

Aug. 22, 1933.

G. R. MURDOCK ET AL

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LIGHTING APPARATUS FOR MOVING PICTURE STAGES

Filed Feb. 5, 1932

4 Sheets-Sheet 1

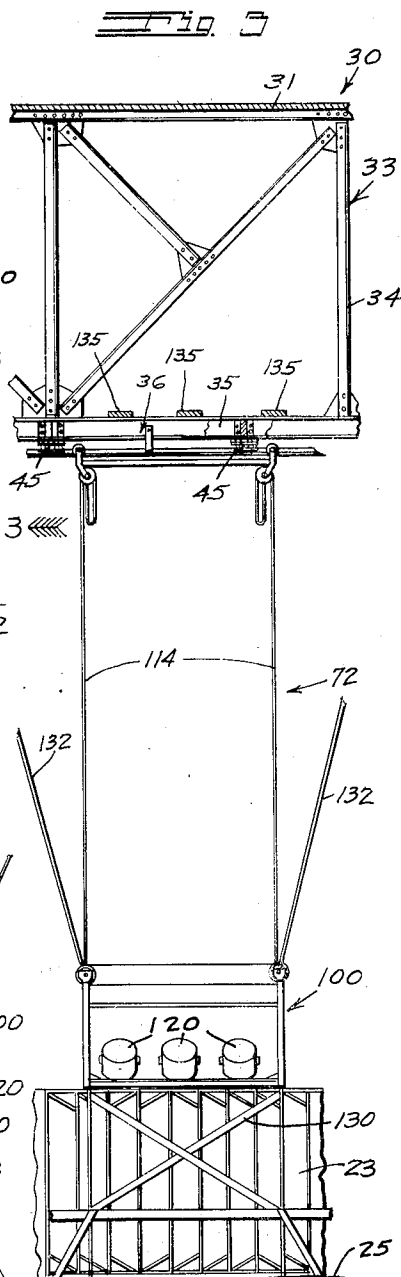
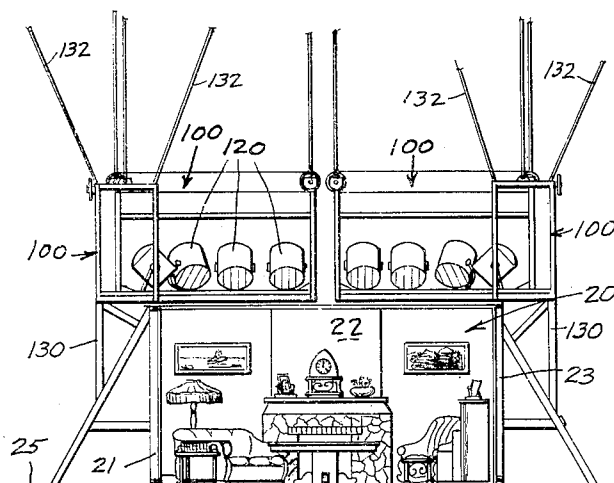
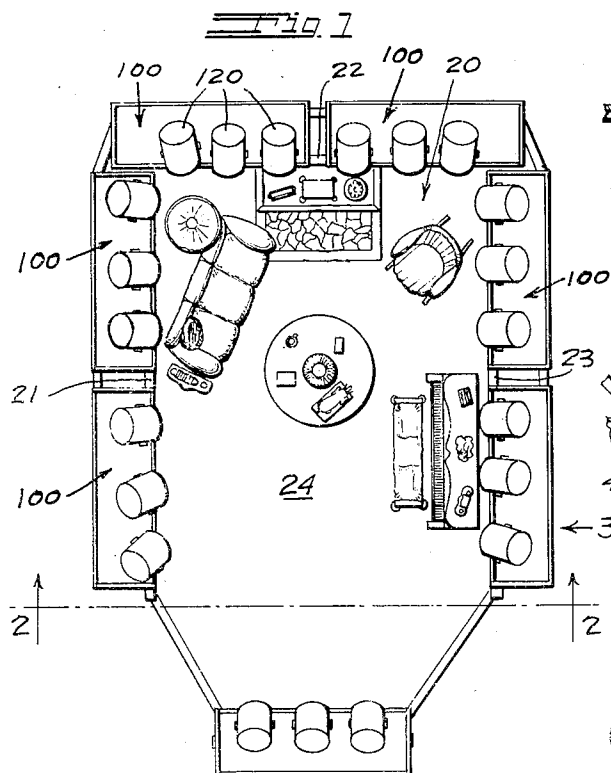


Fig. 2

Fig. 3

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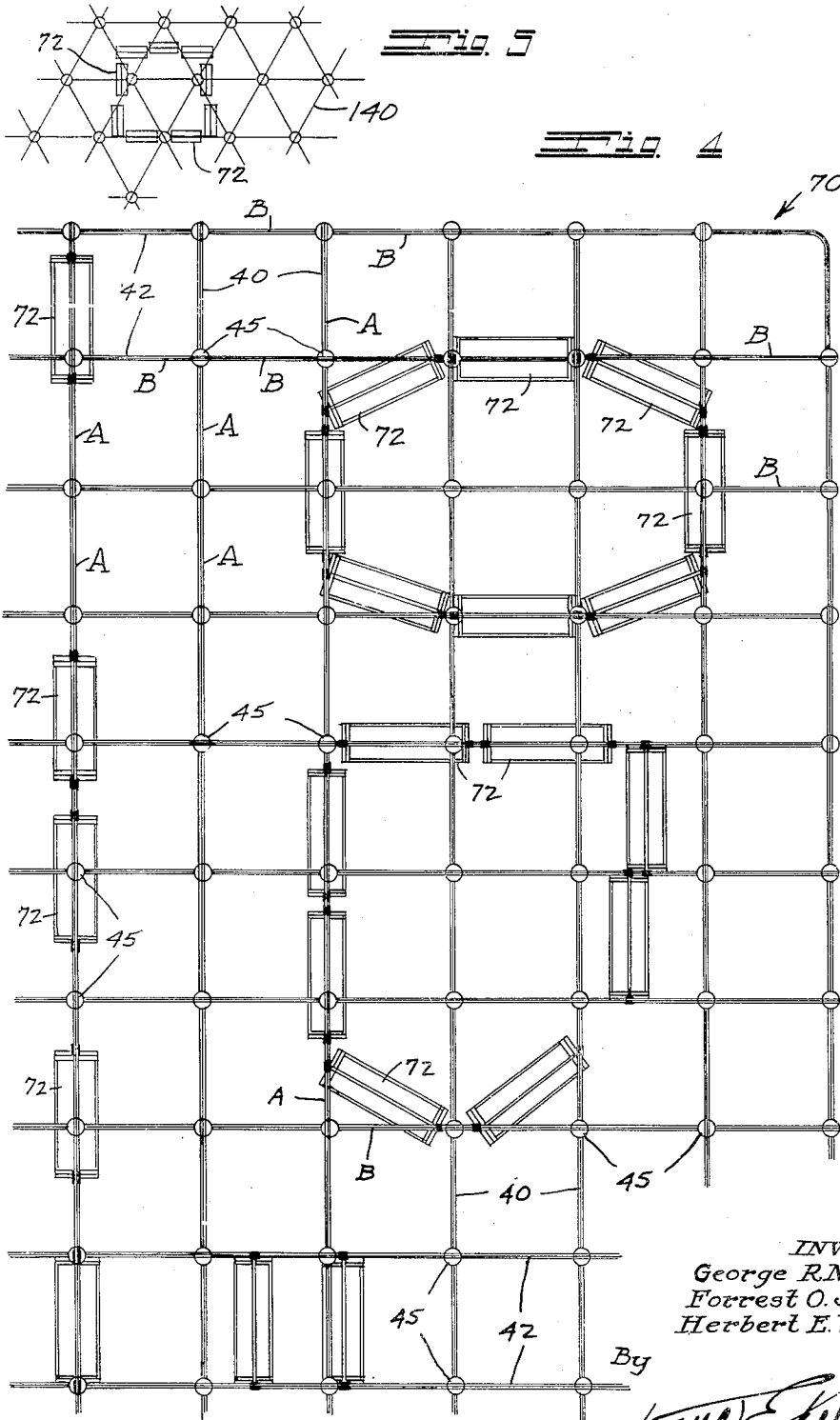
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4 Sheets-Sheet 2



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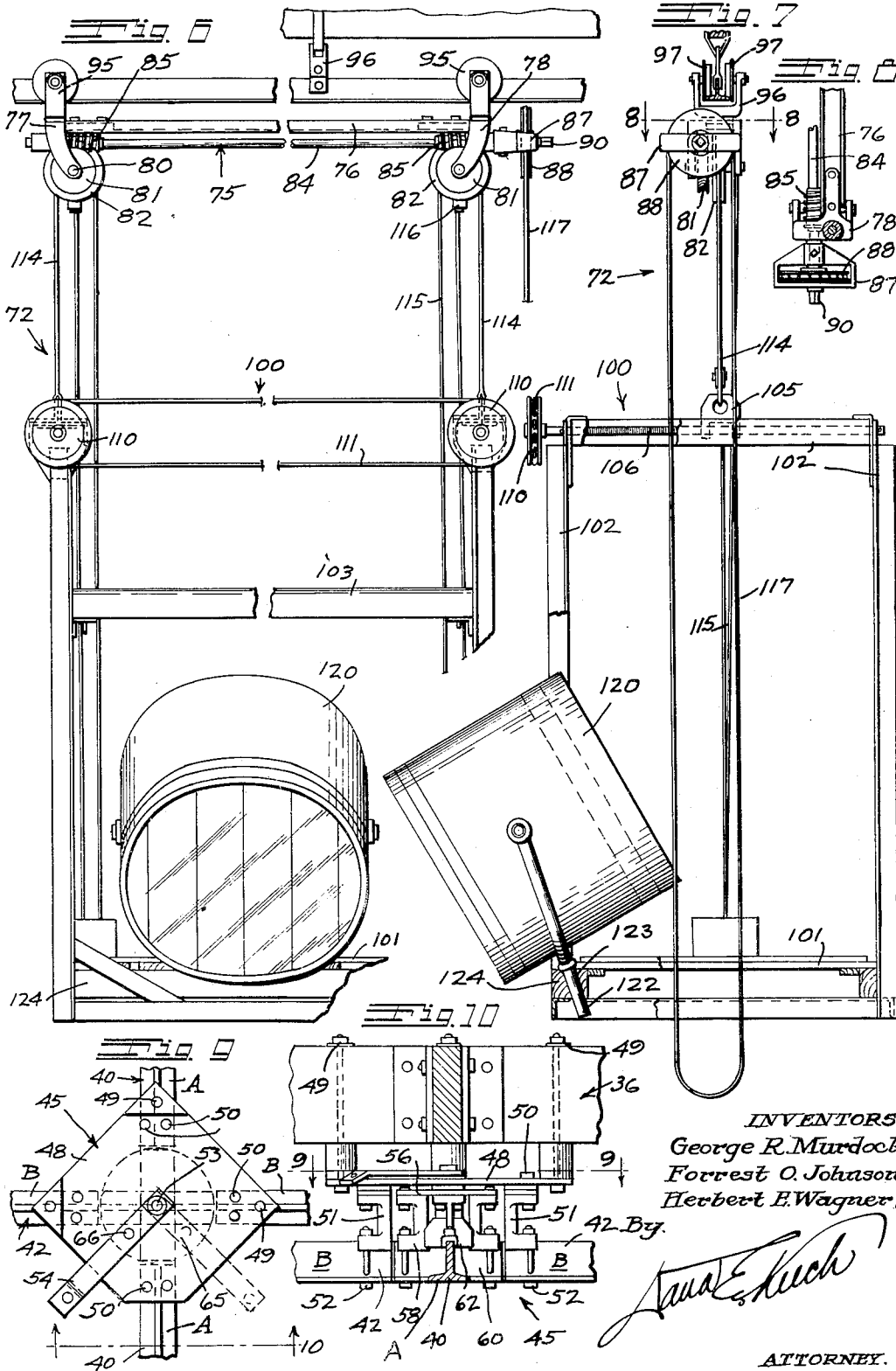
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4 Sheets-Sheet 3



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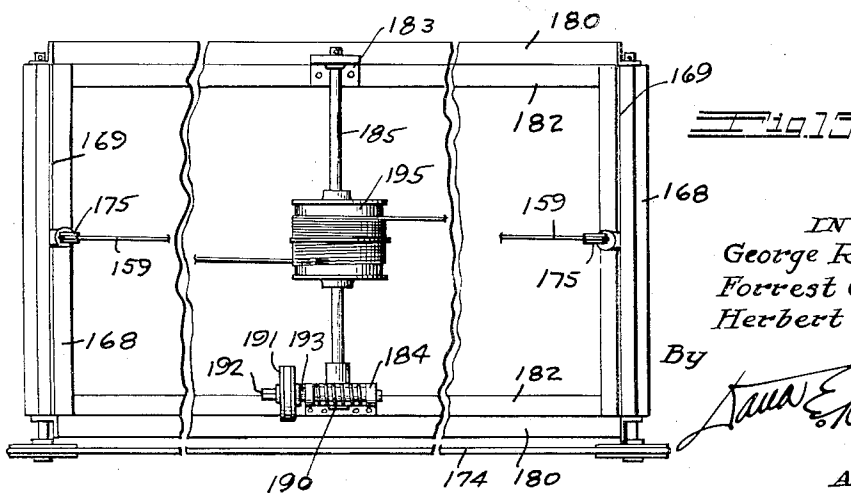
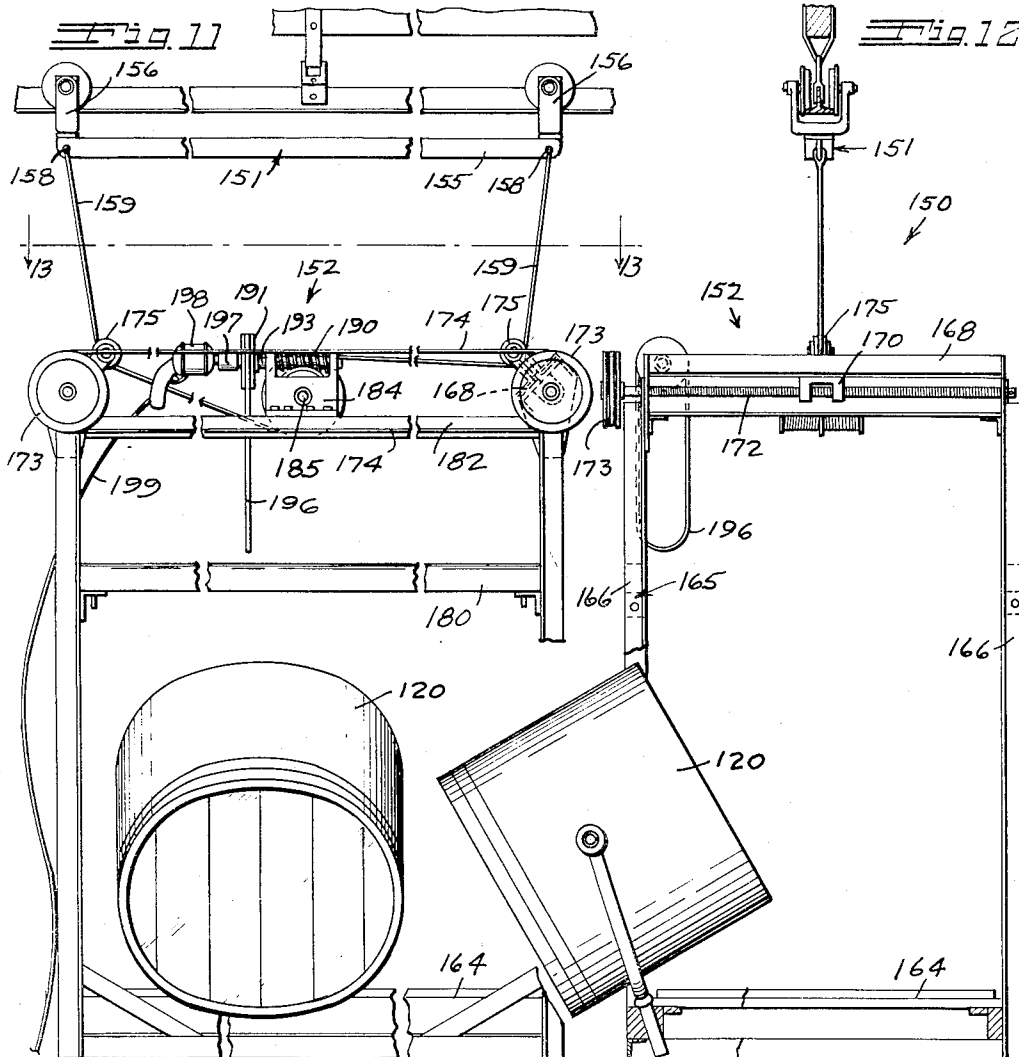
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4 Sheets-Sheet 4



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1,923,741

LIGHTING APPARATUS FOR MOVING PICTURE STAGES

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9 Claims. (Cl. 240-3)

Our invention relates to motion picture stages, and more particularly to lighting equipment for these.

It is common practice to produce motion pictures in closed sound-proof buildings, which are fairly large with a high ceiling, and in which a large number of sets or particular scenes may be erected at the same time. When used for filming a scene, each set must be flooded with light from various angles so as to prevent shadows in the picture. It is customary, therefore, to use a large number of high powered flood lights positioned just out of range of the camera, and bearing on the set. These lights have to be located at some 18 to 45 feet above the floor of the stage, and it is necessary that they be rigidly positioned to prevent flickers of light during the filming operation. The ceiling of these stages is often as high as 50 feet from the floor, and it has been the custom to support the flood lights for lighting the sets either on scaffolding erected from the floor, or on platforms suspended from the ceiling. The manner of suspending the platforms from the ceiling has been by the use of scantlings extending from the four corners of the platform to the ceiling where these are nailed onto the ceiling joists.

Both methods, above noted, of supporting the flood lamps for lighting the sets have proved very unsatisfactory, the first owing to the cost of erecting the scaffolding, and the second owing to the great difficulty of maneuvering the platforms into the proper positions before attaching the scantlings supporting these platforms to the ceiling.

It is accordingly an object of our invention to provide a lighting system for motion picture stages which will permit the flood lamps being supported, and at the same time readily maneuvered into position for lighting any given set.

The manner of accomplishing the foregoing object, as well as other objects and advantages, will be made manifest in the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic plan view of a set on a moving picture stage illuminated by the lighting system of our invention.

Fig. 2 is a vertical sectional view taken on the line 2-2 of Fig. 1.

Fig. 3 is a diagrammatic fragmentary side elevational view taken in the direction of the arrow 3 in Fig. 1.

Fig. 4 is a diagrammatic plan view of a pre-

ferred system of overhead rails for use in the lighting apparatus of our invention.

Fig. 5 is a diagrammatic view of a modified system of overhead conveyor rails for use in our invention.

Fig. 6 is a fragmentary side elevational view of a preferred form of lighting unit of our invention.

Fig. 7 is an end elevational view of Fig. 6.

Fig. 8 is a fragmentary horizontal sectional view taken on the line 8-8 of Fig. 7.

Fig. 9 is an enlarged plan view of a preferred embodiment of an overhead conveyor switch for use in the overhead rail system shown in Fig. 4.

Fig. 10 is a vertical sectional view taken on the line 10-10 of Fig. 9.

Fig. 11 is a view similar to Fig. 6, and showing a modified form of lighting unit which is adapted to be used in our invention.

Fig. 12 is an end elevational view of Fig. 11.

Fig. 13 is a horizontal sectional view taken on the line 13-13 of Fig. 11.

Referring specifically to the drawings, Fig. 1 shows a set 20 which consists in three walls 21, 22, and 23 which are decorated to form three sides of a room 24, which as shown in Figs. 1 and 2 is properly furnished to provide a scene in which it is desired to film moving pictures.

The set 20 is built upon a floor 25 of a moving picture studio stage 30, which is entirely enclosed, the roof 31 of this stage being shown in Fig. 3. The roof 31 is supported by a suitable truss structure 33, the trusses 34 of which include I-beam tension members 35. Built upon the I-beams 35 is a superstructure 36, preferably of timber, the members of this superstructure forming a checkerboard pattern, the squares of which have sides of 12 feet, this pattern covering practically the entire ceiling of the stage 30.

Suspended from the members of the superstructure 36 so as to lie directly beneath these members, are two groups of overhead conveyor rails 40 and 42, the rails of each group being parallel with each other and equally spaced apart, and the rails of the two groups being disposed in the same plane and at right angles to each other as clearly shown in Fig. 4. In order to thus lie in the same plane, the rails 40 and 42 are divided into relatively short sections A and B, respectively, each of which is about 11 feet long, these sections being adapted to be connected by switches 45 which are disposed at all the intersections of the rails 40 and 42. Each switch 45 is disposed between two adjacent aligned rail sections A, and also between two adjacent aligned rail sections B. 110

Referring to Figs. 9 and 10, each switch 45 is seen to include a heavy square plate 48 which is supported at three corners by bolts 49 from horizontal members of the superstructure 36. Bolted to the lower face of the plate 48 by bolts 50 are brackets 51, the lower ends of which are secured by bolts 52 to adjacent extremities of aligned sections A and B of the rails 40 and 42. Extending upwardly through the plate 48, and journalling in a bearing provided therein is a short shaft 53 which has a handle 54 fixed on its upper end, and a switch plate 56 fixed on its lower end. Bolted to this switch plate and extending downwardly therefrom at opposite points on this plate is a pair of brackets 58, the lower ends of which are connected to a switch rail section 60. Secured on the lower face of the plate 56 at opposite points thereon on a line disposed at right angles with the switch rail section 60 is a pair of stops 62, the purpose of which will be made manifest hereinafter.

In Figs. 9 and 10, the rail 60 is shown in position to connect adjacent sections B of the rail 42, while the stops 62 are disposed opposite the ends of sections A of the rail 40, which terminate at this switch.

Formed in the plate 48 is an arcuate slot 65 in which a pin 66, provided on the handle 54, is adapted to move so as to limit the rotation of the switch plate 56 between the two extreme positions in which the switch rail section 60 is aligned with and connects those rail sections A and B, respectively, which terminate at that switch.

For convenience, I shall designate the system of rails 40 and 42 with their connecting switches 45, as shown in Fig. 4, as a checkerboard overhead rail system 70.

Adapted to be supported on and maneuvered into position by the utilization of the rail system 70 is a plurality of lamp crane and platform units 72, as shown in Figs. 3, 6, and 7. Each of the units 72 includes a beam crane 75 having a beam 76, to the opposite ends of which are fixed cast hoist bodies 77 and 78. Each of these bodies provide suitable bearings in which are journaled shafts 80 carrying worm gears 81, and chain sprockets 82. Extending parallel with the beam 76 and journaled in suitable bearings provided in the bodies 77 and 78 is a shaft 84 having worms 85 which mesh with the gears 81. Provided on the hoist body 78 is a guard 87 which extends around a chain sprocket 88 provided on the adjacent extending end of the shaft 84.

Extending outward beyond sprocket 88 is a squared end 90 of the shaft 84, the purpose of which will be made manifest hereinafter. Pivotaly mounted on the bodies 77 and 78 on vertical axes which are preferably twelve feet apart, this being the distance between centers of adjacent pairs of rails 40 and 42, are overhead rail carriages 95, each of which, as shown in Fig. 7, includes a yoke 96 having flanged wheels 97 rotatably mounted thereon so that these are adapted to travel upon and be supported by the various rails and switches of the overhead rail system 70.

It is here to be noted that each of the sections A and B of the rails 40 and 42, supported at their ends by the switches 45, are preferably supported also at one or more points midway between their ends by hangers 99 as shown in Fig. 6 which may be any of the well known hangers provided for this purpose, but which we prefer to be of the type shown and described in

the co-pending application for U. S. Letters Patent of Forrest O. Johnson and Herbert E. Wagner, filed on the 9th day of March, 1932, Serial No. 597,728.

Each unit 72 also includes a lamp platform 100 having a floor structure 101, and end frames 102 extending upwardly therefrom, these end frames being connected by hand rails 103. Each end frame 102 is provided with a slide block 105 which is adapted to be shifted laterally across the frame 102 by a screw shaft 106, the shafts 106 at opposite ends of the platform 100 having chain sprockets 110, which are connected by a hand chain 111.

Connected to the slide blocks 105 are chains 114 which extend upwardly and around the chain sprockets 82, and then, falling downwardly from the opposite sides of these sprockets, form loops 115, the free ends of which are connected as to downward extensions 116 of the hoist bodies 77 and 78. The platform 100 of each lighting unit 72 is thus seen to be supported on the beam crane 75 of that unit through the chains 114. Trained about the sprocket 88 of each unit 72 is an endless chain 117 by means of which shaft 84 may be rotated by a person standing on the platform floor 101, thus raising or lowering the platform 100 by rotating the sprockets 82.

The operation of our invention as embodied in the apparatus described hereinabove, is as follows:

The set 20 shown in Fig. 1 is merely illustrative, and these sets, of various sizes and shapes both interior and exterior, are constantly being builded up, used for a short time and then torn down on the stage floor 25. Before each of these sets is ready for use in filming a scene, a large number of flood lamps 120 must be rigidly positioned at various points about the set so that the entire set may be flooded with light during the shooting of the scene.

As shown in Figs. 1, 2, 3, 6, and 7, a number of the lamps 120 are mounted on each of the platforms 100 of our invention as by inserting yoke stems 122 of lamps 120 into diagonal holes 123 bored in longitudinal joists 124 provided in the floor structures 101. Any preferred number of lamps 120 may be mounted on each platform 100, there being three lamps on each platform as shown in the drawings, these being mounted all along one edge of the platform.

The manner in which our invention is used to provide lighting for the various kinds of sets therefor may be explained with reference to the set 20 shown in Figs. 1 and 2. After the walls 21, 22, and 23 of the set are firmly erected on the floor 25, decorated and made in readiness for filming a scene with this set as the background, a number of units 72 are moved into position around the set by causing the beam cranes 75 to travel over the rails 40 and 42 of the rail system 70. When the units 72 are thus positioned, the platforms 100 are lowered thereon till they are on the proper level for the lamps 120 carried thereby to bear directly upon the set as shown in Fig. 1.

The platforms 100 are then tied together in any suitable manner, and are also rigidly tied to the set as by braces 130.

It is desired to point out here that the number of lights placed on each platform 100 varies so that it becomes necessary to balance the platform by sliding the slide blocks 105 back and forth in the end frames 102. This can be accomplished by the attendant of the lamps on

a platform by pulling on the chain 111. By this operation, the platforms 100 can be leveled up so that only a relatively small strain need be placed on the set 20 in holding the various plat-

forms 100 properly positioned for lighting the set. Under some conditions it may be found desirable to guy the platforms 100 from the superstructure 36 as by the use of guy wires 132 shown in Figs. 2 and 3, although this is not the general practice.

After a set has been shot, and is no longer needed, the braces 130 are removed, the platforms 100 are disconnected from each other, and these platforms are then lifted away from the set by actuation of the beam cranes 75 of the various lighting units 72, and the latter are moved away on the rail system 70 to be used in lighting some other set.

One of the most important advantages of our invention is the facility with which the platforms 100 of each lighting unit 72 may be maneuvered into the proper position relative to a set to take part in the illumination thereof. As shown in Fig. 4, the carriages 95 of each unit 72 may both be disposed on a single one of the rails 40 or 42, or they may be disposed upon an adjacent pair of these rails, or they may be disposed upon adjacent intersecting sections A and B of these rails. It is also illustrated in a left hand portion of this figure that when the switches 45 are properly turned, a series of lighting units 72 may travel rapidly along one of the rails 40 or 42 without interfering with lighting units suspended from other portions of the rail system 70. Furthermore, when the switches 45 of an adjacent pair of parallel rails are turned to connect the various sections of these rails, a number of lighting units 72 may be caused to travel broadside between these rails, as shown at the lower end of Fig. 4.

In Fig. 4 two groups of the lighting units 72 are shown assembled about spaces of different shapes, such as might be occupied by sets which it is desired to illuminate. Obviously, there is practically no shape of set which might be built in the stage 30 that the lighting units 72 might not be grouped around so as to adequately illuminate.

It is believed clear that the maneuvering of any of the carriages 95 around a corner in the rail system 70 is effected by running the wheels 97 of this carriage onto the switch section 60 of the switch 45 at this corner, then by moving the handle 54, swinging this switch section through an angle of ninety degrees, after which the carriage 95 is run from this switch rail section onto one of the main rail sections aligned therewith.

As regards the manner of getting at the switches 45 to operate these, suitable cat walks 135, as shown in Fig. 3, may be provided on the superstructure 36. From these cat walks, the switches 45 may be operated by means of poles with hooks and the lighting units 72 may be maneuvered upon the rail system 70.

While we have pointed out hereinabove certain advantages of a particular form of rail system 70 shown in Fig. 4, there is illustrated in Fig. 5 a rail system 140 made up of equi-lateral triangles, and a number of lighting units 72 are shown suspended from the rail system 140 to indicate how this rail system might be used to facilitate the maneuvering of these lighting units into position for illuminating a set with a rectangular shape.

In maneuvering a lighting unit 72 from a position on one of the cat walks 135, it is sometimes desirable to raise or lower the platform 100 when there is no man standing thereon. The squared shaft end 90 is provided to facilitate accomplishing this quickly. It is contemplated that the men working overhead shall be supplied with one or more electric drills having chucks which may be fitted to the squared shaft end 90 of a lighting unit for rapidly elevating or lowering the platform 100 of that unit.

In Figs. 11, 12, and 13, we have shown a modified form of lighting unit 150, which includes a beam crane 151, and a lamp platform 152.

The beam crane 151 has a beam 155 which is suspended at its opposite ends from overhead carriages 156, which are preferably swiveled on vertical axes spaced twelve feet apart. Provided on opposite ends of the beam 155 are eyes 158 to which are connected cables 159 upon which the lamp platform 152 is hung.

The lamp platform 152 includes a floor structure 164 upon ends of which are provided end frames 165 having corner posts 166, these being connected at their upper ends by an inwardly tilted channel member 168 having a slot 169 extending longitudinally therein in which a block 170 is adapted to slide. The positions of the slide block 170 on the channels 168 are controlled by a threaded shaft 172 having chain sprockets 173, these sprockets being connected by a chain 174. Mounted on the block 170 are idle sheaves 175.

Connecting the corner posts 166 of the end frames 165 are hand rails 180 and compression member 182. Mounted on the compression members 182 are brackets 183 and 184, these brackets having bearings in which is journaled a shaft 185 disposed transversely across the platform 152. Provided in the bracket 184 and on the shaft 185 is a worm and gear mechanism 190, there being a chain sheave 191, and a squared shaft end 192 provided on a worm shaft 193 of this mechanism. Fixed upon the shaft 185 is a double drum 195.

The cables 159 are trained around the pulleys 175 and wound on the drum 195 so that when the drum 195 is rotated by the worm and gear mechanism 190, the cables 159 are either wound up on or unwound from this drum. This results in the platform 152 being elevated or lowered from the beam crane 151. The worm and gear mechanism 190 is adapted to be operated to raise or lower the platform 152, either by manually pulling on an endless chain 196 which is trained over the chain sheave 191, or by applying to the squared shaft end 192 a chuck 197 of an electric drill 198 as shown in Fig. 11.

Lighting unit 150 is especially adapted for being handled entirely by a man on the platform 152. One method suggested for effecting the maneuvering of these lighting units into their proper position for use in lighting sets built on the stage floor 25 is for all of these units not in use to be kept at one corner of the stage with the cable 159 let out from the drum 195 so that the platforms 152 are close to the floor 25, or at least within reach of an ordinary step ladder. When it comes time to position a certain number of the lighting units 150 around a set a workman, carrying one of the electric drills 198 with him which is fed with electricity through a cord 199, climbs into one of the lamp platforms 152. Putting the drill 198 on the worm and gear mechanism 190, the workman starts the motor 198 so as to hoist the lamp platform 152 up as shown in

Fig. 11. The drill 198 may then be laid on the floor 164 of the platform 152, and the workman is free to use a pole with a hook for pulling this lighting unit 150 along the rails 40 or 42 to some point on the rail system 70 from which it is desired to suspend this particular platform 152. As the platform 152 is suspended close to the rail system 70 at this time, it is, of course, easy for the workman standing thereon to maneuver the lighting unit of which this platform forms a part by reaching out with a pole to operate the switches 45 as he comes to them and direct the travel of this unit wherever he may desire. The correct positioning of a lighting unit 72 may, of course, be ascertained by the workman riding on it in cooperation with a workman on the floor by the use of a plumb bob lowered from the unit platform while in elevated position. After the unit has been properly positioned, of course, on the track system, the electric drill 195 may be placed on the squared shaft end 192, and the motor run in a reverse direction to unwind the drum 195 and lower the platform 152 into the proper relation with the set to be illuminated.

While we have described our invention by reference to specific embodiments thereof, it is to be understood that various changes and modifications might be made in these without departing from the spirit of the invention, or the scope of the appended claims.

What we claim is:

1. In combination: a plurality of sets of rails each including a multiple of parallel overhead conveyor rails supported in substantially the same plane, the rails of one set intersecting those of another; switches at said intersections; a plurality of lamp platforms; overhead conveyor carriages having swivelled hanger members engaging said rails and supporting said platforms independently from said rails; means between said carriages and said platforms for elevating or lowering said platforms to position the same relative to a set of scenery; and a system of bracing to hold each platform relatively rigid after its being so positioned.

2. A combination as in claim 1 in which said elevating and lowering means includes a pair of flexible suspension elements and in which means is provided to properly balance said platforms on said elevating and lowering means according to variations of load on said platforms.

3. A combination as in claim 1 in which said groups of rails are disposed at right angles to each other.

4. A combination as in claim 1 in which said groups of rails are disposed at angles of sixty degrees with each other.

5. In combination: a plurality of sets of rails each including a multiple of parallel overhead conveyor rails supported in substantially the same plane, the rails of one set intersecting those of another; switches at said intersections; a plurality of lamp platforms; overhead beams, one for each platform, which are approximately equal in length to said platforms; overhead wheel

carriages swivelled on opposite ends of said beams; said carriages riding on said rails; and means for supporting said platforms from said beams and at various heights therebeneath.

6. In combination: a plurality of sets of rails each including a multiple of parallel overhead conveyor rails supported in substantially the same plane, the rails of one set intersecting those of another; switches at said intersections; a plurality of lamp platforms; overhead beams, one for each platform, which are approximately equal in length to said platforms; overhead wheel carriages swivelled on opposite ends of said beams, said carriages riding on said rails; and means for supporting opposite ends of each of said platforms from corresponding ends of one of said beams, said means being adapted to lower or raise said platforms.

7. In combination: a plurality of sets of rails each including a multiple of parallel equally spaced overhead conveyor rails supported in the same horizontal plane at right angles to each other and intersecting each other so as to form a checkerboard of squares; switches at the intersections between said rails; a plurality of lamp platforms to be maneuvered into a large variety of formations in the area covered by said checkerboard while said platforms are suspended on said rails; overhead conveyor carriages supported by swivelled hanger members having wheels running on said rails; and means for supporting said platforms from said carriages.

8. In combination: a plurality of sets of rails each including a multiple of parallel equally spaced overhead conveyor rails supported in the same horizontal plane at right angles to each other and intersecting each other so as to form a checkerboard of squares; switches at the intersections between said rails; a plurality of lamp platforms to be maneuvered into a large variety of formations in the area covered by said checkerboard while said platforms are suspended on said rails; overhead conveyor carriages running on said rails, one for each platform and from which said platform is hung, a carriage swivelled on a vertical axis on each end of each of said beams, the distance between said axes being equal to the distance between adjacent parallel rails in said checkerboard.

9. In combination: a plurality of sets of rails each including a multiple of parallel overhead conveyor rails supported in substantially the same plane, the rails of one set intersecting those of another; switches at said intersections; a plurality of lamp platforms; overhead conveyor carriages having swivelled hanger members engaging said rails and supporting said platforms independently from said rails; means between said carriages and said platforms for elevating or lowering said platforms to position the same relative to a set of scenery.

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