

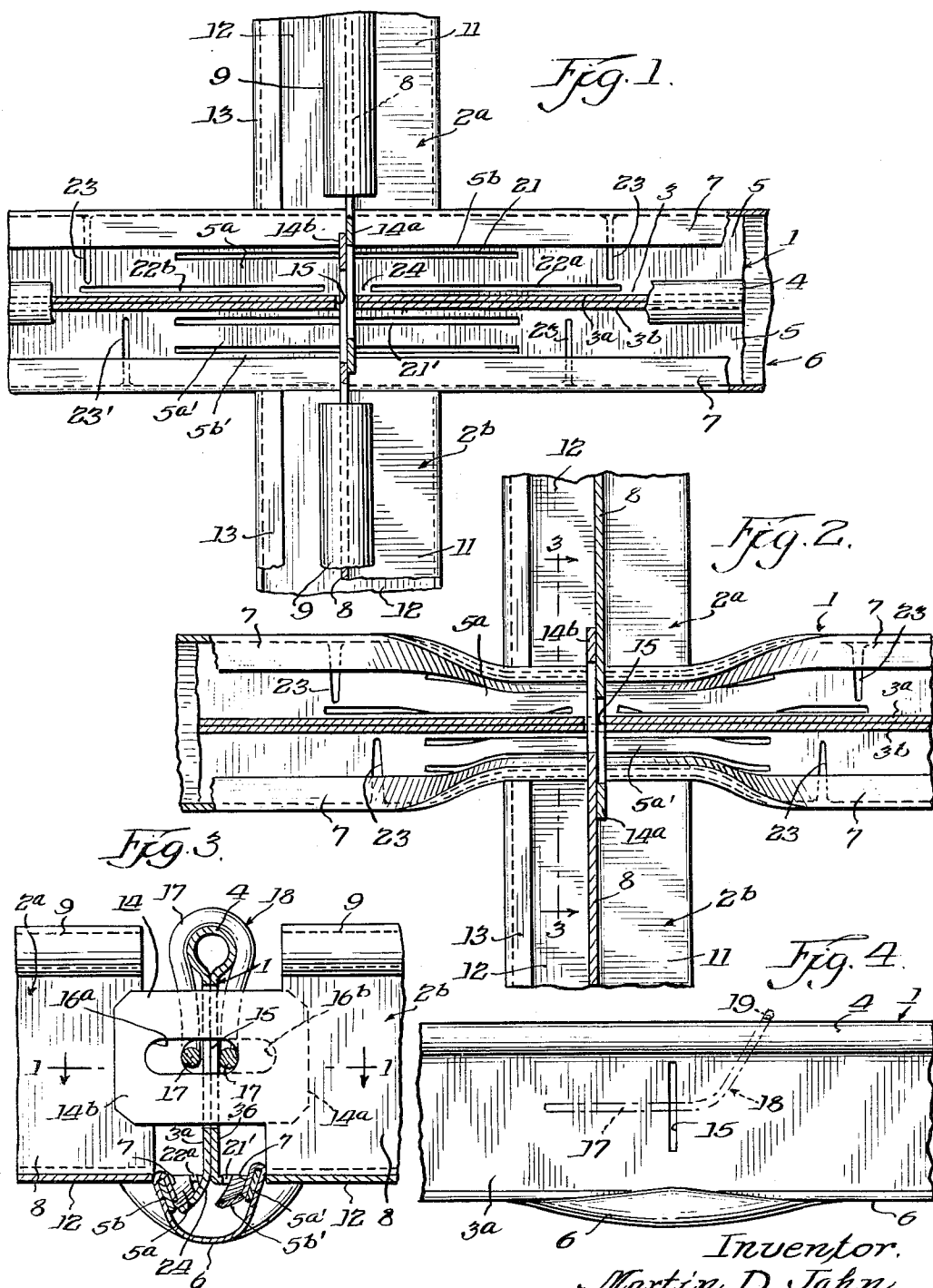
March 29, 1966

M. D. JAHN

3,242,628

SUSPENDED CEILING CONSTRUCTION AND RUNNER THEREFOR

Filed June 15, 1961



Inventor.
Martin D. Jahn.
By *Steel & Steel*
Attys.

1

3,242,628

SUSPENDED CEILING CONSTRUCTION AND RUNNER THEREFOR

Martin D. Jahn, Riverside, Ill., assignor to Chicago Metallic Sash Co., Chicago, Ill., a corporation of Illinois
Filed June 15, 1961, Ser. No. 117,437
10 Claims. (Cl. 52-573)

The invention relates generally to suspended ceiling systems and more particularly to a runner construction for use in fire rated suspended ceiling systems wherein a series of main and transverse or cross runners are suitably suspended from a support thereabove and constructed to receive and support a plurality of acoustical tiles or the like. It has been found that ceilings of this type, if employing heat or fire resistant tiles, may provide an effective fire wall for several hours or more, provided that the ceiling remains in unruptured condition. The runner structures normally are of generally inverted T-shape, having a flange or runner face adjacent their lower edge from which extends a centrally positioned upwardly disposed web member which in many cases terminates along its upper edge in a reinforcing bead or the like. Ceiling systems of the type here involved may be generally classed as being of the concealed type, wherein the runners are not exposed to view, the exposed type where the tiles set directly on the runners, all of the latter being exposed to view, and the semiexposed type wherein the main runners are exposed but the cross runners are concealed, in which case the usual ceiling appears as a series of parallel bands or strips which are relatively continuous and separated by continuous lines of runners.

As the metal runners possess a relatively high inherent coefficient of expansion under the application of heat, upon the application of heat to the bottom of the ceiling the runners will expand, such expansion being greater in the case of exposed runners and creating a serious problem with respect to maintaining the ceiling in an unruptured condition when subjected to heat. Obviously, if a section of the ceiling buckles to the point that the tiles drop or that a rupture takes place which permits flame and gases to pass thereabove, little protection would be afforded. The situation is aggravated by the inverted T-shape of the runners, as the vertical web portion of the exposed runner is relatively insulated, while the transversely or horizontally extending flange portion at the bottom of the web is exposed directly to the heat and thus will tend to initially expand to a greater degree than the upper portions of the runner. This results in a bowing of the runner, whereby the ends of the runner tend to diverge upwardly, or in the case of a runner which is supported at its ends, a considerable bow may take place in a downward direction at the central portion of the runner. In the case of a system wherein the cross runners are also exposed and connected or engaged with the intermediate portions of the main runners, a complicated series of stresses may take place, with the result that the runner not only tends to bow upwardly at its ends and downwardly at its central portion, but in the absence of adequate provision for expansion, tends to seriously twist which can quickly result in a rupture of the ceiling, permitting tiles to drop or otherwise exposing the area above the ceiling structure.

Various methods have been devised in an effort to try to accommodate or absorb the runner expansion at least to a point where rupture of the ceiling is prevented. Often the main runners are fabricated from a strip of sheet material which is folded back upon itself to form a central bead portion along one longitudinal edge of a web portion of double thickness which terminates at

2

its lower edge in outwardly directed oppositely disposed flange portions lying in a common plane and covered by a cap strip which presents a uniform continuous exposed face, the cap having peripheral flange portions which are folded upwardly and around the adjacent edge of the flanges of the runner. On the other hand, the cross runners are often made with a web portion of single thickness which terminates at its upper edge in a tubular bead, forming a reinforcement therefor, and at its lower edge extends laterally outward for approximately the same distance as one of the flanges of the main runner and then is folded downwardly and back upon itself beyond the web portion to form the equivalent of the opposite runner flange. Normally the free edge is folded upwardly and back upon itself to provide a reinforced edge and present a uniform appearance.

In the case of the exposed system, the cross runners may be provided at their ends with suitable interlocking means engageable with the web of the main runner to secure the cross runner or runners thereto and numerous constructions for effecting a suitable interlocking of the cross and main runners have been devised, in which constructions the flange portion of the cross runner abuts the edge of the adjacent flange portion of the main runner, whereby all such flange portions lie substantially in a common plane and present a uniform appearance.

With the advent of the heat resistant system, numerous designs have been devised in an effort to provide an adequate degree of expandability in the structure without rupture of the ceiling. One solution has been to so design the ends of the cross runners that they have considerably less resistance under expansion forces than the main runners so that the end of the cross runner may buckle or deform as such runner expands, such end portion being considerably weaker than the adjacent flange portion of the main runner. Another solution has been to remove the flange portion of the main runner at the point where it would normally tend to abut the cross runner so that only the relatively thin low resistance cap member is positioned at its juncture with the cross runner, so that, upon expansion of the latter, the cap will readily deform under the forces applied thereto by the cross runner. A third solution has been the use of a fusible cap structure adjacent the cross runner connections, such fusible element normally forming a part of a connector structure so that upon the existence of a sufficiently high temperature such portion will fuse and drop away, leaving adequate space for the cross runner to expand with a minimum of undesired distortion.

All of these solutions present problems and disadvantages. For example, cutting away the flanges of the main runner undesirably reduces the strength of the runner and may permit undesired bending and distortions thereat. Likewise special end structures on the cross runners involve various types of die or punching operations, etc., and if the end is weakened too much it likewise may be undesirably deformed in the absence of heat. The use of a fusible element also has a serious disadvantage in that the major expansion takes place at comparatively low temperatures and the fusible link requires a fairly high temperature for fusing, so that until the fusing takes place the stresses in the runner structure may be sufficient to produce a rupture in the ceiling.

The present invention therefore has among its objects the production of a runner structure which has, for all practical purposes, a more than adequate and substantially equivalent strength to that of a standard runner, whereby it may be treated in the same manner without special care and at the same time provide adequate capability of accommodation or absorption of expansion stresses in the runner system.

Another object of the invention is the production of a runner structure which possesses adequate capacity for accommodating runner expansion but which may be of substantially standard construction as to manner of forming the runner, nature of interlocking means on the runner ends, etc., and which may be readily incorporated in such runner structures without material change in the manufacturing techniques and processes employed with prior runner structures.

A further object of the invention is the production of such a novel runner structure which may be completely interchangeable with current runner types and which may be readily adapted for automatic machine fabrication.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

In the drawings, wherein like reference characters indicate like or corresponding parts:

FIG. 1 is a plan sectional view taken approximately on the line 1—1 of FIG. 3 of an intermediate portion of a main runner with which is engaged a pair of aligned cross runners in their normal interlocked relations;

FIG. 2 is a plan sectional view similar to FIG. 1, illustrating the deformation of the main runner upon the application of heat to the system;

FIG. 3 is a transverse sectional view taken approximately on the line 3—3 of FIG. 2 and illustrating the deformation of the main runner; and

FIG. 4 is a side elevational view of the main runner illustrated in FIG. 3, with the cross runners removed therefrom to disclose the general deformation of the runner upon the application of heat to cross runners connected thereto.

The present invention contemplates the fabrication of the runner which is formed with cuts or slots therein, so disposed that they do not, for practical purposes, affect the strength of the runner, enabling it to be handled, installed, etc. in the same manner as previous runners of the same type. The cuts or slots, hereinafter generically referred to as "openings" are so proportioned and arranged that they transversely divide the portion of the runner, at which deformation is to take place, into a plurality of individually deformable sections, each of which requires for deformation only a fraction of the force that would be required to deform a solid or continuous runner portion. Thus, upon the application of compression forces to such portions of the runner engaged with the end portions of cooperable cross runners, the adjacent portions of the main runner may deform, primarily downwardly and inwardly, to accommodate or absorb such forces without disturbing the ceiling tiles, etc. to a point where the ceiling is ruptured.

Referring to the drawings, the reference numeral 1 indicates generally a portion of a runner having engaged with the intermediate portions thereof, the ends of a pair of cross runners 2a and 2b.

The runner 1 is illustrated as being of a double-web construction having a longitudinally extending, vertically disposed body or web portion 3 formed from a single sheet of metal, the plies 3a and 3b of the web portion being connected adjacent their upper edges by a generally cylindrical shaped tubular portion or bead 4 and the lower edges of the web portions 3a and 3b terminating in oppositely directed outwardly extending flange portions 5, the latter being disposed in a common plane and covered by a suitable cap member indicated generally by the numeral 6 which is of lighter gauge material than the runner 5 and is reversely folded back along its longitudinal edges to enclose the bottom faces and adjacent edge portions of the flanges 5.

The cross runners 2a and 2b are also of a generally inverted T-shape in transverse cross section but are illustrated as being of a single web construction, having a web portion 8, the upper end of which terminates in a generally cylindrical, tubular bead 9 and the lower end of

which terminates in a laterally extending flange portion 11 which generally corresponds in dimensions to one of the flanges 5 of the runner 1, the metal forming the runner being folded back upon itself at the free edge of the flange 11 to form a face portion 12 which extends outwardly beyond the outer face of the web 8 and corresponding to the other flange 5 of the runner 1, the free edge portion being folded upwardly and back upon itself, as indicated at 13, to form a reinforced edge. As the face portion 12 of the runner extends from edge to edge of the runner, corresponding to the cap member 6 of the runner 1, an additional cap member is unnecessary and the lower exposed portion of the runners will look alike when viewed from below. The ends of the runners 2a and 2b as well as the adjacent portion of the runner 1 may be suitably formed to provide an interlocking connection, which, in the embodiment illustrated, comprises tongues 14a and 14b extending beyond the adjacent end of the associated runner and adapted to be inserted in a slot 15 in the web 3 of the runner 1, the tongues of the cross members being positioned adjacent one another as clearly illustrated in FIG. 1. The tongues 14 are provided with a similar longitudinally extending slots 16a and 16b respectively, adapted to receive the ends 17 of a generally U-shaped retaining clip 18, the intermediate portion 19 of which is adapted to straddle the bead 4 of the runner 1 as illustrated in FIG. 3 and indicated in dotted lines in FIG. 4.

The construction thus far described is typical of current runner designs, both the single and double web type of runners being currently employed, as well as the use of a clip member to secure the ends of a pair of abutting runners to a main runner extending transversely thereto. However, where interlocking tongues of the type described are employed, the slots, corresponding to 16a and 16b, have been substantially of a size to more or less snugly receive the ends 17 of the clip, whereas the slots 16a and 16b of the construction illustrated are elongated to permit adequate expansion movement of the cross runners toward the main runner.

FIG. 1 illustrates two forms of the invention, one being illustrated on one of the flanges 5 and the other on the other flange 5. The upper flange 5 as viewed in FIG. 1 is provided with a plurality of longitudinally extending slots 21, 22a and 22b, and two transversely extending slots 23, each of the latter being illustrated as having their inner ends disposed adjacent the outermost ends of the slots 22a and 22b, the latter transversely dividing the flange into a plurality of individual deformable sections 5a and 5b.

The slot 21 is illustrated as being greater in length than the corresponding width of the cross runners 2a and 2b, so that the slot spans the width of the runner and extends there beyond at the sides thereof, while the slots 22a and 22b are separated by a relatively short connecting strip 24 which is illustrated as being substantially centered with respect to the cross runners 2a and 2b, the slots 22a and 22b extending longitudinally beyond the ends of the slot 21.

The slots are so disposed and proportioned that under normal conditions of handling, installation and usage the runner has a rigidity substantially the equivalent of the standard runner of the same general type, but upon the application of heat to the cross runners and corresponding expansion thereof which would, in the normal installation apply considerable forces upon the flange of the runner 1, the runner 2a will move downwardly, as viewed in FIG. 1, the transverse sections of the flange portion in opposition to the runner 2a being successively deformed, ultimately assuming a position resembling that illustrated in FIGS. 2 and 3. It will be noted that the transverse sections between the slots 21 and 22a and b, as well as the portion between the slots 21 and the peripheral edge of the runner have moved inwardly in the direction of the applied forces, the slots 23 permitting the material therebetween to move in the direction of the cross runner,

5

whereby such slots become more or less V-shaped, thereby facilitating the deformation of the flange of the runner under the compression forces applied thereto.

In the embodiment illustrated on the lower flange 5 of the runner 1, as viewed in FIG. 1, two slots 21' of equal length are employed which are substantially centered with respect to the longitudinal axis of the runners 2a and 2b, forming individual sections 5a' and 5b', with the slots 23' corresponding to the slots 23 being disposed at points spaced longitudinally beyond the ends of the slots 21'.

Upon the application of compression forces to the flange by the runner 2b when the latter is subjected to heat, the flange 5 may be deformed to a position resembling that illustrated in FIGS. 2 and 3, the flange being subjected to sufficient deformation to permit adequate expansion of the runners 2b. FIG. 4 illustrates in elevation the general deformation of the runner 1, and in particular illustrates how the deformation takes place substantially entirely downwardly, the central portion of the flange 5 directly opposite the cross runners being substantially on a line with the top face of the flange 5, so that relatively little, if any, upward forces will be directed on tiles supported by the runner system. This is particularly advantageous as an upward buckling of the runner would result in a raising of the tiles and a crack or rupture could develop sufficient to permit an undesired amount of flame or heat to pass above the ceiling structure.

It will be particularly noted from the above description that one of the important features of the invention is the construction of a runner structure which for practical purposes of handling, installation and usage is the substantial equivalent to the normal runner, but at the same time is so designed that it will accommodate adequate deformation to absorb expansion forces applied thereto by the ends of the cross runners when the latter are subjected to heat. It is particularly pointed out that the runner 1 should not be confused with previous runners wherein the flange 5 was removed adjacent the ends of the cross runner, reliance being placed solely on the cap structure, etc. to provide adequate rigidity, nor to those structures wherein fusible cap members and the like are employed which may give way under the application of heat. The present invention provides for accommodation of expansion without an undesirable sacrifice in the structural efficiency of the runners.

While several slotted constructions have been illustrated, it is believed obvious that numerous configurations could be employed with varying degrees of success, but I have found that the particular construction illustrated works exceptionally well and at the same time provides a high degree of structural rigidity.

Similarly, while I have illustrated the means for facilitating the deformation as comprising relatively narrow slots, the proportions may be varied and in some cases the metal may be merely sheared or slit without the removal of material such as would take place when the stock is slotted. However, in the first case, as the metal would normally tend to be offset at opposite sides of the slit, additional operations to bring the metal back to a common plane would be required. However, narrow slots similar to that illustrated may be readily formed without deformation of the material on opposite sides of the slots, and with no material sacrifice in strength, etc. It is therefore, intended that the term openings, as it may be used in the claims, be inclusive of a severing or removal of material to form cuts and slots and the like for the purposes intended.

It will be apparent from the above description that the present invention permits the use of runner constructions and interlocking features of widely varying designs, providing a structure which is relatively rigid under normal conditions, being substantially the equivalent of a

6

standard runner insofar as strength is concerned, but at the same time having means for accommodating the expansion forces to which the cross runners may be subjected upon the application of heat thereto.

It will be appreciated that the present invention adapts itself for use with other systems for accommodating expansion in ceiling suspension upon the application of heat thereto.

Having thus described my invention, it will be obvious to those skilled in the art from the disclosure herein given that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction and arrangement of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by letters patent is:

1. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto, thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto.

2. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flange portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion at such a point of opposition to the end of a cross runner being transversely divided into a plurality of individually deformable sections, respectively deformable under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto to accommodate such expansion and prevent excessive distortion of such a system sufficient to cause a rupture and failure of the latter.

3. A runner for suspended ceiling systems of the fire resistant type comprising a longitudinally extending body portion terminating at its lower longitudinal edge in a transversely extending flange portion, the body portion being constructed intermediate its ends to receive the end of a cross runner disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion at such point of opposition to the end of a cross runner being transversely divided into a plurality of individually deformable sections, respectively deformable under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto to accommodate such expansion and prevent excessive distortion of such a system sufficient to cause rupture and failure of the latter.

4. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto, and said runner comprising a deformable cap member overlying the outer face of said flange portions, and concealing said openings.

5. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto, said runner comprising a deformable cap member overlying the outer face of said flange portions, and concealing said openings, and said cap member comprising a strip of metal of lighter gauge, having its longitudinal edges bent upwardly around the free edge of said flange portions.

6. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto, thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto,

and said openings comprising a plurality of longitudinally extending slots in each flange, transversely dividing each flange into a plurality of individually deformable sections.

7. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto, said openings comprising a plurality of longitudinally extending slots in each flange, transversely dividing each flange into a plurality of individually deformable sections, and certain of said slots disposed along parallel longitudinally extending lines, and other of said openings extending transversely to such lines.

8. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto, thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto, said openings comprising a plurality of longitudinally extending slots in each flange, transversely dividing each flange into a plurality of individually deformable sections, certain of said slots disposed along parallel longitudinally extending lines, and other of said openings extending transversely to such lines, and said transversely extending openings intersecting the edge of such flange portion and disposed adjacent the ends of said longitudinally extending openings.

9. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being

of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto, said openings comprising a plurality of longitudinally extending slots in each flange, transversely dividing each flange into a plurality of individually deformable sections, and three longitudinally extending openings provided, and arranged in triangular configuration with two of such openings being disposed in alignment adjacent the runner web and the other of such openings disposed adjacent the flange edge and longitudinally centered with respect to the first two of such openings.

10. A runner for suspended ceiling systems of the fire resistant type, comprising a longitudinally extending body portion terminating at its lower longitudinal edge in transversely extending, oppositely directed flange portions, the body portion being constructed intermediate its ends to receive the end of a cross runner, of similar transverse cross-sectional configuration, extending transversely thereto for connection therewith, and the ends of the cross runner flanged portions disposed in opposition to the adjacent flange portion of the first-mentioned runner, said adjacent flange portion having openings therein at such a point of opposition to the end of the cross runner and extending longitudinally therebeyond, said openings being

of a size and arrangement to permit the adjacent flange portion to deform under the application of compression forces applied thereto by the end of such a cross runner resulting from the expansion of the latter upon the application of heat thereto thereby preventing excessive distortion of such a system sufficient to cause rupture and failure of the latter, said openings being insufficient to materially weaken the runner or permit deformation under the application of normal loads and stresses thereto, said openings comprising a plurality of longitudinally extending slots in each flange, transversely dividing each flange into a plurality of individually deformable sections, three longitudinally extending openings provided, and arranged in triangular configuration with two of such openings being disposed in alignment adjacent the runner web and the other of such openings disposed adjacent the flange edge and longitudinally centered with respect to the first two of such openings, and two transversely extending openings are provided, disposed at opposite ends of said third opening.

References Cited by the Examiner

UNITED STATES PATENTS

25	2,962,131	11/1960	Rossi	52—578
	3,096,862	7/1963	Purdy	52—665

FOREIGN PATENTS

	930,486	8/1947	France.
--	---------	--------	---------

RICHARD W. COOKE, JR., *Primary Examiner.*