This invention relates to ceilings comprising a plurality of panels, usually of sheet metal, and having upwardly turned edge flanges whereby a number of the panels may be supported in edge-to-edge array as a false ceiling suspended from an overhead structure. The overhead structure may be the next higher floor of a building or the bottom chords of roof truss members or the like. Hitherto such ceiling panels have invariably been suspended from the overhead structure by way of bearers in the form of rigid pipes, angles or other continuous bearer members.

In prior suspension arrangements of the kind referred to considerable difficulty occurs in ensuring that the panels are uniformly spaced and otherwise properly positioned, such difficulty arising from the near impossibility of keeping the continuous bearers perfectly straight and also due to the fact that in such ceiling panel arrays each individual panel is supported only by the flanges at opposite sides or ends thereof, and these flanges, being made of relatively thin sheet metal are readily capable of bending about the fold lines whereby the supporting flanges rectangularly join the main plate or facial portion of the panel. The major disability where the bearers are not straight, or the panel support flanges have become deflected as indicated above, is manifested by the lines between the panels being non-straight or of varying width thus spoiling the uniform appearance of the panel array.

The object of this invention is to overcome the stated disability in a particularly simple manner by the provision of anchorage means whereby the flanges of the panels which are not used for suspending the panels are employed, and the endwise structural rigidity thereof taken advantage of, to secure uniform spacing of the panels. Such flanges not used for suspending a panel are referred to herein as "non-working" flanges as distinct from the other flanges ("working" flanges) whereby a panel is attached to the overhead support structure.

In an endeavour to secure the uniform spacing referred to above it has been proposed rigidly to hold the adjacent non-working flanges of neighbouring panels together means of fastenings such as bolts, being over punched tags or the like but these expedients, while effective in holding the panels securely together, are not completely satisfactory because they have to be effected after the panels have been erected, and because they destroy ready demountability of individual panels; also, they are ineffective in preventing bending of panel working flanges about their fold lines relative to the main or facial portions of the panels.

As indicated above, the present invention makes effective use of the endwise structural rigidity of the non-working flanges of the panels and this is done by establishing an anchorage between the non-working flanges and the overhead bearers whereby the flanges of adjacent panels are transformed into effective column-like elements providing lateral stability for the array as a whole, including the bearers, to such a degree that, if desired, the continuous bearers may be of a strip or ribbon-like form laterally highly flexible; that is, horizontally of the array and in the longitudinal direction of the non-working flanges.

Where laterally flexible bearers are employed (as is preferably the case) they are in the nature of flexible ribbons which are suspended "on edge." The ribbons may, of course, be given a cross-section formation as required, provided the lower edges are available for such a formation as described below. It is an important feature of the present invention that the lower edges of the ribbon-like bearer members are formed to constitute sockets into which beaded flanges on the ceiling panels may be inserted in a snap fitting manner and the panels thus securely retained thereby.

It is a further important feature of the present invention that the ceiling panels are themselves employed as the means for imparting lateral stability to the entire ceiling panel array.

The invention may be summarised as consisting in: mounting arrangements for ceiling panels of the kind consisting of a rectangular sheet having working flanges along two opposite edges and non-working flanges along its other edges; comprising, a plurality of bearers which are substantially inflexible in a vertical sense and adapted for overhead suspension, connective means whereby the panels may be secured to the bearers by their working flanges, and a plurality of anchorage hooks or members sidewardly offset from and fixedly joined to the bearers each able to engage a transverse surface of the mutually adjacent non-working flanges of two neighbouring panels to restrain relative movement of the non-working flanges in the direction of their length. (The term "rectangular" as used above is intended to include "square").

Two examples of the invention are illustrated in the drawings herewith.

Fig. 1 is a small scale perspective view of a preferred embodiment of the invention. It shows part of a ceiling array looked at from above.

Fig. 2 is a sectional end elevation, taken on line 2—2 in Fig. 1, but on a much larger scale and including part of an overhead suspension hanger not shown in Fig. 1.

Fig. 3 is a sectional side elevation taken on line 3—3 in Figs. 1 and 2.

Fig. 4 is a fragmentary perspective view of the bearer and hanger portion shown in Fig. 2.

Fig. 5 is a perspective fragment of a modified form of hanger.

Referring to Figs. 1 to 4, a ceiling array comprises a number of ceiling panels 6, 6A, 6B, 6C, 6D, each having working flanges 7 and non-working flanges 8. Each of the working flanges has contact lands 9, oblique intrusion faces 10 and support shoulders 11. Each of the non-working flanges has a contact land 12, and each, adjacent one or each end has a keeper slot 13. The keeper slots preferably have flared lead-ins 14 (see Fig. 2). All of the keeper slots are equally spaced from their adjacent working flanges. The non-working flanges may be different from the working flanges, as just indicated, if desired (for instance for manufacturing convenience) the non-working flanges may be given the same cross-sectional shape as the working flanges.

The bearers extend for the full length (or width) of an apartment to be ceiling. They are parallel to each other and they are spaced by the same distance as the overall length (or width) of a ceiling panel measured across its working flanges. Each bearer (in the arrangement illustrated by Figs. 1 to 4) is a ribbon 15 of relatively flexible sheet metal or the like. Such a ribbon when supported "on edge" is substantially inflexible in a vertical sense; that is to say, when the ribbon is carrying its normal load of ceiling panels there is no noticeable downward deflection of the ribbon. However, the rib-
bons are readily flexible in a lateral horizontal sense, and thus their spacing may readily accommodate itself to that of the ceiling panel working flanges by which the panels are supported thereon as referred to later herein. The ribbons 15 are furnished with means for the suspension thereof from any rigid overhead structure. These means may consist of hangers 16 which at their upper ends (not shown) are provided with conventional bolting flanges, lugs or the like, as well understood. The lower ends of the hangers are formed as bendable tongues 17 which may be entered into ribbon slots 18 and then bent upwardly to constitute suspension hooks.

The lower edge of each ribbon 15 is recessed, slotted or gapped thus to form the bottom edge margin of the bearer as a series of downwardly projecting tongues 19 and anchorages hooks or members 20. The tongues 19 alternatingly bear to left and right (as shown in Fig. 4) and each has a bulge 21 formed in it thus to provide seatings 22 upon which the working flange shoulders 11 may rest as shown in Fig. 2. It will be appreciated that at least three tongues such as 19 (two to one side of the ribbon and one to the other) will suffice to constitute a single socket able to receive and retain the two mutually adjacent working flanges of two neighbouring panels such as 6 and 6A, or 6B and 6C. The tongues 19 are, of course, sufficiently resilient to enable the working flanges to be thrust upwardly to home within the mentioned sockets in a snap-fitting manner.

The ribbons 15 may be made of relatively light gauge sheet metal with the tongues 19 and the hooks 20 preferably integral with the continuous body portion of the ribbon. Although the ribbon is laterally flexible it may, without loss of such flexibility, be longitudinally ribbed as indicated at 23, so as to strengthen it against torsional sagging between hanger supports. Similarly, the metal may be stiffened at points of high bending moment by the provision of pressed in beads, depressions, grooves or the like as indicated at 24 and 25.

The hooks 20 engage within the keeper slots 13 as a freely sliding but nevertheless fairly neat fit so as to give the required anchor effect. This would be achieved, insofar as preventing relative longitudinal movement between the non-working flanges is concerned, if the hooks 20 merely dipped into the keeper slots 13 to engage a surface on a non-working flange transverse to the longitudinal length thereof. For preference, however, the tongues 20 are themselves slotted as indicated at 26 so that the hooks and the non-working flanges mutually interpenetrate or interlock as shown in Fig. 3. This gives an interlocking effect which restrains the non-working flanges against any lateral movement relative to each other, while also ensuring that the panels as a whole are properly positioned relative to the bearer.

Although the flexible ribbon type of bearer, such as 15, is much to be preferred, it will be understood that the invention is applicable to other kinds of bearer. For example (see Fig. 5) a commonly used type of bearer is ordinary metal tubing such as 27. With tube bearers of this type it has been usual to provide panels having working and non-working flanges, in which the working flanges are furnished with spring clips or the like by which they may be attached directly to the tubes. To embody the present invention in the prior construction as just referred to, it is necessary to provide the panel non-working flanges with keeper slots such as those marked 13 in Figs. 2 and 3, and to affix to the tubular bearers anchorages hooks 28 which may be the same as those marked 28 in Figs. 1 to 4.

I claim:

1. A ceiling structure comprising a plurality of ceiling panels of the kind consisting of a rectangular sheet having working flanges along two opposite edges and non-working flanges along its other edges, a plurality of bearers which are substantially inflexible in a vertical sense and adapted for overhead suspension, connective means securing the panels to the bearers by their working flanges, and a plurality of anchorages members sidewardly offset from and fixedly joined to the bearers engaged by surfaces on the mutually adjacent non-working flanges of two neighbouring panels transverse to the longitudinal axis of the non-working flanges to restrain relative movement of the non-working flanges in the direction of their length.

2. An assembled ceiling structure comprising a plurality of ceiling panels of the kind consisting of a rectangular sheet having working flanges along two opposite edges and non-working flanges along its other edges, a plurality of bearers which are substantially inflexible in a vertical sense, flexible in a lateral sense and adapted for overhead suspension, connective means securing the panels to the bearers by their working flanges, and a plurality of anchorages members sidewardly offset from and fixedly joined to the bearers engaged by surfaces on the mutually adjacent non-working flanges of two neighbouring panels transverse to the longitudinal axis thereof to restrain relative movement of the non-working flanges in the direction of their length.

3. An assembled ceiling structure according to claim 2 wherein said connective means comprise a support shoulders on said working flanges and resilient tongues on said bearers having seatings upon which said shoulders may rest.

4. An assembled ceiling structure according to claim 3 wherein said bearers are sheet metal ribbons having said resilient tongues and said anchorage members integral therewith.

5. An assembled ceiling structure according to claim 3 wherein said anchorage members engage said non-working flanges by entering keeper slots formed therein.

6. An assembled ceiling structure according to claim 3 wherein said anchorage hooks engage said non-working flanges by entering keeper slots formed therein and wherein said anchorage members are slotted and mutually interlocked with said keeper slots.

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