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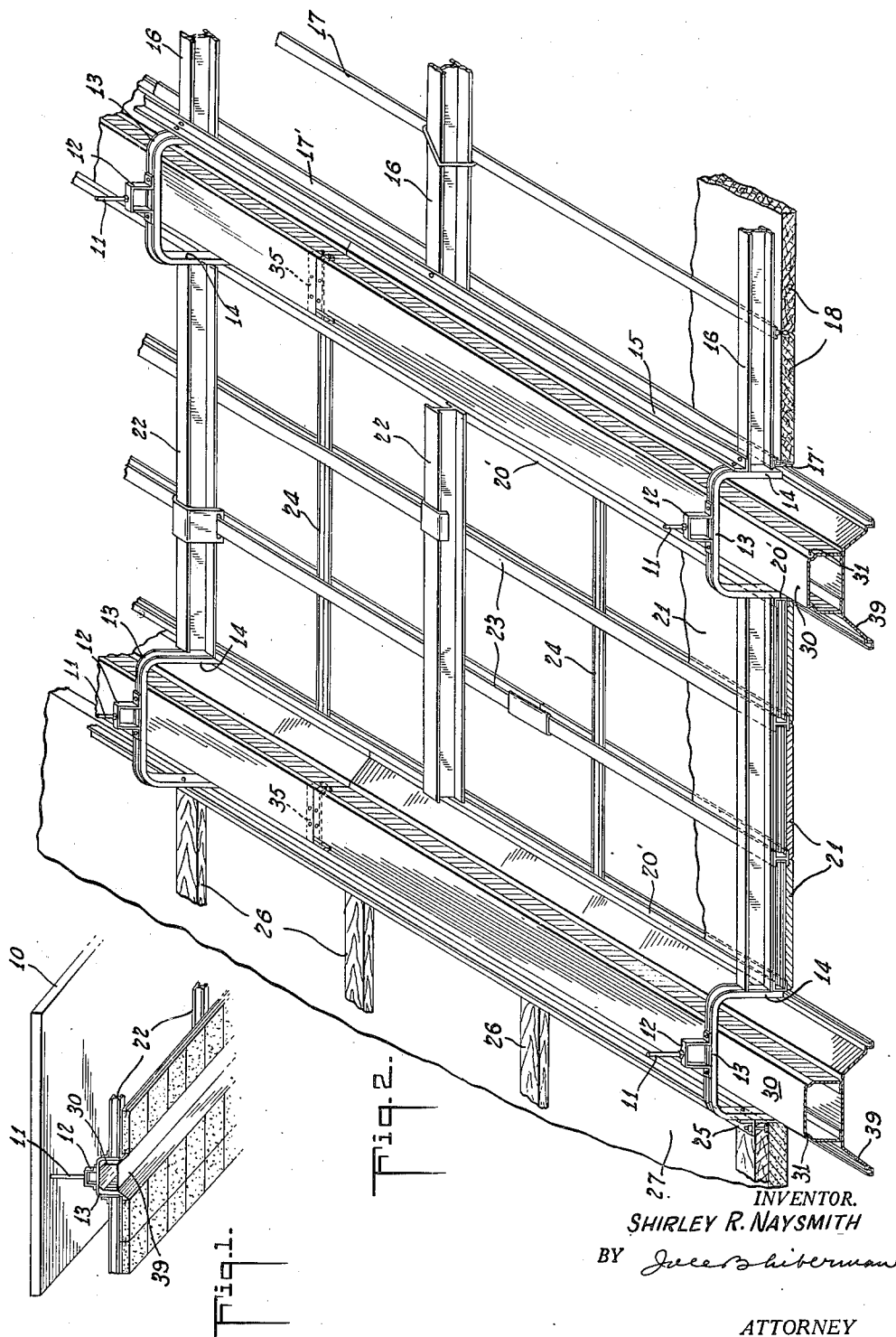
S. R. NAYSMITH

2,376,715

CEILING

Filed May 6, 1943

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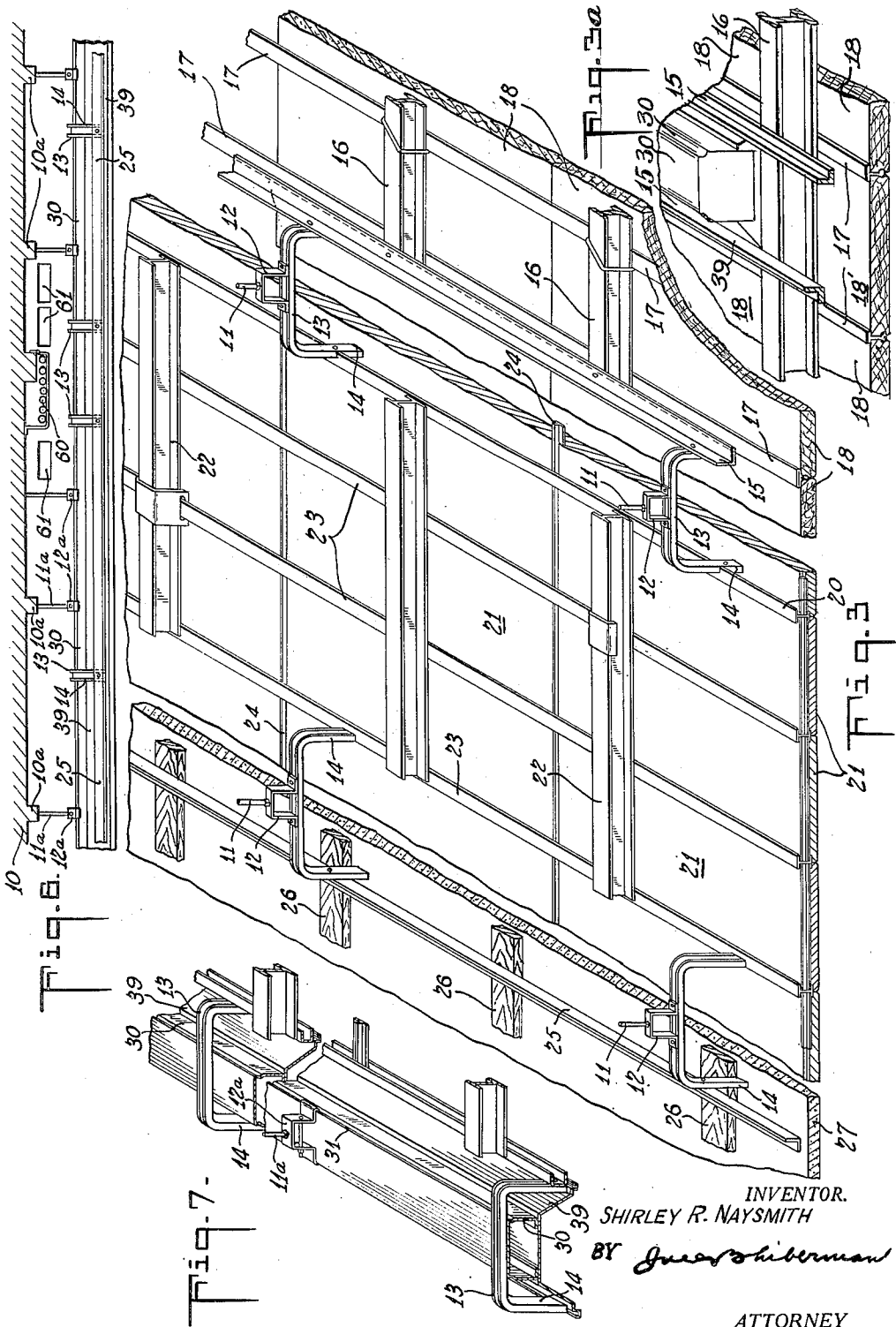
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3 Sheets-Sheet 2



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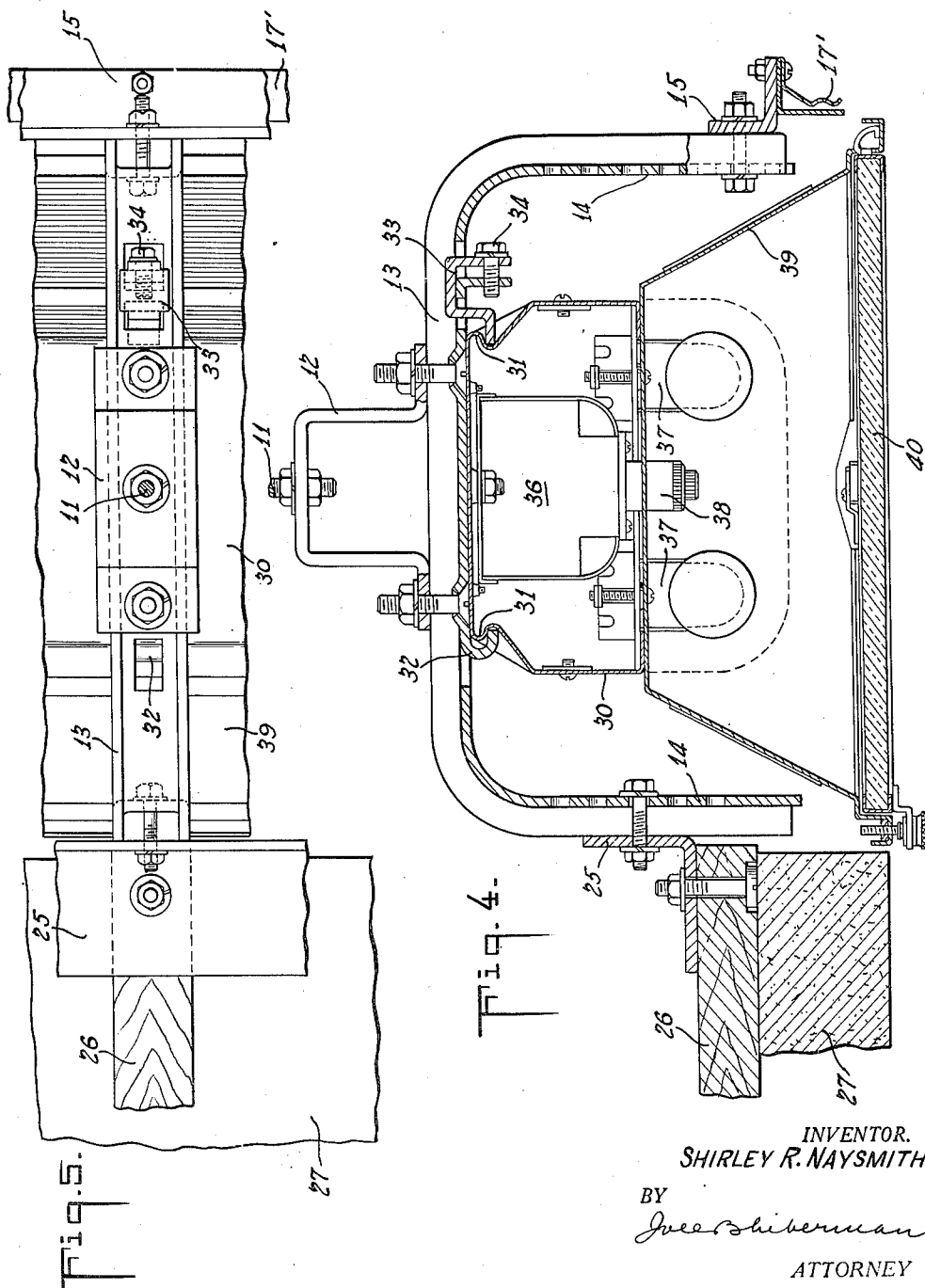
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3 Sheets-Sheet 3



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20 Claims. (Cl. 72-118)

The present invention relates to ceilings, and is more particularly directed toward hung ceilings adapted to include, wherever desired in the ceiling, inbuilt or flush mounted lighting equipment.

Hung ceilings have commonly employed metal or wood furring strips, T-bars, H-bars and the like for the purpose of supporting the ceiling facing, whether it be tile, plaster, plaster board or other facing material, and the supporting framework for the ceiling surfacing itself has usually been supported by a multiplicity of hangers or suspensions which extended up to the superstructure. The surfacing material is usually very light in weight and hence the supports need be only strong enough to support it in place. Where recessed lighting equipment was desired in such hung ceilings these fixtures have more usually relied upon the ceiling supporting framework, notwithstanding its lack of ruggedness.

According to the present invention hanger rods are arranged in parallel rows and where the ceiling employs interfitting ceiling tile these rows of hanger rods are spaced so as to accommodate ceiling tile of modular dimension. These hanger rods are placed along the center line of the lighting equipment. According to one construction each carries an inverted U-shaped yoke, the yokes for a row of hanger rods being parallel with one another and available to support lighting equipment along the entire length of the row or any selected part of the row, and where lighting equipment is not desired these yokes may be spanned by ceiling material and hidden from view. The yokes of a row are interconnected by longitudinally extending members which support suitable cross members and these carry additional longitudinal members, whereby a panel or framework exists between the rows of yokes, and this panel or framework is available to support the desired type of ceiling or surfacing material. In practicing the form of the present invention it is possible to employ common suspension means for the surfacing material and the lighting equipment in such a manner that the suspension means is directly above the lighting equipment, and attachment of the surfacing material to the suspension means is independent of the attachment of the lighting fixture to the suspension means and vice versa.

In an alternate form of construction the hanger rods carry clamps for the wireways and the yokes are clamped to the wireways.

The accompanying drawings show, for purposes of illustrating the present invention two embodiments in which the invention may take form, to-

gether with modifications of certain parts, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In these drawings:

5 Figure 1 is a diagrammatic perspective view showing a hung ceiling from underneath;

Figure 2 is a perspective of a hung ceiling showing various forms of ceiling construction and illustrating the supporting of two rows of lighting equipment;

10 Figure 3 is a view similar to Figure 2 in which the lighting equipment is omitted and ceiling facing material substituted;

15 Figure 3a is a fragmentary view illustrating the ending of a row of lighting equipment within the ceiling area;

Figure 4 is a cross sectional view taken through one of the yokes;

20 Figure 5 is a top plan view of the structure shown in Figure 4;

Figure 6 is a diagrammatic vertical sectional view parallel with the line of lighting equipment showing an alternate form of construction wherein the ceiling surfacing is supported from the lighting equipment; and

25 Figure 7 is a fragmentary perspective view of a portion of the construction of Figure 6.

A suitable superstructure or base is illustrated at 10. This may be a floor, roof, roof truss, or any other overhead construction below which it is desired to place a hung ceiling. This superstructure supports a number of hanger rods 11, for example, half inch steel rods.

As indicated in Figures 2 and 3 the rods 11 are 35 in rows extending from front to rear of these figures. The rows of rods are separated by distances which depend upon the type of ceiling facing material to be used and the intended closeness of mounting of lighting equipment. The spacing of the rods 11 lengthwise of the row may be any desired and convenient spacing so long as the supports are not too far apart as to cause sagging. In Figure 2 the spacing of the rods 11 lengthwise of the row is indicated as 8', while the spacing crosswise is indicated as 4'. In Figure 3 the 4' dimension between rows of yokes is retained, but to show the flexibility of the construction the spacing of the hangers lengthwise is much less than 8'.

40 Each hanger rod 11 is connected to a strap 12 and each strap 12 carries a U-shaped yoke 13. These yokes may conveniently be made from a suitable length of steel of channel cross section bent as indicated in the drawings. Any other suitable form of construction may be employed.

The width of the yoke is preferably somewhat less than 12". The legs 14, 14 of the yokes are employed to support longitudinally extending members for carrying the ceiling surfacing material. On the right-hand side of Figures 2 and 3 the yokes of the right-hand row are secured to a longitudinally extending angle 15. Another similar angle would be carried by the next row of yokes to the right. The angle 15 and the other angle (not shown) support small I-beams, H-beams, or channels indicated at 16, and these beams support T-bars 17 of usual construction by means of clips generally used with T-bars. The T-bars may be full T-bars, as indicated in Figure 3 and at the right of Figure 2, or a half T-bar or L-bar 17' may be used alongside the yokes as indicated in Figures 2 and 4, where the angle 15 is lower and 17' is secured directly to it. The T-bars are so spaced that the distance between the T-bars close to a row of yokes is sufficient for one tile width.

The construction illustrated by the reference characters 15, 16, 17, 17' is one which is suitable for supporting acoustical ceiling units 18 of the snap-in type, and such ceiling tile may extend between one row of yokes and an adjacent row of yokes, and, as indicated in Figures 3, similar tile may extend under the row of yokes where no lighting equipment is to be installed.

The left leg 14 of the right-hand row of yokes 13 of Figures 2 and 3 is secured to an H-bar 20 or half H-bar 20' of conventional form used in supporting another well-known form of ceiling tile indicated at 21. The right-hand side of the left row of yokes, Figures 2 and 3, also supports a similar H-bar 20 or half H-bar 20', the H-bars 20, 20, or 20' support I-beams or H-beams, channels or similar members 22 and these members support intermediate longitudinally extending H-bars 23. The H-bars, together with the conventional splines 24, support the ceiling tile 21 so that the entire area between two rows of yokes may be covered with ceiling surfacing material of the type referred to, and where no lighting equipment is used the ceiling surfacing material may extend under the yokes as indicated at the left of Figure 3.

The left side of the left row of yokes of Figures 2 and 3 supports angles 25, and these angles in turn support wooden cross strips 26 as shown more clearly in Figure 4. These cross strips support any conventional form of plaster ceiling, plaster board, or the like, as indicated diagrammatically at 27. It will, of course, be understood that the ceiling surfacing material will ordinarily be the same throughout a ceiling installation, except where obstructions or local conditions make a different surfacing desirable.

The drawings also illustrate a suitable form of lighting equipment to be carried by the yokes. This lighting equipment may conveniently employ longitudinally extending metal wireways 30 having a beaded upper edge indicated at 31 and such wireways are supported by fixed hooks 32 carried by the yokes 13 and adjustable straps 33 with hook shaped ends and adapted to be clamped in place by bolts 34. The sections of wiring trough 30 may be fastened together by straps indicated in dotted lines at 35, Figure 2. These wireways carry fluorescent lamp auxiliaries 36, lamp sockets 37 and starters 38. The wireways also support reflectors 39 which may be provided with suitable closures 40, if desired. The lighting equipment illustrated herein is shown and claimed in my copending application, Serial No. 414,586

filed October 11, 1941, (now Patent No. 2,321,099 of June 8, 1943) wherein it is pointed out that the lighting equipment has an overall width equal to the width of a tile and a length equal to the opening provided by omitting a number of tiles.

When the lighting equipment is installed it may extend lengthwise the same distance as the ceiling so that all parts terminate in the same transverse plane, i. e., the lighting equipment of Figure 2 would then end in the same plane as the near edge of the ceiling surfacing. When, however, the lighting equipment does not extend as far as the ceiling the space beyond the lighting equipment and in line with it may be closed off, as indicated in Figure 3a, which shows additional longitudinally extending members such as double T-bars 17 spaced so as to accommodate ceiling tile between them such as the central ceiling tile numbered 18' in Figure 3a. In practice all that would be necessary would be to use half T-bars whose length was coextensive with the length of the lighting equipment and double T-bars extending from the ends of the lighting equipment either to the end of the ceiling or to where lighting equipment was to be against installed.

The construction which has been shown herein is one in which the entire support for all the lighting equipment and ceiling may be carried from the simple hanger rods which can be supported from the superstructure in various manners. All that is necessary is to properly space the hanger rods across the area in which the ceiling is to be so as to have these rods spaced close enough to carry all the lighting equipment desired and spaced the proper distance from row to row to accommodate the tile ceiling where one is used. Anywhere that a non-tile type of ceiling is desired this same hanger equipment can be used to support a plaster or plaster board ceiling. Where the use to which the room is to be put when the installation is first made is one wherein comparatively low levels of illumination are required it is obvious that the lighting equipment may be installed of sufficient capacity to provide this amount of illumination, and the space where fixture lighting equipment may later be installed can be closed off by conventional ceiling surfacing material. This material can be readily removed and lighting equipment substituted.

The alternate form of construction illustrated in Figures 6 and 7 is suitable for use where wireways, or other similar horizontal members are available as intermediate supports. Here the superstructure is again illustrated at 10. In the ceiling illustrated beams 10a are at random locations. Plumbing 60 and air conditioning ducts 61 are also shown. Structures such as this frequently congest the area under the ceiling and sometimes make it difficult to locate the supports in the most desirable position. Instead of using rods which extend down to the inverted U-shaped yokes, as previously described, the rods 11a are used to support clamps 12a similar to those shown in the above mentioned application. These clamps support the wiring channels 30 and the wiring channels in turn support the yokes 13. These yokes may be at random spacing on the wiring channel to suit the hung ceiling characteristics and the yokes and wiring channels clamped together as in Figures 4 and 5. In any particular installation part may be as shown in Figures 1-5 and part as shown in Figures 6 and 7.

The constructions provided are extremely rugged both lengthwise and crosswise and can be

readily installed so as to be level and all parts even. The present constructions therefore avoid the reliance upon thin metal sections such as T-bars and H-bars designed primarily to support light weight ceiling surfacing material for the support of heavy lighting equipment. The equipment can hang from the superstructure and remain properly spaced without the necessity of relying upon any side wall construction to prevent its shifting sidewise.

Since it is obvious that the invention may be embodied in other forms and constructions within the scope of the claims, I wish it to be understood that the particular forms shown are but two of these forms, and various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. In combination, a system of supports for a hung ceiling, comprising rows of hanger rods, inverted U-shaped yokes supported by the hanger rods at the lower ends thereof and at a common level with all the yokes in planes at right angles to the direction of the rows of rods, longitudinal members secured to the sides of the yokes of a row, cross members interconnecting the longitudinal members and supplemental longitudinally extending members carried by the cross members, all of said members forming a frame which bridges between the rows of yokes and is supported thereby, and ceiling facing material carried by the frame, whereby the space spanned by the yokes may be left open for down lighting apparatus or closed by ceiling facing material.

2. The combination claimed in claim 1, wherein the span of the yoke is slightly less than an integral fractional part of the spacing of the rows of hanger rods whereby when the ceiling surfacing material is in the form of tiles of modular dimension a single tile width may close the space spanned by the yokes and a plurality of such tile widths will span the space between the rows of yokes.

3. A system of supports for tile ceilings with recessed lighting equipment, comprising parallel rows of inverted U-shaped yokes supported at a common level, the rows being spaced a multiple of a tile width, and a yoke-supported frame including a plurality of longitudinally extending members and cross members, the longitudinally extending members each having a contour to support the ceiling tile, certain of the longitudinally extending members being secured close to the yokes and the other longitudinally extending members being supported from the cross members, the yokes having means for supporting longitudinally disposed lighting units extending from yoke to yoke of a row.

4. A system such as claimed in claim 3, wherein certain of the yokes of a row are provided with additional longitudinally extending members of a contour and spacing to accommodate ceiling tile therebetween.

5. In combination, a plurality of parallel rows of parallel-inverted U-shaped yokes, yoke suspension means, lighting units extending lengthwise of a row of yokes and occupying the full width of the yokes, and ceiling facing bridging the space between adjacent rows of yokes and supported from the yokes.

6. A ceiling facing having a plurality of alternate elongated areas occupied by ceiling surfacing material and interposed elongated, inverted trough-like reflectors having longitudinally extending lighting means therein, and means for

supporting an area of ceiling surfacing material and adjacent reflectors comprising two rows of yokes which span said reflectors and in which said reflectors are secured, and a yoke supported framework which extends between the two yokes and directly supports the ceiling facing material.

7. A ceiling or the like comprising a base and a facing spaced therefrom, said facing comprising a plurality of ceiling tiles and parallel rows of lighting units each comprising elongated, inverted trough-like reflectors having their lower edges in substantially the plane of the faces of the ceiling tile and lighting means, and suspension means for the facing comprising rows of yokes which receive the lighting units from underneath, yoke supported longitudinal members connecting the yokes of a row, and cross members connecting adjacent longitudinal members.

8. In combination, a plurality of inverted U-shaped yokes arranged in parallel rows, suspension means for each yoke, framework interconnecting adjacent rows of yokes and supported by the yokes, ceiling facing material secured to the framework so that the load of the ceiling facing material is carried by the yoke suspensions, and lighting units extending longitudinally through the yokes and supported by the yokes.

9. A ceiling structure hung below a superstructure and comprising a plurality of rows of suspended, inverted U-shaped yokes, a grill interconnecting adjacent sides of adjacent rows of yokes, and supported solely by the yokes, ceiling surfacing material carried by the grill and occupying the area of the ceiling except that between the sides of the yokes of a row, and down lighting equipment occupying the space between the sides of the yokes of each row.

10. In combination, a superstructure above an area of substantial extent, a plurality of pendent supports extending downwardly from the superstructure, arranged in parallel rows and terminating at a common level, an inverted U-shaped yoke carried at the lower end of each support, the yokes in each row being parallel with one another, longitudinally extending members carried by the outer sides of each yoke, cross members extending from the side members carried by one row of yokes to the side members carried on the near side of an adjacent row of yokes, ceiling surfacing supported from the cross members, and down lighting apparatus carried between the yokes of a row and having reflectors whose edges are closely adjacent the ceiling surfacing.

11. A support for tile ceilings using units of standard width comprising a plurality of parallel rows of inverted U-shaped yokes, the rows being parallel with one edge of the tile units, the yokes being parallel with the other edge, the rows being spaced apart a multiple of the standard tile width, the width of the yokes being slightly less than a standard tile width, parallel members supported by the yokes, and cross members supported by the parallel members, and ceiling tile supporting members carried below the cross members and spaced one tile width apart.

12. Means for supporting a ceiling and lighting equipment, comprising yokes suspended at a common level in rows, longitudinal members supported by and interconnecting the yokes at the sides thereof and provided with devices for supporting ceiling surfacing material, and lighting fixture clamps carried by the upper mid portions of the yokes.

13. In combination, a yoke having depending side members and fixed and movable clamping

means on the under side of the upper mid portion thereof, ceiling surfacing material supported from the side members and extending laterally of the yoke, and a lighting fixture secured in the clamps and extending transversely of the yoke.

14. A ceiling or the like comprising a superstructure, ceiling surfacing below the superstructure and occupying relatively wide and long regions and separated by relatively narrow regions of equal length, elongated down lighting apparatus occupying the narrow regions, the down lighting apparatus having continuous wireways, reflectors and light sources extending lengthwise thereof, the lower edges of the reflectors being disposed at the same level as the ceiling surfacing to provide a continuous facing, a plurality of inverted U-shaped yokes receiving the wireways and extending transversely thereof and down outside the reflectors, a framework supported by and interconnecting the yokes of adjacent rows and to which the corresponding region of ceiling surfacing is supportingly secured, and common suspension means arranged in rows in line with the center of the lighting apparatus for carrying the entire load of the lighting apparatus, the yokes, the frame and the ceiling surfacing.

15. A ceiling or the like comprising a superstructure, ceiling surfacing below the superstructure and occupying relatively wide and long regions and separated by relatively narrow regions of equal length, elongated down lighting apparatus occupying the narrow regions, the down lighting apparatus having continuous wireways, reflectors and light sources extending lengthwise thereof, the lower edges of the reflectors being disposed at the same level as the ceiling surfacing to provide a continuous facing, a plurality of inverted U-shaped yokes receiving the wireways and extending transversely thereof and down outside the reflectors, a framework supported by and interconnecting the yokes of adjacent rows and to which the corresponding region of ceiling surfacing is supportingly secured, and common suspension means arranged in rows in line with the center of the lighting apparatus for carrying the entire load of the lighting apparatus, the yokes, the frame and the ceiling surfacing, said suspension means including vertical rods whose lower ends are connected to the yokes, and devices for securing the wireways to the underside of the tops of the yokes.

16. A ceiling or the like comprising a superstructure, ceiling surfacing below the superstructure and occupying relatively wide and long regions and separated by relatively narrow regions of equal length, elongated down lighting apparatus occupying the narrow regions, the down lighting apparatus having continuous wireways, reflectors and light sources extending lengthwise thereof, the lower edges of the reflectors being disposed at the same level as the ceiling surfacing to provide a continuous facing, a plurality of inverted U-shaped yokes receiving the wireways and extending transversely thereof and down outside the reflectors, a framework supported by and interconnecting the yokes of adjacent rows and to which the corresponding region of ceiling surfacing is supportingly secured, and common

suspension means arranged in rows in line with the center of the lighting apparatus for carrying the entire load of the lighting apparatus, the yokes, the frame and the ceiling surfacing, said suspension means including vertical rods whose lower ends are connected to the wireways, and devices for securing the wireways and yokes together.

17. A ceiling or the like comprising a superstructure, ceiling surfacing below the superstructure occupying relatively wide and long regions and separated by relatively narrow and long regions, elongated down lighting apparatus occupying the narrow regions, the down lighting apparatus having continuous wireways having continuous longitudinally extending beads, reflectors and light sources extending lengthwise thereof, the lower edges of the reflectors being disposed at the same level as the ceiling surfacing to provide a continuous facing, a plurality of inverted U-shaped yokes having clamps receiving the beads in the tops of each wireway, the yokes extending down outside the reflectors, a framework supported by and interconnecting the yokes of adjacent rows and to which the ceiling surfacing is supportingly secured, and common suspension means arranged in rows in line with the center of the lighting apparatus for carrying the entire load of the lighting apparatus, the yokes, the frame and the ceiling surfacing.

18. A ceiling such as claimed in claim 17, wherein the suspension means include vertical rods whose lower ends are connected to the yokes.

19. A ceiling such as claimed in claim 17, wherein the suspension means include vertical rods whose lower ends carry clamping devices receiving the beads on the wireways.

20. Means whereby an extended area of ceiling surfacing material alone, or such an area of ceiling surfacing material with long, parallel rows of recessed, down-lighting fixtures including wiring channels and reflecting troughs, the troughs being of substantial width and interspersed in said area, or the ceiling surfacing material alone with gaps for such troughs, or similarly disposed similar lighting fixtures alone and in the absence of ceiling surfacing material may be suspended from above, comprising correspondingly spaced rows of pendent, downwardly opening fixture hangers supported at a common level, adapted to receive the wiring channels and trough from underneath and having both fixture securing devices whereby the channels and troughs may be detachably secured thereto for downward removal and lateral elements independent of the fixture securing devices for supporting the ceiling surfacing material at a level slightly below the lower ends of the lateral elements and extending between adjacent rows of hangers as well as underneath the hangers of a row in the absence of a trough receiving gap, the fixture securing devices being at a level substantially above that of the lower ends of the said lateral elements whereby the fixtures may be above the same, the hangers being substantially rigid in directions transverse of the rows so that transverse pressures are assumed by them and the gap widths are maintained at a predetermined value.

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