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Connecting member

This invention generally relates to connecting members for inter-connecting pairs of structural components, and more particularly, to such members for inter-connecting a pair of components in a toy building set.

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A previous connector for this purpose comprises an elastic, deformable, tubular plug provided with an axially extending slit in each end, so as to enable the ends of the plug to be slightly compressed when inserted in co-axially disposed complementary coupling holes in a pair of adjacent building blocks. This compression will cause the ends of the plug to exert a suitable coupling force between the plug and the inner walls of the coupling holes. This coupling force will generally suffice for detachably inter-connecting a pair of toy building elements.

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In some cases, however, it is desirable to provide a more or less permanent connection between a pair of adjacent components, and the object of the present invention is to provide a connecting member which, when pressed into a pair of complementary coupling holes, will exert a considerably increased coupling force, so as to interlock the two adjacent components.

According to the invention, this is achieved by providing a pair of oppositely disposed, lengthwise extending slits at each end of the plug, all the slits lying in a common axial plane, the plug having

5. a central portion which is readily inwardly deformable and is so configured in relation to the remainder that when this central portion is compressed by the application of an inwardly directed force cross-wise of the plug in a direction generally transverse

10. to the said common plane, the slitted ends of the plug tend to expand.

Preferably the central portion includes a pair of lengthwise extending apertures in alignment with the slits in the ends, the apertures and slits

15. being symmetrical with respect to the common axial plane, and the outer surface of the plug is provided with means for compressing the middle portion of the plug radially inwards in directions generally normal to the common axial plane, when the ends

20. are pressed into a pair of complementary coupling holes in a pair of adjacent components.

When inserted in the coupling holes, the slitted ends of the plug are unable to expand, but their tendency to do so will cause a considerable

25. coupling force to be exerted between the ends of the plug and the walls of the coupling holes. This force is appreciably greater than that obtainable with previous connectors and suffices to provide a more or less permanent connection.

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Examples of connecting members in accordance with the invention will now be described, with reference to the accompanying drawings, in which:-

Figure 1 is a side view showing one form of connecting member;

Figure 2 is a cross section taken on the line II - II of Figure 1;

Figure 3 is a schematic side view partly in section showing the elastic deformation of the connecting member when inserted in a pair of co-

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axial coupling holes in a pair of inter-connected components;

Figure 4 is a side view similar to Figure 1 showing a modified form of connecting member;

5. Figure 5 is a side view of the same embodiment, but viewed in a plane perpendicular to the plane of Figure 4;

10. Figure 6 is a schematic side view similar to Figure 3 showing the elastic deformation of the connecting member shown in Figure 4; and

Figure 7 is a detailed view showing one face of a component provided with a coupling hole and an annular recess around the periphery thereof.

15. Referring now to Figures 1 to 3, the connecting member comprises a tubular plug generally designated as 1 which is symmetrical with respect to a plane C - C perpendicular to the axis of the tubular plug 1, the interior of which is designated as 10. The plane C - C thus divides the plug 1 into two identical halves 1a and 1b provided with a pair of lengthwise extending slits 2a and 2b at either end of the plug.

20. In the middle portion of the plug there is provided a pair of lengthwise extending apertures 3 between the end slits 2a and 2b. The apertures 3 and the end slits 2a and 2b are symmetrical with respect to a common axial plane A - A and also with respect to the median plane C - C.

25. On the outer surface of each of the two halves 1a and 1b there is provided a pair of
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lengthwise extending, wedge-shaped ribs 4a and 4b disposed at either side of the median plane C-C. They are symmetrical with respect to the plane C-C and also to an axial plane B-B which is perpendicular to the plane A-A. The lengthwise extending wedges 4a and 4b have a maximum height adjacent the plane C-C and define respective inclined surfaces tapering towards the ends of the plug in both halves 1a and 1b thereof.

10. The function of this connecting member when used for interlocking a pair of components provided with complementary coupling holes 8 is as follows:-

The two ends of the plug are pressed into a pair of co-axially disposed coupling holes 8a and 8b in a pair of adjacent components 9a and 9b, as schematically shown in Figure 3. During the displacement of the plug relatively to the inner walls of the coupling holes, the wedges 4a and 4b will cause an inwardly directed force to be exerted on the middle portion of the plug and, owing to the apertures 3, this force will cause the middle portion of the plug to be slightly compressed as indicated by the arrows p_1 in Figure 3. As a result of this compression, the walls of the plug will tilt in the regions between the apertures and the slits and the end portions of the plug will have a tendency to expand, as indicated by the arrows p_2 in Figure 3. Thus, the clamping force p_1 exerted by the wedges on the middle portion of the plug and the expanding forces p_2 at the ends of the

plug will co-operate to provide a firm interlocking of the two components 9a and 9b.

5. Referring next to Figures 4 to 6, the structure and performance of this connecting member are substantially the same as described with reference to Figures 1 to 3, except that the plug is here provided with annular beads 6a and 6b around the ends of the plug and with an annular flange 5 in the middle portion thereof.

10. So as not to prevent the compression of the middle portion of the plug, the flange 5 is interrupted by the apertures 3 which extend through the flange 5, as shown in Figures 4 and 6.

15. When using such a connecting member for interlocking a pair of components in a toy building set, it may be desirable to provide a joint wherein the end faces of the plug are flush with the outer sides of the components. For this purpose, it is customary to use components, such as blocks or
20. bars, having coupling holes which extend right through the component and are provided with annular recesses 7 around the coupling holes 8 at both sides of the component. As shown in Figures 6 and 7, these recesses 7 have a depth x which is
25. equal to the width of the beads 6a and 6b. Where the juxtaposed side faces of the two components coincide, as shown in the middle of Figure 6, their co-axial recesses 7 will form a recess having a double width 2x adapted to receive the flange 5
30. having substantially the same width 2x.

Thus, the beads 6a and 6b in combination with the flange 5 and the recesses 7 in components 9a and 9b provide for an assembly, wherein the end faces of the plug are flush with the side faces of the components.

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1. A connecting member for inter-connecting a pair of components in a toy building set when the ends are pressed into a pair of complementary coupling holes in the components of the building set and comprising a tubular plug made of elastically deformable material of which each end is formed with a pair of oppositely disposed, lengthwise extending slits, all the slits lying in a common axial plane, the plug having a central portion which is readily inwardly deformable and is so configured in relation to the remainder that when this central portion is compressed by the application of an inwardly directed force crosswise of the plug in a direction generally transverse to the said common plane, the slitted ends of the plug tend to expand.
2. A connecting member as claimed in claim 1, in which the central portion includes a pair of lengthwise extending apertures in alignment with the slits in the ends, the apertures and slits being symmetrical with respect to the common axial plane, and wherein the outer surface of the plug is provided with means for compressing the middle portion of the plug radially inwards in directions generally normal to the common axial plane, when the ends are pressed into a pair of complementary coupling holes in a pair of adjacent components.
3. A connecting member as claimed in claim 2 in which the means for compressing the middle portion of the plug comprise two pairs of lengthwise extending wedges which are disposed symmetrically with respect to a second common axial plane which is perpendicular to the first plane and which are located symmetrically at either side of a median plane perpendicular to the axis of the tubular plug.

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4. A connecting member as claimed in claim 2 or claim 3 wherein the middle portion of the plug is provided with an annular flange, through which the apertures in the middle portion of the plug extend.
 5. A pair of inter-connected structural components including a connecting member according to any one of the preceding claims located in complementary coupling holes in the respective components.
 10. A connecting member for inter-connecting a pair of components in a building set substantially as described and as illustrated with reference to Figures 1 to 3 or Figures 4 to 6 of the accompanying drawings.
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