Aug. 20, 1968 R. H. JAHN 3,397,501

FIRE-RATED RUNNER WITH EXPANSION SECTION

Filed Oct. 23, 1965

Fig. 1

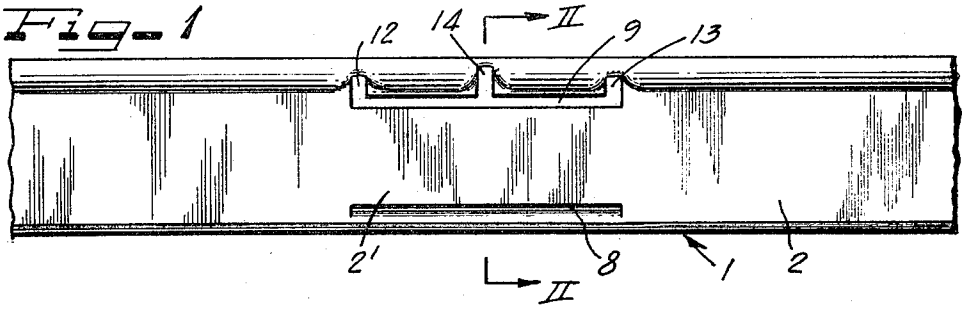


Fig. 2

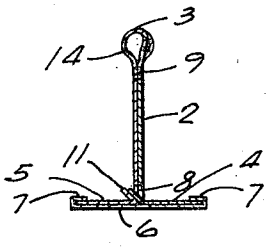


Fig. 3

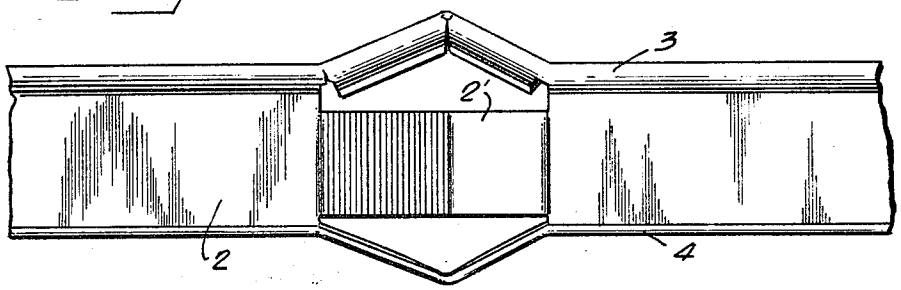
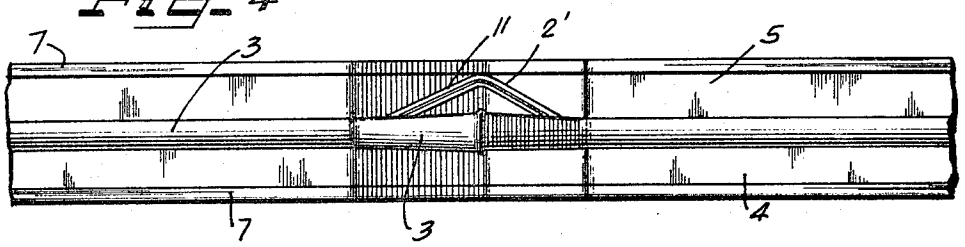


Fig. 4



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FIRE-RATED RUNNER WITH EXPANSION SECTION

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ABSTRACT OF THE DISCLOSURE

An expansion joint for a fire-rated suspended ceiling structure in which a runner comprising a generally upstanding planar web portion terminating at its upper end in a longitudinally extending reinforcing member, and at its lower end in transversely extending flange portions disposed at opposite sides of the web portion, is provided with two longitudinally extending elongated slots in the web portion thereof, one of which is disposed adjacent the flange portions and the other adjacent the reinforcing member, whereby the flange portions form a generally planar section which may readily deform downwardly way from the web portion, said slots defining a planar web section therebetween which may readily deform laterally out of its normal plane and a continuous section of said reinforcing member which completely spans the adjacent longitudinal slot and is integrally connected at its ends to the adjacent portions of said reinforcing member, said reinforcing section having a plurality of slots therein longitudinally spaced along and intersecting the adjacent longitudinal slots, said longitudinally spaced slots being so disposed that said reinforcing section provides lateral and longitudinal stiffening of the runner at said longitudinal slots, said slots in said reinforcing section permitting the portions of said reinforcing section intermediate the slots therein, under the application of compression forces thereto, to readily deform upwardly away from said web portion.

The disclosure

The invention relates generally to a runner construction for a fire-rated suspended ceiling system and more particularly to a runner joint or section which is deformable under the application of expansion forces in the runner to accommodate such expansion.

Summary of the invention

The present invention provides a runner having a planar web portion with a continuous, longitudinally extending reinforcing member integral along one edge and transversely extending flange portions disposed along the opposite edge with an expansion joint intermediate the ends of the runner. The expansion joint is formed in a common extension of the web portion by a first longitudinally extending slot disposed in the web portion of the runner contiguous and substantially parallel to the flange portions, a second slot in the web portion being disposed contiguous and substantially parallel to the reinforcing member, and a plurality of longitudinally spaced third slots. The third slots which intersect and are in communication with the second slots extend partially into the reinforcing member which extends uninterruptedly across the common extent of the web of the runner.

The invention has among its objects the production of an expansion joint which may be disposed in a runner intermediate its ends to accommodate expansion under the application of heat to the runner, whereby such expansion is accommodated at the intermediate section or joint whereby the overall length of the heated runner is ot expanded to a point where the ceiling fails, such runner being so constructed that the deformation of the expansion accommodating section is predictable and will produce reasonably uniform results in which the alignment of the runners ends disposed at opposite sides of the expansion section is adequately maintained without excessive twisting or buckling of the runner out of its original longitudinal axis.

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 side elevational view of a portion of a runner for a suspended ceiling which is provided with an expansion-accommodating section in accordance with the invention;

FIG. 2 is a sectional view taken approximately on the line II—II of FIG. 1;

FIG. 3 is a side elevational view similar to FIG. 1 illustrating the disposition of the components of the expansion section following the application of heat to the runner; and

FIG. 4 is a top plan view of the structure illustrated in FIG. 3.

Runners of the type here involved may vary in details of construction but in general comprise an upstanding web portion terminating at its upper end in suitable reinforcing means such as a tubular bead, and at its lower end in oppositely directed laterally extending flanges disposed in a common plane which form the supporting means for the panels of the ceiling. Due to the cross-sectional configuration of the runner and the fact that only the flange portions are normally exposed to the application of heat in the enclosure bounded by the ceiling, the expansion, which may be considerable, tends to excessively buckle the runner to a point where the ceiling panels may drop, thus rupturing the ceiling. However, if the expansion can be accommodated in an intermediate portion of the runner, and in particular in such a manner that the runner is not excessively distorted out of its original longitudinal axis, the ceiling structure will withstand considerable heat without rupture.

The present invention contemplates, in a runner structure of the type described, an arrangement in which the various portions of the runner at an expansion section disposed intermediate the ends of the runner, may readily deform in different directions upon an application of sufficient heat, thus providing a construction in which the expansion section provides a maximum of rigidity under normal conditions, and yet will relatively easily deform in predetermined directions to permit the desired accommodation of the forces applied thereto. Thus, the expansion section is so constructed that the flange portions of the runner will tend to be deformed downwardly away from the web section, while the latter is deformable laterally out of its original plane, and the reinforcing member, such as a tubular bead, is deformed upwardly. The result of such controlled deformation is an accommodation of the expansion with a minimum amount of distortions of the runner, either as to twisting or angular distortion out of its original axis. Obviously, while it may be readily possible to provide a weakened structure whereby expansion can be accommodated, such weakening can easily result in a loss of runner alignment which could conceivably result in a rupture of the ceiling even though expansion was adequately accommodated in the means provided therefor.

Referring to the drawings, particularly to FIGS. 1 and 2, the reference numeral **1** designates generally a runnner structure of the type initially described, having an upstanding web portion **2**, terminating in its upper end in a longitudinally extending reinforcing member **3** which is illustrated as being in the form of a tubular bead. Extending along the lower edge of the web portion **2** are oppositely

directed laterally extending flanges 4 and 5 which are disposed in a common plane and form the supporting means for ceiling panels in accordance with common practice.

The particular runner construction illustrated is of the double web type in which a strip of material is bent intermediate its longitudinal edges to form the bead 3 with the portion of the strip at opposite sides of the bead being brought into parallel relation to form the web 2 and the edge portions of the strip being bent at right angles thereto to form the flanges 4 and 5, the latter being covered by a suitable cap strip 6 having its longitudinal edges 7 folded around the adjacent edges of the associated flange. The runner thus far described is of generally standard construction and widely utilized.

The expansion section or joint is substantially defined by two longitudinally extending slots, a first slot 8 and a second slot 9, respectively disposed substantially at the juncture of the web portion 2 with the flanges 4 and 5, and at the juncture of the web 2 with the bead 9. In the embodiment illustrated the first slot 8 is formed by merely shearing the web portion 2 along a line slightly spaced from the juncture of the web with the flange portions with the material intermediate the latter and the line of shear being deformed as indicated at 11, to one side of the plane of the web portion as clearly illustrated in FIG. 2. Intersecting the second slot 9, which is somewhat greater in width than the second slot 8, are a plurality of longitudinally spaced third slots 12, 13 and 14 which are in communication with the second slot 9 and extend therefrom partially into the bead 3. The third slots 12 and 13 are respectively disposed adjacent the ends of the second slot 9 and the remaining third slot 14 which preferably is centrally located between the slots 12 and 13 extends from near the mid-point of the second slot 9 into the bead 3 a greater distance than the slots 12 and 13 located at the ends of the second slot 9.

It will be apparent that the slotted construction thus described in effect divides the runner structure at the expansion section into three components, namely, the bead 3, the flange portions 4–5 and the intermediate web portion 2′ which are separated from one another by the respective slots 8 and 9. The flange portions 4–5 extending coextensively with the first slot 8 thus are of substantially planar cross-section with the portion 11 offering substantially little or no resistance to a deformation of the flange structure in a vertical direction. In like manner the portion 2′ of the web disposed intermediate the slots 8 and 9 presents relatively little resistance to deformation in the lateral direction normal to the plane of the web 2. In like manner, the third slots 12, 13 and 14 are so disposed and dimensioned that the intermediate portions of the bead therebetween have a minimum resistance to deformation in an upward direction.

Thus, in use, where the ends of the runner are restricted with respect to movement in an expansion direction, upon the application of heat to the ceiling structure the runner will deform as illustrated in FIGS. 3 and 4, in which the flange portion buckles substantially at its longitudinal center in a downward direction, while the web portion 2 buckles to one side or the other of its original plane and the reinforcing bead 3 buckles upwardly. It will be particularly noted that the longitudinal axis of the runner at opposite sides of the expansion joint remain in substantial alignment, corresponding to the original disposition thereof, and thus with substantially little or no sagging of the runner at the expansion section.

It will be appreciated that this result is achieved by the particular configuration of the expansion section whereby the flange portion adjacent the first slot 8, while capable of deformation downward to accommodate expansion, offers maximum resistance to lateral bending of the runner at the expansion joint, both prior to the application of heat thereto and also in its deformed state. Likewise, the web portion 2′ both prior and subsequent to the application of heat thereto, provides a maximum amount of resistance to a vertical sagging of the runner at the expansion joint, but at the same time permits deformation of such portion to accommodate expansion. Further, the bead 3 at the expansion section provides a stabilization of the runner structure in its normal position and reduces the tendency of the runner to twist, and also provides a reinforcing function when the runner is deformed. Thus, each component of the runner at the expansion section contributes to the reinforcement and strength of the runner in a particular direction, with the direction of deformation being different and thus not materially decreasing the reinforcing action of the components.

It will be noted from the above description that I have provided a runner construction which is extremely efficient for the intended purposes, offering a maximum rigidity during normal usage, and at the same time permitting adequate accommodation of expansion forces without material distortion of the runner.

Having thus described my invention, it is obvious 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, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In an expansion joint for a fire-rated suspended ceiling structure, the combination of a runner comprising a generally upstanding planar web portion terminating at its upper end in a continuous tubular reinforcing bead, and at its lower end in transversely extending flange portions disposed at opposite sides of the web portion, said web having a first longitudinally extending slot therethrough, disposed contiguous and substantially parallel to said flange portions, a second slot in said web disposed contiguous and substantially parallel to said reinforcing bead, the first and second slots being disposed in a common extent of said web, said second slot having a plurality of longitudinally spaced intersecting third slots communicating therewith and extending partially through said tubular reinforcing bead, a portion of said tubular reinforcing bead extending uninterruptedly across the common extent of said web whereby when said runner is subjected to expansion forces accompanying fire conditions, said common extent of said web will buckle laterally to said planar web, said flange portions contiguous to said first slot will buckle downwardly from said runner and the portion of said tubular reinforcing bead extending across the common extent of said web will buckle upwardly to relieve the expansion forces without substantial twisting of said runner.

2. In an expansion joint according to claim 1, wherein said third intersecting slots consist of a slot at each end of said second slot and one near the mid-point thereof, the latter extending deeper into said tubular reinforcing beam than those at the ends thereof.

3. In an expansion joint for a fire-rated suspended ceiling structure, the combination of a runner comprising a generally upstanding planar web portion terminating at its upper end in a continuous, longitudinally extending reinforcing member, and at its lower end transversely extending flange portions disposed at opposite sides of the web portion, said web having a first longitudinally extending slot therethrough disposed contiguous and substantially parallel to said flange portions, a second slot in said web disposed contiguous and substantially parallel to said reinforcing member, the first and second slots being disposed in a common extent of said web, said second slot having a plurality of longitudinally spaced intersecting third slots communicating therewith and ex-

tending partially into said reinforcing member, a portion of said reinforcing member extending uninterruptedly across the common extent of said web whereby when said runner is subjected to expansion forces accompanying fire conditions, said common extent of said web will buckle laterally to said planar web, said flange portions contiguous to said first slot will buckle downwardly from said runner and the portion of said reinforcing member extending across the common extent of said web will buckle upwardly to relieve the expansion forces without substantial twisting of said runner.

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