

Oct. 25, 1960

C. B. LUSK
GRID STRUCTURES

2,957,582

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2 Sheets-Sheet 1

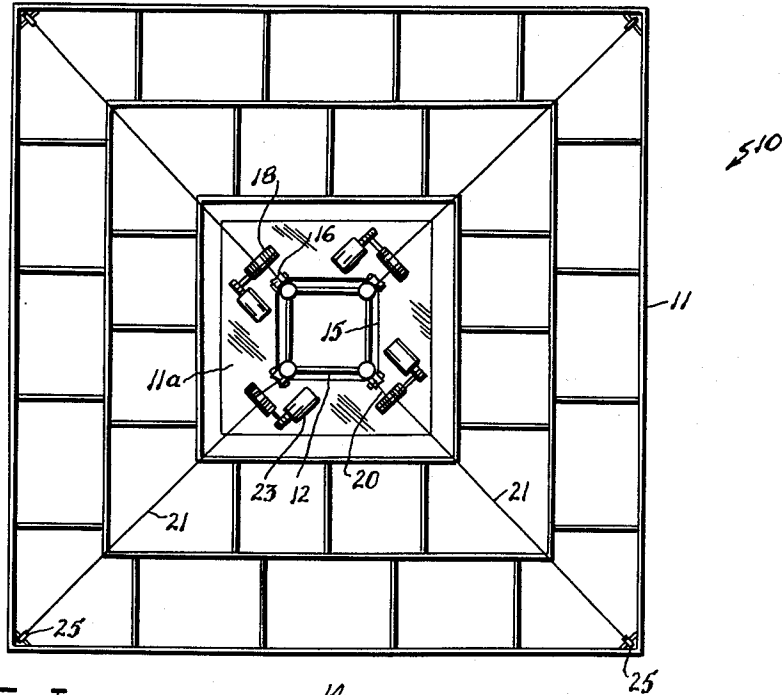


FIG. 1.

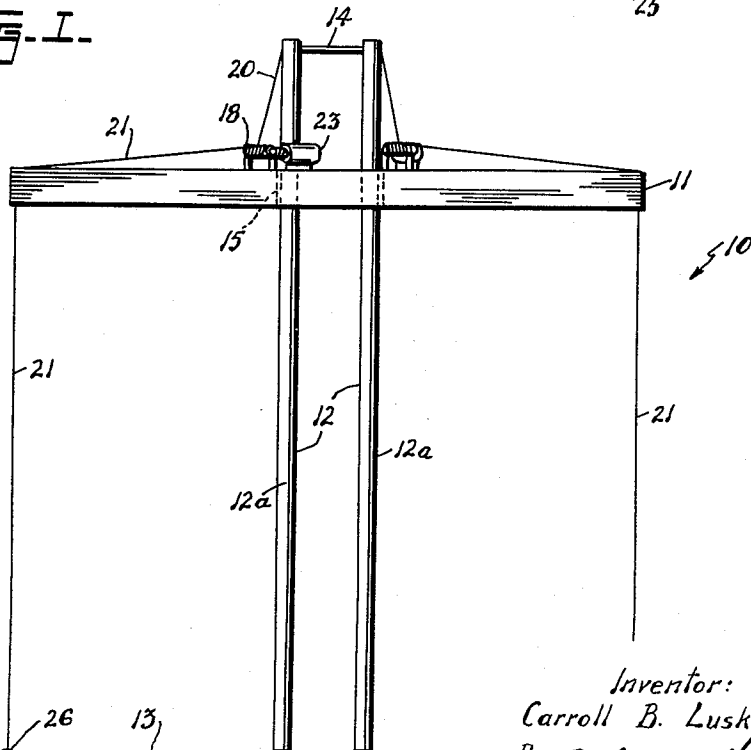


FIG. 2.

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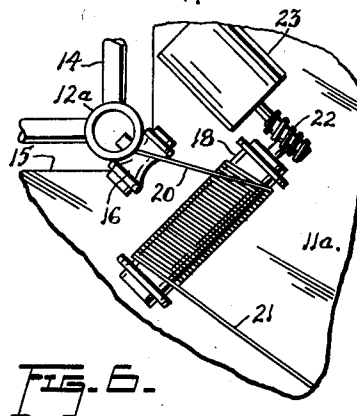
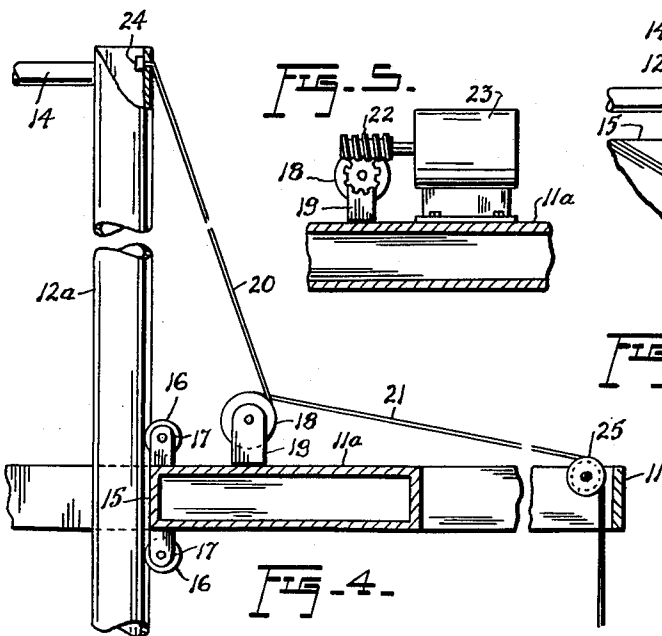
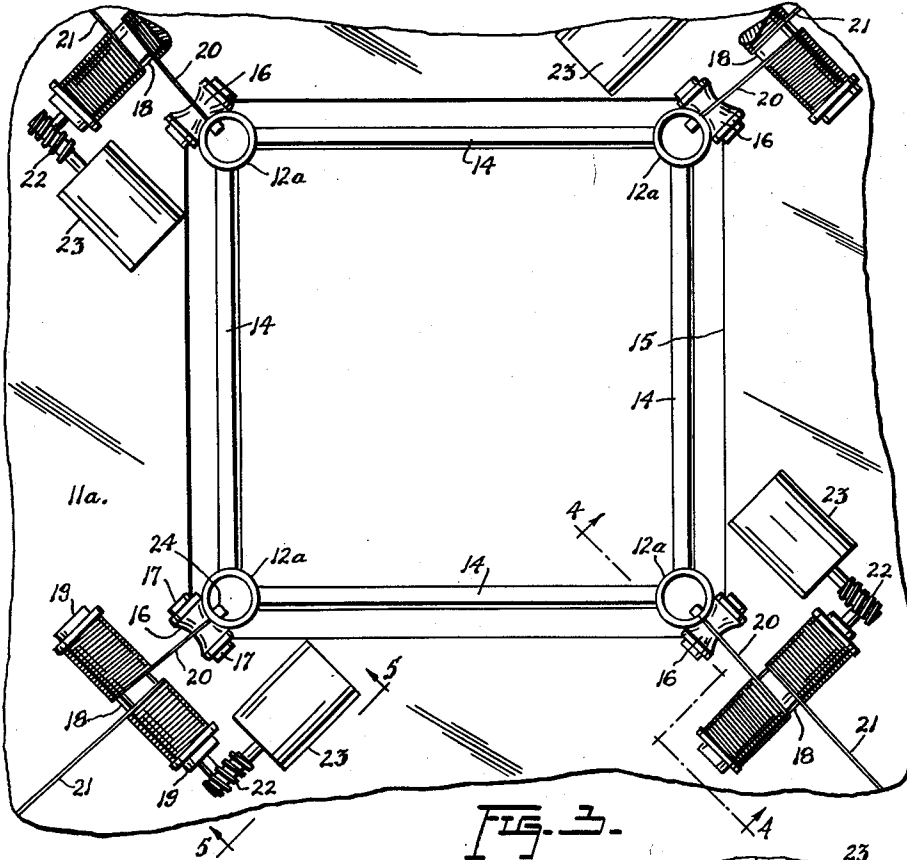
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2 Sheets-Sheet 2



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GRID STRUCTURES

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8 Claims. (Cl. 211-1.5)

This invention relates to new and useful improvements in grid structures such as may be conveniently and effectively employed in theatres, on motion picture or television stages, arenas, showrooms, and the like, for supporting scenery, lights or items to be displayed, and the principal object of the invention is to provide a grid structure of this nature which may be quickly and easily adjusted as to height above the ground or floor.

In accordance with the invention a cantilever type grid member is movable upwardly and downwardly on a supporting tower so that scenery, lights or items of display which are carried by or suspended from the grid member may be raised or lowered with respect to the ground or floor and/or with respect to other scenery or items of display positioned on the ground or floor under the grid member. Hoisting lines extend from the grid member to the top of the tower and guiding lines extend from the grid member vertically downwardly for anchorage to the ground or floor at points spaced laterally from the base of the tower.

The hoisting and guiding lines are arranged in sets disposed symmetrically of the tower and a plurality of motor-driven winches are provided on the grid member for actuating these lines. An important feature of the invention resides in the arrangement of the hoisting and guiding lines so that the hoisting line and the guiding line in each set is actuated by one winch which simultaneously winds the hoisting line while the guiding line is being paid out, and vice versa, whereby to raise or lower the grid member on the tower in an even, properly controlled and stabilized manner.

As such, the invention is a modification of the structure disclosed in a co-pending application Serial No. 694,683, filed November 5, 1957 by George C. Izenour.

Some of the advantages of the invention reside in its simplicity of construction, efficient and dependable operation, in its portability, and in its adaptability to economical manufacture.

With the foregoing more important objects and features in view and such other objects and features as may become apparent as this specification proceeds, the invention will be understood from the following description taken in conjunction with the accompanying drawings, wherein like characters of reference are used to designate like parts, and wherein:

Figure 1 is a top plan view of a grid structure in accordance with the invention;

Figure 2 is a side elevational view thereof;

Figure 3 is a fragmentary top plan view on an enlarged scale;

Figure 4 is a fragmentary vertical sectional view, taken substantially in the plane of the line 4-4 in Figure 3;

Figure 5 is a fragmentary sectional detail, taken substantially in the plane of the line 5-5 in Figure 3; and

Figure 6 is a fragmentary top plan view showing a modified arrangement of the winch means.

Referring now to the accompanying drawings in detail, the grid structure in accordance with the invention

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is designated generally by the reference numeral 10 and includes a grid member 11 which is movable upwardly and downwardly on a supporting tower 12. The latter may be in the form of a set of spaced uprights 12a which extend upwardly from the ground or floor 13 and are secured together at their upper ends by a set of tie bars 14. Additional tie bars or braces may be provided intermediate the ends of the uprights, if so desired.

The grid member 11 may be of any desired shape and, for illustrative purposes only, is shown as being square in the accompanying drawings. The grid member is provided at the center thereof with an opening 15 to accommodate the tower 12, and pairs of guide rollers 16, rotatably mounted in suitable bearing brackets 17 provided on the grid member, are in supportable engagement with the uprights 12a of the tower, whereby to guide the grid member in its movement upwardly and downwardly of the tower.

The uprights 12a are preferably in the form of tubular columns and the rollers 16 are concave so as to fit the curvature of these columns, as is best shown in Figure 3. Moreover, the rollers in each pair are vertically spaced as shown in Figure 4, whereby the grid member is supported in a horizontal plane on the vertical tower and any possible rocking of the grid member is eliminated.

A suitable platform 11a is provided on the grid member 11 around the opening 15 to facilitate mounting of winches hereinafter described, while the remainder of the grid member is in the form of an open, light-weight framework, as exemplified in Figure 1.

A plurality of winches 18 are rotatably mounted in suitable bearing brackets 19 on the platform 11a of the grid member 11 adjacent the opening 15 and in a symmetrical relation to the tower 12, as shown. Each winch has windable thereon a hoisting line 20 and a guiding line 21, and is driven through the medium of suitable reduction gearing, such as the worm drive 22, by an electric motor 23 also mounted on the platform 11a adjacent the associated winch. The hoisting lines 20 extend upwardly from the respective winches and are suitably anchored at their upper ends to the upper ends of the uprights 12a of the tower, as indicated at 24.

The guiding lines 21 extend outwardly from the respective winches and pass over respective guide pulleys 25 which are rotatably mounted adjacent the marginal edges in the corners of the grid member 11. After passing over the pulleys 25, the guiding lines extend vertically downwardly and are suitably anchored to the ground or floor 13 as indicated at 26, at points spaced laterally from the base of the tower.

As is clearly shown in Figures 3 and 4, the hoisting line 20 and the guide line 21 of each winch 18 are windable in opposite directions thereon, so that when the winch is rotated, the hoisting line is paid out during lowering of the grid member on the tower and, at the same time, the guiding line is taken up on the winch and maintained in a taut condition to effectively stabilize the grid member at its outside corner. Conversely, when the winch is rotated to take up the hoisting line during raising of the grid member, the guiding line is simultaneously paid out to compensate for the increasing height of the grid member above the ground or floor. In the arrangement shown in Figure 3, the hoisting line and the guiding line are two separate lines windable on the same winch from opposite directions, so that the unwinding of either line affords space on the winch for winding of the other.

In a modified arrangement shown in Figure 6, the hoisting and guiding lines are constituted by opposite end portions of a single, continuous line having its intermediate portion wound around the winch. However, the same result is obtained, in the sense that winding of the

hoisting line is simultaneous with unwinding of the guiding line, and vice versa.

In either event, the hoisting line and the guiding line are windable on the winch in one layer only, so that the winding of one line and unwinding of the other takes place at exactly the same rate. Moreover, the speed of rotation of the several winches is made exactly the same by an electrical synchronization of the motors 23, as disclosed in the patent application of George C. Izenour, already identified herein.

The winches 18, of course, are of such size as to accommodate lengths of the lines 20, 21 sufficient for the desired amount of vertical travel of the grid member on the tower, and both the tower and the grid member may be of any suitable size, commensurate with the size of the environment where the invention is to be used.

The lower ends of the tower uprights 12a and the lower ends of the guiding lines 21 may be anchored to the ground or floor in any suitable manner, preferably suitable for easy detachment to permit convenient portability of the apparatus as a whole. For the same purpose, the grid member is readily removable from the tower after a simple disconnection of the lines 20 at the anchors 24 and, if desired, the grid member itself may be fabricated from several discernible sections or components, for ease of transportation or storage.

While in the foregoing there has been shown and described the preferred embodiment of the invention, various modifications may become apparent to those skilled in the art to which the invention relates. Accordingly, it is not desired to limit the invention to this disclosure, and various modifications may be resorted to, such as may lie within the spirit and scope of the appended claims.

What is claimed as new is:

1. In a vertically adjustable grid structure, the combination of a tower, a grid member movable upwardly and downwardly on said tower, a motor-driven winch provided on said grid member, a hoisting line extending from said winch to the top of the tower, and a guiding line extending from said winch to a point of anchorage on the ground spaced laterally from the base of the tower, said hoisting and guiding lines being windable on said winch in opposite directions whereby the former is wound while the latter is unwound and vice versa.

2. The device as defined in claim 1 wherein said hoisting line and said guiding line are separate lines windable on the same winch.

3. The device as defined in claim 1 wherein said hoisting line and said guiding line are constituted by opposite end portions of a single line windable on said winch.

4. In a vertically adjustable grid structure, the combination of a tower, a grid member movable upwardly and downwardly on said tower and provided with a central opening receiving said tower therein, a plurality of motor-driven winches mounted on said grid member adjacent said opening and disposed symmetrically with

respect to said tower, a hoisting line extending from each winch to the top of the tower, a plurality of guide pulleys provided on the grid member adjacent its marginal edges, and a plurality of guiding lines extending from the respective winches over the respective guide pulleys and vertically downwardly to respective points of anchorage on the ground, the hoisting and guiding lines of each winch being windable in opposite directions thereon whereby the hoisting lines are wound while the guiding lines are unwound and vice versa.

5. The device as defined in claim 4 together with a set of guide rollers provided on said grid member adjacent said opening therein and engaging said tower.

6. The device as defined in claim 4 wherein said tower includes a set of spaced uprights, together with a set of guide rollers provided on said grid member adjacent said opening, said guide rollers being in supporting engagement with the respective uprights of said tower.

7. The device as defined in claim 4 wherein said tower includes a set of spaced uprights, together with pairs of guide rollers provided on said grid member adjacent said opening, the guide rollers in each pair being vertically spaced and in supporting engagement with one of the uprights of said tower.

8. In a vertically adjustable grid structure, the combination of a tower having a polygonal cross-section and including a set of spaced uprights and transverse tie bars connecting the same together, a grid member movable upwardly and downwardly on said tower and provided centrally therein with a polygonal opening receiving the tower therein, a set of rotatable guide members provided on said grid member and engaging the respective uprights of the tower, a set of motor-driven winches mounted on said grid member adjacent the respective uprights of said tower, a set of hoisting lines windable on the respective winches and extending to the top of the tower, said hoisting lines having upper ends thereof anchored to the upper ends of the respective uprights of the tower, a set of guide pulleys rotatably mounted on said grid member adjacent the marginal edge of the latter and in substantial alignment with the respective winches, and a set of guiding lines windable on the respective winches in a direction opposite to said hoisting lines, said guiding lines passing over the respective guide pulleys and having their lower ends anchored to the ground at points spaced laterally from the lower end of said tower.

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