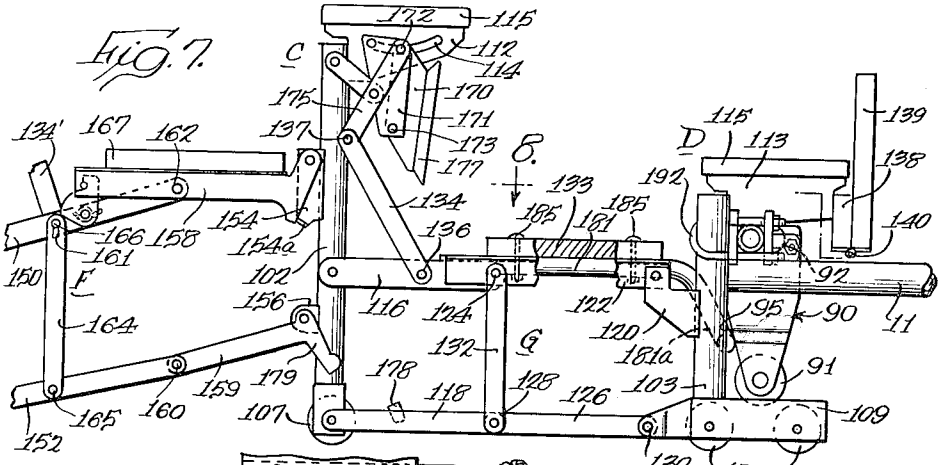



Fig. 8.

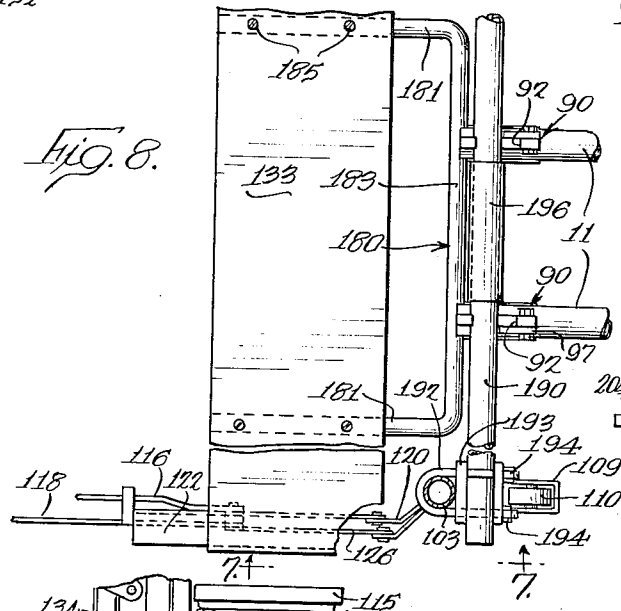



Fig. 11.

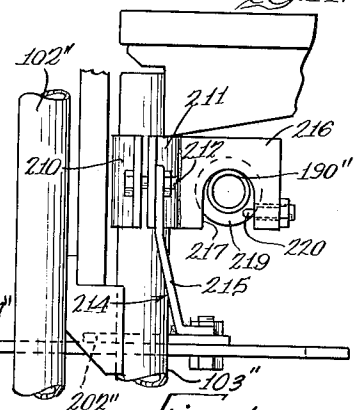



Fig. 10.

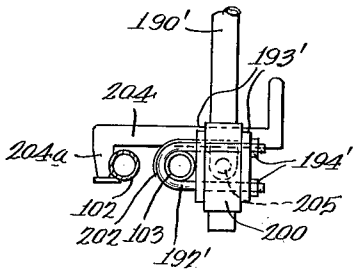
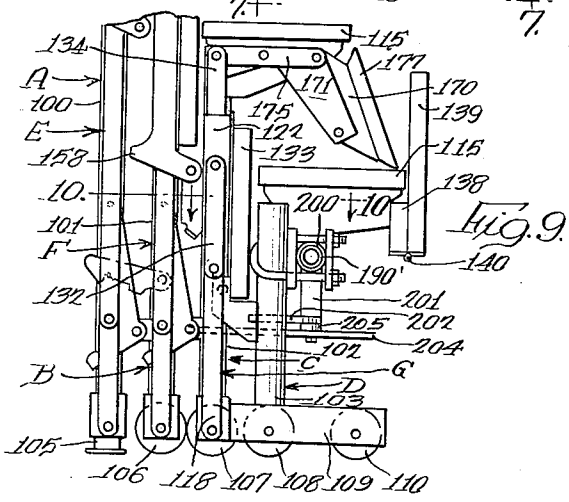



Fig. 9.




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# 3,094,186
# FOLDING BLEACHER AND OPERATOR THEREFOR

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Filed Mar. 28, 1958, Ser. No. 724,628
2 Claims. (Cl. 180—19)

This invention relates to the art of folding bleachers of the general type disclosed in the Lappin et al. Patent 2,815,541. Such bleachers commonly include a rear section adapted for attachment to an upstanding wall structure or the like and a number of foldable front sections usually folded and unfolded manually.

It is a general object of this invention to provide a new and improved power operator for folding and unfolding such bleacher structures.

Another object is to provide a tractor type power operator of the character described having an improved drive means which provides a positive synchronized straight-line drive to both propelling wheels of the operator when coupled to a bleacher, and which permits independent differential movement of the wheels when the operator is uncoupled.

A further object is to provide a new and improved power operator of the type described including a pair of propelling wheels, a large driven sprocket on each wheel, a double chain on each sprocket with one strand of the chain enmeshed with the sprocket teeth and an adjacent strand free, a drive motor having a double ended drive shaft provided with a small drive sprocket on each end, and means mounting the motor for bodily movement to position the drive sprockets in and out of mesh with the free chain strands.

Another object is to provide a new and improved power operator unit of the type described including a reversible drive motor which enables forward or reverse operation of the unit without the need for back gearing or gear change systems.

A further object is to provide a new and improved power operator of the type described including a stand for supporting a person to increase the traction of the propelling wheels on a floor or the like.

It is also an object of the invention to provide a new and improved power operator of the type described including a coupling for connecting the operator to a folding bleacher and means for breaking the bleacher linkage preparatory to folding as the coupling is connected to the bleacher.

Another object is to provide a new and improved power operable folding bleacher construction including means engageable by a power operator coupling to break the bleacher linkage preparatory to folding as the coupling is connected to the bleacher.

A further object is to provide a new and improved folding bleacher construction including means for locking the front two bleacher sections together in folded condition to enable connection of a power operator thereto in cramped quarters.

Other objects and advantages will become readily apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a side elevational view, partly broken away, of a power operator unit embodying the principles of the present invention;

FIG. 1*a* is a fragmentary side elevational view, similar to FIG. 1, showing a lock plug in operative position.

FIG. 2 is a plan view of the operator unit illustrated in FIG. 1, in section at about the line 2—2 of FIG. 1, and partly broken away.



FIG. 3 is a fragmentary plan view taken at about the line 3—3 of FIG. 1;

FIG. 4 is a rear elevational view of the power operator unit illustrated in FIGS. 1 and 2, partly in section;

FIG. 5 is an enlarged fragmentary sectional view at about the line 5—5 of FIG. 3;

FIG. 6 is a fragmentary sectional view at about the line 6—6 of FIG. 5;

FIG. 7 is a fragmentary end elevational view, partly broken away, of a power operable folding bleacher adapted for use with the power operator unit illustrated in the preceding figures, illustrating the bleacher in extended or unfolded condition;

FIG. 8 is a fragmentary plan view of the bleacher structure illustrated in FIG. 7;

FIG. 9 is an end elevational view of a bleacher structure similar to that of FIGS. 7 and 8, in folded condition, and including a modification of the bleacher structure;

FIG. 10 is a fragmentary sectional view taken at about the line 10—10 of FIG. 9; and

FIG. 11 is a fragmentary side elevational view showing another bleacher modification.

While illustrative embodiments of the invention are shown in the drawings and will be described in detail herein, the invention is susceptible of embodiment in many different forms, and it should be understood that the present disclosure is to be considered as an exemplification of the principles of the invention and are not intended to limit the invention to the embodiments illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawings in more detail, the power operator unit of this invention includes a generally horizontally disposed U-shaped frame member 10 which includes parallel horizontal legs 11 each including a downwardly extending portion 12 at the rear of the frame connected by an integral transverse portion 13 adapted for supporting a standing operating person when the unit is coupled to a bleacher thereby to increase the traction of propelling wheels on a gymnasium floor or the like. Near the forward end of the frame, the leg portions 11 are connected by a transverse reinforcing brace 14 suitably welded or otherwise secured at opposite ends to the leg portions 11.

Each frame leg 11, at approximately the midpoint in its length, has a laterally outwardly projecting stub shaft or axle 16 suitably secured thereto as by welding for supporting propelling wheels for the unit. The propelling wheels are supported on the axles 16 through the medium of suitable bearing means 17 and each includes a central hollow hub portion 18 rotatable on the axle, an outwardly extending annular web portion 19 suitably secured to the hub, a rim 20 at the periphery of the web for supporting a suitable tire 21, and a hub cap 22. In this manner, the propelling wheels are independently rotatable on the frame structure for differential movement when the drive is disengaged and thereby enable manipulation of the unit by hand.

The center of gravity of the unit is located approximately over the common axis of the propelling wheels, and the weight at opposite ends of the unit from the wheel axis is approximately balanced to facilitate manual handling when the unit is not coupled to a bleacher so that an operating person need only balance the unit while the wheels support most of the weight. However, the right end of the unit from the wheel axis, as viewed in FIGS. 1 and 2, is slightly heavier than the left end to enable parking when the unit is not in use, and to stabilize the unit for this purpose a third wheel 23 is rotatable in a forked wheel support 24 secured to a bracket 25 extending between and secured to the frame legs 11.

To facilitate manipulation of the unit manually, suit-

able handle means are provided including two handles 27 each including lower upright end portion 28 secured to a frame leg 11, an intermediate rearwardly slanting portion 29 and an upper end hand grip portion 30. The slanting portions of the handles are reinforced by two braces each including a lower end portion 32 secured to a frame leg 11, an upright intermediate portion 33, and an upper rearwardly slanting end portion 34 disposed along the inside of and secured to the adjacent slanting intermediate portion 29 of handle 27. The upper end portions 34 are joined by a transverse connecting member 35. The slanting portions 34 of the braces are welded or otherwise secured to the intermediate portions 29 of the handles. The portions 34 and 35 of the braces and the adjacent portions of the handles form a mount for supporting a plate 37 which is utilized as a control panel.

Power is supplied to the propelling wheels through the medium of large sprockets 39, one secured to the hub portion 18 of each propelling wheel. Each sprocket 39 has a double chain thereon including a first chain strand 40 which tightly encircles the sprocket 39 completely, meshing with all of the sprocket teeth, and a second inwardly disposed chain strand 41 parallel to and secured to the first chain strand. The second chain strand is entirely free, and functions as an internal ring gear, being adapted to receive a relatively small drive sprocket 42 movable into and out of meshing engagement therewith. The drive sprockets 42 are disposed within the periphery of the chain strands 41 and form a part of a drive unit to be described.

The power drive unit for supplying power to the propelling wheels comprises a motor support in the form of a U-shaped bracket pivoted on the frame 10 and including an upright connecting web portion 45 having parallel forwardly extending leg portions 46 pivoted at their ends respectively on legs 11 as at 47. The central web portion 45 has a base 49 of a motor drive unit 50 secured thereon as by bolts 51. When the pivoted bracket and the motor drive unit are allowed to pivot downwardly about the pivot axis 47 to the position shown, the weight of the motor drive unit is supported by means of a cross rod 52 passing through the bracket legs 46 and having opposite ends 52*a* projecting outwardly to rest on the frame legs 11.

The drive motor 50 has a double ended drive shaft or, preferably, comprises a unit including a drive motor and a gear reducer having a double ended drive shaft including shaft ends 54 each of which carries one of the relatively small drive sprockets 42 previously described. It will be understood that the motor drive unit may be pivoted upwardly from the position illustrated to disengage the sprockets 42 from the chain strands 41 and thereby free the propelling wheels for independent differential rotation to facilitate manipulation of the unit manually when it is not coupled to a bleacher. When the motor drive unit is pivoted downwardly to the position shown to mesh the drive sprockets 42 with the chain strands 41, a positive synchronous drive is applied to both propelling wheels to produce movement of the entire unit in a straight line path as is important to obtain proper folding and unfolding of a foldable bleacher linkage without binding.

Means for pivoting the motor drive unit and its supporting bracket includes a pair of parallel arms 56 having their forward ends rigidly secured to the bracket legs 46 respectively and including at the rear ends inwardly turned portions 57 which are joined at a central position by rearwardly bent lugs 58. The lugs 58 provide a pivotal connection at 60 for the lower end of a clutch rod 61. As best seen in FIG. 5, the upper end of the clutch rod is laterally bent and pivotally connected to a slide rod 63 which is slidable in a bearing 64 integral with a bracket 65. Bracket 65 is secured as by bolts 66 to a plate 67 welded or otherwise suitably secured to the crosspiece 35 of the reinforcing brace for the handles. The upper end of the slide rod 63 is pivoted at 69 to parallel links 70 having their upper ends pivoted at 71 to a manually accessible handle 72. The handle 72 has an upwardly projecting lug pivoted at 73 to a portion of the bracket 65.



In operation, it will be understood that movement of the handle to the full line position shown allows movement of the slide rod 63 and the clutch rod 61 downwardly to lower the motor drive unit to a position meshing the drive sprockets 42 with the chain strands 41. Conversely, the handle 72 may be pivoted in a counterclockwise direction about the pivot 73 to the broken line position illustrated in FIG. 5 to thereby elevate the slide rod 63 and the clutch rod 61, raising the motor drive unit and disengaging the drive sprockets 42 from the chain strands 41.

To prevent energization of the drive motor until the drive sprockets 42 are in mesh with chain strands 41, a safety switch 75 is suitably supported beneath the control panel 37. This switch is connected in the motor circuit and is of the normally open type so as to prevent energization of the motor until such time as it is closed. The switch includes a button 76 engageable by a switch actuating member 77 on one of the links 70 which is moved to switch closing position when the handle is moved to the full line position shown.

The drive motor is wired through a conductor 80 leading to the control panel which in turn has a rather long conductor 81 terminating in a plug 82 adapted to be positioned in any convenient receptacle providing electrical power for energizing the motor. A conductor 83 leads from the control panel to a position adjacent one of the hand grip portions 31 where an on-off switch 84 is conveniently positioned for operation by a person handling the unit. The drive motor is of a conventional reversible type, and the control panel includes a reversing switch 86 for obtaining operation of the motor either forwardly or reversely.

The use of a reversible motor enables forward or reverse operation of the unit without the need for complicated and expensive back gearing or gear change systems. The drive train from the motor to the propelling wheels provides a positive synchronized drive when coupled and enables differential rotation of the propelling wheels when uncoupled, all without the necessity for a transmission including complex differential and clutch mechanisms.

At the front end of the frame 10, coupling means is provided for detachably connecting the power operator unit to a bleacher including a pair of coupling members, one secured to each frame leg 11. In a preferred form, each coupling member comprises an upright bracket 90 (FIG. 1) fitted in the slotted end of frame leg 11 and bifurcated at the lower end, as best seen in FIG. 4, to support a roller 91. The rollers 91 facilitate manipulation of the unit when the front end must be lowered to connect the coupling members to a bleacher. The coupling members may be welded or otherwise secured to the frame legs 11, and at the upper ends are each formed with an upwardly opening slot 92 (FIG. 1) elongated in a front to rear direction to receive a bleacher tow bar such as that illustrated at 93*a* and 93*b*. After the front end of the frame is lowered and moved beneath the bleacher tow bar and then elevated to the position shown in FIG. 1, the tow bar is abuttable against the coupling member at opposite ends of the slot 92 depending on whether the operator is moved toward or away from the bleacher. In order to unfold the bleacher, the operator unit is moved in a direction away from the bleacher (to the right in FIG. 1) to engage the tow bar as at 93*a* to pull the same outwardly. In order to fold the bleacher, the operator unit is moved in a direction toward the bleacher (toward the left in FIG. 1) to engage the tow bar as at 93*b* to push the same inwardly.

When the bleacher is extended or unfolded for use, the foldable linkage associated therewith is locked in the sense that mere horizontally directed pressure on a tow bar such as that at 93 will not fold the bleacher. Instead, the linkage connecting the first two sections of the

bleacher must be unlocked or broken. Normally, this linkage is broken manually to initiate folding. According to the invention, the linkage is broken automatically by cam means provided on the front end of the frame, after which pressure applied by pushing horizontally on the tow bar completes the folding. The cam means comprises the front faces **95** of the lower portions of coupling brackets **90**. The cam surfaces **95** are positioned to engage a bleacher linkage trip arm such as that indicated in broken lines at **96** (FIG. 1) when the coupling brackets are positioned to engage the tow bar as at *93a*. Thus, movement to the left in FIG. 1 to take up the lost motion in the coupling means enables the cam means to pivot the trip arm in a clockwise direction to break the bleacher linkage before the coupling members engage the tow bar as at *93b* to complete the folding.

While the power drive described above is calculated to rotate the two propelling wheels synchronously to obtain straightline movement of the operator unit in a path normal to the length of a folding bleacher, during operation, a number of conditions beyond control may cause the operator unit to deviate from a straightline path. For example, if there occurs only a slight difference in air pressure in the inflatable tires **21**, the unit may tend to travel in a wide circle rather than a straightline path. During unfolding particularly, such deviation is undesirable because as the bleacher linkage approaches its extended position, a limited lateral movement is permitted in the linkage because the bleacher is relatively unguided, and any deviation of the unit from a straightline path at this time may cause the linkage to bind and become damaged or inoperative. Binding of the linkage is less likely to occur on folding the bleacher as the linkage is guided to a certain extent by the folding, doubling and overlapping of link parts as the bleacher approaches folded position.

Accordingly, in order to insure straightline tracking of the operator unit on unfolding a bleacher, coupling members **90** each include a lock lug **97** pivotable thereon adjacent the rear end of upwardly opening coupling slot **92**. Each lock lug is pivoted at **98** on coupling member **90** and movable between a first position (FIGS. 1 and 2) extending rearwardly from pivot **98** and a second position (FIG. 1*a*) extending forwardly from pivot **98**. In the first position, the lugs have no function and are normally so positioned when the operator is not in use or when it is being used for folding. The lock lugs are movable to the second position on coupling the operator to a bleacher for unfolding, and being at spaced positions along the bleacher bar and substantially in engagement with the bar at the front side thereof hold the operator aligned on a path normal to the tow bar. Since the lugs prevent lost motion of the coupling members on the tow bar, the operator is forced to travel in a straightline path thereby insuring proper unfolding of bleacher without binding of the bleacher linkage.

It will be understood that there may be departures from the specific construction shown without departing from the scope of the appended claims. Particularly, changes may be made in the supporting frame structure without altering the function of essential features of the invention.

As previously indicated, the power operator unit described above is intended for use with folding bleacher structures of the general type disclosed in Lappin et al. 2,815,541. Figs. 7 to 11 in this application illustrate a bleacher construction of the type referred to but not in its entirety. As no claim is made herein to the specific foldable linkage of such bleachers, only a portion of such a structure is shown in order to simplify the drawings. However, sufficient portions of the bleacher are illustrated to enable an understanding of its operation and a clear understanding of the invention of this application.

Referring to FIGS. 7 to 10, bleachers of the character mentioned include a plurality or series of upright supports or frames herein illustrated as four, designated A, B, C, and D, seen in end elevation in FIGS. 7 and 9. Frame A is the tallest while frame D is the shortest, frames B and C being stepped downwardly in height from frame A to frame D. Frame A includes two upright tubular members **100** (only one visible) which are secured in laterally spaced relationship by a bracing structure (not visible). Frames B, C, and D include respectively tubular members **101**, **102**, and **103** each pair of such tubular members being secured in spaced relationship by a bracing structure similar to that securing the members **100**.

Adjacent frames A and B, B and C, and C and D are connected by associated foldable linkage means E, F, and G respectively so as to stack together in closely adjacent parallel relationship, as illustrated in FIG. 9, when the bleacher is not in use. Foldable linkage of the type referred to is provided at each end of the bleacher, but in order to simplify the drawings only one end of the bleacher is shown and described, it being understood that the other end is identical in structure to the end described.

Upright tubular member **100** of frame A is secured at its lower end to a floor or other supporting surface by any suitable means such as a bracket **105**, and at its upper end may be secured to a vertical wall or the like by any suitable means (not illustrated). Tubular members **101** and **102** are movably supported on a floor or the like respectively by rollers **106** and **107**, while tubular member **103** is supported by a roller **108** and a U-shaped bracket **109** having a supporting roller **110**.

Fixed adjacent the upper ends of members **100**, **101**, and **102** are brackets **112** each of which has an arcuate slot **114**. Fixed adjacent the upper end of tubular member **103** is a bracket **113**. Secured to the upper surface of brackets **112** and **113** are seatboards **115** which extend longitudinally for at least the length of frames A, B, C, and D.

Secured to the front of seatboard bracket **113** on tubular member **103** of frame D and extending downwardly therefrom and longitudinally at least the length of frame D is a two section skirtboard including an upper section **138** and a lower section **139** hingedly connected at **140**.

Linkage means G foldably interconnecting frames C and D includes two vertically spaced links **116** and **118** each having one end pivotally connected to tubular member **102** and extending forwardly therefrom. Secured to tubular member **103** is a bracket **120** extending upwardly and rearwardly therefrom. A footboard supporting bar **122** is pivotally connected to bracket **120** and, at **124**, to the forward end of link **116**. A link **126** is pivotally connected at **128** to link **118** and at **130** to bracket **109**. Extending vertically between connections **124** and **128** and pivotally mounted therebetween is a vertical link **132**. A footboard **133** is secured to footboard supporting bar **122** and extends longitudinally thereon at least the length of frame D.

An arm **134** has one end pivotally connected at **136** to link **116** and has the other end pivotally connected at **137** to a skirtboard mounting means for frame C.

Movably carried in arcuate slots **114** of brackets **112** on tubular member **100** are a skirtboard bracket **170** and a plate **171**, the plate and bracket being connected together at **172** and **173**. Pivotally connected at its upper end to bracket **170** and plate **171** is a member **175** having its lower end pivotally connected to the upper end of link **134**. Secured to skirtboard bracket **170** and extending longitudinally thereon at least the length of the frame is a skirtboard **177**.

Foldable linkage F interconnecting frames B and C includes vertically spaced links **150** and **152**, similar to links **116** and **118** in linkage G, each having a rear end (not visible in FIG. 7) pivoted to tubular member **101** and extending forwardly therefrom. Brackets **154** and **156**

are secured to tubular member **102** in vertically spaced relation and pivotally carry respectively a rearwardly extending footboard supporting bar **158** and a bell crank member **159**. The forward end of link **152** is pivotally connected to the rear end of bell crank member **159** as at **160**, and the forward end of link **150** is pivotally connected to footboard supporting bar **158** as at **162**. Extending vertically between **150** an **152** is a vertical link **164** pivotally connected at its lower end to link **152** and having at its upper end a vertical slot **161** providing a slidable and pivotal connection to link **150** at **166**.

Fastened to footboard supporting bar **158** and extending longitudinally for at least the length of frame C is a footboard **167**.

Means are provided for stabilizing the bleacher when unfolded including the bracket **154** on tubular member **102** which has an angled portion **154***a* operable to support the pivoted footboard supporting bar **158** when it is in a horizontal position to thereby positively prevent further downward movement of the board.

To aid in folding linkage means F, an angled bracket **178** on link **118** is operable upon movement in an upward direction to engage arm **179** of bell crank **159** to pivotally move the bell crank in a clockwise direction and break the linkage connection at **160**.

A link **134'**, similar to link **134** in linkage G has its lower end pivotally connected to link **150** at connection **166**.

Parts completing linkage means F, not visible in FIG. 7, are similar to those of the left of vertical link **132** in linkage G. The linkage means E interconnecting frames A and B is similar to the linkage means F.

To fold the bleacher illustrated in FIG. 7 from the position shown to the folded position of FIG. 9, the link connections at **124** and **128** must be broken or unlocked either by raising footboard **133** or by pulling skirtboard **177** forwardly, or both. Normally, such an operation has been accomplished manually. After this, frame D may be pushed rearwardly and folding of the remaining frames and linkage follows automatically.

To unfold the linkage from the position illustrated in FIG. 9 to that illustrated in FIG. 7, the front frame D is pulled forwardly.

According to the invention, in order to facilitate folding of the bleacher completely by the power operator unit previously described, the bleacher of FIGS. 7 and 8 includes a trip arm such as that referred to at **96** in FIG. 1 engageable by cam means **95** of the power operator unit for breaking the linkage G preparatory to folding the bleacher. The trip arm takes the form of a member **180** which is U-shaped in plan view as seen in FIG. 8, and which includes parallel leg portions **181** and a transverse middle leg portion **183**. Leg portions **181** are suitably secured to the footboard **133** pivoted to frame D as by screws or bolts **185**. The member **180** is preferably located centrally of the length of footboard **133**, and the forward portions of legs **181** are angled downwardly as seen at **181***a* in FIG. 7. The transverse middle leg **183** is thus disposed for engagement by the cam surface **95** on coupling members **90** of the power operator unit, as illustrated in FIG. 7.

In order to facilitate connection of the coupling members **90** of the power operator unit to the bleacher, the bleacher includes a tow bar **190** suitably secured to the frame D for receiving the coupling members. As illustrated the tow bar comprises a horizontally disposed tubular rod **190** having opposite end portions supported respectively on upright tubular members **103** of frame D. The tow bar is attached at each end by means including a U-bolt **192** on member **103** having legs which pass respectively over and under the tow bar and through plates **193** disposed on opposite sides of the tow bar, the U-bolt being secured in place by nuts **194**. In this manner, the tow bar is rigidly attached to the frame D.

In operation, a power operator unit of the type described is moved manually to a position in front of the bleacher where the front end of the frame is lowered, after skirtboard section **139** is elevated, and pushed forwardly to position coupling members **90** beneath the tow bar, after which the front end of the operator unit frame is elevated so that the tow bar is positioned in the slots **92** of the coupling members. In order to properly center the operator unit relative to the bleacher, the tow bar has a centrally disposed guide sleeve **196** thereon which must be embraced at opposite ends by coupling members **90** as illustrated in FIG. 8. As seen in FIG. 7, the slots **92** in coupling members **90** allow considerable lost motion of the coupling member on the tow bar. This permits the coupling members to be positioned initially on the tow bar as illustrated in FIG. 7; that is, with the tow bar at the forward end of the slots and with the cam surface **95** engaging but not pivoting trip arm **181***a*. As the power operator unit is moved toward the bleacher (to the left in FIG. 7) to take up the lost motion of the coupling member on the tow bar, cam surfaces **95** causes pivoting of the trip arm in a clockwise direction to elevate the vertical link **132**, breaking the linkage G between frames C and D. When the coupling member at the rear of slot **92** engages the tow bar, the horizontally directed force of the power operator unit causes folding of linkage G, positioning frame D against frame C. Near the completion of this operation, the abutment bracket **178** on link **118** engages bell crank arm **179** to break linkage F and initiate its folding which is completed on continued movement of the power operator unit to the left. The folding of linkage E follows in the same manner as that of linkage F.

To unfold the bleacher, coupling members **90** are connected to the tow bar with the forward ends of slots **92** engaging the tow bar, and lock lugs **97** are moved to the operative positions shown in FIG. 1*a*. After this, movement of the power operator unit to the right unfolds the bleacher to the position illustrated in FIG. 7. The positioning of the tow bar at the front end of coupling slots **92**, as shown at **93***a*, permits return of the trip arm **180** to the position of FIG. 7.

FIGS. 9 and 10 illustrate a modification of the bleacher particularly adapted for use in crowded places. More specifically, where the floor space in front of a bleacher is limited to a narrow aisle area for example, as by other bleachers or by a railing, there may not be sufficient space for manipulation of the power operator unit when the bleacher is unfolded. In this case, it is sometimes necessary or desirable to manually fold the first bleacher section including linkage G to position frame D against frame C to thereby provide space for manipulating the power operator unit. In such situations, there is no need for a trip arm such as that shown in FIGS. 7 and 8, and this feature is omitted from the bleacher of FIGS. 9 and 10. Instead, means is provided for latching frame D to frame C in folded condition to permit use of the operator unit for the remaining folding and unfolding operation.

Thus, the bleacher of FIGS. 9 and 10 includes a tow bar **190'** similar to that in FIGS. 7 and 8 which is attached to frame D by means similar to that in FIGS. 7 and 8 and designated by primed reference numbers. The latch means comprises a sleeve **200** fitted on the tow bar **190'** at its connection to the upright tubular member **103** of frame D, and embraced by U-bolt **192'** and plates **193'** as in FIGS. 7 and 8. The sleeve **200** includes an integral depending leg **201** having a fixed hook **202** thereon which embraces tubular member **103** to reinforce the depending leg **201**. The leg **201** also has a hook **204** pivoted thereon at **205** and including a latch portion **204***a* for embracing upright tubular member **102** on frame C when the frame D is folded against frame C.

It will be understood that the latch member **204** positively secures frame D to frame C to enable folding and unfolding of the remaining bleacher structure with the power operator unit. On folding, linkage G is broken

manually and frame D pushed against frame C to enable latching of hook member **204**. On unfolding, after the power operator unit has been utilized to extend the remaining bleacher portions, hook **204** is manually disengaged and frame D manually extended from frame C.

In some bleacher installations, it is desirable to omit one or more (depending on length) centrally located sections of seatboards **115** and skirtboards **138—139** and **177**, leaving only footboards **133** and **167** which provide stairs for easily ascending or descending the bleacher when unfolded for use. In this event, it will be understood that the elimination of portions of the skirtboard **138—139** and the lowest seatboard **115** will leave portions of the tow bar **190** exposed, presenting a hazard likely to trip spectators using the steps provided by footboards. Accordingly, the bleacher modification illustrated in FIG. 11 encompasses a bleacher construction wherein the tow bar is removably mounted to be readily detachable after the bleacher is unfolded to thereby eliminate the trip hazard and to be easily attachable for folding the bleacher where it may remain until the bleacher is again unfolded.

Referring to FIG. 11, wherein like parts are designated by double primed numbers, a tow bar support structure, one provided at each end of the bleacher, includes a pair of half circular clamplike brackets **210** and **211** embracing upright tubular member **103″** and rigidly secured thereon as by bolts **212** (one visible) on opposing sides of the tubular member. A bracket **214** has upstanding leg portions **215** also secured by bolts **212** and includes a fixed hook **202″** (similar to that at **202** in FIGS. 9 and 10) embracing tubular member **103″** to reinforce the bracket. A removable hook **204″** (similar to that in **204** in FIGS. 9 and 10) is pivoted on bracket **214** at **205″** to latch around upright tubular member **102″** when the first bleacher frame D is manually folded against the adjacent frame C. Clamplike bracket **211** is formed with an integral forwardly extending tow bar support **216** having a downwardly opening recess **217** to receive an upwardly inserted portion of tow bar **190″**, the latter preferably including a collar **219** fixed thereon to locate the tow bar properly relative to support **216**. Adjacent the lower end of recess **217**, the support **216** has a detent pin **220** which is preferably of the spring loaded type engageable beneath the tow bar to releasably retain the same in position, permitting insertion and withdrawal of the tow bar from the recess.

We claim:

1. In a power operator for folding bleachers, a frame, a pair of laterally spaced propelling wheels independently rotatable on the frame about a common axis, a handle on the frame for manipulating the operator, a relatively large sprocket secured on each wheel, a double chain on each sprocket including a first strand completely encircling the sprocket tightly for rotation therewith and a second parallel free strand secured to the first adjacent thereto on the side thereof toward the other double chain, a motor support pivoted on the frame between the wheels for movement about an axis parallel to the wheel axis, a drive motor on the motor support having a double ended drive shaft, a relatively small drive sprocket on each end of the drive shaft positioned respectively within the peripheries of said second strands and engageable therewith, means for pivoting the motor support to mesh the drive sprockets with the second strands to drive the wheels synchronously or to disengage the drive sprockets from the second strands to permit independent differential movement of the wheels, and means for coupling the frame to a folding bleacher.

2. In a power operator for folding bleachers, a frame including a pair of laterally spaced rearwardly extending members, a handle mounted on the frame extending upwardly and rearwardly, a pair of laterally spaced propelling wheels independently rotatable respectively on the frame members on a common axis, each wheel having an internal driven ring gear thereon, a drive unit movably mounted on said frame between said wheels, said drive unit including a reversible drive motor, a double ended drive shaft, and an externally toothed drive gear on each end of the shaft positioned respectively to cooperate with the internal wheel gears, said drive gears movable into an out of positive driving relationship with said internal driven wheel gears when the drive unit is moved between a first position for positive driving and a second position for disengagement of the drive gears to permit independent differential rotation of the wheels, and means for coupling the operator to a folding bleacher.

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