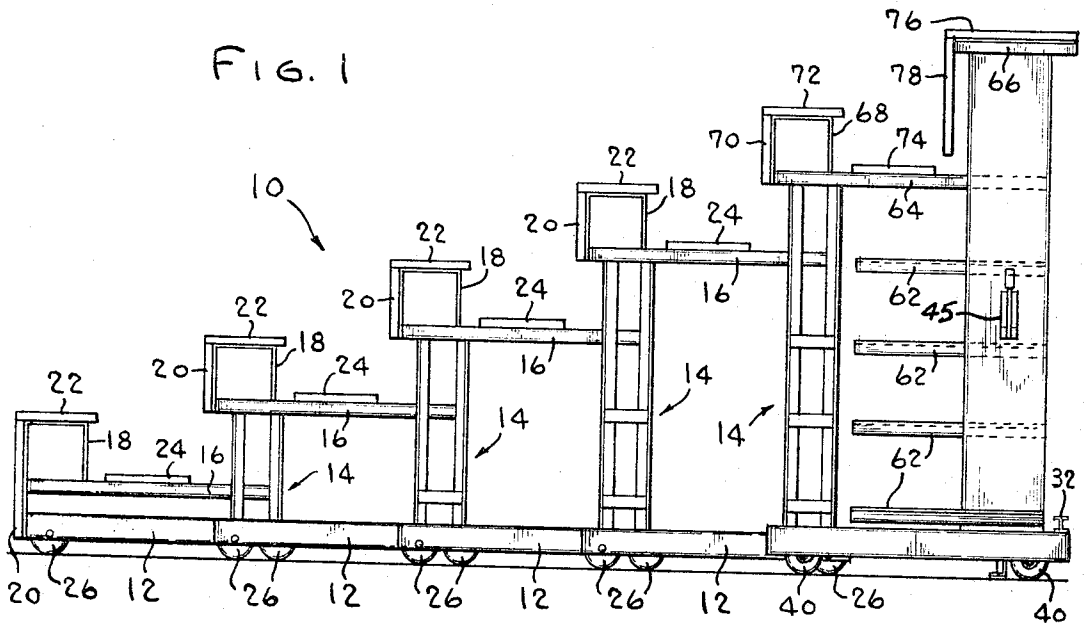
Aug. 15, 1967 H. F. BAHR 3,335,533

LIFT MECHANISM FOR BLEACHERS AND THE LIKE

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FIG. 1



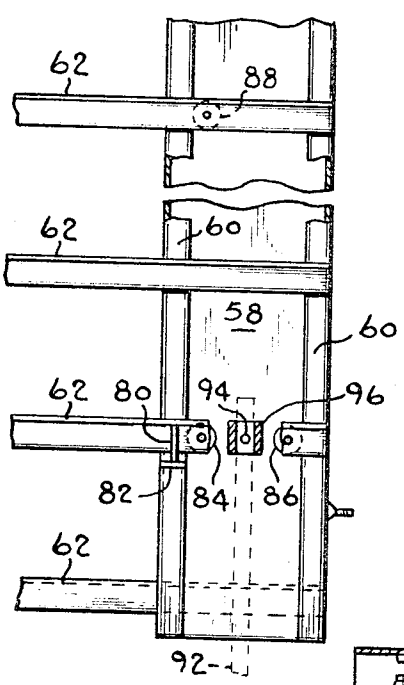




FIG. 5

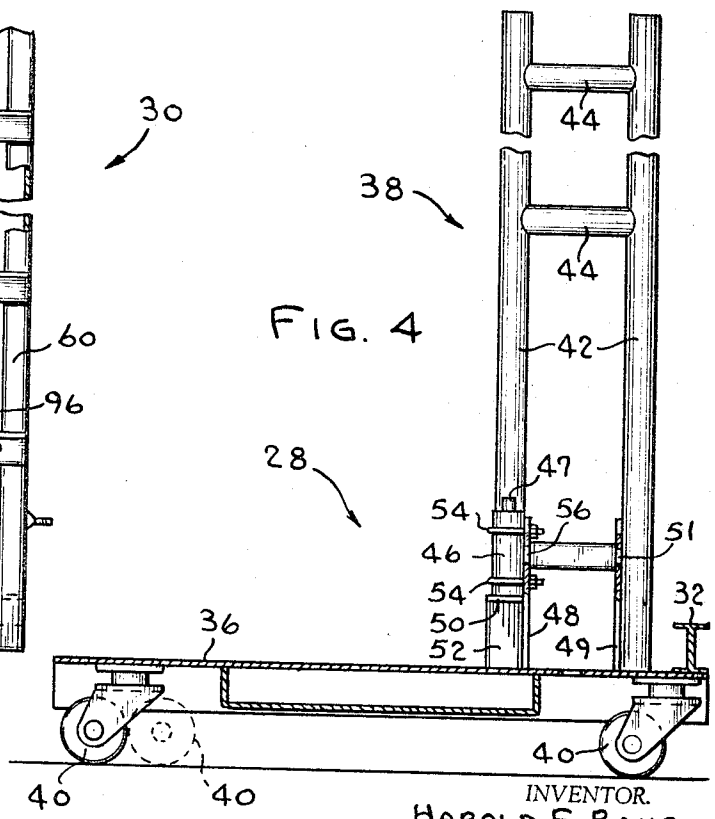



FIG. 4

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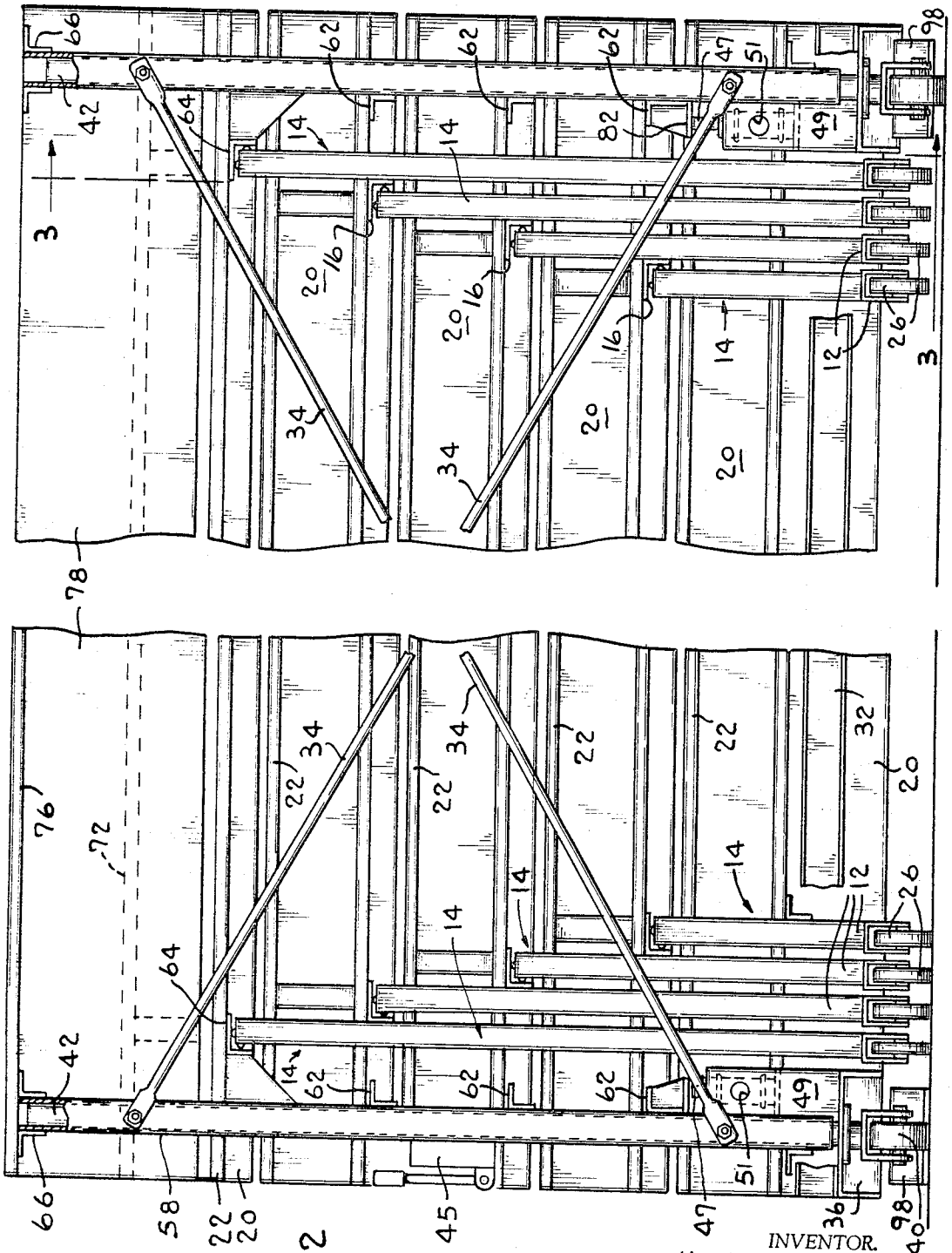



FIG. 2

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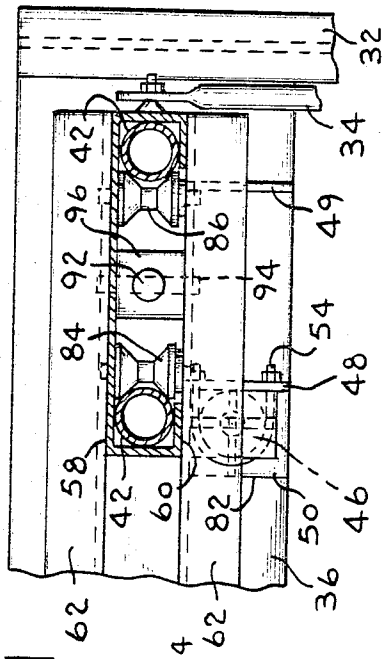


FIG. 6

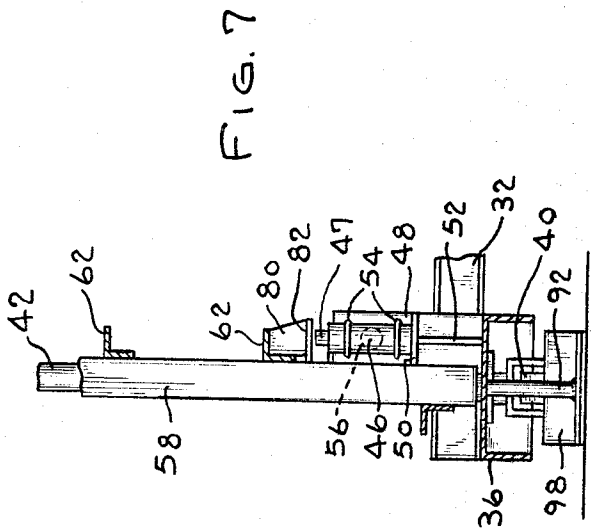


FIG. 7

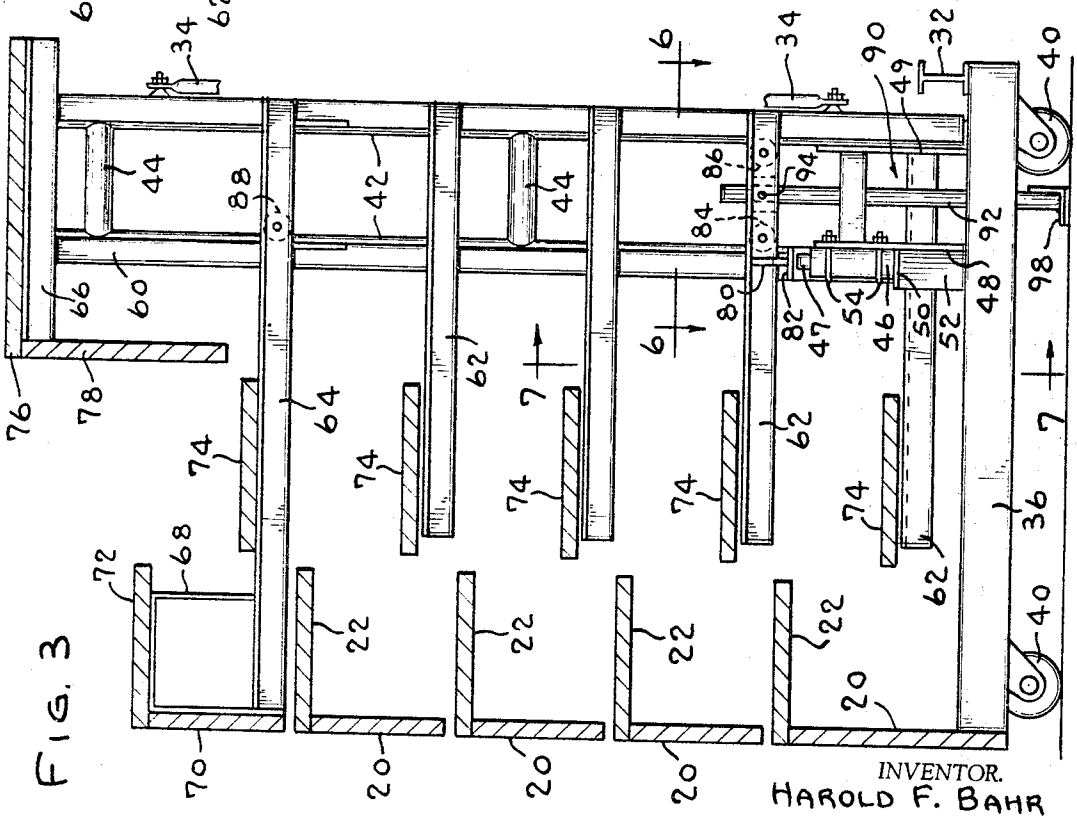


FIG. 3

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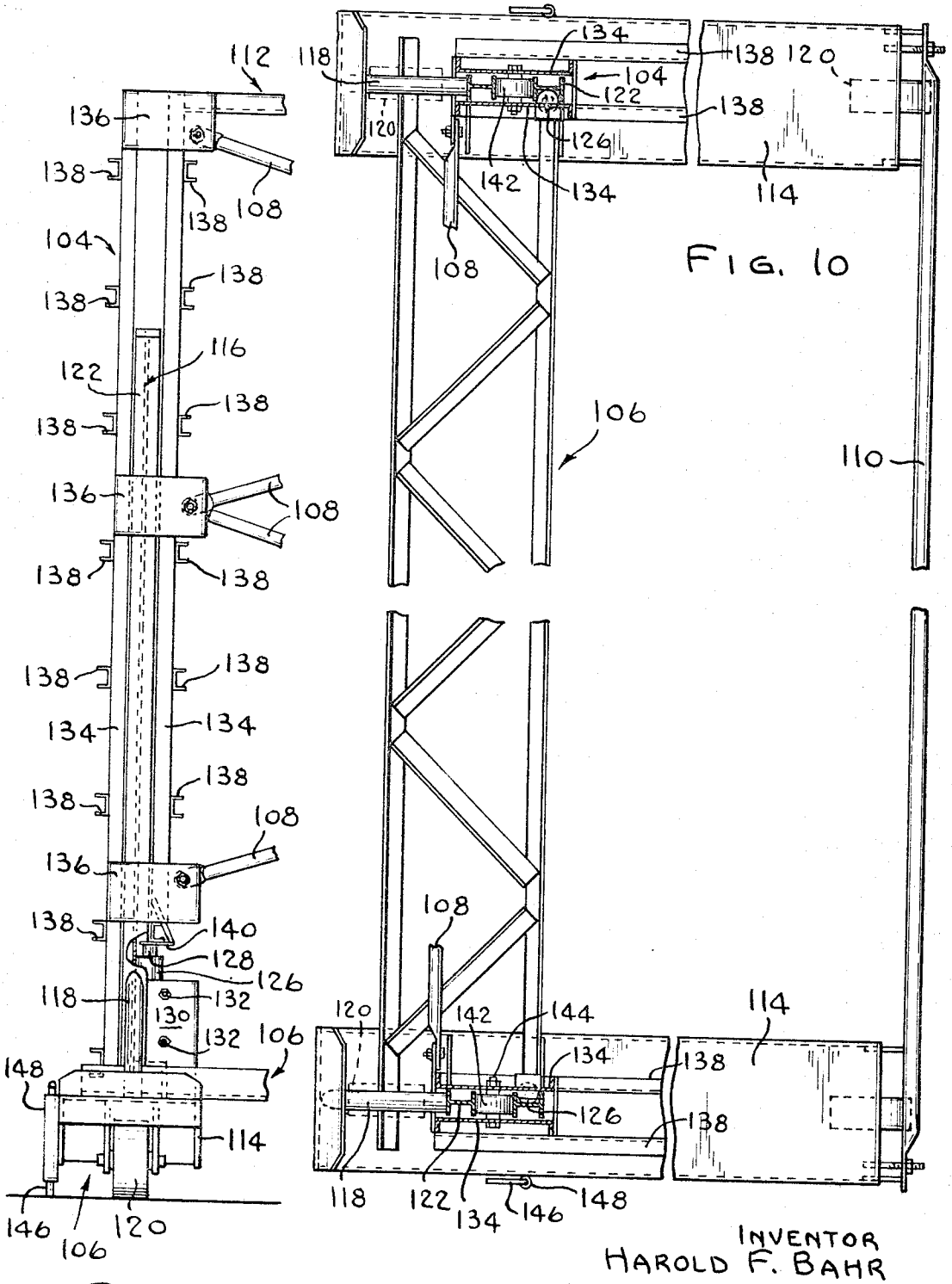



FIG. 8

FIG. 10

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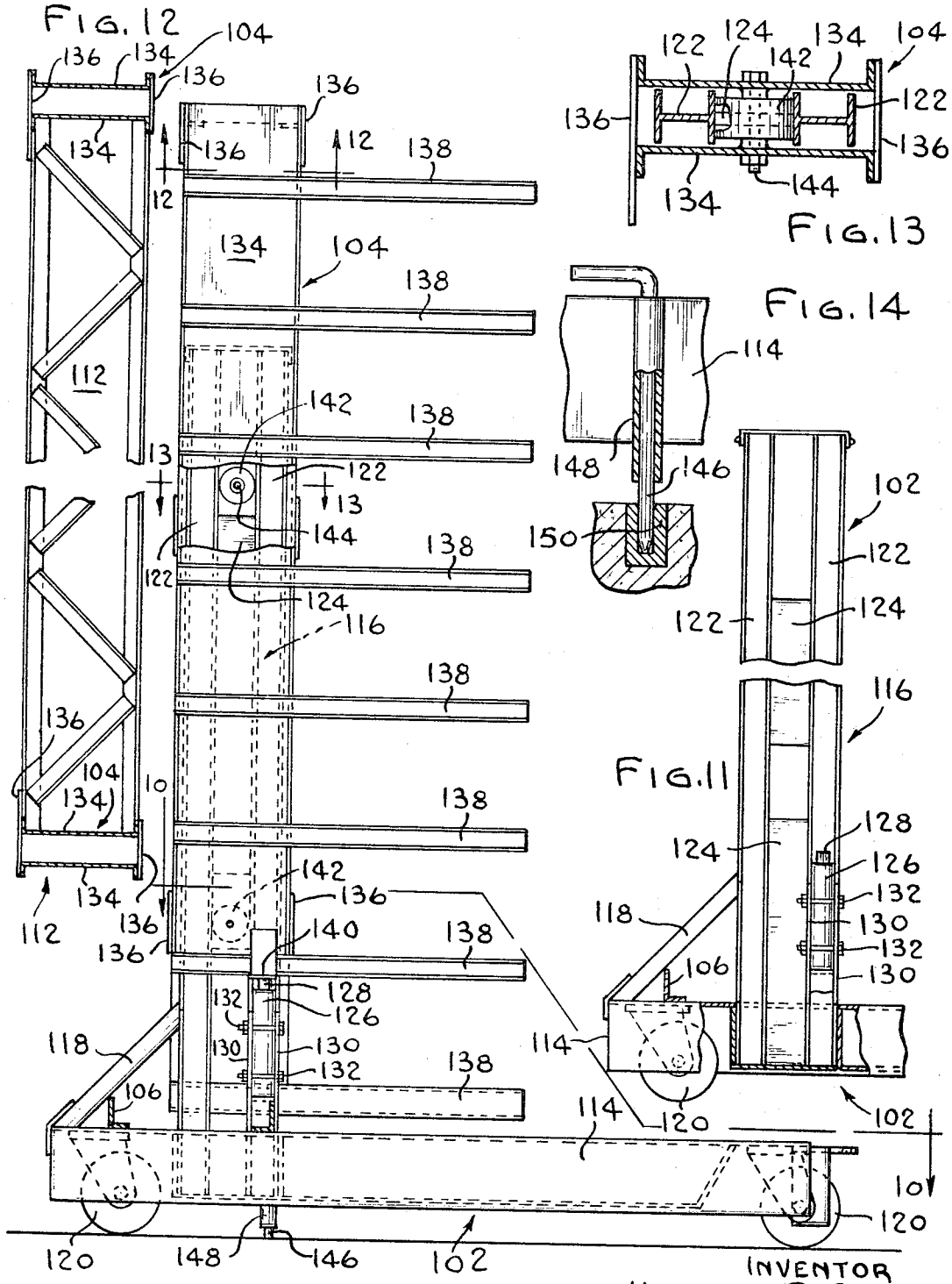
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LIFT MECHANISM FOR BLEACHERS AND THE LIKE

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3,335,533

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# 3,335,533
# LIFT MECHANISM FOR BLEACHERS AND THE LIKE

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Filed Mar. 27, 1964, Ser. No. 355,184
10 Claims. (Cl. 52—122)

This invention relates to an improved lift mechanism for moving large and bulky structures such as telescoping bleachers and chair risers and the like.

The primary object of this invention is to provide a lift mechanism which is of relatively simple construction, is easy to operate and is effective to safely lift and move an entire bleacher section.

Another object is to provide a lift mechanism which is capable of lifting and transporting an entire bleacher section while maintaining good balance and stability.

Another object is to provide a lift mechanism which can be readily detached from the structure to be moved so that one lift mechanism can be used to move several structural units if desired.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims, as will obvious modifications of the two embodiments shown in the drawings, in which:

FIG. 1 is a side elevation view of a bleacher assembly with the lift mechanism of the present invention positioned in operating position at the rear thereof and with the bleacher sections in extended position;

FIG. 2 is a fragmentary rear elevation view of the structure shown in FIG. 1 but with the bleacher in retacted position;

FIG. 3 is a sectional view taken along line **3—3** of FIG. 2.

FIGS. 4 and 5 are fragmentary side elevation views of the two basic parts of the lift mechanism shown disassembled from each other;

FIG. 6 is a fragmentary sectional view taken along line **6—6** of FIG. 3;

FIG. 7 is a fragmentary sectional view taken along line **7—7** of FIG. 3;

FIG. 8 is a fragmentary rear elevation view (with parts broken away) of a modified form of the invention particularly adapted for use with a seating structure of heavy construction such as that employed in a telescoping or folding chair riser;

FIG. 9 is a vertical sectional view (with parts broken away) taken along line **9—9** of FIG. 8;

FIG. 10 is a horizontal sectional view taken along line **10—10** of FIG. 9;

FIG. 11 is a fragmentary side elevation view of the wheeled support assembly with the lift assembly disassembled therefrom;

FIG. 12 is a horizontal sectional view taken along line **12—12** of FIG. 9;

FIG. 13 is a sectional view taken along line **13—13** of FIG. 9; and

FIG. 14 is an enlarged elevation view (with parts broken away) of the stabilizing means for the lift mechanism.

While the lift mechanism of this invention may be employed to advantage with various types of structures, it is particularly well adapted for use with telescoping bleacher seats and chair risers of the type used in gymnasiums, auditoriums and the like.

A bleacher seat assembly of the type referred to is shown in FIG. 1 and is indicated generally by the reference numeral **10**. The various sections of the assembly **10** are of similar construction with each successive section being of a different height so that they will nest together when retracted. Each section includes a pair of spaced horizontal carriage members **12, 12** and a pair of spaced vertical column assemblies **14, 14** fastened to the carriage members as shown. The pairs of carriage members **12, 12** are interconnected to provide a self-supporting structure by suitable back braces (not shown).



To each column assembly **14** is fastened a horizontal seat angle **16** extending forwardly from the columns and parallel to carriage members **12** at the desired height depending on the particular section involved. Angles **16** have seat brackets **18** fastened thereto for mounting riser and seat boards **20** and **22**, respectively, at the forward ends of the angles. Foot boards **24** are also mounted on angles **16** as shown.

Each section of the bleacher assembly is supported for extending and retracting rolling movement by two pairs of wheels **26** mounted between the legs of the channel-shaped carriage members **12** as clearly shown in FIG. 2.

As shown in FIG. 2, each pair of carriage members for the respective bleacher sections are spaced so that each successive section going from front to rear fits inside the next section. Similarly, as shown in FIG. 1, the seat height of each successive section going from rear to front decreases so that as each section is rolled rearwardly it will nest underneath and between its next adjacent section to the rear. When the bleacher assembly is extended as shown in FIG. 1, the seat angle **16** of one section is supported on the top of a column **14** of the next adjacent section to the front. The various sections of the bleacher assembly may be held and retained in either retracted or extended position by a row lock and trip mechanism like that shown in copending application Ser. No. 29,853 now Patent No. 3,157,916 assigned to the assignee of this application.

Referring now to the lift mechanism of this invention, FIGS. 4 and 5 show the two basic assemblies of such mechanism. FIG. 4 shows a wheeled support assembly **28** and FIG. 5 shows a lift assembly **30** which, when assembled together, cooperate to provide the several objects of this invention. As shown in FIG. 2, a spaced pair of assembled support assemblies **28, 28** and lift assemblies **30, 30** are fastened together by a horizontal I-beam **32** and a pair of cross braces **34, 34** to produce a self-supporting unit.

Each support assembly **28** is comprised of a horizontal channel member **36** and a vertical tubular guide rail assembly **38** mounted thereon. Each channel **36** is provided with a pair of castors **40, 40** for wheeling the entire unit along the floor when desired. Guide rail assembly **38** is comprised of a pair of spaced tubes **42, 42** rigidly secured to each other by a plurality of cross tube supports **44** welded to the vertical tubes as shown. As shown clearly in FIGS. 3 and 7, a suitable lifting means such as a hydraulic ram unit **46** having a piston **47** is mounted on support assembly **28** by means of a mounting structure comprised of plates **48, 50** and **52** and a pair of U-bolts **54, 54**. Plate **48** is provided with an opening **56** therein and a second support plate **49** is provided with a second opening **51** therein through which a hydraulic oil line (not shown) is extended for connecting ram **46** with a pump unit **45** mounted on the side of channel **58**, as shown in FIGS. 1 and 2.

Lift assembly **30** (FIGS. 3 and 5) is comprised of a vertically extending formed channel **58** having a pair of retaining flanges **60, 60** thereon and a plurality of lifting angle members **62** fastened thereto by welding or other suitable means. Also fastened to channel **58** are a top footboard angle **64** and a top seat angle **66**. Just as in the bleacher structure previously described with reference to FIG. 1, footboard angle **64** is provided with a seat

iron **68** for mounting riser and seat boards **70** and **72** thereon. A footboard **74** is also mounted thereon. Similarly, top seat angle **66** is provided with a top seat board **76** and riser **78** mounted thereon. Also mounted on channel **58** is a gusset plate **80** and a lift plate **82** adapted for cooperation with the lift ram **46** on the support assembly as will be hereinafter described.

As shown in FIGS. 3, 6 and 7, lift assembly **30** is slidably supported on support assembly **28** with tubes **42, 42** slidably engaged in opposite ends of channel member **58** with the retaining flanges **60, 60** of the channel serving to retain the channel in place on the tubes. A pair of alignment rollers **84** and **86** rotatably mounted between channel **58** and the second from the bottom lift angle **62** and a single alignment roller **88** is mounted between channel **58** and the top footboard angle **64**. Rollers **84, 86** and **88** serve to prevent binding of the channel **58** on the guide rail assembly **38** to thus insure a smooth sliding relationship between the two assemblies even under the heavy loads experienced when lifting a bleacher seat unit of the type shown in the drawings.

As shown in FIGS. 3 and 7, when the lift mechanism is fully assembled lift plate **82** on the lift assembly will be positioned directly over the end of the operating piston **47** of ram **46** so that upon actuation of the ram the entire lift assembly **30** including lift angles **62** will be moved upwardly with respect to the support assembly **28**.

An optional feature of the present invention is the provision of a brake assembly **90** which is comprised of a tube **92** fastened between channel **58** and the second from the bottom seat angle **62** by means of a pin **94** and a collar **96** (FIG. 5). Tube **92** is provided with a brake pad angle **98** mounted on the lower end thereof so that when the lift mechanism is in its down position as shown in FIGS. 3 and 7, pad **98** will engage the floor and serve as a brake to prevent the lift mechanism from rolling.

From the foregoing it will be apparent that to operate the lift mechanism of this invention, the first step is to position the mechanism at the rear of the bleacher unit **10** as shown in FIGS. 1, 2 and 3. It will be appreciated that in the specific embodiment of the invention shown in the drawings and described above, the top portion of the bleacher seat structure is mounted on the lift mechanism and thus the lift mechanism in effect becomes a part of the bleacher unit itself. In such embodiment it is not contemplated that the lift mechanism will in normal use be separated from the bleacher unit but instead will become a more or less permanent part thereof. It should be understood, however, that in other embodiments of this invention the lift mechanism can be constructed and utilized as a separate unit in which case the lift mechanism can be used with more than one bleacher unit.

Proceeding further with the description of the operation, the lift mechanism, as shown in FIGS. 3, 7 and in the left-hand half of FIG. 2 is in its non-operative or down position with the weight of the bleacher unit **10** carried by carriage wheels **26** and not by the lift mechanism. When it is desired to move bleacher unit **10** it is first necessary to retract the bleacher unit from the position shown in FIG. 1 to that shown in FIG. 3. Next, the hydraulic ram **46** on each of the two spaced support assemblies **28** is energized by actuation of pump unit **45** causing the lift assemblies **30, 30** to be moved upwardly on the guide rail assemblies **38, 38**. This in turn will cause lift angles **62** to engage the bottoms of the bleacher footboards **24** and thus lift the entire bleacher unit **10** off the floor to the position shown on the right-hand half of FIG. 2. In such position the entire weight of the bleacher unit is supported by castors **40** of the lift mechanism and the bleacher unit can then be rolled along the floor to whatever location is desired.

FIGS. 9–14 show a second embodiment of the invention particularly adapted for handling a heavier type structure such as a retractable chair riser section. The modified lift mechanism is comprised of a wheeled support assembly **102** (FIG. 11) and a lift assembly **104** which are shown in assembled position in FIGS. 8, 9 and 10. As shown in FIGS. 8, 10 and 12 a spaced pair of assembled support and lift assemblies are fastened together by a horizontally disposed bottom support girder **106**, rear cross braces **108**, a front cross brace **110** and a top support girder **112** between the tops of the two lift assemblies, all of which cooperate to produce a self-supporting unit.



Each support assembly **102** is comprised of a horizontally extending base **114** and a vertical guide rail assembly **116** mounted thereon. Guide rail assemblies **116** are rigidly supported on base members **114** by diagonal support braces **118**, Each base **114** is provided with a pair of castors **120, 120** for wheeling the entire unit along the floor when desired.

Each guide rail assembly **116** is comprised of a pair of spaced I-beams **122, 122** rigidly secured to each other by a plurality of connector plate members **124** welded therebetween as shown in FIG. 11. A suitable lifting means such as a hydraulic ram unit **126** having a piston **128** is mounted on support assembly **102** by means of a pair of support plates **130** and bolts **132**.

Each lift assembly **104** is comprised of a pair of vertical channel members **134, 134** rigidly secured together in spaced back-to-back relationship by connector plates **136** welded there-between to form a box-like member. A plurality of lifting channel members **138** are fastened to channel members **134** at a plurality of vertically spaced points as clearly shown in FIGS. 8 and 9. It is noted (FIG. 8) that a pair of lifting channels **138** is provided at each vertical level to accommodate the heavier chair riser construction. Also mounted on the side of one of the vertical channels **134** is a gusset plate **140** adapted for cooperation with the lift ram **126** mounted on the wheeled support assembly. While some variation is contemplated it is preferred that the ratio of the height of said lift assembly **104** to the length of said base portion **114** is about 2 to 1.

As shown in FIGS. 8 and 9, lift assembly **104** is slidably supported on the guide rail assembly **116** of wheeled support assembly **102** with the I-beams **122, 122** of the guide assembly positioned inside the box-like lift assembly formed by vertical channels **134, 134**.

A pair of alignment rollers **142, 142** are rotatably mounted between channels **134, 134** by bolts **144** (FIG. 13) which cooperate with spaced I-beams **122, 122** to prevent binding of the channels **134, 134** on the I-beams **122, 122** to thus insure a smooth sliding relationship between the two assemblies even under the heavy loads experienced when lifting an entire retractable chair riser section.

As shown in FIG. 8, when the lift mechanism is fully assembled, plate **140** on lift assembly **104** will be positioned directly over the end of operating piston **128** of ram **126** so that upon actuation of the ram the entire lift assembly **104** including lift channels **138** will be moved upwardly with respect to the support assembly **102**.

To provide added stability to the chair riser section, bleacher section, or other structure used with the lift mechanism, a pair of stabilizer pins **146** are provided as shown in detail in FIG. 14. Pins **146** are slidably mounted in collars **148** welded to base members **114** of the lift mechanism and are positioned to register with sockets **150** mounted in the floor. Thus, when the lift mechanism is bolted or otherwise secured to the rear of the chair riser section, pins **146** will serve to provide some additional lateral stability to the chair riser section when such section is in use.

The operation of the modified lift mechanism shown in FIGS. 8–14 is as follows. When it is desired to move the chair riser section the pins **146** are disengaged from sockets **150** and the hydraulic rams **126** are energized causing the lift assemblies **104, 104** to be moved upwardly

on the guide rail assemblies **116, 116**. This in turn will cause lift channels **138** to engage the chair riser section at a plurality of vertically spaced points to thus lift the entire section off the ground. In such position the entire weight of the bleacher unit is supported by castors **120** of the lift mechanism and the chair riser unit can then be rolled along the floor to the desired location.

Although two embodiments of the present invention have been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims. For example, while the lifting means shown in the drawings is in the form of a hydraulic ram other types of lifting mechanisms could be employed such as a mechanical jack operable either by hand or electric motor.

I claim:

**1.** A lift mechanism for moving bleacher units and the like comprising:

a pair of spaced support assemblies each including a horizontal base portion having wheels and a vertical guide rail assembly mounted on said base portion at the rear end thereof, said support assemblies being interconnected by bracing means to provide a self-supporting structure adapted for positioning at the rear of a bleacher unit;

a pair of lift assemblies each slidably mounted on the guide rail assembly of said pair of support assemblies, each of said lift assemblies including a plurality of vertically spaced lift members fastened thereto and adapted for insertion into the bleacher units from the rear to provide engagement with the vertically spaced horizontally extending members of a bleacher unit; and

a lifting means mounted between each of said support assemblies and said lift assemblies and adapted when energized to move said lift assemblies upwardly with respect to said support assemblies.

**2.** A lift mechanism according to claim **1** in which each of said guide rail assemblies includes a pair of vertical tubular members and in which each of said lift assemblies includes a channel member slidably engaged with said tubular members.

**3.** A lift mechanism according to claim **2** in which each of said channel members is provided with a pair of retaining flanges to hold said channel members securely in place on said tubular members.



**4.** A lift mechanism according to claim **1** in which a roller means is provided between said lift assembly and said guide rail assembly.

**5.** A lift mechanism according to claim **1** in which each of said lifting means includes a hydraulic ram means mounted on a support assembly.

**6.** A lift mechanism according to claim **1** in which said lift assemblies are provided with seat and footboards mounted on the upper portion thereof to serve as the top seat structure of the bleacher unit.

**7.** A lift mechanism according to claim **8** in which each of said guide rail assemblies includes a pair of spaced vertically extending I-beams.

**8.** A lift mechanism according to claim **7** in which each of said lift assemblies includes a box-like member slidably mounted on said I-beams.

**9.** A lift mechanism according to claim **1** in which each of said support assemblies is provided with a stabilizer pin adapted for engagement with a socket mounted in the floor.

**10.** A lift mechanism according to claim **1** in which the ratio of the height of said lift assemblies to the length of said base portions is about 2 to 1.


**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,183,057 | 12/1939 | Albach et al. | 52—9 |
| 2,968,841 | 1/1961 | Vance | 52—143 X |
| 2,983,968 | 5/1961 | Wurn | 52—143 X |
| 3,103,707 | 9/1963 | Lappin et al. | 52—9 |
| 3,107,399 | 10/1963 | Murphy | 52—10 |

OTHER REFERENCES

Safeway Spectator Seating by Safway Steel Products, Inc., Milwaukee, Wisconsin, cat. #G.S. 657, page 11 relied upon 1–59.



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