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2,841,255

ACOUSTICAL SYSTEM

Filed March 3, 1955

2 Sheets-Sheet 1

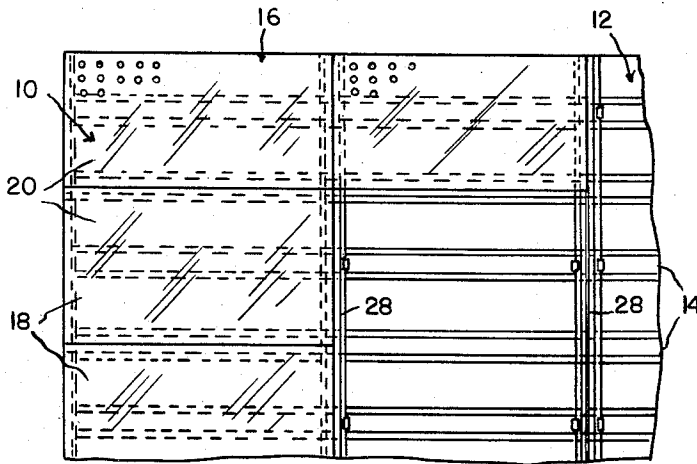


FIG. 1.

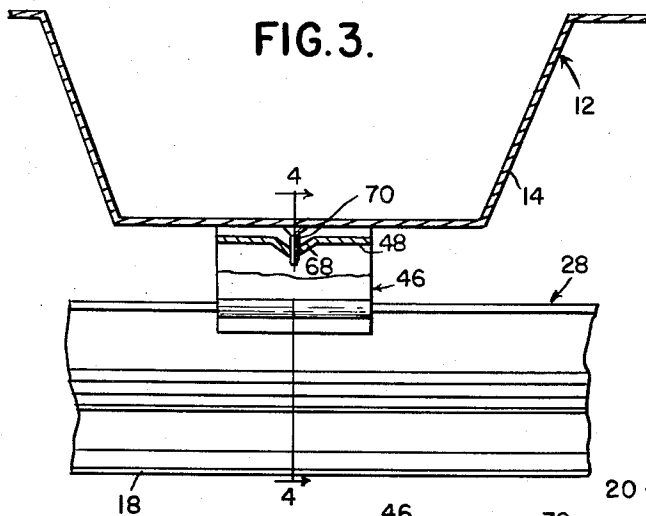


FIG. 3.

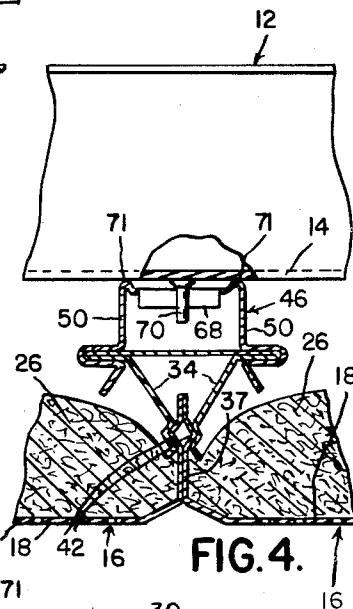


FIG. 4.

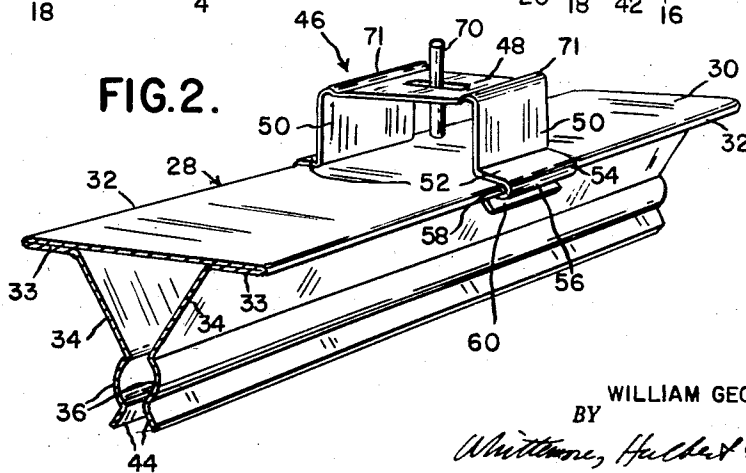


FIG. 2.

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FIG. 6.

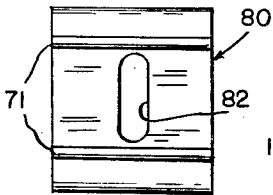


FIG. 7.

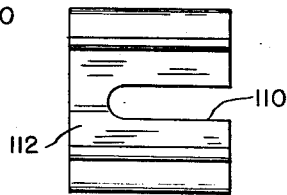


FIG. 8.

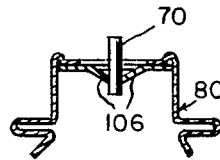


FIG. 9.

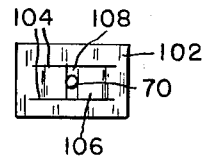


FIG. 10.

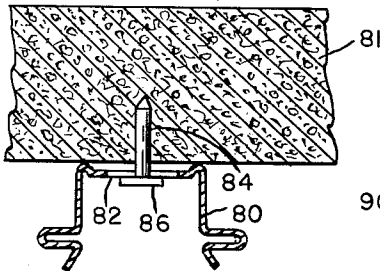


FIG. 11.

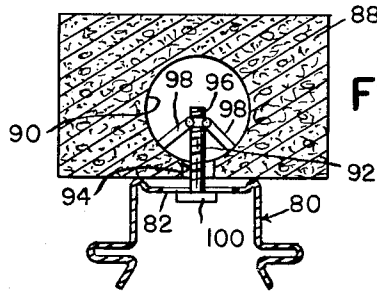
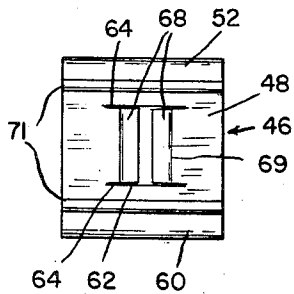


FIG. 5.



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2,841,255

ACOUSTICAL SYSTEM

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5 Claims. (Cl. 189—88)

This invention relates to acoustical systems.

In acoustical systems of the type which are made up of a plurality of individual sound absorbing units, installation has been a difficult and time consuming job. Accordingly, one object of the present invention is to provide an acoustical system made up of individual sound absorbing units having provision for quickly and easily mounting the units on a deck or the like.

In accordance with conventional practice, the individual sound absorbing units are each composed of a pan which supports the sound deadening material, and the pans are releasably secured to T-bars which are attached to the deck or ceiling at spaced intervals. The present invention is concerned, at least in part, with the problem of attaching the T-bars to the deck and in accordance with the present invention, snap clips are provided which are secured to the deck and which have portions readily and easily engageable with the T-bars enabling even the most inexperienced personnel to make the installation.

Another object of the invention is to provide a means for securely attaching the clips to the deck which is particularly characterized by the strength of the connection and the speed and ease with which the connection may be made.

Other objects of the invention will become apparent as the following description proceeds, especially when taken in conjunction with the accompanying drawings wherein:

Figure 1 is a bottom plan view of a deck or ceiling partially covered by a plurality of individual sound deadening units of my acoustical system, constructed in accordance with the present invention;

Figure 2 is a perspective view of the snap clip and T-bar in assembled relation;

Figure 3 is a sectional view illustrating the connection between the deck and the T-bars;

Figure 4 is a sectional view taken along the line 4—4 on Figure 3;

Figure 5 is a plan view of one of the snap clips employed in the present acoustical system and illustrated in Figures 2—4;

Figure 6 is a plan view of a snap clip having a modified construction;

Figure 7 is a plan view of a snap clip having another modified construction;

Figure 8 is a sectional view of the snap clip of Figure 6 shown in association with another element which cooperates with the clip;

Figure 9 is an elevational view of the element shown in Figure 8;

Figure 10 shows the clip of Figure 6 secured to a deck in a different manner; and

Figure 11 shows the clip of Figure 6 secured to a deck in still a different manner.

Referring now more particularly to the drawings and especially to Figure 1 thereof, the acoustical system there illustrated is generally designated by the numeral 10 and is shown in connection with a ceiling or deck 12. The deck in the present instance is formed of sheet metal hav-

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ing the parallel downwardly projecting ribs or corrugations 14. It will be appreciated, of course, that the deck or ceiling may take other forms and may, for example, consist of bar joists, wood joists, trusses, plaster ceiling, concrete slab, etc.

The acoustical system 10 is made up of a plurality of individual sound absorbing units 16 which are arranged in edge to edge relationship and are adapted to completely cover the underside of deck 12. In the Figure 1 illustration, only a portion of the acoustical system is shown installed in order to illustrate more clearly the deck and the manner in which the units 16 are attached to the deck. Each sound absorbing unit 16 comprises a pan 18, usually of metal, having a bottom wall 20 of generally rectangular configuration which may be formed with a multiplicity of perforations in accordance with conventional practice. Projecting upwardly from the four edges of the rectangular bottom wall 20 are side walls and end walls which cooperate with the bottom wall to define a space for receiving and enclosing a body of sound absorbing material 26. In the present instance, the sound absorbing material is in the form of a fiberglass blanket or pad although it will be appreciated that so far as the present invention is concerned, other materials may be employed to serve this function.

The means for attaching the individual units 16 of the acoustical system to the underside of the deck or ceiling 12 will now be described. The units are releasably connected to T-bars 28 which are secured to the underside of the deck in spaced relation extending transversely of the direction of length of the corrugations 14. The T-bars may, of course, extend parallel to the corrugations and then be secured to the corrugations. However, in this instance the distance between corrugations would have to correspond to the spacing of the T-bars which depends upon the dimensions of the units 16. The T-bars are each formed of a flat strip of web 30 having straight parallel longitudinal edges 32. Extending inwardly from edges 32 are the return bent portions 33 having legs 34 connecting into the inner ends of the return bent portions and extending away from the web in directions inclined towards each other. The legs 34 extend for the full length of the strip 30 and adjacent their lower ends are provided with laterally outwardly bowed portions 36 which define recesses.

It will be noted from Figures 2 and 4 of the drawing that the end walls 37 of each pan are formed with laterally inwardly shaped arcuate portions 42 generally conforming with the recesses 36. The lower extremities of the legs 34 beyond the arcuate portions 36 are provided with lips 44 flaring laterally outwardly to facilitate the insertion of the end walls 37 of pans 18 of adjacent sound absorbing units. It will be apparent that the end walls of two adjacent units are releasably clamped between the legs 34 of each T-bar and that these end walls may be readily inserted between the legs by merely applying an upward pressure sufficient to cam the legs outwardly so that the end walls may snap into releasable clamping relation with respect to the T-bars. The T-bars are preferably of resilient material such as a high grade steel, for example.

The T-bars are secured to the deck by means of the snap clips 46. These snap clips are secured to the corrugations 14 of the deck in a manner described more fully below and are adapted to releasably clamp the T-bars at spaced intervals along their length. Each snap clip is of generally channel-shaped configuration having a web 48 and legs 50 projecting from opposite side edges of the web at right angles to the plane of the web. The legs are formed at points spaced from the web with laterally outwardly extending portions 52 which are disposed in a common plane parallel to the web, and integrally

connecting into the laterally outer extremities of the portions 52 are the downwardly extending portions 54 return bent as indicated at 56 to define the opposed recesses 58. Lips 60 integrally connect into the inner extremities of return bent portions 56 and are flared outwardly to facilitate the ready insertion thereof into the opposite side edges 32 of the T-bars 28. The clips 46 are of a flexible resilient material, preferably steel, so that the legs will naturally return to the undeformed condition illustrated in the drawings to releasably hold the T-bars.

The web 48 of each clip is formed with an opening 62 and this opening is formed by cutting the web along the spaced parallel lines 64 and then cutting the web along a line extending between the lines 64 at right angles thereto. The opening 62 is then formed by bending the fingers 68 defined by the cut lines in the direction of the legs 50.

The clips are secured to the corrugations 14 of the deck by metal pins 70. The pins have one end secured to the corrugations by welding and project downwardly from the deck. The width of the opening 62 in the web of the snap clips is related to the diameter of the pins 70 in a manner such that the clips may be pressed over the pins to insert the latter into the openings 62 but preventing withdrawal of the clips from the pins due to the locking action afforded by the inclined fingers 68 defining the openings. The width of the openings 62, of course, is somewhat less than the diameter of the pins so that a degree of pressure is required to press the snap clips over the pins. In order to reduce the pressure thus required, the cut lines 64 extend somewhat beyond the bend 69 between the fingers 68 and the body of the web.

It will be noted that the opposite side edges of the web 48 of the snap clips are formed with raised shoulder portions 71 adapted to engage the deck and space the main body of the web away from the deck. This is done in order to insure that the clips are firmly seated against the deck without any tendency to rock. It also serves the purpose of spacing the main body of the web sufficiently from the deck to clear the weld joint between the pin and the deck.

The method of installing the acoustical system described above will be readily apparent. First of all, the pins are welded to certain corrugations 14 of the deck in spaced rows, the spacing between the rows being determined by the length of the acoustical units 16. Then a snap clip 46 is pressed over each pin and will, of course, be prevented from accidentally being withdrawn by reason of the locking action of the fingers 68. A T-bar is then pressed into clamping relation with the snap clips of each row of clips and this is readily accomplished by reason of the fact that the lower extremities of the legs of the clips have the flaring lips 60. Since the laterally outwardly extending portions 52 of the recesses 58 extend in a common plane parallel to the web, there will be no tendency for the T-bar to cam past these recesses. It may be necessary to adjust slightly the position of the snap clips on the pins 70 and if such adjustment is necessary, it may be easily accomplished by simply sliding the snap clip a small amount laterally relative to the pin. The fact that the openings 62 in the webs of the clips are elongated permits this adjustment.

Thereafter the individual sound absorbing units are readily snapped into position on the T-bars and the installation is complete.

Referring now to Figure 6, a snap clip is there illustrated having a modified construction. The clip shown in this figure is identified by the numeral 80 and is exactly like the clip 46 except for the opening in the web. Instead of having an opening formed by the fingers 68, as in the case of the clip 46, the clip 80 is provided with an elongated opening 82 formed in the web and extending between the shoulders 71.

In some instances it may be desirable to secure the snap clips to the deck by means other than the pin 70 previously described. Thus, for example, the clips may be attached to the deck by a headed element, in which case there is no need to provide a clip such as the clip 46 having the specially formed opening in the web. As seen in Figure 10, the snap clip 80 is secured to a deck 81 of concrete or wooden joists, for example, by a powder actuated pin 84. The pin is driven into the deck by suitable powder actuated means and has a head 86 of a diameter greater than the width of slot 82 to retain the clip fixed to the deck. The shank of the pin is, of course, inserted through the slot 82 before being driven into the deck.

The clip 80 may also be secured to a deck by means of butterfly type bolts. A concrete slab 88 is shown in Figure 11 having a cored out portion 90 into which the shank of a butterfly type bolt 92 extends. Openings 94 are provided into the cored out portion 90 at spaced intervals along the underside of the deck to receive the shank of the bolts. Threaded on the shank of each bolt is a sleeve 96 and pivoted to opposite sides of the sleeve are the arms 98. These arms are under spring tension normally urging the arms outwardly to the position shown in Figure 11. However, the pivotal connection between the arms and sleeve 96 enables the arms to be pressed against the sides of the shank to permit the shank and arms to be inserted into the cored out portion whereupon the arms will be free to swing outwardly and into engagement with the wall of the cored out portion. The bolt is then turned by means of the head on the shank to draw the bolt up into the cored out portion to thus clamp the clip 80 against the underside of the deck. The head 100 of the bolt is, of course, of a greater diameter than the width of slot 82 to retain the clip against the deck. It will be understood that this type of bolt may be employed in connection with other types of decks in which a free space exists above the deck to permit the arms 98 of the bolt to swing outwardly when the shank is inserted through an enlarged opening in the deck.

There also may be instances wherein it is desirable to use the clip 80 in connection with the pins 70. In such cases the plate 102 is employed in conjunction with the clip 80. The plate 102 has the longitudinally extending parallel cut lines 104, and the plate is also cut along a transverse line approximately midway between the opposite ends of the plate to define fingers 106 which are bent in one direction as illustrated to define an opening 108 to receive pin 70. The opening 108 is of slightly smaller width than the diameter of the pin so that the pin must be pressed into the opening with a degree of pressure. The cut lines 104 are seen to extend beyond the bend line between the fingers and the plate to minimize the amount of pressure thus required. The plate 102 is applied against the web of clip 80 within the channel so that the opening 108 registers with the slot 82 and it will be apparent that when a pin 70 is inserted through the slot 82 and opening 108 the fingers 106 will prevent the pin from being withdrawn.

While the pins 70 have been described as secured to a deck by welding, and while welding is far simpler and more advantageous than other means, it will be appreciated that other means may be employed for securing the pins to a deck.

Figure 7 illustrates still another form of clip. This clip has a slot 110 in the web 112 which is elongated as illustrated and opens through one side of the web. Otherwise the clip 112 is exactly like clip 46. The clip 112 may be employed in connection with the powder actuated pin 84 or the butterfly type bolt 92, if desired. The clip 112 may also utilize the plate 102 in which event, of course, the plate would be applied against the underside of the web within the channel of clip 112. In this manner the clip 112 can be used in connection with a deck having the pins 70.

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It is, of course, possible that the clips herein described could be attached to a deck by screws or nails. Thus, referring to Figure 10, in place of the pin 84, a self tapping screw or a nail could be employed.

What I claim as my invention is:

1. In a sound absorbing system for a deck or the like, a plurality of sound absorbing units, a plurality of bars supporting said units on said deck, means mounting said bars on said deck in spaced relation including generally channel-shaped clips of resilient material having their legs releasably engaged with said bars, and means securing said clips to said deck with the legs thereof projecting outwardly from said deck including pins secured to said deck and projecting therefrom in spaced relation, and elongated openings in the bases of said clips extending along a line from one leg thereof to the other receiving said pins, said openings being defined by the straight parallel free ends of fingers integral with said bases and extending within the channels toward each other from opposite sides of said openings at an inclination in a direction away from said bases, said fingers gripping said pins and permitting said pins to be inserted into said openings in said direction but preventing withdrawal of said pins in the opposite direction, and said clips being transversely shiftable on said pins lengthwise of said openings.

2. Means for mounting a plurality of furring strips in the form of elongated bars on a deck or the like comprising generally channel-shaped clips of resilient material having their legs releasably engageable with said bars, and means securing said clips to said deck with the legs thereof projecting outwardly from said deck including pins secured to said deck and projecting therefrom in spaced relation, and elongated openings in the bases of said clips extending along a line from one leg thereof to the other receiving said pins, said openings being defined by the straight parallel free ends of fingers integral with said bases and extending within the channels toward each other from opposite sides of said openings at an inclination in a direction away from said bases, said fingers gripping said pins and permitting said pins to be inserted into said openings in said direction but preventing withdrawal of said pins in the opposite

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direction, and said clips being transversely shiftable on said pins lengthwise of said openings.

3. Structure as in claim 2 in which said clips have shoulders projecting from said bases in a direction opposite said legs pressed firmly against said deck by the cooperation of said fingers and pins to stabilize said clips.

4. Structure as in claim 3 in which said shoulders are pressed firmly against said deck under a resilient tension by the cooperation of said fingers and pins to increase the holding action of said fingers.

5. Means for mounting a plurality of furring strips in the form of elongated bars on a deck or the like comprising generally channel-shaped clips having their legs releasably engageable with said bars, and means securing said clips to said deck with the legs thereof projecting outwardly from said deck including pins secured to said deck and projecting therefrom in spaced relation, elongated openings in the bases of said clips extending along a line from one leg thereof to the other receiving said pins, a pair of resilient fingers associated with the opening in the base of each clip extending within the channel toward each other at an inclination in a direction away from said base, said pins projecting through said openings and said fingers gripping said pins and permitting insertion of said pins into said openings in said direction but preventing withdrawal of said pins in the opposite direction, and said clips being transversely shiftable on said pins lengthwise of said openings.

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