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INTERLOCKING METALLIC STRUCTURAL MEMBERS

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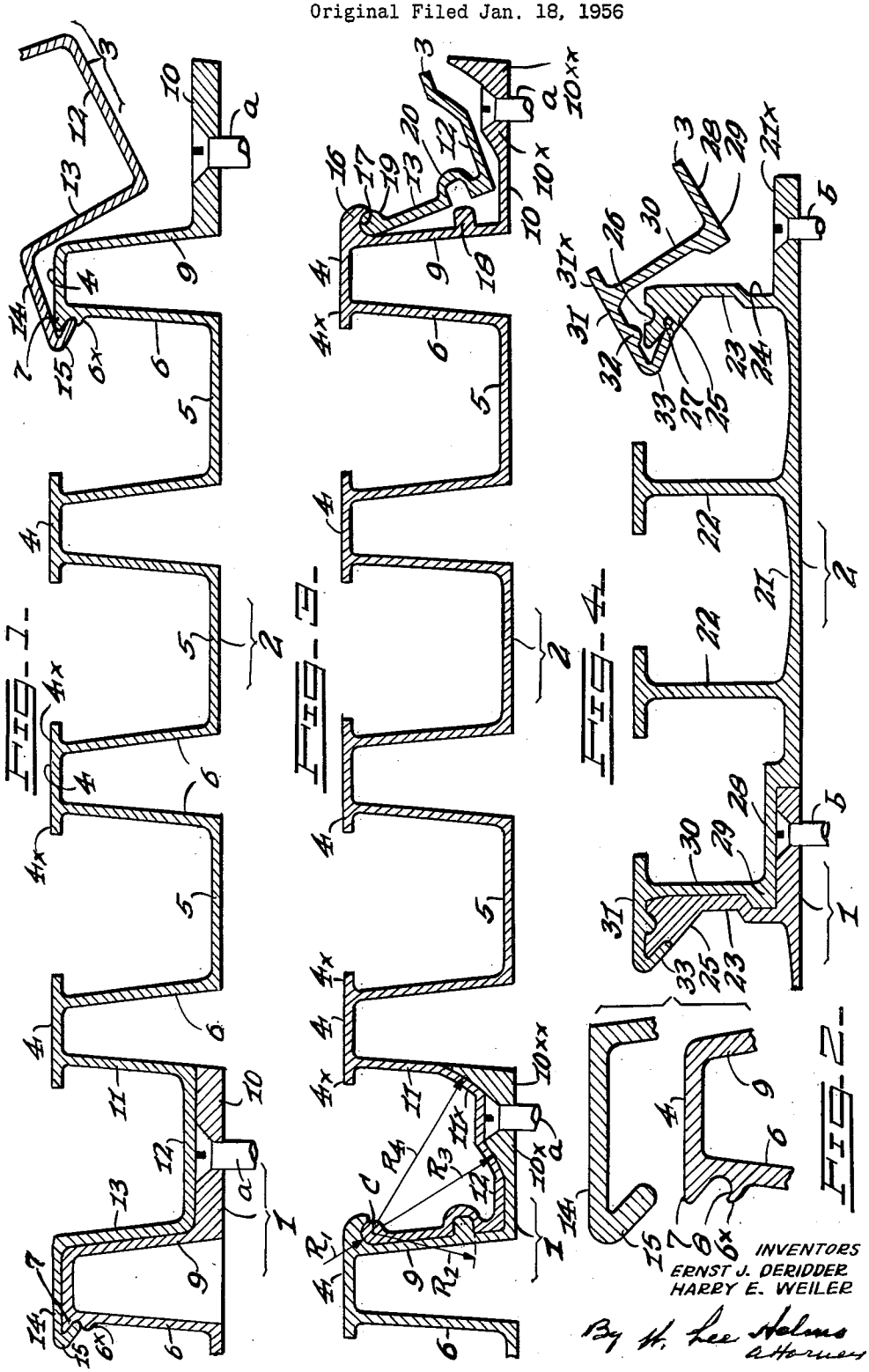

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INTERLOCKING METALLIC STRUCTURAL MEMBERS

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16 Claims. (Cl. 189—34)

The present invention relates to metallic structural members adapted to be formed by extrusion and having ends so formed that a plurality of the said members may be interlocked.

This application is a continuation of copending application Serial No. 559,865, filed January 18, 1956, now abandoned.

An object of this invention is to provide a metallic structural member particularly adapted for use as flooring in vehicles such as trucks, railway cars, etc.

A further object of the present invention is to provide a metallic structural member adapted for interlocking with other similar structural members in such a manner as to form at each interlocking point a strong moisture-resistant joint having exceptional resistance to pressure.

The structural member of our invention is suited for use in any connection where a surface formed of a plurality of interlocked sections and assembled with great facility and at low cost is required. When interlocked, the said members virtually provide, in assembly a unitary structure regardless of length and the number of members interlocked.

The invention will be described with reference to the accompanying drawing, in which:

FIGURE 1 is a cross-sectional view showing three members of our invention, the left hand outermost member being interlocked with the centrally positioned member, and the right hand outermost member being in position prior to interlocking, said two outermost members being broken way;

FIGURE 2 is an enlarged view of the interlocking areas of the members of FIGURE 1;

FIGURE 3 is a view similar to FIGURE 1, the shape of the members at the interlocking areas, being modified; and

FIGURE 4 illustrates a further modification of the invention.

Referring to the drawings and particularly to FIGURE 1, there are shown three structural metallic members generally indicated from left to right at 1, 2 and 3. These members are interlocked, and the outermost members 1 and 3 are broken away. Each member is formed of a plurality of alternate hollow ribs and channels, providing flat rib surfaces 4 and flat channel base walls 5. The side walls 6 of the channels are set at an angle obtuse to the base walls 5. The flat rib surfaces 4 have flange areas 4X on either side overhanging the adjacent channels.

Referring specifically to member 2, and to the right hand end thereof, it will be noted that the rib surface 4 terminates at its inner edge in a nose portion 7, below which is an upwardly and obliquely facing rounded seat 8 (above 6X) formed by a curved ridge 6X on the outer surface of wall 6 beneath nose 7 (FIGURE 2). Surface 4 at its outer edge merges with a downwardly extending strut 9, said strut 9 having at its bottom an outwardly extending base wall 10, the latter being aligned with the channel base walls 5.

Member 2 at its opposite end has a channel extension formed of a wall 11, base 12, upwardly extending leg 13, horizontal rib 14, and inwardly hooked nose 15. Elements 12, 13, 14 and 15, respectively, conform with wall 10, strut 9, surface 4, nose 7 and seat 8 of the first-mentioned end of member 2. It will be noted that the base 12 is raised, so that it rests horizontally upon base wall 10.

The members may be attached to a supporting structure by bolts, such as are shown at (*a*), passing through the base walls 10. These bolts are countersunk so that the channel bases 12 may be flush with the walls 10.

It will thus be apparent that two or more of the structural members of our invention may be brought together at their conforming end areas, and interlocked in the manner illustrated in the drawing. The right hand member (e.g. member 3) may be brought into locking engagement with the left hand member (e.g. member 2) from above the latter, the rounded nose 15 being first inserted in the seat 8, and the right hand member then being rotated into locked position.

Referring to the modification of FIGURE 3, it will be seen that the structural member 2 is formed at one end with a nose 16 under which is provided a rounded seat 17. Behind seat 17 is the downwardly extending strut 9 having at its bottom the outwardly extending base wall 10. Strut 9 bears on its outer face and below the center thereof, a tongue 18, said tongue having flat sides and a slightly rounded outer surface. Base wall 10 is formed at its outer end with a seat for the head of the bolt (*a*), said seat being formed between an inner shoulder 10X, and an outer wall 10XX which extends upwardly for a distance above the peak of the said shoulder. At the opposite end of the member the wall 11 has an outwardly bent portion 11X below its midpoint, which conforms with the upper surface of the wall 10X, the head of the bolt (*a*) and the exposed surface of the shoulder 10X. Section 11X merges into the shortened base 12. Leg 13, in this instance, terminates in a rounded nose 19 which conforms with the seat 17. Leg 13, furthermore, has an outwardly curving section 20 providing a groove conforming with tongue 18.

In the modification of FIGURE 3, the interlocked members have surfaces curving around the center point (C), as indicated by the radii R_1, R_2, R_3 and R_4. Thus, in bringing members together into interlocked position, the right hand member is rotated about point (C). The dimension between nose 19 and leg 11 may be varied depending upon the elasticity of the material of which the members are constructed. With more elastic materials, this dimension may be increased to provide an extremely tight joint, the right hand member being sprung into interlocked position. In a sense it will be seen that the nose 16, strut 9, and base wall 10 form a channel-like profile configuration having inner surface portions of the nose and of the base wall opposed to each other. Also the curved seat 17 has surface portions opposed to each other, one adjacent the strut 9 and facing laterally outwardly and the other adjacent the lip of the nose 16 and facing laterally inwardly. Similarly, the section 11*x*, base 12, leg 13 and nose 19 in a sense form a projecting profile configuration adapted to interfit within the aforementioned channel-like profile configuration.

Coming to FIGURE 4, structural members are shown which have a continuous bottom wall 21, provided with integral T-shaped stiffener ribs 22. At one end of the member, the bottom wall is thickened, as shown at 21X. Inwardly of section 21X rib 23 has its lower end offset and forming an outwardly exposed seat 24. Rib 23 at its top merges into an inwardly directed ledge 25. Ledge 25 has an inclined undersurface and a flat top surface with a centrally positioned longitudinal rounded groove 26 therein. The undersurface of ledge 25 is cut back for a short distance below the top surface thereof to form a seat 27. At its opposite end, the structural member is formed with a raised flat wall 28, which interfits with the aforesaid wall 21X, and has at its end a nose

29 which conforms with the seat 24 in leg 23. Nose 29 merges into an upwardly extending leg 30 conforming with the outer surfaces of leg 23 at its upper area and ledge 25. At the top of leg 30 is a flat rib 31 having an inwardly extending flange area 31X. Rib 31 is provided on its undersurface with a rounded protrusion 32 conforming with groove 26, and at its outer end has a downwardly and inwardly inclined nose 33 which conforms with the seat 27.

The modified structure shown in FIGURE 4 offers an improved tightness and strength in the interlocked joint. If desired, the groove 26 may be lined with a sealing compound for even additional tightness and moisture resistance. Again, this construction may be said to define a channel-like edge profile configuration (nose 29, leg 30, flat rib 31, and nose 33) having interfitted therein a projecting edge profile configuration (rib 23 and ledge 25).

The structural members of our invention are preferably of aluminum, but it will be understood that other metals may be employed. The walls of these members are sufficiently flexible to allow for an interlocking action in which the said walls will spring into tight connection. Each of the members may, of course, be provided with as many intermediate ribs and channels or stiffener legs between its interlocking ends as desired or permitted by the method of manufacture.

The structural members are particularly useful for refrigerated trucks and trailers, which usually require grooved flooring for sufficient air circulation below the freight.

Having described our invention, what we claim and desire to secure by Letters Patent is as follows:

1. At least two panel-like extruded metal sections adapted for interlocking engagement along their side edges to form at least a portion of a floor, each of said sections having a plurality of uniformly-spaced parallel upstanding load-carrying longitudinal ribs of uniform height, each of said ribs having an upstanding straight wall portion and a laterally-flanged flat top, the width of said top being of the order of the spacing therebetween to define slots communicating with air channel ways between said ribs, one of said sections having an upstanding substantially flat-topped rib-like load-carrying projection along one side edge, the inner side of said projection, adjacent its top, being provided with a curved-bottom groove-like seat, a generally horizontal fastening flange having a flat undersurface projecting from the outer side of said projection at its base, the other of said sections having, along one side edge, an upwardly offset marginal portion provided with an upstanding rib-like web, the undersurface of said marginal portion and the outer surface of said web being complementary, respectively, to the upper surface of said flange and to the outer surface of said projection for snug mating engagement therewith when said sections are interlocked, a generally horizontal flange projecting from the outer side and at the top of said web and adapted to overlie the top of said projection, said last-mentioned flange having a downturned lip terminating in an inturned rounded edge adapted for interfitting engagement within said seat and the undersurface of said last-mentioned flange and of its lip being complementary to the corresponding underlying surfaces on said projection for snug mating engagement therewith, when said sections are interlocked, the construction and arrangement of said sections being such that said lip edge can be engaged in said seat with said other section tilted up from its said one side edge and then said other section can be pivoted downwardly about said lip edge to interlock said sections against relative translational movement therebetween in any direction normal to the longitudinal extent of the interlocking engagement therebetween.

2. The structure defined in claim 1 including complementary longitudinal tongue and groove configurations on the top of the projection and the undersurface of the flange on the other section, said configurations being adapted to interfit snugly when said sections are interlocked.

3. The structure defined in claim 1 including complementary longitudinal tongue and groove configurations on the outer sides of the projection and the web, said configurations being adapted to interfit snugly when said sections are interlocked.

4. The structure defined in claim 1 in which each rib on each section and the projection on the one section is hollow and includes two spaced upstanding side walls, and the web on the other section constitutes a side wall of an upwardly facing channel.

5. The structure defined in claim 1 in which each rib on each one section is T-shaped and has a single upstanding wall portion.

6. At least two extruded panel-like metal sections adapted for interlocking engagement along their side edges to form at least a portion of a floor having upstanding parallel ribs provided with load-carrying flat tops separated by channels, one of said sections having along one side edge an upstanding rib provided along its inner side and adjacent its top with a curved-bottom groove-like seat, a flange-like lateral fastening extension, having a flat bearing under-surface, at the lower edge of the outer side of said rib, the other of said sections having along one side edge an upstanding rib which includes an upstanding straight-wall portion, said portion being provided along its outer side and adjacent its upper edge with a flange-like lateral extension adapted to overlie the top of said one section rib and merging at its outer edge in a down-turned lip which terminates in an inturned rounded edge complementary to said seat on said one section for pivotal engagement therein during assembly of said sections and said other section having an upwardly offset channel bottom portion at the inner side of said other section rib for overlying engagement with said lateral extension on said one section, the outer side of said other section rib, said lateral extension and lip thereon, and said channel bottom portion being complementary and having surfaces conforming respectively to the outer side of said one section rib, said top and inner edge thereof, and to said fastening extension, the construction and arrangement of said sections being such that said lip can be hooked over said inner edge of said one section rib with said rounded edge engaged in said seat while said other section is tilted up from its said one side edge and then said other section pivoted down about said rounded edge to assemble said sections into interlocking engagement with said conforming surfaces on said other section in snug overlying engagement with the top and outer side of said one section rib.

7. The structure defined in claim 6 in which the rib on the one section is constituted by a single upstanding wall portion.

8. The structure defined in claim 6 in which the rib on the one section includes two spaced upstanding side walls.

9. The structure defined in claim 6 including complementary longitudinal tongue and groove configurations on the outer sides of the ribs on the sections, said configurations being adapted to interfit when said sections are interlocked.

10. At least two panel-like extruded metal sections adapted for interlocking engagement along their side edges to form at least a portion of a floor, a wall, or the like, one of said sections having an upstanding substantially flat-topped rib along one side edge, the inner side of said rib, adjacent its top, being provided with a curved-bottom groove-like seat, a generally horizontal fastening flange having a flat undersurface projecting from the outer side of said rib at its base, the other of said sections having, along one side edge, an upstanding rib, a generally horizontal flange projecting from the outer side and at the top of said last-mentioned rib and adapted to overlie the top of said rib on said one section, said last-

mentioned flange having a down-turned lip terminating in an in-turned rounded edge adapted for interfitting engagement within said seat and the undersurface of said last-mentioned flange and of its lip being complementary and conforming to the corresponding underlying surfaces on said rib on said one section for snug mating engagement therewith when said sections are interlocked, said one section having along its said one edge an outwardly facing portion adapted to abut the outer side of said rib on said other section when said sections are interlocked, the construction and arrangement of said sections being such that said lip edge can be engaged in said seat with said other section tilted up from its said one side edge and then said other section can be pivoted downwardly about said lip edge to interlock said sections against relative translational movement therebetween in any direction normal to the longitudinal extent of the interlocking engagement therebetween.

11. A floor section for a vehicle comprising: an extruded aluminum section having a bottom panel portion provided with a generally flat undersurface; a plurality of T-shaped longitudinal ribs upstanding from said panel portion in spaced parallel relation, the upper surfaces of said ribs being in substantially flush relation to one another but having their side edges spaced from one another at distances of the order of their widths to provide longitudinal slots communicating with channelways spaces interiorly of said section between said ribs; and means at each side edge portion of said section and integral therewith for forming a longitudinally extending interlocking connection with another section of similar bottom panel and upstanding T-shaped rib construction by relative pivotal movement between adjacent sections, said connection preventing relative translational movement between interlocked sections in any direction normal to the longitudinal extent of the connection therebetween, whereby a floor for a vehicle may be assembled by longitudinally interlocking a plurality of such sections, within which floor air may flow through said channelway spaces between adjacent ribs.

12. The structure defined in claim 11 in which the means for forming an interlocking connection includes a T-shaped upstanding rib at at least one side of the section.

13. Floor structure for a vehicle comprising: a plurality of relatively-narrow elongated sections assembled in side-by-side relation to constitute a floor for a vehicle, each section comprising a metal extrusion having a bottom panel portion adapted to be supported by the chassis of the vehicle and a plurality of T-shaped longitudinal ribs upstanding from said panel portion in spaced parallel relation, the upper surfaces of said ribs being substantially in a plane parallel to the plane of said bottom panel portion and said surfaces having their side edges spaced apart at distances of the order of their widths to provide longitudinal slots communicating with channelway spaces between adjacent ribs; and continuously extending means at and integral with the side edge portions of said sections interlocking the latter to one another against relative translational movement between said sections in any direction normal to the longitudinal extent of said sections.

14. The structure defined in claim 13 in which the interlocking means includes the outermost rib of at least one section of each adjoining pair.

15. At least two panel-like extruded metal sections adapted to be assembled in side-by-side interlocking relation to form at least a portion of a vehicle floor, each of said sections having a panel-like base portion provided with a generally flat undersurface and upstanding therefrom a plurality of uniformly-spaced parallel T-shaped longitudinal ribs of uniform height, the edges of the flanged tops of said ribs being spaced apart at distances of the order of the width of said tops to define longitudinal slots communicating with channelway spaces between said ribs, one of said sections having along one side edge a channel-like profile configuration having opposed generally upwardly and downwardly facing inner surface portions and opposed generally laterally outwardly and inwardly facing inner surface portions and the other of said sections having along one side edge a projecting profile configuration adapted to interfit within said channel-like configuration and having opposite generally upwardly and downwardly facing outer surface portions and opposite generally laterally outwardly and inwardly facing outer surface portions, the construction and arrangement of said configurations being such that said projection configuration can be engaged in said channel-like configuration with said sections tilted relative to each other and then said sections relatively rotated about such engagement into substantially coplanar interlocking relation wherein said inner and outer surface portions are engaged and prevent relative translational movement between said sections in any direction normal to the longitudinal extent of the connection therebetween.

16. The structure defined in claim 15 in which one of the profile configurations includes at least a portion of an outermost rib on the corresponding section.

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