Nov. 14, 1933. B. E. BALDUF 1,935,537

RESILIENT BUILDING STRUCTURE

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Fig-1

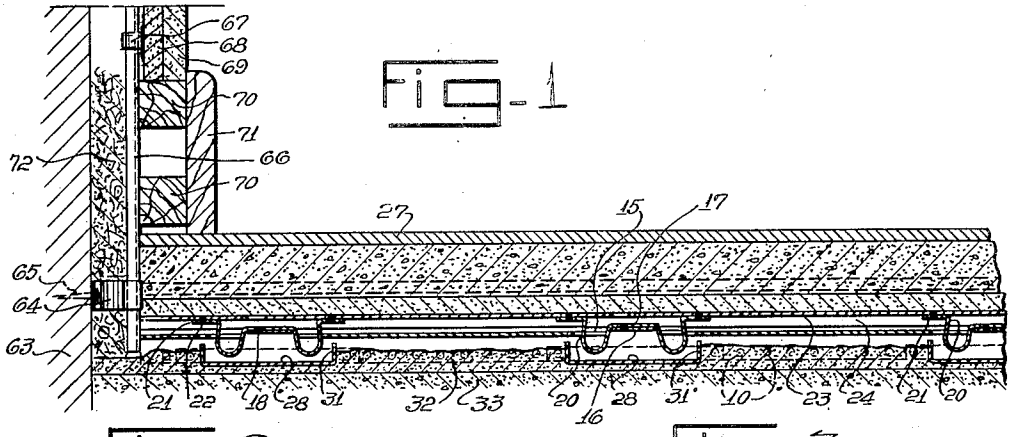

Fig-2

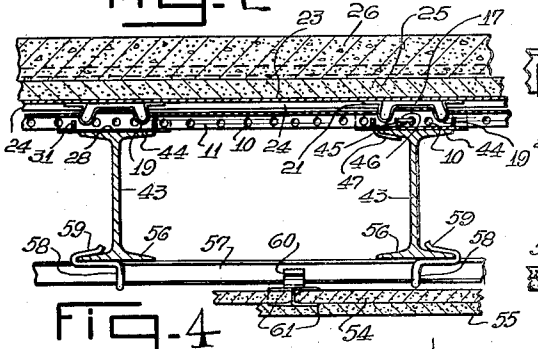

Fig-3

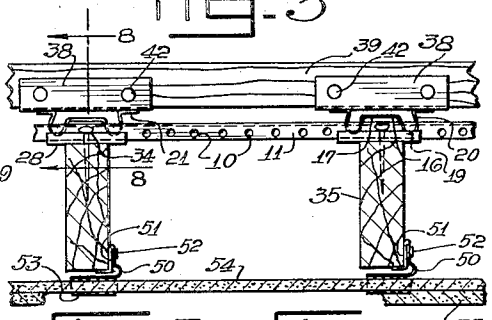

Fig-4

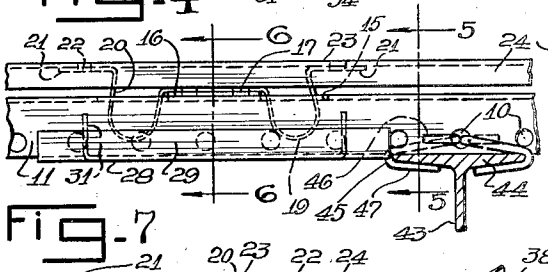

Fig-5

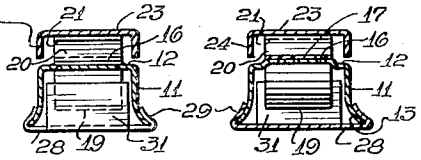

Fig-6

Fig-7

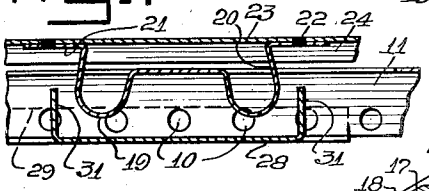

Fig-8

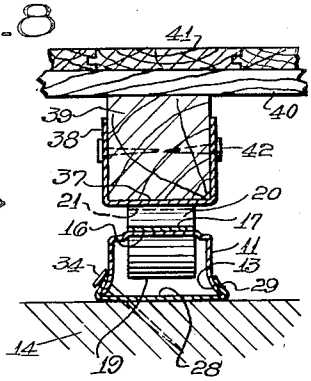

Fig-9

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RESILIENT BUILDING STRUCTURE

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Fig-10

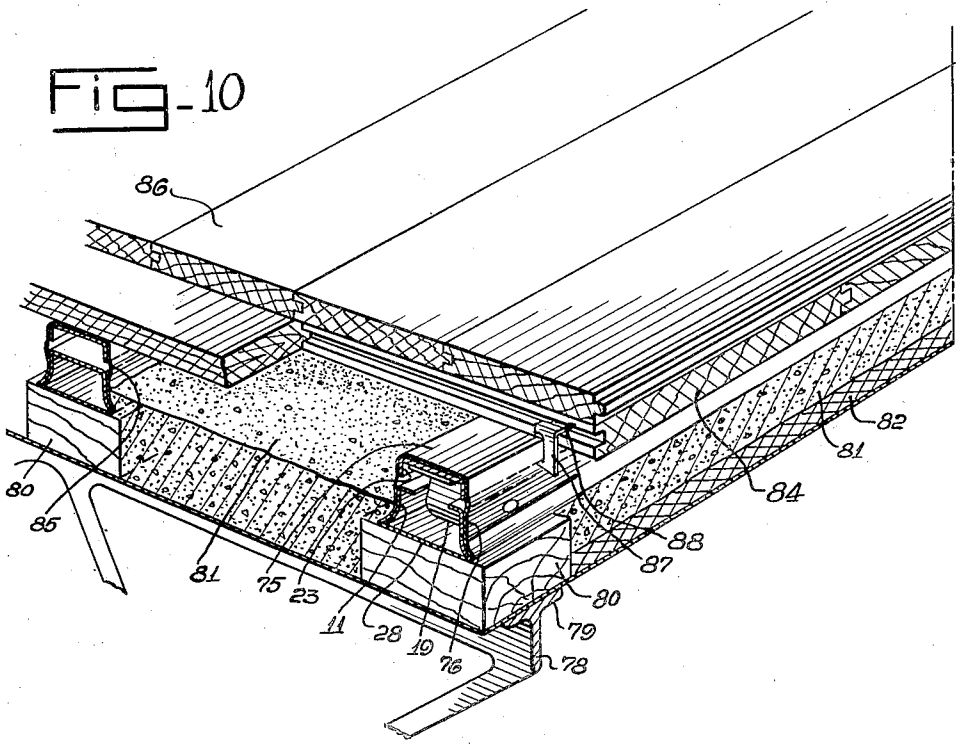


Fig-12

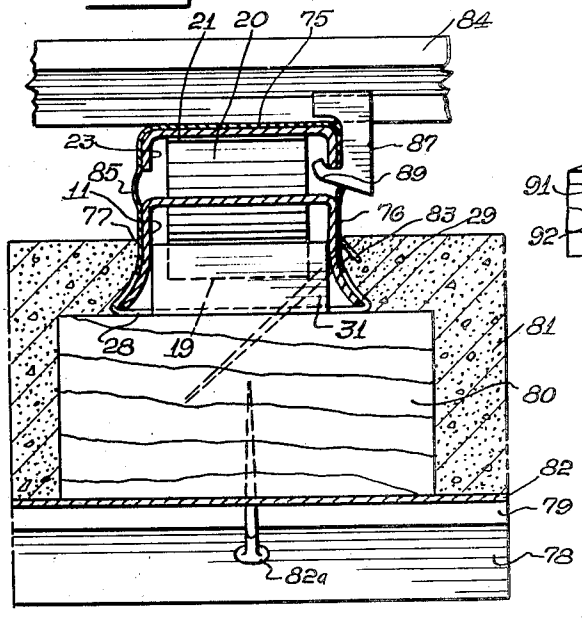
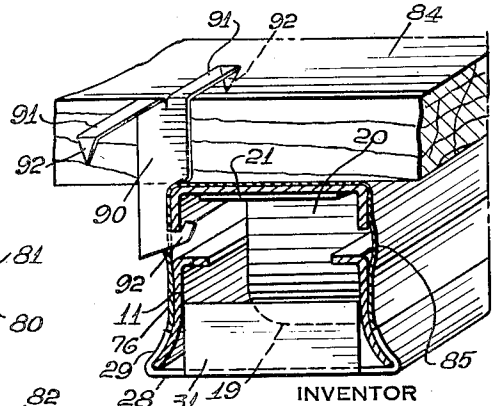


Fig-11



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UNITED STATES PATENT OFFICE

1,935,537

RESILIENT BUILDING STRUCTURE

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Application January 11, 1932. Serial No. 585,866

18 Claims. (Cl. 72—118)

This invention relates to building or other constructions, and has reference more specifically to building constructions in which the floors of the building are resiliently supported for the purpose of insulating against sound and vibration, and for other purposes.

In my Patent No. 1,778,412, I have disclosed a building construction in which the walls, floors and ceilings of a room are resiliently supported for the purpose of sound insulation. In the construction of the floor, the individual springs used are attached individually to a nailing strip and the shoes are grouted individually to the floor. The present invention deals more specifically with an improvement in which a continuous runner is provided with the spring clips so as to facilitate the erection of a building and lower the cost of labor required for the erection.

An object of this invention, therefore, is to provide continuous spring runners for supporting the floors of a building, which can be conveniently formed into shape largely through the use of automatic machinery and at a low cost of production.

Another object of the invention is to produce a building construction which is easily adapted to receive either a wooden floor, or a floor made of a poured, cementitious slab; also to improve building and other constructions in other respects hereinafter specified and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which

Fig. 1 is a fragmentary, sectional elevation through a building showing the floor and a portion of a wall,

Fig. 2 is a sectional elevation of a modified form of construction, in which the spring runners are supported directly upon steel beams,

Fig. 3 is a sectional elevation through another modification of the construction, in which the spring runner is arranged to receive a wooden nailing strip,

Fig. 4 is a large scale view of the spring runners shown in Fig. 2,

Fig. 5 is a transverse, sectional view through the spring runner, taken on line 5—5 of Fig. 4,

Fig. 6 is a transverse, sectional elevation through the spring runner, taken on line 6—6 of Fig. 4,

Fig. 7 is a sectional elevation through a modified form of the spring runner in which the springs are formed integrally with the runner,

Fig. 8 is a sectional elevation through a spring runner with a wooden nailing strip supporting a wooden floor, taken substantially on the line 8—8 of Fig. 3,

Fig. 9 is a perspective, sectional view of a spring runner for supporting a wooden nailing strip,

Fig. 10 is a perspective, sectional view of a form of floor construction employing a modified form of resilient runner imbedded in a cementitious slab,

Fig. 11 is a perspective, sectional elevation of the runner shown in Fig. 10 with a certain modified floor attaching clip, and

Fig. 12 is a sectional elevation on a large scale, showing the runner of Fig. 10.

In the construction of my improved spring runner, I provide a comparatively long strip of light sheet metal with a row of holes or perforations 10 along each longitudinal edge formed by a perforating die commonly used in the art. The perforated strip is then passed between forming rollers which form the strip into a channel having a pair of downwardly extending legs 11, connected by a web portion 12, the lower edges of the legs 11 containing the perforations 10 being arcuate in shape and flared outwardly to form sections 13 for resting upon a support 14. At suitable intervals, the web 12 is provided with a pair of openings 15 separated by a section 16 formed integrally with the web 12. A resilient spring clip as disclosed in my Patent No. 1,811,250, has a saddle section 17 resting upon the section 16 and preferably secured thereto by means of spot welds 18, rivets or the like. Downwardly extending resilient loops 19 are formed integrally with the saddle member 17 and extend into the openings 15, said loops also extending upwardly to form legs 20, and then outwardly to form flanges 21. The axes of said loops preferably extend substantially at right angles to the channel. Each of the flanges 21 is preferably provided with an opening 22 for receiving a rivet, or said flanges 21 may be secured by spot welding or the like to a channel strip having a web 23 and downwardly extending legs 24 along each edge of said web. Plasterboards 25 may be supported upon the channel webs 23, and a poured slab 26 of gypsum, concrete or other cementitious material may be supported by said plasterboards 25, the latter acting as a form. A finish floor surface 27 may be then applied on top of the slab 26, said floor surface being of asphalt mastic, linoleum, rubber tiles or other desired topping and wear-resistant surfaces. The spring clips are designed with sufficient strength to properly carry the loads required but with sufficient resiliency to be highly efficient for sound insulation. The spring clips may be formed in-

tegrally with the runner if desired, as shown in Fig. 7.

The channel flanges 11 are preferably prevented from spreading under the load of a floor, by means of a spreader plate 28 having flanges 29 formed along each edge thereof, said flanges extending upwardly and inwardly to fit over the arcuate sections 13, being preferably secured thereto by spot welds 30. The ends of spreader plate 28 are preferably bent upwardly to form flanges 31 extending on the outside of each of the resilient loops 19, said flanges and said plate 28 serving to prevent grouting material 32 from contacting with the resilient loops 19 and thus stop the vibration of the spring clips and reduce the sound insulating efficiency thereof. The grouting material 32 is preferably used when the runners are supported upon a reinforced concrete base 33, but when said runners are supported on a poured gypsum slab 14 or on other nail penetrable cementitious slabs, the runners are preferably secured to the base by means of nails 34 driven through the holes 10 into said base 14 in addition to the gypsum or other grout. If desired, the runners may be supported upon wooden joists 35 which may or may not be located under the spreader plate 28. If the joists 35 come directly under the spreader plate 28, the nails 34 may be driven through the light metal of the runner legs 11 above the flanges 29 and then through the light metal of the spreader plate 28. The spreader plate 28 may be omitted for certain uses if desired.

In mounting the runners on the concrete base 33, a line of the plastic and cementitious grouting material 32 is deposited on the floor and the runners are pressed into the grouting material more or less to secure a level floor. The holes 10 aid in bonding the runner to the grouting material, a trowel being run along the outside of the runners after setting to secure a smooth surface and aid in the bonding action of the grouting material.

If desired, instead of using the steel channels supported on the spring flanges 21, I may support channel clips having webs 37 secured to the flanges 21, and upwardly extending legs 38. A wooden nailing strip 39 may be then supported on the channel web 37 between the channel legs 38, and a rough floor 40 may be nailed to the nailing strips 39, a finish wooden floor 41 being secured to the rough floor 40. Nails 42 may be driven through suitable openings in the channel legs 38 into the nailing strips 39 to secure said nailing strips in place.

The spring runners may be supported upon steel beams 43 if desired, (Figs. 2 and 4) and these beams may be of any suitable structural shape including the type known as "bar joists". These beams are usually provided with upper flanges 44 upon which the spring runners rest. In order to secure the runners to the flanges 44, wire clips 45 may be provided with hooks 46 for engaging in the holes 10, the free ends 47 of said clips being bent around the flange 44, thus securing the spring runner to said flange. If a spreader plate 28 happens to be positioned above the joist, a hole is driven through one of the flanges 29 to register with a hole 10 for the reception of the hook 46. If desired, the hole in the flange 29 may be preformed in said flange so as to register with one of the holes 10.

In order to resiliently suspend a ceiling from the bottom of wooden joists 35, spring clips are provided with resilient loops 50 which are bent inwardly and then outwardly to form L-shaped sections 51 for embracing the edge of the joists 35. A nail 52 is then driven through a hole in the clip into the joist to secure said clip rigidly in place. A plate having outwardly extending, oppositely disposed fingers 53 is secured to the free end of the loop 50 for the reception of opposite edges of plasterboards 54. A plaster coating 55 is then applied to the lower face of the plasterboards 54 over the exposed fingers 53. In applying a resilient ceiling to lower flanges 56 formed on the steel joists 43, it is preferable to suspend grillage channels 57 to the flanges 56 by means of U-shaped wire clips 58 having hooks 59 which spring over one of the flanges 56 on the joist so as to secure said grillage channels 57 to the flange 56. Clips 60 are then snapped into place on the lower flange of grillage channels 57, said clips 60 being provided with outwardly extending, oppositely disposed fingers 61 forming channels for the reception of the abutting edges of plasterboards 54. The plaster coating 55 is then applied to the bottom face of the plasterboards 54 over the fingers 61.

It is thus seen that both the floor and the ceiling are resiliently supported so as to effectively prevent the passage of sound in either direction through the building construction. The floor is efficient in preventing the passage of impact sounds above in a downward direction to the room below and the resiliently hung ceiling prevents the passage of sounds from the room below upwardly through the building construction.

The walls of the building are also preferably resiliently supported and may be composed of a masonry wall 63 to which resilient spring clips 64 are attached by means of nails 65. Channel strips 66 are hooked into place on the ends of the clips 64, and clips 67 are used to connect a plasterboard 68 to the channel strip 66, after which a plaster coating 69 is applied to the outer face of the plasterboard 68. Nailing strips 70 may be used below the plasterboards 68, these strips 70 being secured to the channel strips 66 by wiring or otherwise, and a base board 71 is nailed to the strips 70 above the finished floor 27. A small amount of insulating material 72 such as a mixture of gypsum and fiber as described in my Patent No. 1,723,989 may be placed in the wall cavity to improve the sound insulating efficiency.

It is often desirable in new constructions to embed the resilient runner in a cementitious base rather than grouting or nailing the runner to the base after it has set to solid form. For such a construction as shown in Figs. 10 to 12, the runner is preferably provided with a protective covering 75 of paper, cloth, or other suitable membrane or material. This membrane 75 extends over the channel webs 23 and has downwardly extending flaps, 76 which are adhesively attached by adhesive 77 to the channel legs 11. For positioning the runners above beams 78 having upper flanges 79, spaced blocks 80 are interposed between the tops of said flanges 79 and the bottoms of the resilient runners. The blocks 80 may be of wood and are of a height such that the tops of the runners extend well above a cementitious slab 81 to be subsequently poured. A sheet of expanded metal 82 rests on top of the flanges 79 to support the slab 81 while in a plastic state and reinforce its lower surface after it has set. Instead of expanded metal, paper backed wire mesh, or plasterboard supporting a reinforcing mesh may be used. Nails 82a are driven into the

blocks 80 and bent around the flanges 79 to attach the blocks to said flanges. Nails 83 are used to attach the runners to the blocks 80. In pouring the slab 81, the paper cover 75 prevents the cementitious material from flowing into the space around the spring clip which, when set, would prevent their proper flexing and operation.

The slab 81, which is composed of gypsum, concrete, or the like, is allowed to set and a sub-floor 84 of wood, or other suitable material, is then laid on the runner webs 23. The paper 75 may be removed before laying the floor 84 if desired, by slitting along both sides with a knife, or the paper may be left in place. If the second procedure is followed, the weight of the floor 84 depresses the spring clips slightly thus forming a bulge 85 on each paper flap 76 which permits the springs to freely flex later when the floor is subjected to impacts. A finish floor 86 may be laid on the sub-floor 84 if deemed necessary. In order to connect the floor 84 with the runner channel legs 24, a clip 87 is formed of sheet metal and has a pointed flange 88 extending laterally of the clip 87 at an angle slightly greater than 90° so that it tends to draw the floor 84 tight against the web 23 as said flange is driven into the edge of each board forming said floor. If tongue and groove lumber is used, the tongue of one board engages with the groove of the adjoining board with the flange 88 locked in position between the two. However, this type of clip is equally suited for square edge boards. Each clip 87 is provided with a hook 89 which extends outwardly and upwardly to engage under one of the channel legs 24. In the form of clip 90 shown in Fig. 11, a pair of oppositely disposed flanges 91 are formed on said clip to engage the upper surface of the floor board 84, said flanges terminating in downwardly extending prongs 92 which can be driven into the board. A hook 92 is formed on the clip 90 to engage under one of the channel legs 24.

My resilient runners are also applicable under machinery of different kinds to isolate sound and vibration.

I would state in conclusion that while the illustrated examples constitute practical embodiments of my invention, I do not wish to limit myself precisely to these details, since manifestly, the same may be considerably varied without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a building construction, an elongated metallic channel strip having downwardly extending legs, said legs being connected by a web, said web being provided with spaced openings, spring clips have integral resilient loops extending into said openings, said clips being supported by said web, means for supporting said runner, and a structure supported by said spring clips.

2. A spring runner comprising an elongated metallic channel member, and integral spring clips supported at spaced intervals on said member, said spring clips being struck out from the metal of said member and having parts for connection to a structure.

3. A resilient runner comprising an elongated metallic channel having legs and a connecting web, said web having openings at intervals, spring clips supported by said web and having resilient loops extending into said openings, and outstanding sections formed on said spring clips for attachment to a structure.

4. A spring runner comprising a channel shaped metallic member having considerable length, said chanenl having a web and outwardly extending legs, said legs being provided with a series of holes adjacent the free edges thereof, a series of integral spring clips supported at intervals by said web, and means associated with a clip for attachment to a member to be supported.

5. In a building construction, an elongated metallic channel member, a plurality of spring clips supported at spaced intervals along said member, and a channel member secured to said spring clips for supporting a structure, said channel members being in spaced, substantially parallel relation.

6. A spring runner comprising an elongated metallic channel member having a web and outwardly extending legs, a spreader plate connecting the outer edges of said legs, and a plurality of spring clips supported at intervals along said channel member for connection to a structure.

7. A spring runner comprising a channel shaped, elongated, metallic member having a web and outwardly extending legs, said web having a series of openings, a spring clip supported by said web and having a resilient loop extending into an opening, a structure supported by said spring clips, a spreader plate connecting the free edges of said legs, and upwardly turned ends on said spreader plate adapted to partially enclose said resilient loop so as to prevent grouting material from contacting with said loop.

8. In a building construction, a cementitious base slab, an elongated spring runner of channel shape having downwardly extending legs supported by said slab, the lower edges of said legs being provided with a series of openings, grouting material securing said legs to said slab and extending into said openings, spring clips supported at spaced intervals by said runner, and a structure supported by said spring clips.

9. In a building construction, a plurality of metallic joists in spaced parallel relation, a spring runner extending transversely across said joists, said runner being substantially U-shaped in cross section and having downwardly extending legs supported by said joists, said legs being provided with a series of openings along the bottom edges thereof, a hook member extending into one of said openings and around a portion of said joist for attaching said runner to said joist, a plurality of spring clips supported by said runner, and a structure supported by said spring clips.

10. In a building construction, a plurality of joists in spaced, parallel relation, spring runners supported by said joists, springs clips supported by said runners at spaced intervals and attached to a floor structure, and a ceiling structure resiliently attached to the lower parts of said joists.

11. In a building construction, an elongated, metallic supporting member, a plurality of spring clips supported by said member, a channel supported by said clips, a plasterboard supported by said channel, and a poured, cementitious slab supported by said plasterboard.

12. In a runner for supporting building structures, an elongated channel member having a web and outstanding legs, said legs being provided with a series of openings along each of the free edges thereof, said web being provided with a series of openings in spaced relation, a plurality of spring clips supported by said web with resilient loops extending into said openings, an elongated supporting member attached to the free ends of

said spring clips, and a spreader plate connecting the legs of said runner.

13. In a building construction, a supporting beam, a resilient runner supported by said beam, spacing means between said runner and said beam, and a cementitious slab poured about said spacing means and a portion of said runner.

14. In a floor construction, a resilient runner comprising an upper, elongated, resiliently supported member, a floor member supported by said elongated member, and a clip having a hook engaging said elongated member and having a prong adapted to be driven into engagement with said floor member.

15. A building runner comprising an elongated metallic channel having legs and a connecting web, spring slips supported along said web in spaced relation, a supporting strip secured to said spring clips in spaced, parallel relation to said web, and a flexible membrane loosely enveloping said strip and a portion of said channel so as to prevent grout from stopping the vibration of said spring clips.

16. In a building unit, a pair of elongated spaced channel strips in spaced, parallel relation, said stips having legs extending outwardly from said strips in substantially the same direction, and resilient, flat spring clips yieldingly connecting said strips and arranged in spaced relation along said strips.

17. In a building construction, an elongated metallic channel having downwardly extending legs supported on a floor, a plurality of flat spring clips supported at spaced intervals along said channel, and a finish floor supported by said spring clips.

18. In a building unit, an elongated, metallic channel member, flat spring clips arranged at spaced intervals along said channel member, said clips having resilient loops, the axes of which extend at substantially right angles to said channel member, and means associated with said clips for supporting a floor structure.

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