Feb. 27, 1968 H. C. DUPUIS ET AL 3,370,391

RESILIENT STRUCTURAL BEAM

Filed Sept. 7, 1965

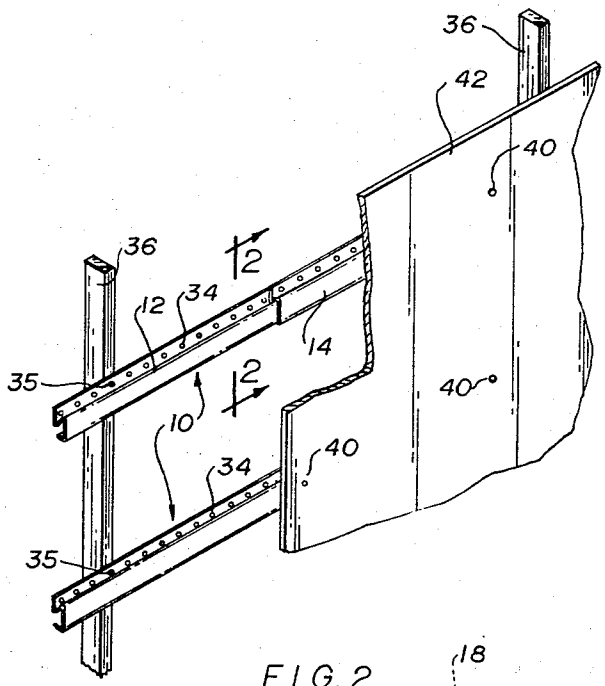


FIG. 4

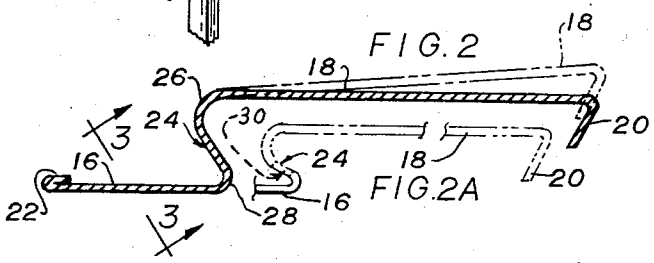


FIG. 2

FIG. 2A

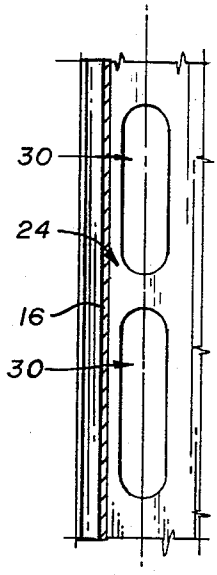


FIG. 3

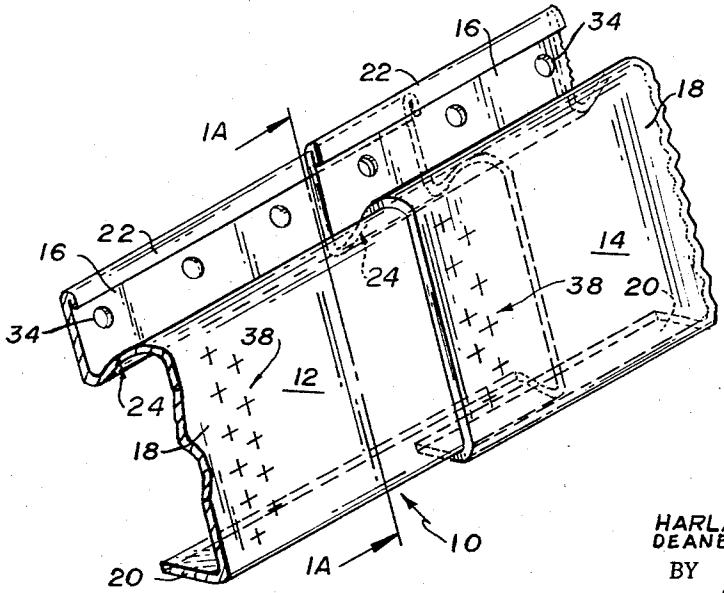


FIG. 1

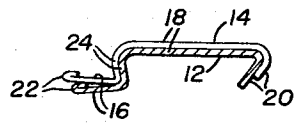


FIG. 1A

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RESILIENT STRUCTURAL BEAM

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ABSTRACT OF THE DISCLOSURE

A resilient runner or structural beam useable in wall, and ceiling structures and the like and comprised of a pair of offset spaced planar bearing portions and an intermediate sinuously curved integral web connecting said planar bearing portions together. One of the arcuate sections making up said web having a greater arcuate extent and more generous radius than another arcuate section making up said web. One of the arcuate sections is also directly connected to one planar bearing portion and another arcuate section is directly connected to the other planar bearing portion as well as to the first mentioned arcuate section.

This invention relates to a resilient structural beam or runner useable particularly in wall, ceiling and floor structures or various combination thereof which are purposely designed and constructed to reduce the transmission of sound. More particularly, it is concerned with providing a resilient beam or runner which can be readily spliced to a similar beam or runner without deteriously affecting the beam's resiliency and other advantageous characteristics and without the necessity of supporting such beams in the area were splicing of the same occurs.

In prior building construction practices resilient beams or runners have been used as intermediate anchoring elements for securing wallboards, dry wall units and floor panels in a resilient fashion to studding, joists, etc. whereby the interdisposed resilient beam or runner advantageously acts to attenuate sound transmission through the main wall, floor or ceiling covering members. The configurations of such beams, however, were such that the beams did not lend themselves to being readily spliced together at their ends and they frequently had to be joined together in such a fashion that their sound attenuation characteristics were adversely affected.

Accordingly, it is the primary purpose of the instant invention to provide an improved resilient sound attenuating structural beam or runner wherein the configuration of the beam allows satisfactory and even unsupported splicing of one beam with another beam of similar configuration without at the same time adversely affecting the resiliency, sound attenuation and other advantageous characteristics of either of the spliced beams.

These and other purposes and advantages of the instant invention will become more apparent from a review of the following detailed description when taken in conjunction with the appended drawings, wherein:

FIG. 1 is an enlarged fragmentary perspective view of a pair of spliced structural beams embodying the instant invention and illustrates how the beams are joined together at their adjoining longitudinal ends in overlapping relation;

FIG. 1A is a cross-sectional view of the structural beams taken on the line 1A—1A of FIG. 1.

FIG. 2 is a sectional view with parts removed generally taken along line 2—2 of FIG. 4 illustrating the cross-section of a beam of the instant invention and further illustrating in dotted lines a modification thereof;

FIG. 2*a* is a broken sectional view similar to FIG. 2 and illustrates in dotted lines a slightly modified form of the beam of FIG. 2 and an operative resilient position of certain parts thereof of the beam of FIG. 2 relative to their removal position as shown in solid lines in FIG. 2;

FIG. 3 is a sectional view on an enlarged scale generally taken along line 3—3 of FIG. 2 and rotated 90° clockwise; and

FIG. 4 is a perspective view of a typical wall structure formed of studding, resilient structural beams embodying the instant invention and a portion of a panel member, such as plasterboard or wallboard, secured to the structural beams.

With further reference to the drawings, a preferred form of beam or runner **10** that can be used in carrying out the teachings of the instant invention generally comprises one or more beam sections **12** and **14** that have been roll formed into substantially the same configuration as shown, not only to facilitate splicing or joining together of the beam sections in a unique overlapping fashion at their adjoining longitudinal ends, but also to provide an overall resilient beam **10** of desired length as will be described hereinafter in detail. Although only two beam sections **12** and **14** are shown, it is obvious that any number of sections can be employed depending on the length of final beam desired in a given wall, floor or ceiling structure.

Each of the beam sections **12** and **14** is made up of spaced and substantially planar bearing portions **16** and **18** which can be disposed in planes generally parallel to each other as shown in solid lines in FIG. 2 or in convergent planes as indicated in dotted and solid lines in FIG. 2. The free marginal edge of the planar portion **18** which is preferably larger than portion **16** and offset is folded back upon itself to form a unique downwardly extending and inwardly directed flange **20** desirably disposed at an angle, preferably an acute angle in the range of 60° to 85°, to the underlying surface of the planar portion **18**. This flange **20** contributes to the rigidity and overall strength of the sections **12** or **14**, as the case may be, and also functions, as will be more apparent hereinafter, to limit the relative resilient movement between the spaced portions **16** and **18** and to enable splicing of beam sections **12** and **14** at their adjoining longitudinal ends. It is further observed that the more the angle of the flange **20** approximates 85°, the easier it is to nest together two beams **10** during splicing. The free marginal edge of the other spaced portion **16** can include a folded-over flange **22** that contributes to the rigidity and overall strength of the beam sections **12** and **14** making up the structural beam **10**.

Planar spaced portions **16** and **18** are joined together by an integrally formed intermediate integral web portion **24** of greater length than flange **20** and comprising reversely or sinuously curved arcuate parts or sections **26** and **28**. The arcuate part **26** is advantageously formed so as to have a greater arcuate extent and more generous radius than the arcuate extent and radius of arcuate part **28**. For example, the radius of section **26** can be on the order of $\frac{3}{16}$ of an inch and the radius of section **28** can be on the order of $\frac{1}{32}$ of an inch. The curved part **26** along its longitudinal extending edge is connected to one edge of the bearing portion **18**. Similarly, the curved part **23** is connected along it longitudinally extending edge to an edge of the other bearing portion **16**.

The curved parts **26** and **28** of the intermediate portion **24** act as a spring connector between bearing portions **16** and **18** and advantageously contribute to the overall resiliency of the portions **16** and **18** relative to each other in response to forces or force components exerted in a direction normal to the planar surfaces of the spaced portions **16** and **18**. To further contribute to the resiliency of the spaced portions **16** and **18**, the intermediate portion **24** can advantageously have a series of perforations **30** pro-

vided therein with these perforations **30** being disposed along a common longitudinal axis. As best shown in FIG. 3, these perforations **30** can have the shape of elongated openings. Perforations **30** are preferably located within the curved part **26** and substantially immediately above the point of interconnection of the integrally formed curved components **26** and **28**. Further, the perforations **30** can be located within the curved part **28** and substantially immediately above the point of interconnection of the bearing portion **16** and the curved component **28** as shown by dotted lines in FIG. 2*a*. The size and spacing between successive perforations **30** should always be such as to enhance the resiliency between bearing portions **16** and **18** without sacrificing the desired rigidity and overall strength of a beam section **12** or **14**. Bearing portion **16** is further provided with a series of spaced perforations **34** for anchoring the beam section to an underlying support means or grid such as the spaced wall stud members **36** shown in FIG. 4 in a manner conventional in the art.

During formation of a beam section **12** or **14**, the upper surface of the bearing portions **18** can be provided with a pattern of intersecting score lines generally indicated at **38** or any other suitable deformation. Although only two such rows of exemplary deformations **38** are shown in the beam sections **12** and **14** of FIG. 1, which are arranged number can be used and the rows of the deformations relatively close together, it is to be understood that any making up the pattern would ordinarily cover substantially the entire exposed upper surface of bearing portion **18** in a beam section **12** or **14**.

The point of intersection of each of the score lines **38** serves as a guiding and centering means for a fastener element **40** during penetration of bearing portion **18** by element **40** used to anchor a panel thereto. To assist penetration by the element **40**, the deformations **38** can actually, if desired, be deformed inwardly, by a suitable roll forming tool, so as to define a funnel-like depression. The fastener element **40** usually is a self-tapping screw that can be first driven through a surface covering member or panel **42** by a suitable tool, such as a screwdriver, not shown. In the event that the first attempt to drive the fastener **40** through the surface member **42** does not result in alignment of the fastener **40** with a point of intersection of score lines **38** on the underlying beam **10**, the fastener itself then usually inclines automatically until the point of intersection of one of the intersecting score lines **38** of the closely arranged deformations is in alignment with the forward end of the driven fastener element **40**. Once the fastener element **40** is in alignment with such a point of intersection, further driving of the fastener element **40** by the tool effects relatively easy penetration of bearing portion **18**. Such penetration punctures and deforms parts of the bearing portion **18** into tight engagement with the forward end of the driven fastener element **40** so as to positively hold the fastener element and, in turn, the surface covering member **42** to the underlying beam **10** so as to positively secure a surface member **42** thereto.

By virtue of the unique shape of the various parts **26** and **28** of intermediate portion **24** in combination with the angular disposition of the unique inwardly directed flange **20**, beam sections **12** and **14** can advantageously be spliced together at their adjoining longitudinal ends in overlapping relation. With reference to FIG. 1, the adjoining longitudinal end of a beam section **12** is preferably attached to the adjoining longitudinal end of a beam section **14** in such a fashion that the oppositely facing surfaces of the flanges **20** and the intermediate portion **24** at the said adjoining ends can be disposed in positive mating surface-to-surface contact with each other. The generous radius of curved section **26** permits sufficient flexure and an opening of one end of a beam section, such as section **14**, sufficiently to snugly receive the opposing end of a similar beam section **12** without seriously or severely distorting the original shape of section **26** of the first beam section **14** at the point of splice between sections **12** and **14**. This is rendered even easier where intermediate portion **24** is perforated as noted above. Flange **20** of the lapping beam, such as section **14**, can also be displaced sufficiently to receive the underlying flange **20** of beam section **12**.

Such end-to-end jointure of the beam sections **12** and **14** advantageously results in a rigidly spliced beam **10** of a predetermined length. Because of the tight joint or splice brought about by the interlock between the sections **24** and **20** of the beam sections **12** and **14**, the overall spliced beam **10** need not be supported in the immediate area of the splice. Depending upon the particular building code requirements involved, any number of beams **10** or beam sections can be affixed to the studs **36** or joists. After affixation of the beams **10**, the wallboard **42** can be secured by the screws **40** in the aforedescribed manner to the bearing portion **18** of the underlying beam section **12** or **14** as the case may be. Whenever a load, such as sound vibration, is applied against the fastened wallboard **42** the spaced portions **16** and **18** will have relative displacement towards each other and result in resilient collapsing of the intermediate portion **24** as indicated by dotted lines in FIG. 2. The amount of collapse is controlled by engagement of flange **20** with the understructure such as a stud **36**. In addition to performing this function, flange **20** acts as a stop during driving of a panel fastener into bearing portion **18** whereby the fastener **40** is prevented from engaging the underlying structure such as studding and from bringing about a permanent collapse of web portion **24** and a locking of the bearing portion **18** to the studding by means of a fastener **40**.

As noted above, the splice between adjacent beam sections need not be supported in the area of the splice. Further, such snug splicing for all practical purposes eliminates any rattling sounds of the affixed beam **10** when loads are imposed upon the surface member **42** and studs **36**, and the like. If desired, the overlapped extent of the flange **22** on the beam section **12** between the joined beam sections **12** and **14** can be cut away prior to their jointure as aforedescribed to facilitate such jointure.

Finally, it is to be understood that any number of beam sections of given lengths can be spliced together at their adjoining longitudinal ends so as to fabricate a resilient structural beam of any required length.

An advantageous embodiment of the invention has been shown and described. It is obvious to those skilled in the art that various changes and modifications may be made therein without departing from the spirit and scope thereof as set forth in the appended claims.

What is claimed is:

1. A resilient runner made of readily flexible material and comprising a pair of offset spaced planar bearing portions and an intermediate sinuously curved integral web connecting said planar bearing portions together, one of the arcuate sections making up said web having a greater arcuate extent and more generous radius than another arcuate section making up said web, one of the arcuate sections also being directly connected to one planar bearing portion and another arcuate section being directly connected to the other planar bearing portion as well as to the first mentioned arcuate section and an inwardly directed stop flange formed integrally with one of the planar bearing portions and of a shorter length than said web, said stop flange being arranged at an acute angle of at least 60° relative to said last mentioned bearing portion.

2. A resilient runner as set forth in claim **1**, wherein said stop flange is arranged at an acute angle of between 60° to 85° relative to said last mentioned bearing portion.

3. A resilient runner as set forth in claim **1**, wherein one of said bearing portions is provided with a series of fastener penetrating deformations.

4. A resilient runner as set forth in claim **1**, wherein one of said arcuate sections is perforated.

5. An elongated composite resilient runner comprised of a pair of similarly configured beams spliced together in overlapping relationship, each of said beams being made

of a readily flexible material and having a pair of offset spaced planar bearing portions and an intermediate sinuously curved integral web connecting said planar bearing portions together, one of the arcuate sections making up said web having a greater arcuate extent and more generous radius than another arcuate section making up said web, one of the arcuate sections also being directly connected to one planar bearing portion and another arcuate section being directly connected to the other planar bearing portion as well as to the first mentioned arcuate section and one of the planar portions in one of said beams being provided with a stop flange formed integrally therewith and of a smaller length than the web of the beam with which it is associated, said stop flange also being arranged at an acute angle of at least 60° relative to said last mentioned bearing portion.

6. A composite resilient runner as set forth in claim 5, wherein said stop flange is arranged at an acute angle of between 60° and 85° relative to the planar portion with which it is associated.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,370,391 February 27, 1968

Harlan C. Dupuis et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 28, "combination" should read -- combinations --; line 35, "were" should read -- where --. Column 2, line 3, "removal" should read -- normal --. Column 3, line 27, cancel "relatively close together, it is to be understood that any number can be used and the rows of the deformations" and insert same after "arranged" in line 25, same column 3.

Signed and sealed this 17th day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents