Nov. 22, 1960 T. S. CHRIS 2,961,077

BUILDING CONSTRUCTION

Filed April 3, 1957 2 Sheets-Sheet 1

Fig. 1

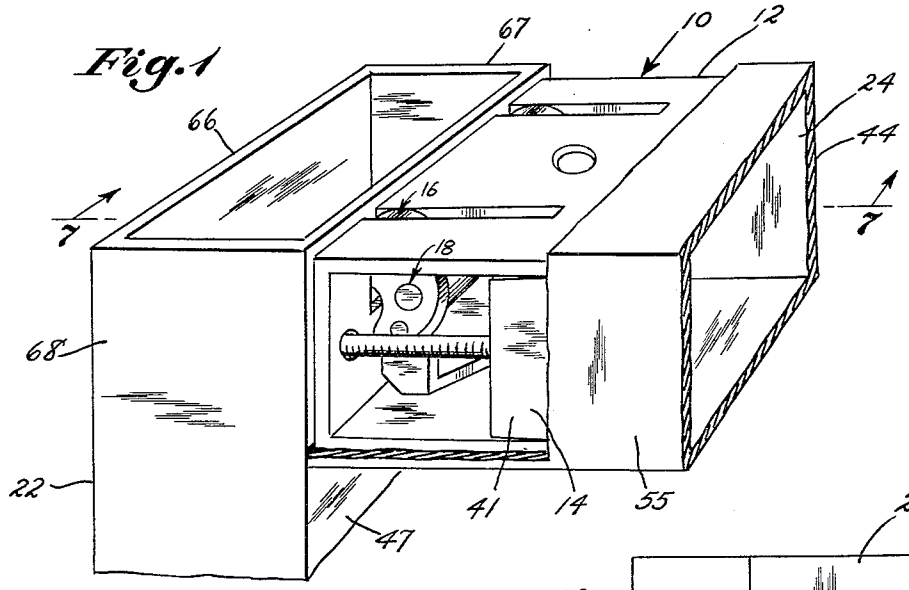
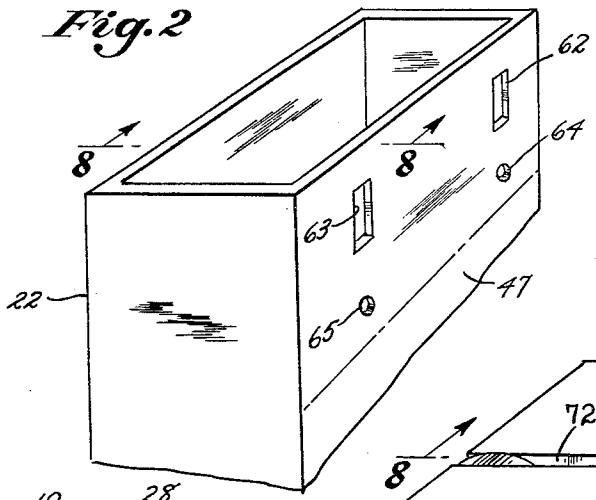


Fig. 2



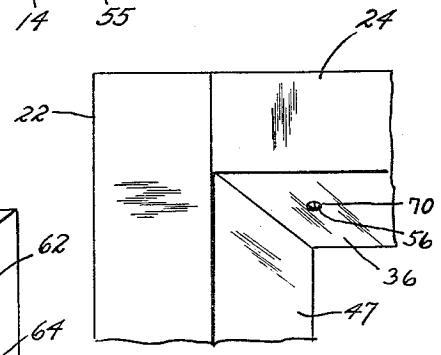


Fig. 5

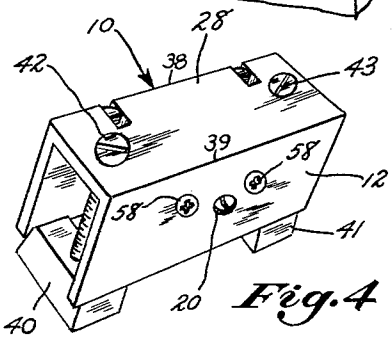


Fig. 4

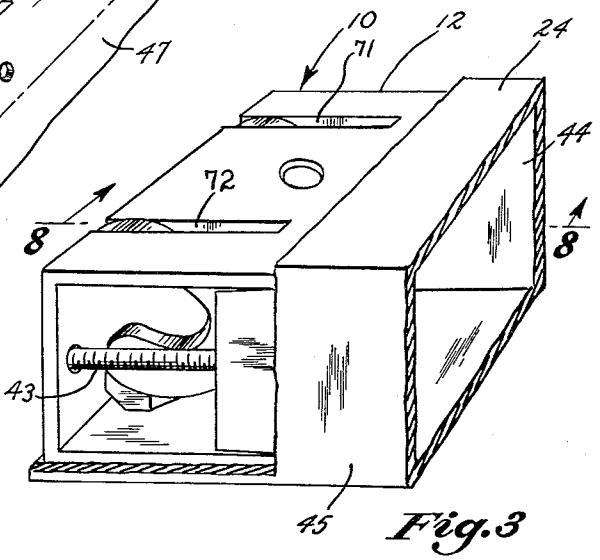


Fig. 3

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BUILDING CONSTRUCTION

Filed April 3, 1957 2 Sheets-Sheet 2

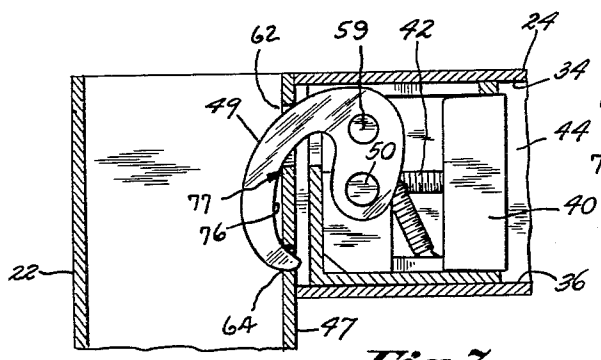


Fig. 7

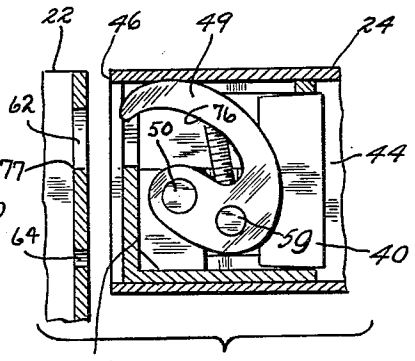


Fig. 8

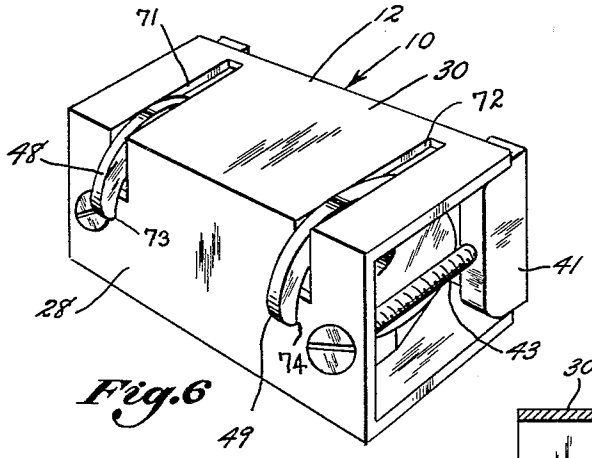


Fig. 6

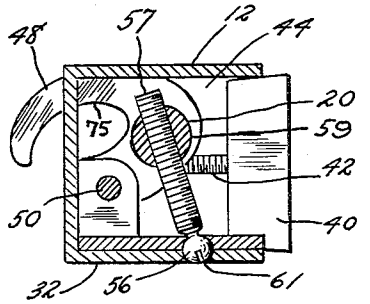


Fig. 9

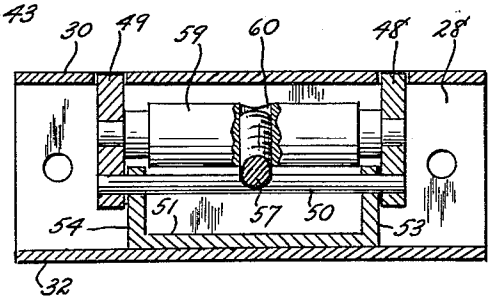


Fig. 11

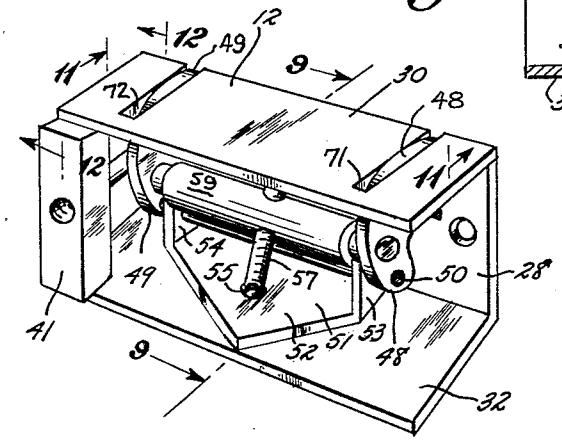


Fig. 10

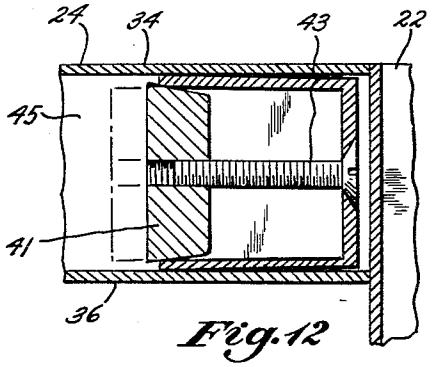


Fig. 12

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2,961,077

BUILDING CONSTRUCTION

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Filed Apr. 3, 1957, Ser. No. 650,344

2 Claims. (Cl. 189—36)

This invention relates generally to building construction, and more particularly to improvements in the interconnection of hollow members to each other. Since the invention involves the integration of angularly disposed parts, it may be said to relate to connectors as well, which may have utility in the fields of furniture, and other articles.

The present invention has high utility in connection with building openings such as doors, vestibules, windows, entrances and store fronts.

In the past vertical tubular elements have been connected to horizontally or angularly disposed tubular elements, by means of an internal plug which in turn is engaged by exposed screws. This construction is unsightly in showing exposed screw heads, and is disadvantageous in that it is difficult to obtain an adequate seal against water and weather.

It is therefore among the objects of the present invention to provide structure which enables a relatively low skilled person to make a strong and permanent (or temporary) connection between angularly arranged hollow building elements.

Another object herein lies in the provision of structure of the class described in which the parts may be connected or disconnected by the manipulation of a single screw, only the head of which is exposed, and such is on a relatively concealed under-surface.

A feature of the invention is that the screw head may have any desired configuration, so that it can be turned with a screw driver, or where unauthorized tampering may become involved, a special head and tool may be used.

Another object of the present invention lies in the provision of structure of the class described which requires simple fabrication and assembly, so that the same may be manufactured in large scale at low cost, and have a consequent wide distribution and use.

A feature of the present invention is that all of the parts can be assembled at the erection site. This may be contrasted with earlier methods which, because they do not permit blind fastening, require that relatively large assemblies be set up or pre-assembled at a shop or factory and then as a bulky heavy unit require exceptional handling and setting-up difficulties.

Another feature herein is the adaptability of the present construction for use in any articles where hollow elements are interconnected or where one of the elements is hollow, to receive the hooks which are movably associated with the coacting element. Examples of this are wall fixtures and shelves, legless seats, chassis and frames, etc.

These objects and other incidental ends and advantages will more fully appear in the progress of this disclosure and be pointed out in the appended claims.

In the drawings in which similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a fragmentary perspective view showing an embodiment of the invention.

Figure 2 is a fragmentary view, showing a vertical structural element and corresponding to Figure 1.

Figure 3 is a fragmentary perspective view, corresponding generally to Figure 1, and showing a horizontal structural element containing a connector in its disengaged position.

Figure 4 is a bottom perspective view of the connector in its disengaged position and removed from the horizontal structural element.

Figure 5 is a bottom perspective view, reduced, of structure arranged in the manner shown in Figure 1.

Figure 6 is a perspective view of the connector, as seen from above and with the hook element, partially projected.

Figure 7 is a vertical sectional view as seen from the plane 7—7 on Figure 1.

Figure 8 is a fragmentary sectional view comparable to Figure 7 but showing the hook element retracted and the structural elements separated.

Figure 9 is a vertical sectional view as seen from the plane 9—9 on Figure 10.

Figure 10 is a rear perspective view, as seen from above, of the connector, with one of the expanding members removed for clarity.

Figure 11 is a vertical sectional view as seen from the plane 11 on Figure 10.

Figure 12 is a vertical sectional view as might be seen from the plane 12—12 on Figure 10 but with the vertical and horizontal structural elements introduced.

In accordance with the invention, the connector generally indicated by reference character 10 comprises broadly a body element 12; expanding means 14; a hook element 16; means to pivotally mount the hook element 18; and actuating means for the hook element 20. The vertical structural element is indicated by 22, and the horizontal structural element by 24.

It will be understood by those skilled in the art to which the present invention relates that the designations "vertical" and "horizontal" structural elements is merely arbitrary for purposes of description in this specification, and may of course have other positions. The horizontal and vertical structural elements may be referred to herein and "first" and "second" structural elements.

As best seen in Figures 4 and 10, the body element 12 is preferably formed from metal which is bendable, as for example aluminum, brass or stainless steel. The body element 12 may be a portion cut from a length of U channel, and in the basic orientation of the drawings, may have a front wall 28, a top wall 30, and a bottom wall 32. The distance between the topmost and bottommost surfaces of the walls 30 and 32 is preferably slightly smaller than the distance between the opposed inner surfaces of the top and bottom walls 34 and 36 of the structural element 24, so that the connector 10 may be inserted within the hollow interior of the element 24. The edges 38 and 39 are also arranged to effect this insertability.

The expanding means 14 preferably includes a pair of wedges or expanding members 40 and 41 which may be moved toward or away from the front wall 28 by means of the screws 42 and 43 which are threadedly engaged within the respective expanding members. Since the width of the body element 12 is preferably just small enough to permit its insertion into the structural element 24, and the expanding members 40 and 41 are located at the ends of the body element 12, as they are drawn forward by the rotation of the screws 42 and 43 they cause the top and bottom walls 30 and 32 to be pushed outward (Fig. 12) where they may exert great pressure against the walls 34 and 36, at areas which adjoin the connection of the walls 34 and 36 with the relatively vertical walls of the structural element 24, at 44 and 45. This is of great

advantage because the walls 34 and 36 are well supported thereas so that they are not distorted by adequate pressure required to securely maintain the body element 12 in operative position. As best seen in Figures 7, 8 and 12, the front wall 28 is preferably spaced a slight distance from the free edge 46 of the structural element 24. The purpose of this is to prevent the tips of the hooks from striking the front wall 28, and to assure that the free edge 46 will be drawn up snug against the surface of the wall 47 of the structural element 22.

The hook element 16 preferably includes a pair of hook members 48 and 49 which are provided with aligned orifices which journal the hook members on the axle 50. The axle 50 is carried by a bracket 51 generally of U shape and having a base 52 and uprights 53 and 54. The base 52 acts as the upper half of a socket 55 for the ball 56 of the clamping screw 57. The base 52 is secured to the upper surface of the bottom wall 32 in a suitable manner, as by rivets (not shown) or the screws 58. The hook members 48 and 49 are interconnected by a tie-bar 59 the outer ends of which are reduced in diameter and seated in correspondingly positioned holes in the hook members. The tie-bar 59 at the center thereof is provided with a threaded transversely disposed orifice 60 in which the screw 57 is engaged. The hook element 16 has a travel preferably substantially in excess of 90°, from a retracted position shown in Figure 8 to a fully projected or clamping position seen in Figure 7. This movement is produced by rotation of the clamping screw 57, which is engaged by any suitable tool through the opening 61 in the bottom wall 32, said bottom wall 32 being provided with a shaped orifice which forms the bottom half of the socket 55.

The vertical structural element at a level where it is desired that connection be made with the connector 10 is provided with a pair of hook shank passing holes 62 and 63, and aligned directly therebelow, a pair of hook tip engaging holes 64 and 65. These holes are provided in the meeting wall 47, and it will be noted that the remaining walls 66, 67, and 68 require no openings of any kind.

The use of the present invention is a simple and convenient matter. While in the drawings, the structural elements 22 and 24 are shown to be of equal width, the vertical structural element may, where desired be wider or narrower than the horizontal structural element, it being necessary only that there be sufficient width to accommodate the holes 62 and 63. In integrating parts which are to be joined by the connector, the screw head in the external form of a ball 55 is engaged by a screw driver or similar tool which is inserted from below the wall 36 through the access hole 70 (Fig. 5), after the screws 42 and 43 have been tightened to internally clamp the walls 30 and 32 outward against the structural element 24. Rotation of the screw 57 in one direction retracts the hook members into the position shown in Figure 8. Then the screw 47 is rotated in an opposite direction, which causes the hook members to move up and out through the slots 71 and 72 and to enter the holes 62 and 63. Continued rotation of the clamping screw 57 causes the hook members to continue to swing downward so that the tips 73 and 74 engage the holes 64 and 65. Since the pressure at the tips 73 and 74 is a result of tension between the structural elements and pressure transmitted by the tie-bar 59, each hook member 48 and 49 may surely and positively engage its holes 64 and 65 for maximum strength and security.

The inner surfaces 75 and 76 of the hook members have a slight taper and approach the axis of the axle 50 in a direction away from the tips 73 and 74. This taper is of low order so that when the tips 73 and 74 have fully seated into the holes 64 and 65, a binding pressure is created at the lower edges of the holes 62 and 63 at the point indicated by reference character 77 (Fig. 7). This camming action enables the parts to be drawn up snug with pressure distributed over at least four points, and immobilizes the various parts with respect to each other. Should it become desirable to disconnect the parts, the above steps are reversed.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person, skilled in the art to which the present invention relates.

I claim:

1. Building construction comprising: a first hollow structural element, a second structural element; a connector having an expandable body positioned within said first structural element, said body expanded and frictionally engaged with the inner surfaces of said first element; said second structural element including a planar wall having a first passing hole and a tip-engaging hole aligned with said first passing hole, both holes extending through the plane of said wall, said expandable body having a curved hook element rotatably mounted thereon about an axis parallel to the plane of said wall, and means to rotate said hook element in a direction toward said wall; said hook element extending through said passing hole in a first direction, and the tip thereof engaging the edge of said tip engaging hole in a second direction opposite said first direction, whereby said hook element serves to draw and secure said first and second structural elements together.

2. Building construction comprising: a first hollow structural element, a second structural element; a connector having an expandable body positioned within said first structural element, said body expanded and frictionally engaged with the inner surfaces of said first element; said second structural element including a planar wall having a first passing hole and a tip-engaging hole aligned with said first passing hole, both holes extending through the plane of said wall, said expandable body having a curved hook element rotatably mounted thereon about an axis parallel to the plane of said wall, and threaded means to rotate said hook element in a direction toward said wall; said hook element extending through said passing hole in a first direction, and the tip thereof engaging the edge of said tip engaging hole in a second direction opposite said first direction, whereby said hook element serves to draw and secure said first and second structural elements together.

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