

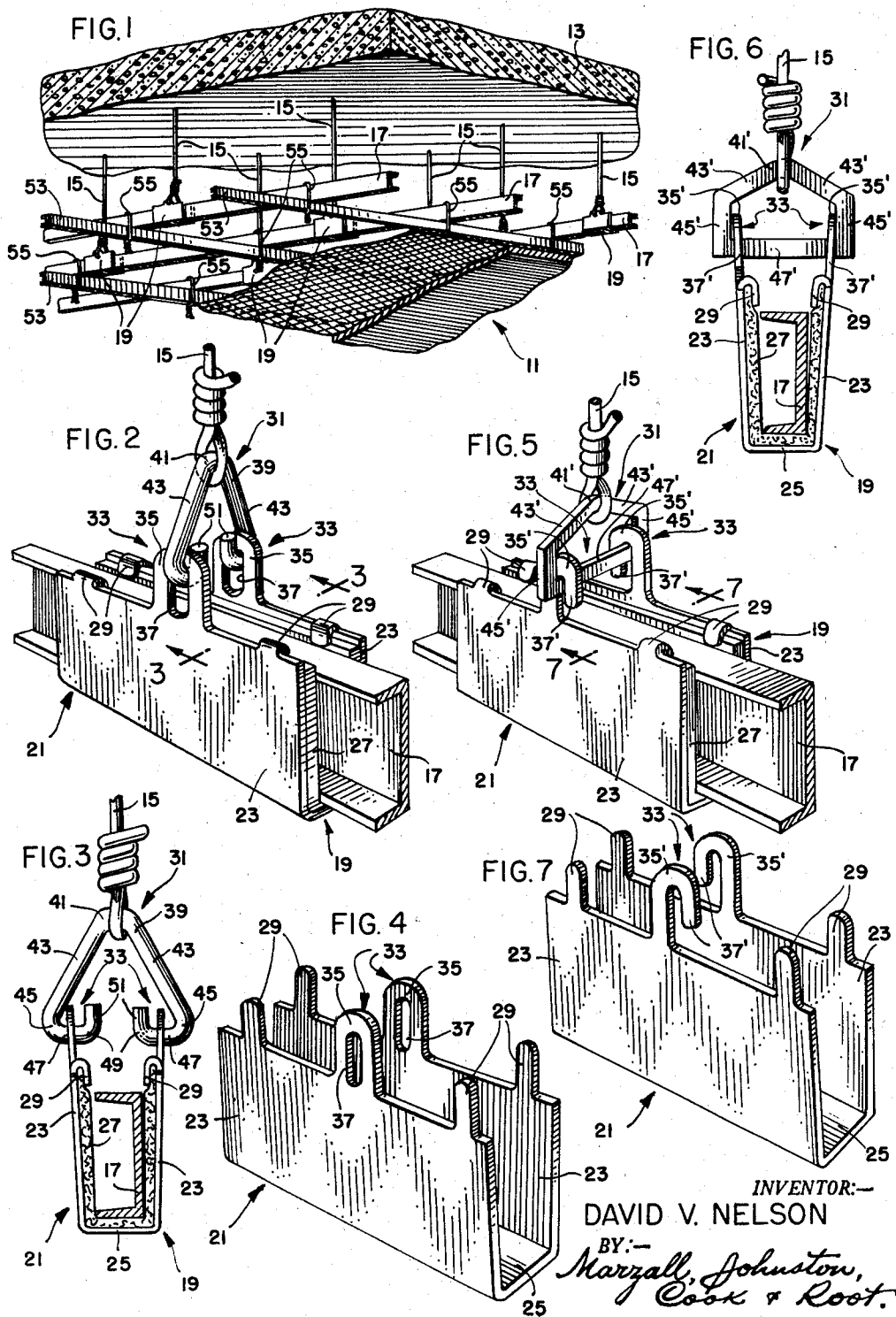
Oct. 20, 1959

D. V. NELSON

2,909,355

HANGER

Filed April 26, 1955



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2,909,355

HANGER

David V. Nelson, Evanston, Ill.

Application April 26, 1955, Serial No. 503,909

3 Claims. (Cl. 248—317)

The present invention relates in general to building construction and has more particular reference to sound and vibration proof means for supporting ceilings and other surfacing elements in manner suppressing sound transmission therethrough, the present invention relating to improvements in the structure disclosed in U.S. Letters Patent No. 2,124,311, which issued July 19, 1938, on the invention of David V. Nelson.

The desirability of sound suppressing support means for mounting ceilings and like structural elements becomes obvious when it is understood that ceilings, partitions, and like structural elements may function as enlarged sounding boards to magnify any vibration transferred thereto from the basic structure in which mounted. The provision of means for suppressing the transfer of sound creating vibrations between the basic structure and the suspended element is particularly useful in office buildings and other structures where quietness is especially desired and where the basic structure of the building is subjected to vibration.

An important object is to provide improved sound deadening support means for suspending ceilings and similar panel forming elements in building structures.

Another important object is to provide an improved acoustical mounting clip for suspending panel-like elements in building structures, the clip embodying means forming a resilient bed for receiving a supported portion of the suspended element, and comprising self-adjusting suspension means for rockingly hanging the clip in free floating fashion from a basic building structure in which the suspended element is mounted.

Another important object is to provide a mounting clip of simplified and inexpensive construction in combination with means for mounting the same in free floating, self-adjusting fashion, as on a suspension wire; a further object being to provide a suspension stirrup and means for rockingly hanging the mounting clip on the stirrup; a further object being to form the mounting clip for suspension on the stirrup in readily detachable fashion; a still further object being to form the clip with integral suspension ears adapted for detachable connection with a suspension stirrup.

Briefly stated, in accordance with one aspect of the invention, a ceiling comprising a plurality of spaced apart beams may be suspended in a building structure by means of preferably sheet metal clips forming beam receiving channels lined with a layer of resilient, sound deadening material, such as felt, forming a beam receiving bed in the clip, the clip being formed with integral ears permitting the same, after application in carrying position on a beam, to be rockably suspended in readily detachable fashion on a carrying stirrup, said stirrup being adapted for connection in a basic building structure, as on a suspension wire, in position to detachably receive the mounting clip.

The foregoing and numerous other important objects, advantages and inherent functions of the invention will be more fully understood from the following description,

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which, taken in connection with the accompanying drawings, discloses preferred embodiments of the invention.

Referring to the drawings:

Fig. 1 is a fragmentary perspective view of a ceiling suspended in a basic building structure;

Fig. 2 is a perspective view of parts of the structure shown in Fig. 1;

Fig. 3 is a sectional view taken substantially along the line 3—3 in Fig. 2;

Fig. 4 is a perspective view of an element of the structure shown in Figs. 2 and 3; and

Figs. 5, 6, and 7, respectively, are views corresponding with Figs. 2, 3, and 4 in order to illustrate a modified arrangement embodying the invention.

To illustrate the invention, the drawings show a ceiling structure 11 suspended from a basic support structure 13, such as the concrete frame of a building in which the ceiling structure is mounted. This frame may be formed with suspension wires or cables 15 imbedded therein and depending therefrom to form means for suspending the ceiling structure. In the illustrated embodiment, the ceiling structure comprises a plurality of beams 17, which preferably extend in substantially parallel, spaced apart relationship, said beams being suspended on the cables 15 by means of acoustical suspension units 19 embodying the present invention.

The units 19 each comprise a channel shaped clip 21, which may be formed of any preferred material, but which may be most conveniently produced as a sheet metal stamping by bending the opposite ends of a rectangular strip of material to form parallel, spaced apart and upstanding wall portions 23 interconnected by means of a joining wall 25 forming the bottom of the channel shaped clip. The unit 19 also comprises a layer 27 of felt or other suitable resilient acoustical material, said layer preferably comprising a strip of material formed to fit within and cover the inner walls of the channel shaped clip 21, which may be formed with preferably integral fingers or lugs 29 at the edges of the wall portions 23 in position to be folded inwardly upon the acoustical layer, after assembly thereof in the clip, in order to hold the same in place.

It will be noted that the units 19 are of exceedingly simple, inexpensive construction and are each adapted to receive a beam 17 within the channel shaped clip in position bedded upon the resilient acoustical material of the layer 27. Of course, any desired number of mounting units 19 may be utilized in supporting a beam which may be hung in a desired location merely by applying the required number of units 19 in mounted position upon the beam and by then attaching the same each upon a corresponding suspension cable 15. To facilitate the attachment of the units 19 in freely rockable fashion upon the suspension cables 15, a mounting stirrup 31 may be attached on each of the suspension cables and the spaced side walls 23 of the channel shaped clips 21 may be formed with preferably integral attachment ears 33 adapted for preferably rocking connection with a suspension stirrup 31, the attachment ears 33 being disposed at and extending upwardly of the edges of the side walls 23, which are remote from the bottom wall 25 of the clip.

As shown more particularly in Figs. 2, 3, and 4, the attachment ears 33 may comprise each a mere extension 35 of the wall portion 23 on which it is attached, said extension being formed therethrough with a preferably elongated perforation or slot 37. For use in conjunction with clips formed with such perforated extensions 35, the cooperating suspension stirrup 31 may comprise a length of wire 39 medially bent, as at 41, to provide an anchoring portion, about which a suspension cable 15 may be connectingly secured, as by merely twisting the

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same around the stirrup portion 41, and a pair of divergent arms 43 mutually inclined at a preferably acute angle, the terminal portions of the arms 43 being bent mutually inwardly, as at 45, to form clip supporting portions 47. The opposite end extremities of the wire 39 may be bent, as at 49, preferably upwardly, to provide terminal lugs 51, the length of which is preferably slightly less than that of the elongated perforations 37. Accordingly, a beam mounted clip 21 of the sort shown in Figs. 2, 3, and 4, may be readily attached upon a corresponding suspension stirrup merely by applying the attachment ears 33 in position to receive the terminal lugs 51 of the stirrup through the openings 37 of the clip, whereby to rockingly suspended the clip by its said ears 33 upon the clip supporting portions 47 of the stirrup.

As shown more particularly in Figs. 5, 6, and 7, the attachment ears 33 may comprise each a mounting hook 35' having a nose 37', the hook being preferably integrally connected upon a wall portion 23 of the clip 21 at the base of the hook. For use in conjunction with clips formed with hooks 35', the cooperating suspension stirrup 31 may comprise any suitable or preferred means forming a stirrup loop 39'. Such means, as shown in the embodiment illustrated in Figs. 5, 6, and 7, may conveniently comprise a sheet metal stamping formed with a portion 41' to provide an anchoring portion, about which a suspension cable 15 may be connectingly secured, as by merely twisting the same around the stirrup portion 41'. The stirrup may also embody a pair of divergent arms 43' terminating in spaced apart side members 45', said side members being integrally interconnected, as by means of a clip supporting bar portion 47'. Accordingly, a beam mounted clip of the sort shown in Figs. 5, 6, and 7, may be readily attached upon a corresponding suspension stirrup merely by applying the noses 37' of the hooks 35' over the clip suspension bar portion 47' of a stirrup. The clips 21, in that connection, may be formed with hooks 35', which both face toward the same end of the clip 21. If desired, however, the hooks on a clip may be formed in position facing opposite directions to thereby more surely secure the clip upon its cooperating suspension stirrup.

It will be seen from the foregoing that the suspension structures of the present invention provide for freely rocking connection of the stirrup means 31 on the suspension cables 15, as well as the readily attachable and detachable connection of the beam suspension units 19 each on its cooperating support stirrup, a stirrup being rockable on its suspension cable about an axis which extends in a direction substantially normal with respect to the axis about which the clip is rockingly mounted on the stirrup. The foregoing arrangement, accordingly, provides for the free floating and self-adjusting suspension of the beam carrying clips in fashion entirely eliminating any tendency of the clips to bind upon the suspended beams in fashion impairing the efficacy of the desired acoustical sound deadening or noise suppressing construction.

Of course, any other suitable or preferred kind of suspension element may be used in place of the cables 15, but a cable comprising flexible wire will not transfer as much vibration from the basic structure 13 to the ceiling structure 11 as will a more rigid suspension element. Consequently, flexible support elements are preferable over more rigid ones. Any vibration transferred through the suspension elements 15 to the clips 21 will be minimized by the free floating characteristics afforded by the rocking connections between the suspension elements 15 and the stirrups 31, and between the stirrups 31 and the clips 21. Any vibration that may be applied to the clips 21 will be largely, if not entirely, absorbed in the resilient layer of acoustical material 27 and will not be transferred to the ceiling 11 through the beams 17,

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The beams 17, accordingly, form a substantially vibrationless support on which the ceiling itself may be constructed. The ceiling itself may, of course, be of any preferred structural form and may comprise a plurality of spaced apart cross beams 53 anchored or otherwise suspended upon the beams 17 in any suitable or preferred fashion, as by means of tie elements 55, which, as shown in the illustrated embodiment, may comprise pieces of wire wrapped around the beams 17 and 53. The spaced apart beams 53, of course, provide an anchorage for the ceiling panel 57, which may be of any preferred material or structural character. As shown, the ceiling 57 may comprise a plaster receiving layer 59, such as expanded metal or other foraminous material, secured to the beams 53 in any convenient or preferred fashion, as by utilizing the ends of the tie wires 55 to fasten the plaster carrying layer 59 in place. Alternately, if the beams 53 are of wood or other nail receiving material, the layer 37 may be mounted, as by means of nail-like fasteners, or the layer may comprise wooden slats nailed in place upon the beams. The ceiling may be finished, as by applying a finishing layer 61 upon the base layer 59; and this finishing layer may be of plaster or any other suitable surfacing material, depending, of course, upon the nature of the underlying support layer; and it is entirely within the conception of the present invention to form the ceiling of boards nailed or otherwise attached directly upon the beams 53.

Surfacing structures embodying panels, such as ceilings, when mounted in the manner described, are substantially soundproof. Any vibration originating or initiated in the basic support structure 15 is excluded from reaching the ceiling structure 11, all vibration transmitted from the basic support structure being prevented from reaching the ceiling structure through the suspension stirrups 31 and the acoustical unit 19, especially at the resilient layer 27. The structure, however, has adequate strength to support the weight of the ceiling, and, if desired, a layer of sand may be spread upon the upper side of the ceiling 57 to increase its sound excluding properties. It is thought, also, that the convenience of assembly or installation afforded by the ready attachability and detachability of the clips 21 on the stirrups 31 will be clearly apparent.

It is thought that the invention and its numerous attendant advantages will be fully understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction, and arrangement of the several parts, without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the forms herein disclosed being preferred embodiments for the purpose of illustrating the invention.

The invention is hereby claimed as follows:

1. A hanger for mounting a beam in a building structure comprising a single piece of sheet metal formed to provide an elongated channel member having a bottom wall and integral spaced side walls forming a mounting clip, a vibration absorbing lining of resilient material disposed in said channel member for bedding a beam to be supported in the clip, each of said side walls, at the edge thereof remote from said bottom wall, being formed with an integral lug, adjacent each end thereof, and with an integral upstanding support ear disposed medially between said lugs, each of said lugs being bent inwardly upon its carrying wall to clampingly secure said lining thereto, and a stirrup element detachably connected with said ears, said stirrup being formed with spaced bearing portions, and said ears being formed with openings receiving and rockably engaging said bearing portions to support the mounting clip for rocking movement on the stirrup element about an axis extending transversely of said channel member and medially between its opposite ends.
2. A hanger for mounting a beam in a building struc-

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ture comprising a single piece of sheet metal formed to provide an elongated channel member having a bottom wall and integral spaced side walls forming a mounting clip, a vibration absorbing lining of resilient material disposed in said channel member for bedding a beam to be supported in the clip, each of said side walls, at the edge thereof remote from said bottom wall, being formed with an integral lug, adjacent each end thereof, and with an integral upstanding support ear disposed medially between said lugs, each of said lugs being bent inwardly upon its carrying wall to clampingly secure said lining thereto, said ears being formed each with a slot elongated in a direction normal to the bottom wall of said channel member, and a stirrup detachably connected with said ears and comprising a rod medially bent to provide outwardly inclined arms terminating in mutually inwardly bent ears forming spaced apart bearing portions extending in said slots, whereby to rockably mount the ears of the clip on said stirrup in detachable fashion.

3. A hanger for mounting a beam in a building structure comprising a single piece of sheet metal formed to provide an elongated channel member having a bottom wall and integral spaced side walls forming a mounting clip, a vibration absorbing lining of resilient material disposed in said channel member for bedding a beam to be supported in the clip, each of said side walls, at the edge thereof remote from said bottom wall, being formed with an integral lug, adjacent each end thereof, and with an integral upstanding support ear disposed medially between said lugs, each of said lugs being bent inwardly

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upon its carrying wall to clampingly secure said lining thereto, said ears forming hooks, one on each side of the clip, and a stirrup element forming a closed loop having mutually inclined arms defining a hanging portion and a suspension bar supported between the outer ends of the mutually inclined arms, said hooks, respectively, facing opposite ends of the channel member whereby the suspension bar of the stirrup may be applied in clip supporting position by inserting the same between said hooks and then turning the stirrup about an axis normal to the bottom wall of the channel member to connect spaced bearing portions of said bar each with a corresponding one of said hooks.

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