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CEILING PANEL

The present invention relates to a box-shaped metal ceiling panel.

5 When the ceiling panels of the type described are installed on the ceiling by forming side joints between adjacent ceiling panels, three dimensional vision is enhanced and esthetic effect is improved. A ceiling panel with only side walls cannot be
10 securely joined to a suspension bar. As a consequence, conventional ceiling panels are provided with mounting flanges which are formed by bending the side walls inwardly so that the mounting flanges can be securely
15 attached to the suspension bar. The mounting flanges are joined to each other by welding so that deformations of the ceiling panels can be prevented. However, when the thickness of the mounting flanges is thin, it is extremely difficult to joint the flanges
by welding.

20 The present invention was made to solve the above and other problems encountered in the conventional ceiling panels.

 The present invention therefore provides a metal ceiling panel in which upright side walls are extended
25 from respective sides of a polygonal bottom plate; the upper portions of the upright side walls are bent inwardly in parallel with the bottom plate in such a



way that the bent portions form mounting flanges and the adjacent mounting flanges overlap each other at their ends; the portions of the upper mounting flanges overlying the lower mounting flanges are depressed downwardly to define respective end recesses; fastener means is disposed within each of these recesses; and the upper and lower mounting flanges are securely joined to each other by the fastener means.

One of the features of the present invention resides in that adjacent mounting flanges are joined to each other by fastener means such as screws, rivets or the like so that regardless of the thickness of the mounting flanges, they can be securely joined to each other. Another feature of the present invention resides in that the fastener means are disposed within the respective end recesses of the upper mounting flanges without any protruding portions so that when the ceiling panel in accordance with the present invention is attached to suspension bars, the mounting flanges can be brought into surface contact with the suspension bars or the joint members thereof, whereby stable and reliable joint between the ceiling panels and the suspension bars can be obtained easily and esthetic effect can be enhanced.

The above and other objects, effects, features and advantages of the present invention will become

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more apparent from the following description of preferred embodiments thereof taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a top view of a ceiling panel in accordance with the present invention;

FIG. 2 shows a development thereof in perspective view;

FIG. 3 is a sectional view, on an enlarged scale, taken along the line III-III of FIG. 1;

FIG. 4 shows a development of a modification of the ceiling panel shown in FIG. 1;

FIG. 5 is a top view of the modification of FIG. 4; and

FIG. 6 is a side view, partly in vertical section, of ceiling panels attached to a ceiling.

As shown in FIG. 1, a ceiling panel in accordance with the present invention comprises a rectangular bottom plate 1, upright side walls 4, 5, 10 and 11 extending upwardly from the four side edges of the bottom plate 1, and mounting flanges 6, 7, 12 and 13 bent inwardly at right angles from the upper edges of the upright side walls 4, 5, 10 and 11, respectively, and therefore is in the form of a shallow box. The ceiling panel is made of a light metal sheet such as an aluminum plate.

The ceiling panel is formed by bending a plate as shown in FIG. 2. The plate comprises the bottom

plate 1, elongated panel portions 4a, 5a, 10a and 11a which are integral with the bottom plate 1 and constitute the upright side walls 4, 5, 10 and 11, respectively, and elongated panel portions 6a, 7a, 12a and 13a which are integral with the elongated panel portions 4a, 5a, 10a and 11a and are extended outwardly thereof. The outward elongated panel portions 12a and 13a are slightly shorter than the inward elongated panel portions 10a and 11a while the outward elongated panel portions 6a and 7a are substantially equal in length to the inward elongated panel portions 4a and 5a.

Projections 14 of L-shape in cross section are struck out of the two ends of the outward elongated panel portion 12a as shown in FIG. 2 so that end recesses 16 are defined by the L-shaped projections 16. In like manner, L-shaped projections 15 are struck out of the two ends of the outward elongated panel portion 13a which is in opposed relationship with the outward elongated panel portion 12a, so that end recesses 17 are defined by the projections 15. The horizontal portions of the projections 14 and 15 are formed with small holes 30 and 31, respectively. The recesses 16 and 17 are formed at positions adjacent to the inner edges of the mounting flanges 12 and 13, respectively.

When the inward panel portions 4a, 5a, 10a and

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11a are bent upright with respect to the bottom plate 1, the upright side walls 4, 5, 10 and 11 are formed. When the outward panel portions 6a, 7a, 12a and 13a are bent inwardly at right angles with respect to the inward panel portions or upright side walls 4, 5, 10 and 11 in such a way that the surfaces of the projections 14 and 15 are brought into contact with the upper surfaces of the inward panel portions 6a and 7a, the fundamental shape of the ceiling panel in accordance with the present invention is obtained.

As described above, the surfaces of the projections 14 and 15; that is, the bottom walls of the recesses 16 and 17 are brought into contact with the upper surfaces of the mounting flanges 6 and 7 or the inward panel portions 6a and 7a. Therefore, the width of the inward panel portions 10a and 11a must be greater than the width of the inward portions 4a and 5a by the height of the projections 14 and 15.

When the fundamental shape of the panel ceiling in accordance with the present invention is obtained in the manner described above, the bottom walls of the end recesses 16 and 17 are in face-to-face contact with the upper surfaces of the mounting flanges 11 and 12. Fastener means or rivets 19 with a head 18 are inserted into the small holes 30 and 31 of the recesses 16 and 17 and passed through the mounting flanges 6 and 7 and the lower ends of the rivets 19



are formed into heads as indicated by 20 so that the mounting flanges 6 and 7 are securely joined to the adjoining mounting flanges 12 and 13. In this case, the heads 18 of the rivets 19 are disposed within the recesses 16 and 17 without protruding beyond the upper surfaces of the flanges 12 and 13. Thus the ceiling panel in accordance with the present invention is constructed.

It has been described that the mounting flanges 12 and 13 are disposed over the mounting flanges 6 and 7, but, as shown in FIGS. 4 and 5, projections 14 and 15 may be struck out of the mounting flanges 6 and 7 so that the flanges 6 and 7 are disposed over the flanges 12 and 13.

So far it has been described that the bottom plate 1 is rectangular in shape, but it is to be understood that it may be of any polygonal shape.

Next the mode of installation of the ceiling panel on a ceiling will be described with reference to FIG. 6. First the upper surfaces of the mounting flanges 12 and 13 of adjoining ceiling panels are abutted against the lower surfaces of horizontally extending flanges 24 of a suspension bar 23 suspended from a suspension-bar supporting beam 21 by means of a metal fixture 22. Then, U-shaped members 25 each having an upper limb 27 and a lower limb 26 are fitted in such a manner that the lower limbs 26 are disposed

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below the mounting flanges 12 and 13 and the upper limbs 27 over the flanges 24. Thereafter, wing bolts or screws 28 are so screwed through the upper limbs 27 that the leading ends of the wing bolts or screws 28 are forcibly pressed against the upper surfaces of the flanges 24 of the suspension bar 23, whereby the ceiling panels are fixed in place.

According to the present invention, the inwardly bent mounting flanges are joined with each other by fastener means as described above so that the structural strength of the ceiling panel can be enhanced. Furthermore, fastener means do not protrude beyond the upper surfaces of the upper mounting flanges so that the upper surface of the mounting flanges can be brought into surface contact with the lower surface of the suspension bars. As a result, the connection between the suspension bars and the ceiling panels can be stabilized and esthetic effect can be enhanced.



CLAIMS

1. A metal ceiling panel comprising: a polygonal bottom plate, upright side walls extending from respective sides of said polygonal bottom plate, mounting flanges extending inwardly at right angles with, and from the upper edges of the respective upright side walls in parallel with said polygonal bottom plate, one of the mounting flanges of the adjoining upright side walls lying at the end portion thereof over the other mounting flange, the end portion of said one mounting flange which overlaps or overlies the other mounting flange being provided with a recess depressed toward the bottom plate, the undersurface of the bottom wall of the recess being in face-to-face contact with the upper surface of the other mounting flange, and fastener means extending through the bottom wall of the recess and through said other mounting flange so that the one and the other mounting flanges are securely joined to each other, the head of said fastener means being within the depth of the recess so that it does not protrude beyond the upper surface of the one mounting flange.

2. The metal ceiling panel according to claim 1, wherein said recess is formed by striking out of the mounting flange.



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3. The metal ceiling panel according to claim 1 or 2, wherein the upright side wall of said one mounting flange is greater in height by the depth of said recess than the upright side wall of said other mounting flange.

4. The metal ceiling panel according to claim 1 or 2, wherein the length of said one mounting flange is smaller than that of the upright side wall to which said one mounting flange is connected.

5. The metal ceiling panel according to claim 1 or 2, wherein the recess is formed at a position adjacent to the inner edge of the mounting flange.

