

Jan. 23, 1968

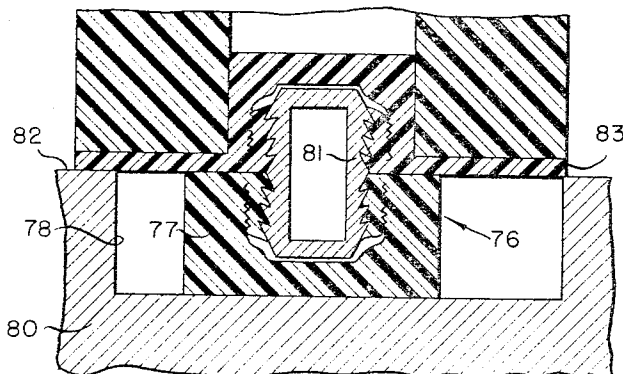
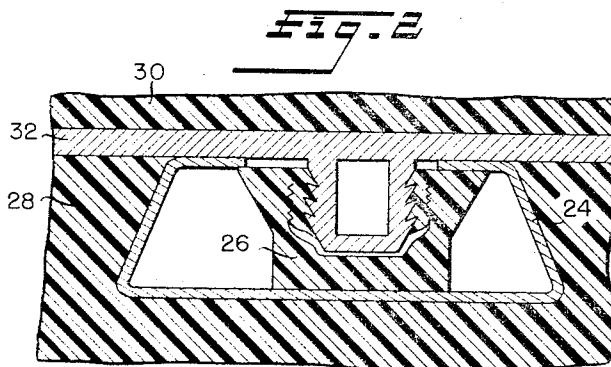
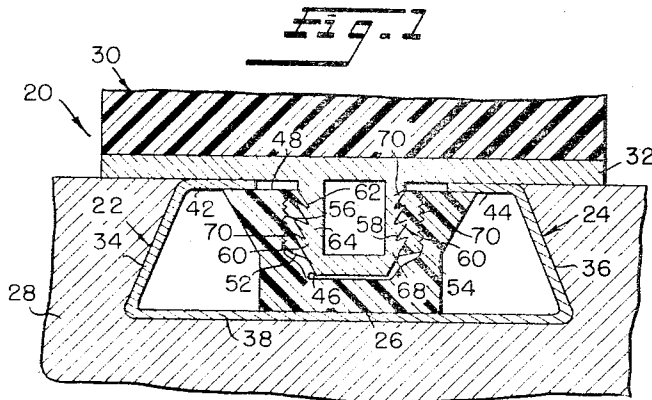
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3,364,641

FLOATING SPLINE SEAT

Filed Oct. 12, 1966

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

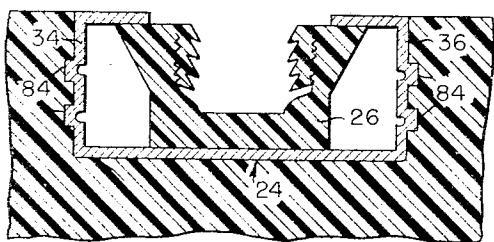


Fig. 4

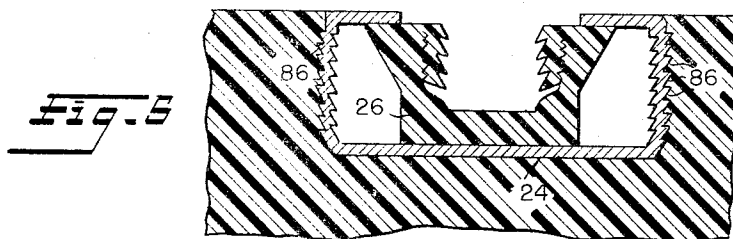


Fig. 5

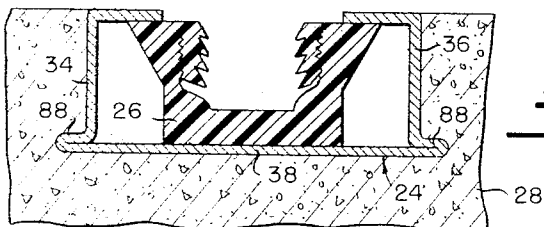


Fig. 6

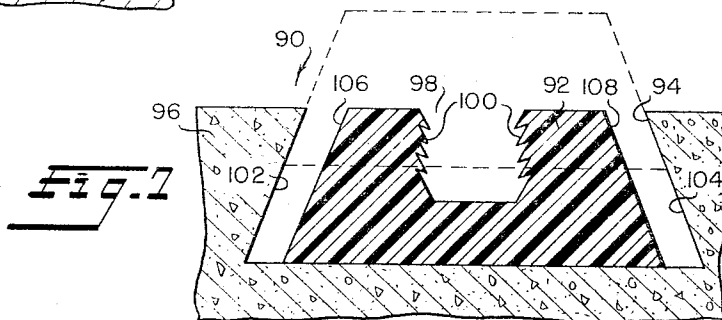


Fig. 7

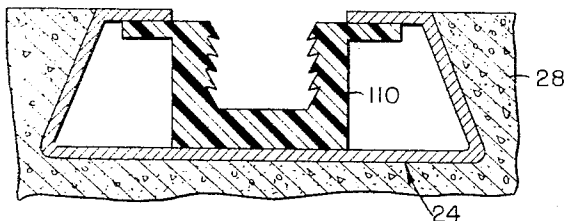


Fig. 8

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3 Sheets-Sheet 3

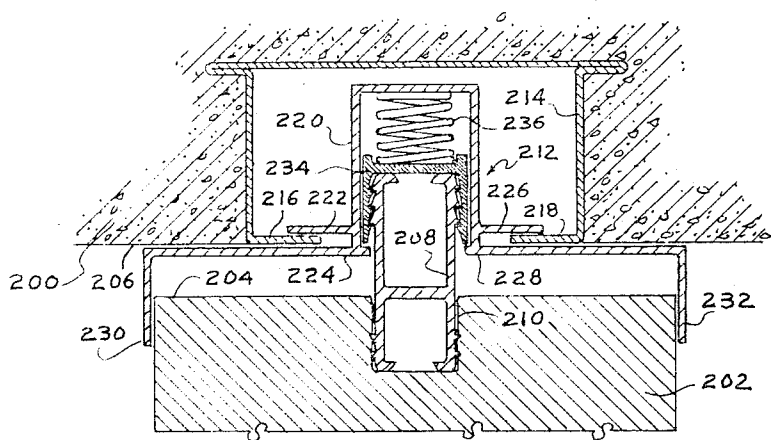


Fig. 9

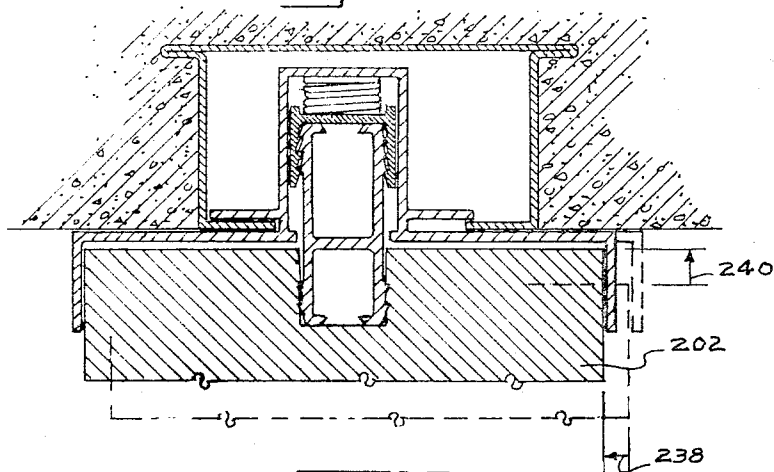


Fig. 10

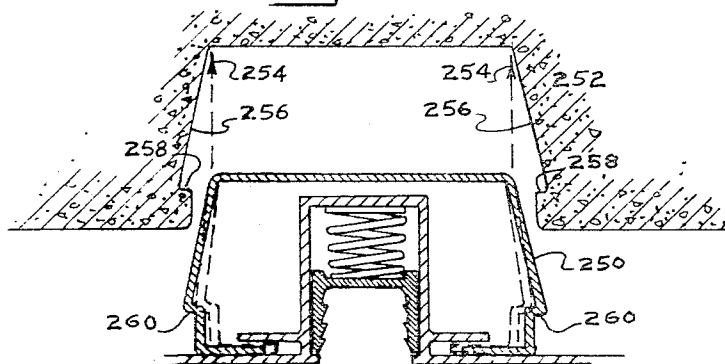


Fig. 11

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FLOATING SPLINE SEAT

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Continuation-in-part of application Ser. No. 513,652,
Nov. 26, 1965. This application Oct. 12, 1966, Ser. No.
598,560

14 Claims. (Cl. 52—396)

This application is a continuation-in-part of my application Ser. No. 513,652, filed Nov. 26, 1965, which in turn is a continuation-in-part of my application Ser. No. 174,554, filed Feb. 20, 1962. Both applications are abandoned.

This invention relates to improved components for use in the building construction systems disclosed and claimed in my copending applications 837,495, filed Sept. 1, 1959 and 164,043, filed Jan. 3, 1962, both abandoned, and more specifically relates to a novel seat assembly for a spline connector.

The systems disclosed in my earlier applications and in U.S. Patent No. 3,214,802 provide a joint connection for wooden, synthetic, prefabricated, and other structural members built around a spline type connector which may be forced into cooperating slots in adjacent structural members to align them, and in some instances, to hold them in abutting relationship. In employing beams, posts, panels and other structural components, alignment difficulties are sometimes encountered. This problem is greatest with poured concrete floors and wall where locations and dimensions of spline receiving slots are difficult to control.

It is the major object of the present invention to provide a novel floating seat assembly which may be employed with the spline connectors to provide relative limited movement of the abutting surfaces to accommodate thermal expansion and contraction of the structural members, and also to reduce the difficulties of alignment where one of the structural members is a body of concrete.

Another object is to provide a novel spline and seat connecting joint wherein the seat is capable of limited movement in a plane perpendicular to the longitudinal axis of the joint. Thus, the seat may move laterally of the longitudinal axis, or in a direction perpendicular to both the direction of the lateral movement and the longitudinal axis, or in both directions.

In one embodiment, the floating seat assembly includes a rigid channel-like housing of metal or plastic in which a slotted seat member for receiving the spline is mounted for a limited side-to-side movement. The slotted seat member and walls of the slot in the structural member may be provided with cooperating surfaces to prevent movement of the seat member from the recess. In applications where a vertical wall is supported by a body of concrete, the recess and seat member may be arranged to permit insertion into and removal of the seat member from the slot in the structural member, and if desired, also permit limited movement in the direction of the depth of the slot.

Other objects and the novel features of the present invention will become fully apparent from the claims, and from the description as it proceeds in conjunction with the appended drawings, wherein:

FIGURE 1 is a transverse sectional view of an improved building construction joint connection employing a floating spline seat member constructed in accordance with the principles of the present invention;

FIGURE 2 is a view similar to FIGURE 1, showing the spline seat member of the floating seat assembly displaced laterally from its centered position;

FIGURE 3 shows a further embodiment of the floating seat assembly provided by the present invention;

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FIGURE 4 is a view similar to FIGURE 2, but illustrating an alternate arrangement for retaining the floating seat assembly housing in a structural member;

FIGURE 5 is a view similar to FIGURE 4 and illustrates a further arrangement provided for retaining the assembly housing in a structural member;

FIGURE 6 is a view similar to FIGURE 5, illustrating a still further housing-retaining arrangement;

FIGURE 7 is a view similar to FIGURE 6, illustrating an embodiment of the floating seat assembly which is particularly useful in conjunction with poured concrete construction;

FIGURE 8 is a view similar to FIGURE 7 of a further embodiment of the present invention;

FIGURE 9 is a transverse sectional view of an improved building construction joint connection wherein the seat member is mounted for limited displacement in two coordinate directions defining a plane that is perpendicular to the longitudinal axis of the joint;

FIGURE 10 is a view of the joint of FIGURE 9 showing the seat member displaced both laterally and in a direction to compress springs supporting the seat member with arrows indicating the extent of displacement from the neutral position illustrated in FIGURE 9; and

FIGURE 11 is a similar view of a further embodiment showing a seat subassembly that can be snapped into a slot in a beam or foundation member of concrete or other construction material.

Referring now to the drawings, in which an exemplary structure is illustrated, FIGURE 1 illustrates a connecting joint 20 between a first structural member 30 and a second structural member 28. The first structural member 30 has a continuous spline 64 which extends for the length of the edge surface which abuts structural member 28 and may, for example, extend 4 or 8 feet. Structural member 28 may have a similar or greater length and have an upper abutting edge surface containing a continuous slot into which spline 64 freely extends. A slotted spline receiving seat member 26 of a suitable material is located in the slot in structural member 28 and contains an internal slot which lockingly engages the side walls on the spline attached to structural member 30.

Floating seat assembly 22 consists, generally, of an elongated, channel-like housing 24 within which an elongated, slotted spline receiving seat member 26 is mounted for limited side-to-side movement to facilitate assembly of the structural member 28 in which the floating seat assembly 22 is incorporated with a structural member 30 equipped with a spline type connector 32 which is also disclosed in my copending application 174,555, filed Feb. 20, 1962, the disclosure of which is hereby incorporated by reference.

The channel-like configuration of housing 24 is provided by a pair of spaced side walls 34 and 36 connected by a transversely extending rear or end wall 38. A pair of elongated flanges 42 and 44 are formed on the edges of housing side walls 34 and 36 opposite rear wall 38 to retain seat member 26 in the housing. Housing side walls 34 and 36 form acute angles with housing rear wall 38 and obtuse angles with flanges 42 and 44, providing a tapered or trapezoidal cross-sectional configuration. This configuration is effective to retain housing 24 in structural member 28 which may conveniently be of concrete (FIGURE 1), plastic (FIGURE 2), or similar castable material cast around the housing. Housing 24 may be extruded, or formed by a bending or similar process from any metal, alloy or of a plastic material which will provide a substantially rigid housing.

Seat member 26 is an elongated member provided with a substantially rectangular inwardly directed slot 46 opening into its exterior surface 48. Seat member 26 may be

formed of either rigid or resilient material, depending upon the connector with which it is employed, and may be provided with two longitudinally extending, laterally directed wall portions or flaps 52 and 54 which are displaced into engagement with slot side walls 56 and 58 by insertion of connector 32. Mating, tooth-like projections 60 and 62 formed on connector side walls 66 and 68 and on side wall portions 52 and 54 of seat member 26 interengage, providing a connection which resists displacement of connector 32 from the seat member slot. Serrations 70, formed on the opposite sides of deformable wall portions 52 and 54 and on the slot side walls 56 and 58, resist movement of the deformable wall portions relative to the slot side walls.

FIGURE 2 illustrates the floating seat assembly of FIGURE 1 with the seat member 26 displaced from its neutral or centered position. As may be seen from this figure, housing 24 permits substantial movement of seat member 26 and thereby accommodates significant misalignment of structural components as well as thermal expansion and contraction of the magnitudes likely to be encountered in the types of building constructions with which the floating seat assembly is intended to be employed, but yet provides an adequate anchor for holding structural members 28 and 30 together.

FIGURE 3 illustrates an embodiment of the floating seat assembly of the present invention indicated generally by reference character 76. This assembly consists of a seat member 77 which, in all its significant aspects, is identical to the seat member 26 described above, and which is mounted for limited side-to-side movement in a recess 78 formed in the structural member 80 and opening onto the edge surface 82 thereof. This seat assembly may be advantageously employed in poured concrete or similar cast-type construction since it eliminates the channel-like housing 24 and thereby provides an extremely simple joint construction which may be used for supporting a vertical wall on a concrete footing. Seat member 77 of the floating seat assembly may be readily assembled to structural member 80 by inserting it into the open recess 78 in a direction normal to its length and to its direction of side-to-side movement and indicated by the arrow in FIGURE 3.

As is illustrated further in FIGURE 3, floating seat assembly 76 may be employed with a spline connector 81 of the type disclosed in my copending application 837,495 to join a panel 82 of the type disclosed in my copending application 164,043 to structural member 80. To accommodate even greater misalignment, thermal expansion and contraction, a floating seat assembly may be substituted for the panel edge-frame 83 in the illustrated joint connection. It will be understood that the illustrated joint connection is merely exemplary and that posts, beams, or other panels, to mention only a few, may be substituted for panel 82 or structural member 80, or both. Wedge shaped blocks (not shown) may be driven between recess walls 78 and seat member 76 to position seat member 76 in a desired location.

In the housing embodiment illustrated in FIGURES 1 and 2, the housing side walls 34 and 36 are, as discussed above, formed at acute angles to rear wall 38 to provide a tapered housing configuration which retains housing 24 in structural member 28. Alternate methods of accomplishing this same objective are illustrated in FIGURES 4-6. As is shown in FIGURE 4, longitudinally extending ribs 84 may be formed on the exterior surfaces of the housing side walls 34 and 36. Or, as is shown in FIGURE 5, longitudinally extending tooth-like projections 86 may be formed in the housing side walls. This embodiment is particularly useful with wooden structural members since the projections 86 will grip and bite into the side walls of the recess in which the housing is fitted. The embodiment of FIGURE 6 shows projections 88 on the exterior of a substantially rectangular housing cast into concrete.

FIGURE 7 illustrates a further embodiment 90 of floating seat assembly. This embodiment, like the embodiment illustrated in FIGURE 3, dispenses with the channel-shaped housing 24 and therefore involves one less part. Floating seat assembly 90 consists of a trapezoidally sectioned, elongated seat member 92 mounted for limited movement in a direction normal to its length in a cooperating trapezoidally sectioned recess 94 formed in structural member 96. A longitudinally extending slot 98 is formed in seat member 92 to receive a spline connector which may be an integral part of the mating structural member as shown in FIGURE 1 and as a separate part, as shown in FIGURE 3. Tooth-like projections 100 shown in FIGURE 7 formed on the slot side walls are intended to cooperate with similar tooth-like projections formed on the spline connector to provide locking engagement between the spline connector and the seat member.

The seat member-receiving recess 94 formed in structural member 96 is substantially wider than seat member 92, allowing limited side-to-side movement of seat member 92 in recess 94 in a direction normal to its length to accommodate misalignment as well as expansion and contraction of a further structural member (not shown) assembled to structural member 96. Seat member 92 may also move upwardly in the recess 94 to a position shown in dotted lines in FIGURE 7, but not completely out of the recess. Movement in the latter direction is limited by the engagement of the recess side walls 102 and 104 with the seat member side surfaces 106 and 108.

Floating seat assemblies constructed in accordance with the principles of the present invention may employ a wide variety of seat members including that illustrated in FIGURE 8, which has a spline receiving seat member 110.

Referring now to FIGURE 9, the floating seat may be mounted in an overhead beam 200 or in the ceiling which serves as a floor in a multi-story building. The other structural member may be a non-load bearing partition 202. The elongated edge surfaces 204 and 206 are in close face-to-face relationship. The spline 208 may fit in slot 210 of structural member 202 and extend into the floating seat subassembly 212 described below.

In structural member 200, a channel-like housing 214 having flanges 216 and 218 may be provided which is similar to housing 24 in the embodiment of FIGURE 6. A spline seat retaining member 220 has a central U-shaped cross section and spaced flanges 222 and 224 which straddle flange 16, and spaced flanges 226 and 228 which straddle flange 218. Flanges 224 and 228 may be provided with depending legs 230 and 232 which extend over the opposite sides of structural member 202. A space between edge surface 204 and the lower surface 224 may be provided.

Spline seat retaining member 220 has in its interior the seat member 234 which is preferably provided with projections that lockingly engage with mating projections on spline 208. Resilient compression members, such as a plurality of spaced coil springs 236 are provided along the length of the joint to allow seat member 234 to be urged upwardly in spline seat retaining member 220.

Referring now to FIGURE 10, structural member 202 is illustrated as being shifted or displaced laterally in the direction of arrow 238 and upwardly in the direction of arrow 240. Such displacements not only accommodate contractions and expansions, but also reduce tolerance requirements for the components in the system.

FIGURE 11 shows another floating seat assembly which is similar to the embodiment described in connection with FIGURES 9 and 10, excepting the entire seat including the channel-like member 250 may be combined as a subassembly and then inserted in slot 252 by movement in the direction of arrows 254. Slot side walls 256 may be formed with projections 258 which engage projections 260 on the walls of member 250. The walls of member 250 are resilient and capable of being compressed toward each other during assembly to a position as il-

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lustrated in dotted lines. Once assembled, the embodiment of FIGURE 11 provides a seat member 262 which is capable of limited movement in a plane perpendicular to the longitudinal axis of the joint.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. A connecting joint for a multi-component building comprising:

- (a) a pair of structural members having elongated edge surfaces in close face-to-face relationship;
- (b) a spline connector means comparatively rigidly fixed to one of said members and extending substantially the entire length of said abutting edge surfaces;
- (c) an elongated slot having substantially parallel wall edges at said edge surface of the other of said members, the distance between the slot wall edges being less than the width of the abutting edge surface of said one member;
- (d) said spline connector means extending from said one member into the elongated slot of said other member and having substantially parallel, flat wall surfaces that are spaced apart a distance smaller than the distance between said slot wall edges;
- (e) a seat member located in the slot of said other member and having a slot with substantially parallel walls spaced apart and constructed to lockingly engage a portion of the spline connector means extending into the elongated slot of said other member; and
- (f) means for mounting said seat member for limited movement relative to said other member in a direction perpendicular to the longitudinal axis of said elongated slot to reduce tolerance requirements for the components in the system.

2. The connecting joint as defined in claim 1 wherein the spline connector means is an integral part of the edge surface of said one member, and the seat member is mounted for limited movement in a direction laterally of said longitudinal axis.

3. The connecting joint as defined in claim 1 wherein the spline connector means is a part separate from each of said structural members; the edge surface of said one member contains a slot substantially identical to the slot in said seat member; a portion of the spline connector is lockingly engaged also in the slot in one member; and the seat member is mounted for limited movement in a direction laterally of said axis.

4. The connecting joint as defined in claim 1 wherein said other structural member is a horizontal concrete body, said elongated slot is horizontally disposed and said one member is a vertical wall.

5. The connecting joint as defined in claim 4 wherein the side walls of the elongated slot in said other member are vertical.

6. The connecting joint as defined in claim 4 wherein the side walls of the elongated slot in said other member slope upwardly and toward each other to partially enclose the top of and prevent vertical removal of said seat member from said slot.

7. The connecting joint as defined in claim 4 wherein said elongated slot is defined by a channel-like housing of

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rigid material different from cement and the seat member is positioned inside said metal housing.

8. The connecting joint as defined in claim 7 wherein said rigid housing has a cross section in the shape of a trapezoid with a slot extending the length thereof in the top side of said trapezoid forming said elongated slot in said other member.

9. The connecting joint as defined in claim 7 wherein said rigid housing has a cross section in the shape substantially of a rectangle with a slot extending the length thereof in the top side of said rectangle forming said elongated slot in said other member, and projections extending outwardly from the housing walls for securing the housing in said concrete member.

10. The connecting joint as defined in claim 1 wherein the seat member is supported for limited movement in two directions lying in a plane that is perpendicular to said longitudinal axis.

11. The connecting joint as defined in claim 10 wherein said seat member mounting means comprises a sub-assembly including a channel-like housing secured in the slot of said other member, a spline seat retaining member located in said channel-like housing, flange means on said channel-like housing for maintaining said spline seat retaining member in said housing for limited movement in a direction laterally of said longitudinal axis, resilient compression members normally urging said spline seat retaining member against said flange means and compressible to provide limited movement in a direction perpendicular to the direction of both said lateral movement and said longitudinal axis, and means mounting said seat member to said spline seat retaining member.

12. The connecting joint as defined in claim 11 wherein said channel-like housing has resilient walls which are resiliently compressible and said other member has projections on side wall surfaces for lockingly engaging said channel-like housing.

13. The connecting joint as defined in claim 11 wherein said resilient compression members comprise a plurality of coil spring means spaced along the length of said seat member.

14. The connecting joint as defined in claim 1 wherein said elongated slot is defined by a channel-like housing of rigid material different from the material forming said other structural member having in its side that opens onto said edge surface a slot extending the length thereof to form said elongated slot, and projections extending outwardly from said housing walls for securing the housing in said other structural member.

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