United States Patent [19]

De George

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[45] **July 31, 1973**

[54] **SUSPENDED CEILING SYSTEM**

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[73] Assignee: **De George Ceilings, Inc.,** Buffalo, N.Y.

[22] Filed: **July 16, 1971**

[21] Appl. No.: **163,475**

Related U.S. Application Data

[63] Continuation of Ser. No. 873,249, Nov. 3, 1969, abandoned.

[52] **U.S. Cl.** **52/484,** 52/488, 52/645

[51] **Int. Cl.** **E04b 5/57**

[58] **Field of Search** 52/488, 483, 484, 52/485, 645, 348, 144

[56] **References Cited**

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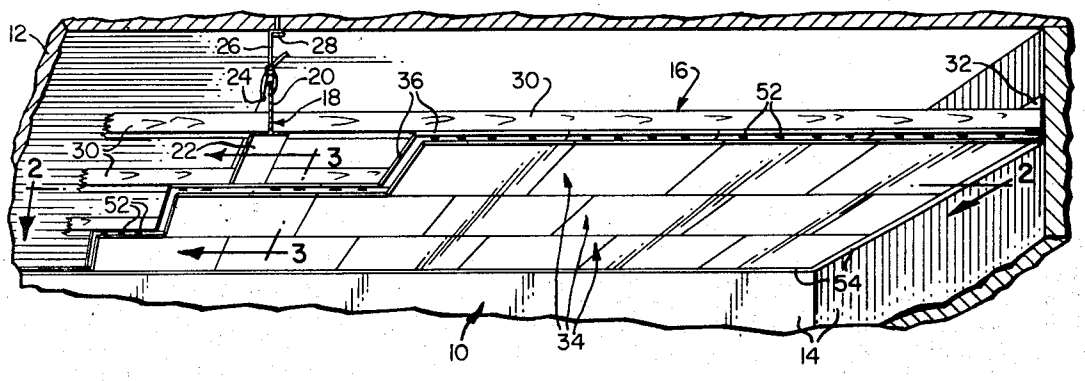
568,358	6/1958	Belgium	52/484

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[57] **ABSTRACT**

A suspended ceiling system adapted to cover the interior overhead ceiling and wall structure in a building and a method of installing the same include at least one first installed main longitudinal metal runner of inverted T-shaped cross section including an upper web suspended from the overhead structure at a selected level therebelow and a lower transverse flange projecting laterally from each side of the web. A next installed plurality of auxiliary wooden cross runners of rectangular cross section are arranged in parallel spaced relationship along both sides of the main runner with their inner ends supported by the flange in substantially abutting relationsip with each side of the web and their outer ends supported by either the flange of another main runner or an angle bar anchored to the adjacent wall so that the undersides of the cross runners are substantially flush with each other, and are either spaced or offset slightly above the underside of the main runner, or notched over the flange so that their undersides are substantially flush with the underside of the latter, or slotted to receive and extend toward each other under the flange of the main runner. A last installed plurality of decorative and/or acoustical panels are arranged beneath and cover the undersides of the cross runners and main runner, and a plurality of staples are driven through selected mating edge portions of the panels into the undersides of the cross runners. The cross runners on each side of the web of the main runner may be pivotally connected together intermediate their ends to an overlying longitudinal stringer to form a foldable and unfoldable group to facilitate storage, shipment and installation, and the panels preferably are of the interlocking tongue and groove type, wherein the staples piercing a female mating edge portion of one panel are covered by the later installed and interlocked male mating edge portion of an adjacent panel.

1 Claim, 6 Drawing Figures



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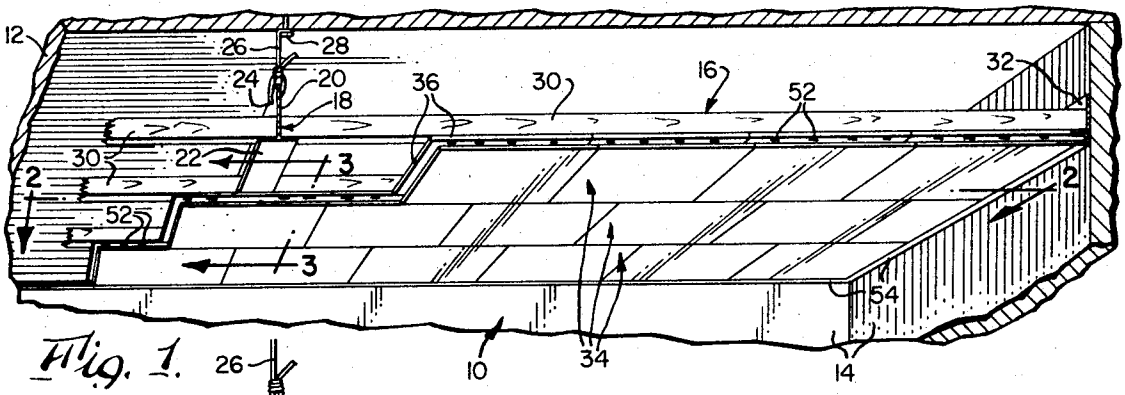


Fig. 1.

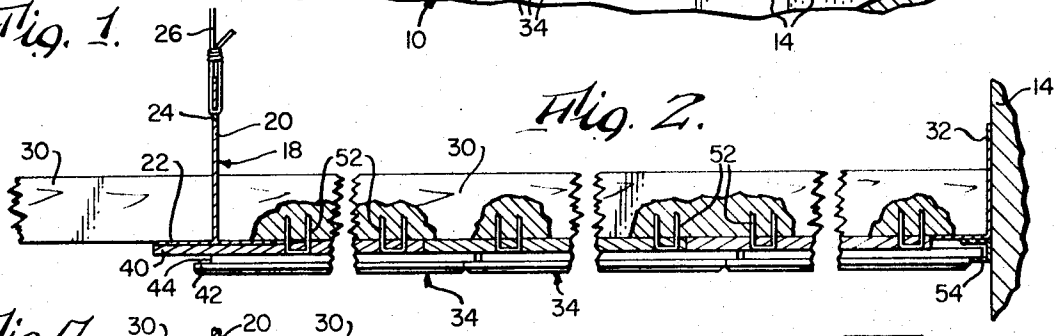


Fig. 2.

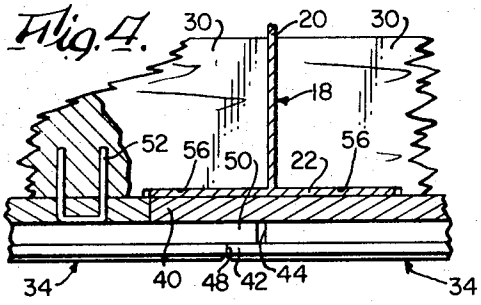


Fig. 4.

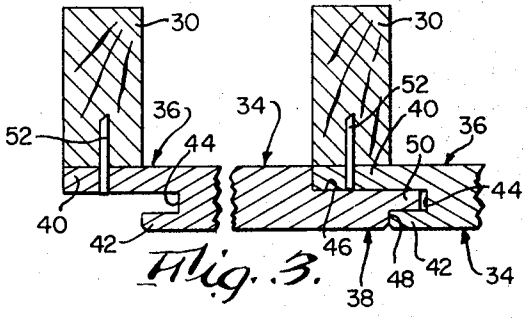


Fig. 3.

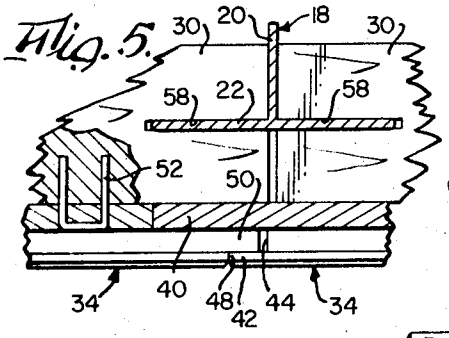


Fig. 5.

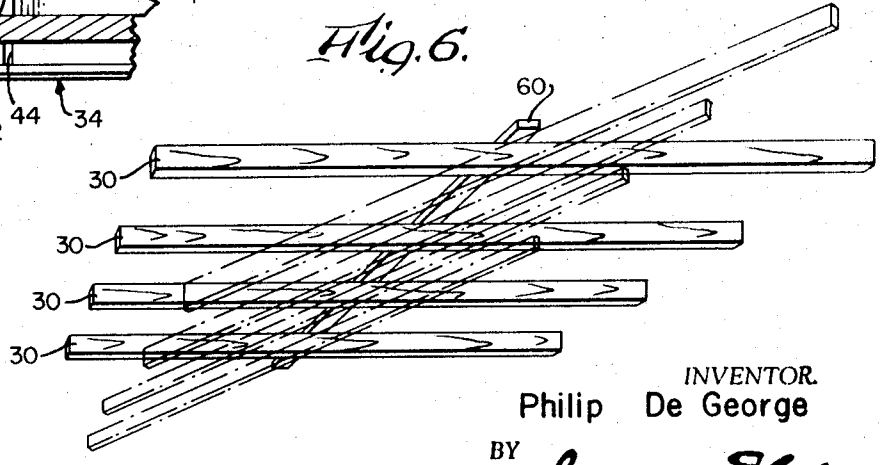


Fig. 6.

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SUSPENDED CEILING SYSTEM

REFERENCE TO RELATED APPLICATION

This application is a continuation of my prior copending application entitled SUSPENDED CEILING SYSTEM, Ser. No. 873,249, filed Nov. 3, 1969, and now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to improvements in ceiling installations, and more particularly to a new and improved suspended ceiling system and a new and improved method of installing the same.

2. Description of the Prior Art

A wide variety of suspended ceiling systems and installation methods exist, and their advantages are well known. However, they have a common defect in that the panels are difficult to install. For example, in U.S. Pat. No. 1,951,346, it is necessary to install the panels in and between opposed channel shaped cross runners, which is a rather tedious fitting process. Alternatively, the panels and the grid work of such suspended ceiling systems are designed so that the panels are supported on the flanges of interlocked main and cross runners of inverted T-shape, with the marginal portions of the panels resting upon the horizontal flanges of such runners. To so install such panels, it is necessary that the same be first inserted edgewise upwardly through the openings in the grid work and then lowered and repositioned until their lower marginal edge portions are suitably supported thereon such as is disclosed in U.S. Pat. Nos. 3,084,401 and 3,153,304. The frequent necessity to form interlocking connections between the main and cross runners, as in the first of these two patents, obviously increases the cost and complexity of manufacture and installation, while the need for first inserting the panels edgewise through the grid openings in each of the patented construction, followed by repositioning of the panels until they lay substantially horizontally on the grid forming flange portions is both time consuming and tedious.

Further, while it is well known to staple decorative panels to the underside of a solid backing structure, as when covering an original solid ceiling, such as shown in U.S. Pat. No. 3,287,871, this, to applicant's knowledge, has not been accomplished in suspended ceiling systems. Indeed, the main and cross runners are made of a solid and substantially impervious, rigid material, most often sheet metal and sometimes plastic, which is not suitable for being pierced by fasteners particularly staples.

SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the invention to provide a new and improved suspended ceiling system and method of installing the same which are so designed as to permit direct installation of the panels to the undersides of the main and cross runners, and thereby avoid the disadvantages of the aforesaid and other prior art systems and installation methods, wherein the panels must be either fitted between and in a complex runner structure or first inserted edgewise upwardly through the openings between the runner structure and then replaced on such runner structure from above. To this end, there is provided a new and

improved suspended ceiling system which is adapted to cover the interior overhead structure in a building and new and improved method of installing the same, wherein the improvement comprises: a first installed main longitudinal runner of inverted generally T-shaped cross section including an upper web suspended from and at a selected level below such overhead structure and a lower transverse flange projecting laterally from each side of the web with its underside made of material normally not suitable for stapling; a next installed plurality of auxiliary cross runners of generally rectangular cross section arranged in generally parallel, spaced relationship and alignment along both sides of the main runner with their inner ends supported by the flange in substantially opposed relationship with both sides of the web and their undersides substantially flush and made of material suitable for stapling; and a last installed plurality of generally rectangular panels arranged beneath and covering the undersides of the main and cross runners and having male and female mating edge portions forming interlocking cross joints extending along the undersides of the cross runners and transversely of the underside of the flange, with each female mating edge portion having on its upper side an upper overhanging lip and on its underside a shorter reentrant lip forming a groove therebetween, with each male mating edge portion having on its upper side an upper notch receiving such overhanging lip and on its underside a short lower notch receiving such reentrant lip and forming therebetween a tongue inserted into such groove, with the overhanging lips of the cross joints being made of material suitable for stapling, and with a plurality of staples driven through the overhanging lips of the cross joints into the undersides of the cross runners and hidden by the tongues.

Another object is to provide such a system and method wherein those cross runners on at least one side of the main runner are pivotally connected together to an overlying longitudinal stringer to form a foldable and unfoldable group, to facilitate storage, shipment and installation.

A further object is to provide such a system and method wherein the undersides of the cross runners are supported at their inner ends on the upper side of the flange so that their undersides are spaced or offset slightly above the underside of the flange, and the panels are slightly deformed as they span the junctures of the undersides of the flange and cross runners.

Still another object is to provide such a system and method wherein the undersides of the cross runners are provided at their inner ends with notches overlying the flange so that their undersides are substantially flush with the underside of the flange and the panels are substantially undeformed as they span the junctures of the undersides of the flange and cross runners.

A still further object is to provide such a system and method wherein the cross runners are provided at their inner ends with slots intermediate their upper sides and undersides and receiving the flange so that the cross runners on both sides of the web extend towrd each other beneath the flange, the panels are substantially undeformed as they span the junctures of the undersides of the cross runners beneath the flange, and the staples are driven through the overhanging lips of the cross joints into the undersides of the cross runners beneath the flange.

Additional objects and advantages of the invention will become apparent upon consideration of the following detailed description and accompanying drawing wherein:

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partial perspective view of the interior wall and ceiling structure of a room in a building, and illustrating a partially installed suspended ceiling system and method constituting a preferred embodiment of the invention;

FIG. 2 is an enlarged sectional view taken on line 2—2 of FIG. 1 and illustrating the manner in which the panels are stapled to the undersides of the cross runners;

FIG. 3 is a fragmentary and further enlarged sectional view taken on line 3—3 of FIG. 1, and illustrating the manner in which the female mating edge portions of the two panels are stapled to the undersides of adjacent cross runners, as well as the interlocking relationship between the male and female mating edge portions of two adjacent panels to hide such staples;

FIG. 4 is a fragmentary sectional view on the same scale as FIG. 3 and illustrating a modification of the inventive system and method, wherein the inner ends of the cross runners on each side of the web of the main runner are notched so that the undersides of the cross runners are flush with the underside of the lower transverse flange of the main runner, instead of being spaced slightly thereabove, as shown in FIG. 2;

FIG. 5 is a view similar to FIG. 4, but illustrating a further modification wherein the inner ends of such cross runners are provided with longitudinal, horizontal slots intermediate their upper sides and undersides, with the slots receiving the flange of the main runner on both sides of the web, and with the inner ends of the cross runners extending toward each other underneath the flange and with their undersides substantially flush; and

FIG. 6 is a perspective view illustrating a further modification wherein the cross runners may be formed into a foldable and unfoldable group.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, and particularly FIGS. 1 and 2 thereof, the interior portion of a building is generally indicated at **10** and includes a horizontal ceiling wall **12** and vertical side walls **14.** In order to cover such interior overhead structure of the building in accordance with the inventive method, there is provided the inventive suspended ceiling system, a preferred embodiment of which is generally indicated at **16.** Such system includes at least one first installed main longitudinal runner **18** which is formed into an inverted T-shaped cross section usually from sheet metal or plastic such as rigid polyvinyl chloride or other suitable material which normally is not suitable for stapling because of its relatively impervious character. Main runner **18** thus includes an upper vertical web **20** and a lower transverse horizontal flange **22** projecting laterally from each side of the web along the length of the runner. Web **20** is, in turn, provided with a series of longitudinally spaced, transverse through holes **24** adjacent its upper end (only one such hole being shown) for the purpose of suspending main runner **18** at a selected level below the overhead ceiling and side wall structure by means of wires or the like **26** having their lower ends looped through the holes and suitably tied, while their upper ends are suitably secured to ceiling **12** by fasteners **28** such as nails (only one such wire and fastener being shown).

A next installed plurality of horizontal auxiliary cross runners **30** are arranged in parallel spaced relationship and alignment along both sides of main runner **18,** with each cross runner being formed into a vertically elongated rectangular cross section from a material which is suitable for stapling, such as a 1 × 1-½ inches wooden furing trip or other suitable pervious material such as a cellular plastic. As will be evident from FIGS. **1** and **2,** the opposite ends of runners **30** are squared off and their inner ends are supported by the flange **22** in substantially opposed and abutting relationship with both sides of web **20,** while their outer ends are supported at substantially the same level as their inner ends on the lower horizontal flange and substantially abutting the upper vertical flange of an angle bar **32** suitably secured to the adjacent wall **14.**

A last installed plurality of panels **34** which are shown in the form of generally square tiles and which may be of the acoustical and/or decorative variety of well known construction, such as bonded wood or glass fibres, are arranged beneath and cover the undersides of both cross runners **30** and main runner **18.** The panels **34** illustrated are of the interlocking joint forming type, wherein each includes a pair of adjacent female mating edge portions **36** (FIG. **1**) and a pair of adjacent male mating edge portions **38** (only one of which is shown in FIG. **3**), with preferably the entire panels and at least their mating edge portions being made of material, such as that above, which is suitable for stapling. Each female mating edge portion **36** is adapted to underly the adjacent overlying cross runner **30** (FIG. **3**) and has on its upper side an upper overhanging lip **40** which is adapted to be stapled to the underside of such cross runner and on its underside a shorter lower reentrant lip **42** forming a groove **44** therebetween. Correspondingly, each opposite male mating edge portion **38** also is adapted to underly the corresponding adjacent cross runner **30** and has on its upper side an upper notch **46** adapted to receive the overhanging lip **40** of the next adjacent panel, and on its underside a shorter notch **48** adapted to receive the shorter reentrant lip **42** of the adjacent panel and forming therebetween a tongue **50** adapted to be received in such groove, as best seen in FIG. **3.**

Thus, as also seen in FIGS. **1** and **2,** it is the female edge portions **36** of the panels or tiles **34** which edge portions extend along and are suitably stapled to the undersides of cross runners **30** by staples **52** driven through overhanging lips **40** into the undersides of such cross runners and hidden by tongues **50,** while the opposite male edge portions **38** extending along such cross runners are inserted into and form interlocked cross joints with such female edge portions **36** to secure the panels **34** in place, and preferably in staggered rows, with their cross joints extending along the undersides of such cross runners **30** and transversely of the underside of flange **22,** as illustrated. Of course, the remaining male and female edge portions **38, 36** form interlocking longitudinal joints extending transversely of the undersides of such cross runners and longitudinally of the underside of flange **22,** as is evident from FIG. **1.**

As depicted in FIG. 1, the remote and right hand panels 34 respectively have their male edge portions 38 suitably supported by molding 54 suitably secured to walls 14. This molding is shown in FIG. 2 as being of channel-shaped, cross-section and is specifically designed to receive such male edge portions. Obviously, as one views the panels 34 extending forwardly and to the left hand side of main runner 18, as shown in FIG. 1, they eventually could reach walls similar to walls 14, and the panels adjacent such walls will have either their female edge portions 36 or will be suitably cut away to provide a lip or tongue suitably supported by suitably shaped molding (not shown).

It now will be seen that the inventive suspended ceiling system 16 readily can be installed by the inventive method, first by suspending the appropriate number of main runners 18 and attaching the angle bars 32 to walls 14, followed next by installation of the appropriate cross runners 30 on both sides of such main runners and the molding such as 54, together with the arranging and stapling of the last installed panels 34 to the undersides of such cross runners. This system and method represent a substantial improvement over prior art systems and methods, in that the panels are installed readily merely by stapling the same to the undersides of the cross runners from beneath, while eliminating the necessity for inserting and fitting such panels between and into chanel-shaped runners or edgewise into the spaces formed by a grid framework followed by horizontal orientation of such panels to rest upon the flanges forming such grid work. Likewise, the preferred simple construction of cross runners 30 eliminates any need for providing complicated interlocking devices between the cross runners and the main runners, as formerly employed.

As seen in FIGS. 1 and 2, in the first preferred embodiment of the inventive system and method, and which embodiment really is the simplest of all, the cross runners 30 simply rest at their inner ends upon the flange 22 of main runner 18. Thus, the undersides of such cross runners are spaced or offset slightly above the underside of the flange. Therefore, it is necessary in arranging the panels to slightly deform the undersides of panels 34 as they span the offset junctures of the undersides of the cross runners 30 and flange 22, as best shown in FIG. 2. This slight deformation is hardly noticeable, particularly from the normal distance of one standing on the floor beneath such ceiling.

However, at a slight increase in cost, the inner ends of cross runners 30 may be notched as at 56, shown in FIG. 4, where they overly flange 22. Obviously, the vertical depth of notches 56 is adjusted so that the undersides of cross runners 30 are flush with the underside of flange 22, thereby ensuring flush joints between panels 34 without any offset or deformation of such panels as they span the junctures of the undersides of the cross runners and flange. As an alternative modification, each cross runner 30 can be provided with a horizontal longitudinal slot 58 at its inner end, as shown in FIG. 5, such slot being located intermediate the upper side and underside of the runner, to slidably receive flange 22 on each side of web 20 of the main runner 18, so that the lower portions of the inner ends of such cross runners extend toward each other from both sides of web 20, beneath flange 22 with their undersides flush. This modification not only provides for smooth even joints between adjacent panels 34, which are undeformed as they span the junctures of the undersides of the cross runners beneath the flange, but also provides cross runner material beneath flange 22 which readily can receive staples 52 driven through overhanging lips 40 of the cross joints into the undersides of cross runners 30 beneath the flange.

A further modification is shown in FIG. 6, wherein a selected number of cross runners 30, such as those on one or both sides of web 20 of main runner 18, may be pivotally connected in predetermined spaced relationship intermediate their ends to an overlying, preferably wooden, stringer 60 suitably secured thereto such as by nails or screws (not shown), in order to form a foldable and unfoldable group of such cross runners. Obviously, this represents pre-packaging of modular groups of cross runners 30 which are foldable and unfoldable to facilitate storage, shipment and installation of such groups.

It now is evident how the invention accomplishes its various objectives, and numerous advantages of the invention likewise are apparent. Furthermore, while the invention has been described and illustrated herein by reference to certain preferred embodiments, it is to be understood that various changes and modifications may be made by those skilled in the art without departing from the inventive concept, the scope of which is to be determined by the appended claim.

I claim:

1. A suspended ceiling system adapted to cover the overhead interior structure of a building and wherein the improvement comprises: a first installed main longitudinal runner of inverted generally T-shaped cross-section and including an upper web suspended from and at a selected level below said overhead structure and a lower transverse flange projecting laterally from each side of said web with its underside made of material normally not suitable for stapling; a next installed plurality of auxiliary cross runners of generally rectangular cross-section arranged in generally parallel spaced relationship and alignment along both sides of said main runner with their inner ends supported by said flange in substantially opposed relationship with both sides of said web and their undersides substantially flush and made of material suitable for stapling, said cross runners being provided at their inner ends with slots intermediate their upper sides and undersides and receiving said flange so that said inner ends of said cross runners on both sides of said web extend toward each other beneath said flange; and a last installed plurality of generally rectangular panels arranged beneath and covering the undersides of said main and cross runners, being substantially undeformed as they span the junctures of the undersides of said inner ends of said cross runners beneath said flange, and having male and female mating edge portions forming interlocking cross joints extending along the undersides of said cross runners and transversely of the underside of said flange, with each of said female mating edge portions having on its upper side an upper overhanging lip and on its underside a shorter lower reentrant lip forming a groove therebetween, with each of said male mating edge portions having on its upper side an upper notch receiving said overhanging lip and on its underside a shorter lower notch receiving said reentrant lip and forming therebetween a tongue inserted into said groove, with said overhanging lips of said cross joints being made of material suitable for stapling, and with a plurality of staples driven through said overhanging lips of said cross joints into the undersides of said cross runners, including the undersides of said inner ends of said cross runners beneath said flange, and hidden by said tongues.

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