Nov. 30, 1943. A. C. OLSEN 2,335,303

BUILDING STRUCTURE

Filed Dec. 5, 1941

Fig. 1.

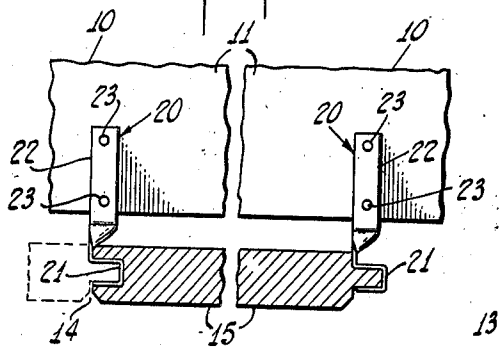


Fig. 2.

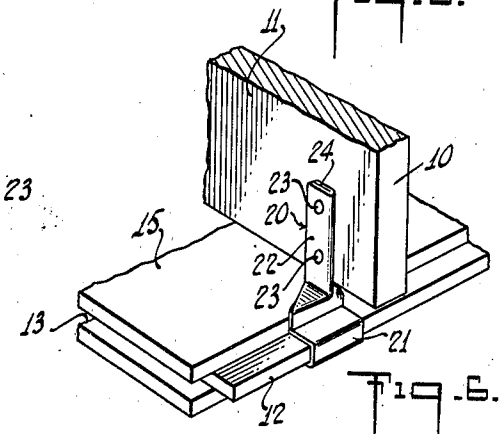


Fig. 3.

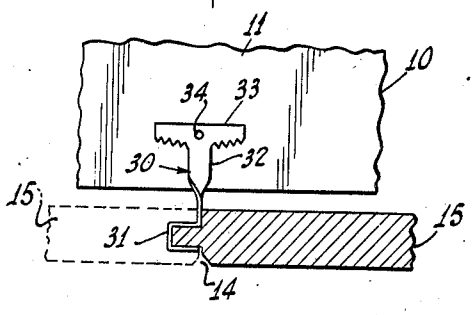


Fig. 6.

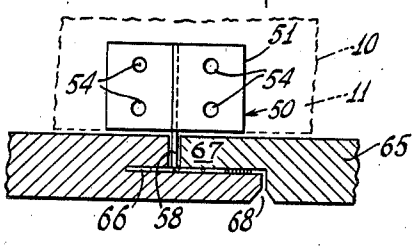


Fig. 7.

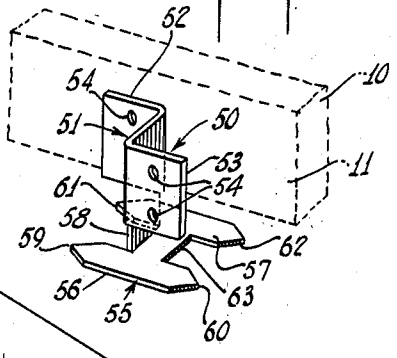


Fig. 4.

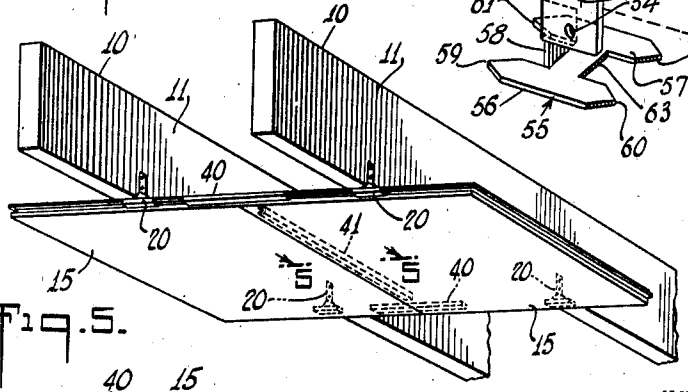
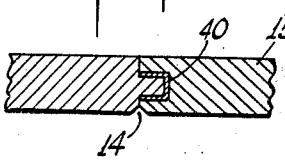


Fig. 5.



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BUILDING STRUCTURE

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5 Claims. (Cl. 72—118)

This invention relates to building structures and particularly to wall and ceiling constructions of the built-up panel type.

In the construction of buildings of all types, including homes as well as business and commercial structures, there is an increasing tendency to employ, as wall and ceiling coverings, assemblages of panels instead of plaster, stucco, and the like. Panels made of fiber insulating board are extensively used for that purpose. These panels generally include the types known in the trade as tile and plank. The designation "tile" is generally used to indicate relatively small size sections, including square sections, such as 12" x 12", 16" x 16", and rectangular sections such as 16" x 32" and 24" x 48". The designation "plank" is generally used to indicate relatively elongated rectangular panels which are usually furnished in lengths of 6' to 12' and in widths of 8" to 16". By the use of these panels, ornamental effects of variable character can be easily realized, and sound absorbing materials employed over specified areas. Panels made of gypsum or like materials may be similarly utilized, particularly where fireproofing is desired. In addition, savings are generally realized when a wall or ceiling covering of the panel type is employed, the cost of installation being reduced, in some cases to a substantial extent.

The present invention has for its purpose to provide an improved panel attachment means which is particularly suitable for use in the assembly of wall and ceiling coverings of the type in which the panels are formed with tongues and corresponding grooves, ship-laps, kerfs or other well-known mating formations on or in their opposite edges. When the tongue-and-groove type of panels are employed, this invention contemplates the provision of attachment elements embodying a panel-engaging portion which is adapted to be received within the groove formed in one edge of one panel and to extend around the tongue projecting from the edge of the adjacent panel. In the case of other panel edge formations, such as the ship-lap and/or kerfed types, the panel-engaging portion of the element is modified so as to cooperate with the mating portions at the edges of adjacent panels.

More particularly, it is an object of the invention to provide a novel attaching element adapted to secure panels directly to a supporting structure without requiring the use of intermediate furring and to maintain an assembly of panel coverings in a position relative to the supporting structure so that the exposed surfaces of the panels are retained in a common level plane, independent of any unevenness or limited dimensional variations of the supporting structure. This feature of the invention is obtained by reason of the fact that the attaching element is designed for attachment directly to a surface of the supporting structure which is in a plane substantially at right angles to the plane of the panel covering, thereby eliminating the requirement for the use of furring. Also, the construction of the attaching element is such that the retention of the panels in a common plane is not affected by relative movements of adjacent panels under the influence of moisture absorption or the like.

As will be apparent from the drawing and from the more detailed description herebelow, the attachment elements provided by my invention may be secured directly to a beam, joist or stud of the supporting structure at intervals therealong in order that each of the panels may be engaged by at least one attaching element along each of a pair of its opposite edges. It will also be apparent that the attachment elements do not interfere with the engagement of adjacent panels when interlocking or interfitting panel edges are employed and, when installed, are wholly invisible from the room side of the completed panel covering. Moreover, they are more easily applied in use, less expensive, lighter in weight, and smaller in bulk than most types of panel securing devices heretofore designed or suggested. They are particularly adapted for attaching panels to an overhead supporting structure, but may be advantageously employed with a vertically disposed supporting structure.

The invention likewise contemplates the use, with my novel panel attachment elements, of panel edge stiffening members in the event that panels with tongue-and-groove type edges are employed which do not have sufficient natural stiffness or rigidity to retain their shapes when suspended at widely spaced points, particularly those panels which have a tendency to sag over a period of time when attached to overhead supporting structures. The panel edge stiffening means are particularly advantageous when used along edges intersecting a joint between adjacent panels and in position to bridge such joint. Each stiffening member is in the form of an elongated channel-shaped element so dimensioned that it may be placed within the groove formed in an edge of one panel and receive the tongue formed on an edge of an adjacent panel, thus lying hidden from view after being inserted, but never-

theless serving greatly to stiffen the edges of both panels.

In adapting the invention to the erection of covering structures embodying panels of various materials, shapes and edge constructions, various minor changes may be made, as will be readily appreciated by one skilled in the art. In the accompanying drawing several forms of attachment devices and a form of stiffening member are illustrated.

In the drawing:

Fig. 1 is a broken line view in elevation showing the application of an attachment element of the present invention for attaching a panel covering to the supporting structure;

Fig. 2 is a perspective view of the attaching element shown in Fig. 1;

Fig. 3 is a view similar to Fig. 1 showing the application of a modified form of attachment element;

Fig. 4 is a perspective view of a panel covering assembly depicting the application of stiffening members in connection with attaching elements of the present invention;

Fig. 5 is a sectional view taken along lines 5—5 of Fig. 4 showing more clearly the association of the channel stiffening member with mating panel edges;

Fig. 6 is an elevational view, in section, illustrating the application of a modified form of attaching element to panels with ship-lap edges; and

Fig. 7 is a perspective view of the attaching element shown in Fig. 6.

Referring now to the drawing, a portion of a ceiling construction is shown, comprising a supporting structure and a covering of inter-engaged panels which are attached to the supporting structure by means of attachment elements of the present invention. As best shown in Fig. 4, the overhead supporting structure comprises horizontally spaced wood beams 10 having their broad faces 11 extending in substantially parallel vertical planes. The covering panels 15 may be in the form of fiber insulating board and may have a decorative finish for exposure within a room. These panels are cut in relatively short, square or rectangular, sections designated as tile, each having two adjoining edges provided with tongues 12 and the two opposite edges provided with mating grooves 13 for interlocking or interfitting engagement with the tongues of adjacent panels. Such tongue-and-groove interlocking relationship between adjacent panels 15 is indicated clearly in the drawing and the attaching means which I have provided comprises a plurality of devices, such as indicated at 20, for securing the panels to and suspending them from the overhead structure in a level horizontal plane.

As seen most clearly in Figs. 1 and 2, each such attaching device 20 comprises a panel-engaging portion 21 in the form of a channel and a relatively elongated shank 22, extending transversely of the channel in a plane at a right angle to the plane of the mouth of the channel. The shank 22 is provided with one or more perforations 23 for securing the attaching device to a vertical face 11 of a beam, by nailing or the like. The gauge of the comparatively stiff but bendable metal employed in the fabrication of the attachment element 20 is sufficiently thin to enable the channel portion 21 of this element to be positioned between the tongue 12 of one panel 15 and the groove 13 of the adjacent panel, the outer surfaces of the channel 21 closely fitting against the inner walls of the groove and the inner surfaces thereof closely engaging the outer surfaces of the tongue, as shown in Fig. 1. Although the channel 21 occupies some space, the panels 15 are usually fabricated of material which is compressible or deformable to a certain extent, and no difficulty will be encountered in inserting the tongue 12 of one panel into the groove 13 of the adjacent panel and maintaining the slidable inter-engagement therebetween, even when a plurality of securing devices have previously been applied either to the tongue of one or within the groove of the other. It is noteworthy that, with proper dimensioning of the channel portion according to the cross-sectional size and shape of the tongues and grooves formed on the edges of the panels, the attaching element is completely invisible through the V-shaped grooves 14 with which the exposed edges of the panels are usually provided. The blank from which the element 20 is formed is originally of substantially the same width from one end to the other, and the shank 22 is formed by doubling the metal longitudinally upon itself as indicated at 24 and then providing one or more openings 23 in this portion of the element for the nails or other fastening elements by which it is secured to a face 11 of the beam 10.

In Fig. 3 there is illustrated a modified form of attachment element for attaching tongue-and-groove mating panels to an overhead supporting structure in the manner described above. In this embodiment, the attachment element 30 comprises a channel portion 31 to fit within the groove of one panel and around the tongue of an adjacent inter-engaging panel edge, in a manner similar to the portion 21 of the form of attachment element previously described. The element 30 has a transversely extending portion or shank 32 bent or twisted adjacent the channel portion 31 until the head 33 of the shank lies in a plane at a right angle to the plane of the mouth of the channel portion. This permits the channel portion to be engaged with the tongues and grooves of the panels as described, while the head 33 may be secured to the face 11 of the beam 10 by a nail or screw, such as indicated at 34.

In the erection of a panel suspension system utilizing the attaching elements described above, a plurality of these elements are fastened successively to the faces of the beams 10 so that the lowermost surface of the channel portion of each element will lie in a common horizontal plane. Adjacent pairs of attaching elements fastened to each beam are spaced apart a distance equal to the corresponding dimension of a panel to be held by and suspended between the pair of elements. If the selected panel has a transverse dimension sufficient to span a number of adjacent beams, some economy in material and labor can be effected by eliminating the use of attachment elements at every alternate beam without depriving the assembly of the required support.

Each of the elements 20 of Figs. 1 and 2 is secured to the beams 10 with only one nail or other fastening means driven through the upper perforation of the extending portion 22. The element 30 of Fig. 3 has a centrally located nailing perforation 34 in the head portion 33. Thus, in either embodiment a swinging movement of the elements around the nails as a pivot is permitted, thereby enabling the panels to have sufficient clearance for positioning between a pair of the elements and engagement with the channel portions thereof. After the panels are thus en-

gaged, they will be retained in a common plane without being effected by the relative movements of adjacent panels under the influence of moisture absorption or the like. If desired, however, the attachment elements may be fixed against further pivotal movement by driving nails or other fastening means through additional perforations provided on the extending portions, such as the lower perforation shown on the extension **22** of the element **20**. Additional perforations may likewise be provided for this purpose adjacent either one or both opposed ends of the T-head **33** on the element **30**.

A covering structure comprising a large number of panels may be adequately secured in position by the attaching elements of the forms above described, but in the event that these panels are of soft texture or to be secured to beams spaced apart at considerable distances such as to be likely to sag, the retention of the panels in a common plane may be insured by means of stiffening elements such as channel members **40**. The channel members **40** are preferably of metal and of the same gauge as the channeled portions of the attachment elements, but are considerably longer. They may be applied at various locations and in Fig. 4 an opposing pair of them (one in dotted lines) is shown applied to the edges of the panels running at right angles to the beams and in a position to bridge and reinforce the joint between adjacent panels occurring intermediate the beams **10**. When so positioned, each elongated stiffening member **40** discourages sagging of the panels at points between the securing device and particularly at the joints between adjacent panels. Channel reinforcing members may also be employed along the edges of the panels which extend parallel to and intermediate the beams, and may be of sufficient length to extend substantially the entire distance along these edges, as shown in dotted lines at **41**. The channel reinforcing members may also serve to protect the relatively frangible panel edges from damage during shipment and storage by inserting the channels within the groove or applying them over the tongues of the panels at the factory prior to packing for storage or shipment.

The embodiment illustrated in Figs. 6 and 7 of the drawing may be employed with various types of panel edges, such as tongue-and-groove edges, straight butt-bevel edges or straight edges with intermediate horizontal kerfs or slits, or the ship-lap edge arrangement shown in Fig. 6. As shown, the attaching element **50** comprises a shank portion **51** which is Z-shaped in plan to provide oppositely extending off-set flanges **52** and **53**. Either one of these off-set flanges may be employed for securing the element to a face **11** of the beam **10**, by means of nails or other fastening elements which pass through the perforations **54**. The oppositely off-set flange serves as a reinforcing or stiffening member for the panels **65** when engaged with the panel-engaging portion **55** of the attaching element. The panel-engaging portion **55** comprises a pair of spaced wings **56** and **57** integrally connected with the shank by a connecting rib **58** and bent into a plane at right angles to the planes of the flanges **52, 53**. The wings **56, 57** extend on opposite sides of the connecting rib **58** and each of them terminates in pointed ends or prongs **59, 60** and **61, 62**. The pair of prongs **59—61** are adapted to be inserted into the kerf **66** or forced into the edge of one of the panels, as shown in Fig. 6, while the oppositely extending pair of prongs **60—62** together with the intermediate, integrally-connected plate **63**, form a supporting or bearing surface which is disposed beneath the overhanging ship-lap **67** of the adjacent interfitting panel. Thus, it will be apparent that when the interfitting ship-lap panels **65** are engaged with the attaching element **50**, the lower panel-engaging portion **55** of the attaching element will be disposed within the interfitting panel edges so as to be completely invisible through the V-shaped grooves **68** with which the exposed edges of the panels are usually provided.

The manner in which the Z-type attaching elements **50** are utilized in the erection of a panel covering system is the same as described in connection with the fasteners **20** and **30**. A plurality of these elements **50** are fastened successively to the vertical faces of beams so that the panel-engaging portion **55** of each element will lie in a common level plane. Adjacent edges of adjacent panels underlying the beam will be engaged by the wings of the panel-engaging portions in the manner previously described, thus insuring the retention of the entire panel covering in a common level plane.

It will be observed that in each of the embodiments described, the panels are attached to the supporting structure by fastening elements formed so as to make possible the nailing or other securement of the fastening elements to a face of the supporting member such as a beam **10** which is in a plane at right angles to the plane of the panel covering. Thus, my invention provides a panel attaching means that is economical and efficient in use, and one that will retain the panels composing the covering in a common level plane entirely independent of any unevenness or limited dimensional variations occurring in the supporting members. Moreover, the attachment elements of the present invention serve to fasten the panels to the supporting structure without the use of furring strips, thus eliminating the cost of the furring, since the fastening elements are fastened directly to faces **11** of the beams **10**. It will also be apparent that these attachment elements may be employed according to the invention in the erection of panel coverings for vertical walls, as well as ceilings, since the elements may be attached to the vertical studs of the wall supporting structure and the panels engaged with the elements in the same manner described above in connection with the beams or joists of the overhead supporting structure.

I claim:

1. An attachment element for use in securing a covering of decorative panels to beams, joists or studs, comprising a piece of relatively thin sheet metal formed to provide a holding portion to concealably engage mating panel edges inwardly of the outer exposed surfaces of the panels and an integral shank portion extending transversely to the holding portion in a plane at a right angle to the longitudinal axis of the holding portion, said shank portion being formed for securement to either of the faces of a beam, joist or stud which lie at right angles to the plane of the paneling and at any position in the transverse dimensions of said faces, whereby said attachment elements are adapted for securing the panels directly to the beams, joists or studs in a common level plane, independently of variations in the level of the beams, joists or studs without the use of furring intermediate said panels and the beams, joists or studs.

2. An attachment element for use in securing a covering of decorative panels to beams, joists or studs, said elements comprising a piece of relatively thin sheet metal formed to provide a channel portion adapted to cooperatively engage adjacent mating panel edges formed inwardly of the outer exposed panel surfaces, and an integral shank portion extending in a plane at a right angle to the plane of the mouth of the channel portion, said shank portion being formed for securement to either of the faces of the beams, joists or studs which lie at right angles to the plane of the paneling and at any position in the transverse dimension of said faces, whereby said attachment elements are adapted for securing the panels directly to the beams, joists or studs in a common level plane, independently of variations in the level of the beams, joists or studs without the use of furring intermediate the panels and the beams, joists or studs.

3. An attachment element for use in securing a covering of decorative panels to beams, joists or studs, said element comprising a channel portion formed for concealed complemental engagement with inter-fitting tongues and grooves of adjacent panels, and an integral shank portion extending transversely of the channel portion in a plane at a right angle to the plane of the mouth of the channel portion and adapted for securement in fixed position to either of the faces of the beam, joist or stud which lies at a right angle to the plane of the panels, said shank portion being of sufficient length to permit the same to be secured at any desired position transversely of said face.

4. An attachment element for use in securing a covering of tongue-and-groove type decorative panels to beams, joists or studs, said element having a concealable panel-holding portion comprising a channel of substantially rectangular transverse cross-section adapted to be received within the groove formed in one edge of one panel and to extend around the tongue projecting from the edge of the adjacent panel and having an integral shank portion extending transversely of the channel in a plane at a right angle to the plane of the mouth of the channel and adapted for securement in fixed position to either of the faces of the beam, joist or stud which lies at a right angle to the plane of the panels, said shank portion being of sufficient length to permit the same to be secured at any desired position transversely of said face.

5. An attachment element for use in securing a covering of panels to beams, joists or studs, said element comprising a substantially rectangular piece of relatively thin sheet metal bent at one end thereof to provide a channel portion and folded longitudinally at its other end to provide a shank portion lying in a plane at a right angle to the plane of the mouth of the channel portion.

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