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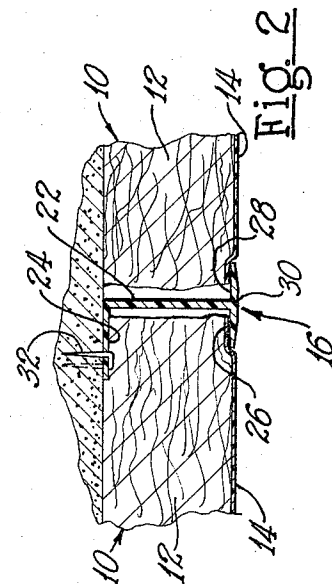
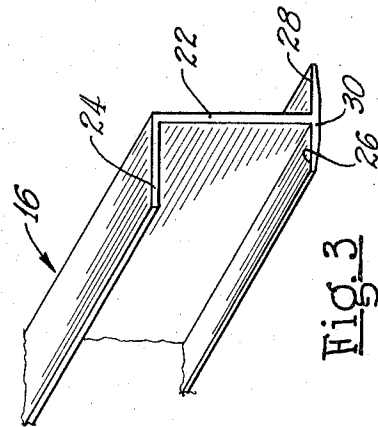
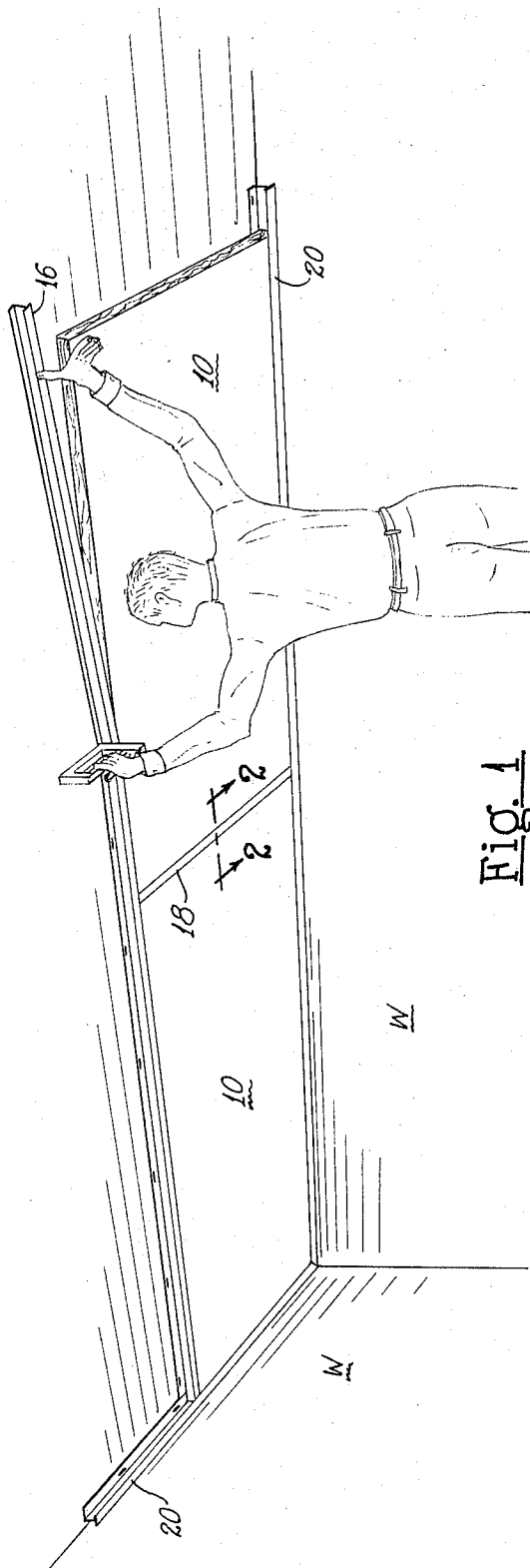
D. MacDONALD

3,313,076

SUSPENSION SYSTEM FOR CEILINGS

Filed Dec. 19, 1963

3 Sheets-Sheet 1



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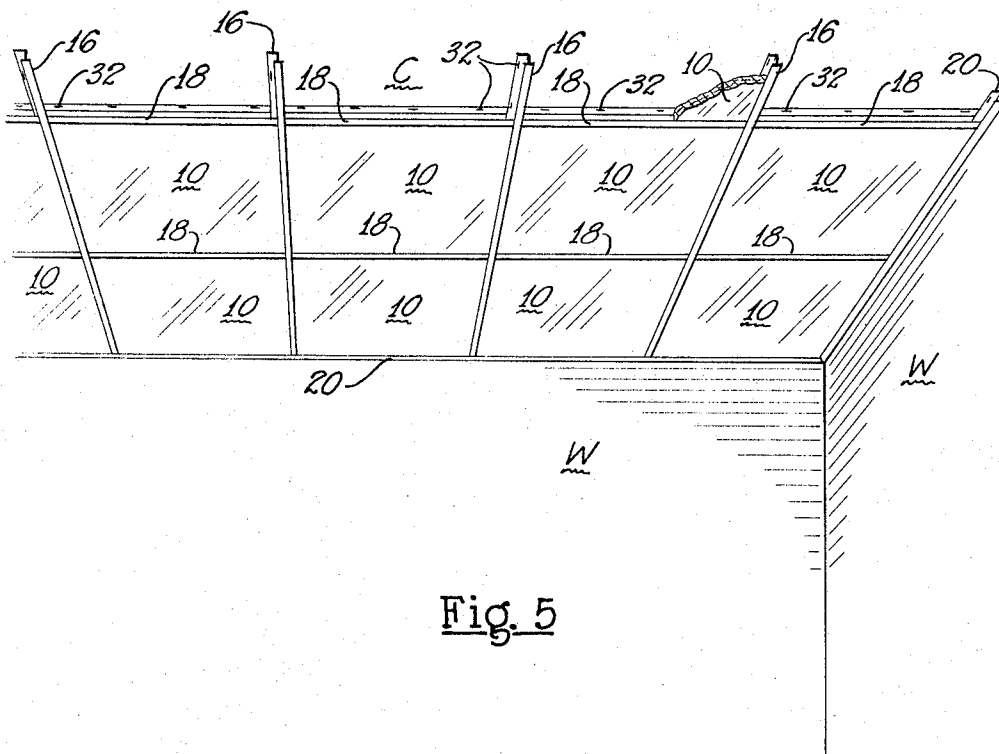
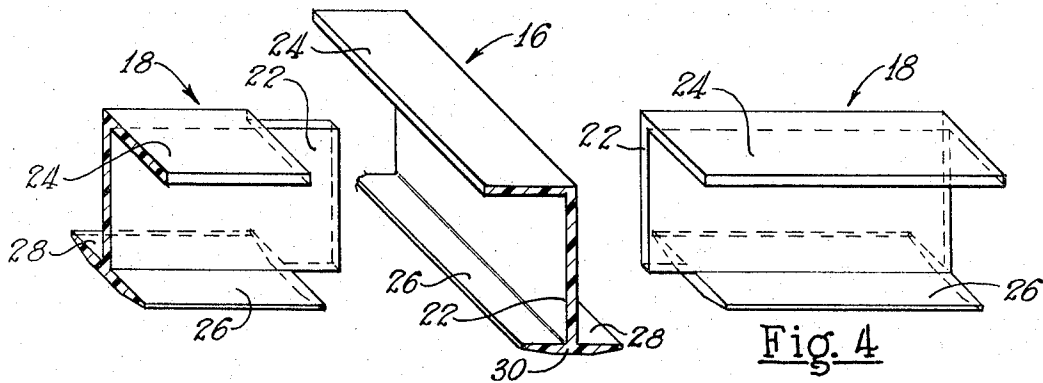
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3 Sheets-Sheet 2



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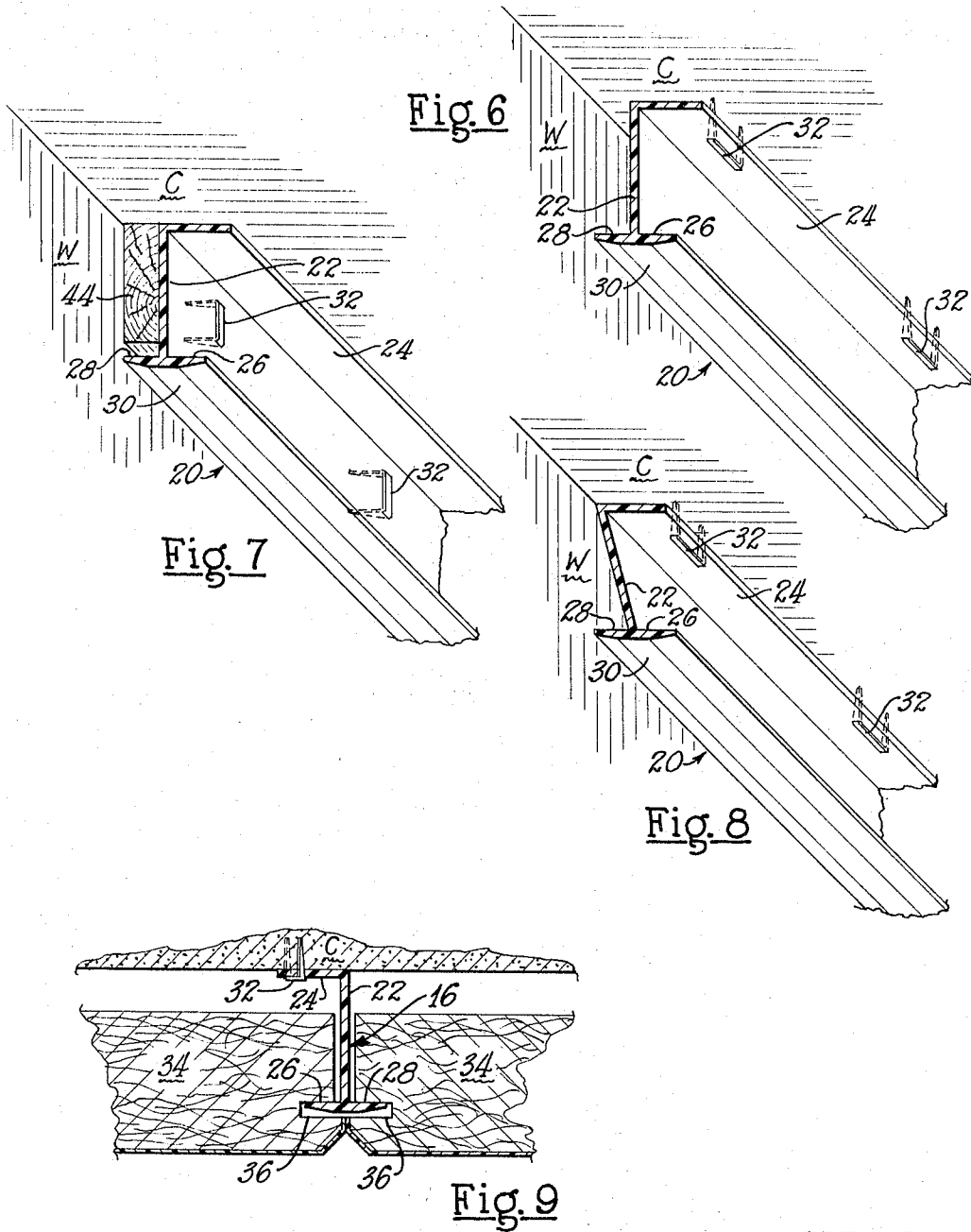
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SUSPENSION SYSTEM FOR CEILINGS

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3 Sheets-Sheet 3



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3,313,076

SUSPENSION SYSTEM FOR CEILINGS

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2 Claims. (Cl. 52-496)

The present invention relates to a suspension system for ceilings and more particularly to an improved supporting member for suspending ceiling panels or tiles.

Suspended ceiling structures have found extensive application in the construction of new structures as well as in the remodeling and renovating of existing structures. Ceiling structures of this type are employed for decorative as well as sound absorbing purposes. The suspended ceiling systems of the prior art have been typically of the type employing a grid network of interconnected runner-like support means having an inverted T-shaped cross sectional profile, the entire assembly thereof being suspended by wires or the like from an existing ceiling surface or the exposed joist members of a new ceiling. This type of ceiling structure necessitated cumbersome means for connecting the individual grid members to one another as well as for connecting the entire assembly to the existing ceiling surface or exposed joist members.

It has further been found that due to relatively rigid characteristics of the supporting structures of the prior art which are fabricated principally from metal stock, the removal and/or replacement of the associated ceiling panels or tiles has been difficult.

It is an object of the present invention to produce a ceiling suspension system for supporting panels or tiles wherein the assembly is fabricated from flexible, lightweight plastic material enabling the associated panels to be easily installed and later removed or replaced if desired.

Another object of the invention is to produce a supporting system for a ceiling consisting of a plurality of panels or sections which are supported by a grid network of cooperating supporting plastic strips.

Another object of the invention is to produce a supporting system for a suspended ceiling structure consisting of a plurality of panels or tiles wherein the system is easily and readily installed in a simple and efficient manner to the exposed surface of an existing ceiling or the exposed joist members of a new construction.

Other objects and advantages of the invention will become apparent from reading the following detailed description of an embodiment thereof in connection with the accompanying drawings, in which:

FIGURE 1 is a fragmentary perspective view of a ceiling structure being constructed with the supporting members fabricated in accordance with the teachings of the invention;

FIGURE 2 is an enlarged sectional view taken along line 2-2 of FIGURE 1;

FIGURE 3 is a fragmentary perspective view of a flexible plastic supporting strip of the invention;

FIGURE 4 is an enlarged exploded sectional view of a junction between an extended runner strip and a pair of cooperating cross pieces;

FIGURE 5 illustrates an alternate ceiling structure utilizing the same plastic supporting strips as employed in the embodiments of FIGURES 1 to 4, but smaller panels or tiles;

FIGURE 6 is an enlarged fragmentary view of a manner of attaching the plastic supporting strip at the peripheral portion of the ceiling;

FIGURE 7 is an enlarged fragmentary view similar to FIGURE 6 showing another manner of attaching the

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plastic supporting strip at the peripheral portion of the ceiling;

FIGURE 8 is an enlarged fragmentary view similar to FIGURES 6 and 7 showing still another manner of attaching the plastic supporting strip at the peripheral portion of the ceiling; and

FIGURE 9 is a sectional view of the supporting strip employed in cooperation with kerfed ceiling tile units.

Referring to FIGURES 1 to 4, inclusive, there is shown a typical ceiling structure employing the concepts and structure of the invention. The exposed ceiling C which is typically plaster or plasterboard is to be covered by a suspended ceiling formed of a plurality of panels 10. The panels 10 may satisfactorily be formed of glass fibers 12 coated with a thermosetting resinous material, such as phenol formaldehyde. A product which has been found to have excellent properties for this purpose is manufactured and sold by Owens-Corning Fiberglas Corporation of Toledo, Ohio, and is referred to commercially as "Sonocor." Among the advantages of utilizing a panel formed of glass fibers is that the resultant ceiling will be fire resistant and dimensionally stable. Also, the ceiling will afford excellent thermal insulation in addition to its exceptional acoustical properties. The size of the panels 10 may vary substantially, but in the arrangement illustrated in FIGURE 1 are approximately 2' x 4'. Since this type of ceiling structure is especially desirable for acoustical, sound deadening, or sound proofing purposes, the panels may advantageously be comprised of a fibrous material or other sound-absorbing material, such as perforated wallboard, perforated sheet having sound-absorbing mats thereabove, or the like. The lower surfaces of the fibrous panels 10 of the illustrated embodiment of the invention are covered with a thin plastic film or layer 14 which is adhesively secured thereto. The film 14 can be formed of a variety of different plastic materials such as vinyl, for example.

The panels 10 are supported along their peripheral marginal edges by a grid-like network of plastic suspension strips 16 and 18 arranged at substantially right angles to one another. Elongate strips 20, similar in configuration and profile to the strips 16 and 18, are secured to the ceiling C adjacent the upper edge of the vertical walls W. The profile of the strips 16, 18 and 20 consists of a central elongate web 22, an upper flange 24 extending substantially transversely in one direction from the upper marginal edge of the web, and a pair of lower flanges 26 and 28 extending in opposite directions from the lower marginal edge of the web. It has been found that by curving the lowermost surface 30 of the flanges 26 and 28, as illustrated in FIGURES 2 and 3, the overall decorative appearance of the finished ceiling structure will be materially improved. The plastic suspension strips 16, 18 and 20 may be typically formed of a suitable polyester resin and fabricated into strips by the conventional plastic extrusion processes.

As will be apparent from FIGURE 2, the spacing between the flanges 26 and 28 and cooperating upper flange 24 and the ceiling C, respectively, is typically less than the thickness of the associated panels 10. Therefore, the marginal edge portions must be slightly compressed during installation in order that the edge portions will be received and thereafter retained in a slightly compressed condition by the plastic supporting strips 16. It has been found that by compressing the marginal edge portions of the panels, the film 14 tends to conform to the configuration of the adjacent flanges 26 and 28 thereby decreasing the "shadow" effect typically inherent in suspended ceiling arrangements. Also, due to the fact that the film 14 conforms or molds itself to its respective flange, any inherent unevenness in the existing ceiling is adequately masked and results in a pleasing overall appearance.

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In certain instances the film 14 is stretched during its application to the fibrous core material and later, due to the memory of most plastic film materials, tends to return to its normal unstretched state causing the composite panel to warp. However, when the panels are installed in the manner hereinafter described, the warpage thereof will be corrected and eliminated.

The installation of the invention illustrated in FIGURE 1 is accomplished by first installing the plastic strips 20 in the region of the juncture of the side walls W and the ceiling C, thereby to provide initial support for two inner marginal edges of the panel 10. The strips are secured by stapling the flange 24 to the ceiling C. Next, the main strip 16 is fitted against the exposed surface of the first positioned panel 10 and the end of the supporting strip 16 abutting the strip 20 is stapled in place. The panel 10 is manually held by the operator with one hand while his other hand is used to force the strip 16 against the exposed edge of the panel 10. After the initial portion of the strip 16 is stapled, the next portion thereof is flexed against the exposed edge of the panel and is stapled to the ceiling and so forth until the entire exposed edge of the first panel 10 is covered. Then, a cross strip 18, which has been previously cut in accordance with the illustration in FIGURE 4, is fitted against the exposed edge surface of the panel 10 and is thereafter stapled to the ceiling C. The end of the cross strip 18 which is fitted against the strip 16 has a portion of the flange 26 removed as illustrated in the right hand cross strip 18 in FIGURE 4, while the other end of the cross strip 18 which fits against the ceiling strip 20 has a portion of the upper and the lower flanges 24 and 26 removed as illustrated in the left hand cross strip 18 in FIGURE 4. After the cross strip 18 is suitably secured in place, the next panel 10 is installed, and the strip 16 is flexed into a position against the exposed edge opposite the edge in contact with the strip 20. Then, it is stapled in place as mentioned above. The operational cycle is repeated until the entire area of the ceiling has been covered.

It will be apparent that due to the longitudinal flexibility of the strip 16, the installation of the ceiling is greatly facilitated and allows the strip to readily conform to any slight irregularities in the side edges of the panels 10. Thereby, the overall, appearance of the resultant ceiling structure will be greatly enhanced.

It will be understood that the strips 16 are stapled to the existing ceiling by staples 32 which are driven into and through the flange 24 by a stapling device, such as a staple gun. The stapling process is facilitated by the fact that the flange 24 is of such dimension that it extends outwardly a distance farther than its respective lower flange 26, so that the stapling gun can be moved along the strip and apply the staples at the desired spacings. If desired, the staples 32 may be driven on 9" to 12" intervals to satisfactorily secure the strips in place.

Another method of installing the ceiling panels is illustrated in FIGURE 5 wherein the panels 10 are shown as being square rather than rectangular. However, as will be apparent, the shape is not the important consideration and rectangular panels may likewise satisfactorily be employed. Initially, the plastic strips 20 are applied to the perimeter of the ceiling C, in the same manner described in connection with the description of FIGURE 1. The strips 20 are stapled to the ceiling in such a fashion that the flanges 24 and 26 extend away from the adjacent wall surface in a direction generally toward the center of the room in which the new ceiling is to be installed. The main strips 16 are then stapled on the desired centers which would be twenty-four inch centers in the case of twenty-four by twenty-four inches square.

After the main plastic suspension strips 16 are stapled in place, the first course of ceiling panels 10 is applied. If the dimension of the first course is of less width than twenty-four inches, for the example used, the panels must be cut with a cutting tool to conform to the desired size.

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It has been found that the panels 10 are most readily cut by placing them on a surface with the plastic layer uppermost and thereafter severing the panels by moving the cutting tool along a straight edge. Beginning with one side wall W, the first course of the panels is fitted between the adjacent main strips 16. Due to the relatively thin flexible characteristic of the strips 16, they can be manually flexed to permit the insertion of the panels 10 therebetween. When the panels 10 are properly inserted the strips 16 are permitted to return to the normal unflexed condition firmly engaging the panels 10 therebetween.

Next, the cross-strips 18 are applied against the exposed edge of the installed panels 10 in such fashion that the cooperating flanges 24 and 26 extend outwardly away from the associated panel. Before the cross-strips 18 are applied, the ends thereof must be trimmed to fit over the flanges of the main strips. With reference to FIGURE 4, it will be seen that one end of each cross-strip 18 must have the bottom portion adjacent one end trimmed to accommodate the lower flange 28 of the associated main strip 16. The other end of each cross-strip 18 must have both the upper and lower portions trimmed to fit between the spaced upper and lower flanges 24 and 26 respectively of the associated main strip 16.

The trimmed cross-strips 18 are then fitted tightly against the exposed edge of the panel 10 with the flanges 24 and 26 extending outwardly away from the exposed edge. When the cross-strips 18 fit tightly against the panels 10, the flange 24 is stapled in place. Upon completion of the first course of panels, the second course is accomplished in the same manner, and so on across the entire ceiling.

With reference to FIGURES 6, 7 and 8 there is shown various ways by which the supporting strips can be secured adjacent the reentrant angle made by the vertical side walls W and the ceiling C. With specific reference to FIGURE 6, there is shown a plastic ceiling strip 20 in which the flange 24 is secured directly to the surface of the ceiling C and the web portion 22 is spaced from the side wall W a distance determined by the length of the extending flange 28. It will be noted that in its installed position, the plastic supporting strip is such that the web extends substantially transversely or normal to the ceiling C.

In FIGURE 7 there is shown an embodiment of the invention in which a furring strip 44 or the like is nailed within the zone defined by the juncture of the vertical side wall W and the adjacent ceiling C and the plastic strip is stapled thereto. As illustrated, the staples 32 are driven through the web material 22 of the plastic strip directly into the furring strip 44.

The modification of the installation shown in FIGURE 9 is one in which the upper flange 24 is positioned to have its length extending immediately adjacent the angle or the juncture line between the vertical wall W and the ceiling C. In this installation the upper flange 24 is secured to the ceiling by means of the staples 32 as in the embodiment according to FIGURE 7. It will be noted that in this embodiment the web member 22 is angularly disposed with respect to the adjacent vertical wall. This angular disposition is caused by the camming effect of the lower outwardly extending flange 28 and is made possible due to the relative flexibility of the material which makes up the plastic strip.

As shown in FIGURE 10, the plastic supporting strips 16 may be employed in the production of a suspended ceiling structure comprised of a plurality of acoustical tiles or panels 34, each having a peripheral kerf 36. It will be understood that the main plastic supporting strips 16 are installed in the same fashion as described in connection with FIGURES 1 to 4, that is, by aligning them properly and stapling the upper flange 24 to the existing ceiling or exposed joist members by means of a series of staples 32. The oppositely extending flange members 26 and 28 are designed to fit within or into the kerf 36 which

is formed peripherally around each of the tile members 34. The panel is thereby supported in cooperation with the other associated plastic supporting cross-strips 18 and 20.

Although mention has been made throughout the foregoing description that the plastic supporting strips 16, 18 and 20 were applied to an existing ceiling such as plaster or plasterboard, it will be readily recognizable that the strips could likewise be satisfactorily secured to exposed joists of a new structure or an existing structure in which the previous ceiling material had been removed.

It has been mentioned that supporting strips may be formed of polyester resin plastic material; however, it will be clearly apparent that other plastic materials may also be satisfactorily employed such as other synthetic or natural organic materials. Of paramount importance is that the material used in the manufacture of the supporting strips must at some stage in its production be capable of being shaped or molded and at some subsequent stage assume a more or less rigid condition. The term "flexible" in reference to the supporting strips has been used to describe a physical characteristic which must be inherent in the strips in order for the objectives of the invention to be realized. More specifically, the term "flexible" when applied to the supporting strips means that the strips can be flexed or displaced from their normal alignment and will tend to return to their original configuration upon the removal of the displacing force. The necessity for this characteristic is particularly manifested in FIGURE 1 wherein the supporting strips are displaced longitudinally during installation of the ceiling tile and then readily return to their original straight alignment before being stapled in place. The necessity for such characteristic is also manifest in the supporting strip as employed in the ceiling arrangement illustrated in FIGURE 5 wherein certain of the strips are initially stapled in place and the central web portion must be flexed or displaced sidewise in order for the reception or removal of a ceiling tile element. Upon the release of the displacing force the central web portion will then tend to return to its original unflexed configuration.

What I claim is:

1. In a supporting system for ceilings comprised of a plurality of compressible fibrous sections, a grid-like network of plastic material strips, said strips having a flexible central elongate vertically extending web portion having an upper and lower marginal edge; an upper planar portion for engagement with a supporting surface and extending horizontally in one direction from the upper marginal edge of said web portion; and a lower shelf-like portion extending in opposite directions from the lower marginal edge of said web portion in a plane substantially parallel to the plane of said flange portion, said compressible fiber sections supported by said lower shelf-like portions, the

spacing between said upper planar flange and respective portion of said shelf-like member is less than the thickness of the fibrous sections whereby a marginal edge of the fibrous sections is compressed and tightly retained.

2. A ceiling system including a plurality of associated panels of compressible fibrous material aligned in side by side association within a grid-like network of strips for containing the marginal edges of said panels characterized in that each of said strips comprises a thin flexible central elongate web portion having a pair of spaced apart upper and lower edges, a pair of flanges integral and coextensive with said web portion and extending substantially transversely to said web portion in opposite directions from the lower edge thereof, and an integral flange coextensive with said web portion and extending substantially transversely in one direction from the upper edge of said web portion, said integral flange extending in a plane substantially parallel to the plane of said pair of oppositely extending flanges, said integral flange having two free edge portions thereof which extend outwardly away from said web portion a distance therefrom further than the corresponding free edge portions of the respective one of said pair of flanges, said pair of flanges and said integral flange being spaced apart a distance less than the thickness of the said associated panels, thereby the marginal edge portion of the panels is compressible, and said web portion being flexible laterally to permit the insertion and removal of the marginal edge portion of the said associated panels and said strip being flexible in a plane parallel to the plane of said flanges.

References Cited by the Examiner

UNITED STATES PATENTS

2,130,531	9/1938	Arand	52—485
2,242,558	5/1941	Venzie	52—496
2,291,220	7/1942	Germonprez	52—145
3,217,460	11/1965	Downing	52—495 X

FOREIGN PATENTS

1,114,960	1955	France.
1,123,293	1956	France.
1,233,078	1960	France.
1,272,448	1961	France.
1,323,677	1963	France.
907,585	1954	Germany.
530,146	1940	Great Britain.

OTHER REFERENCES

German printed application No. 1,001,798, Jan. 31, 1957.

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JOHN E. MURTAGH, *Examiner*.