STRUCTURE FOR THE ASSEMBLY OF ADJUSTABLE FRAMEWORK

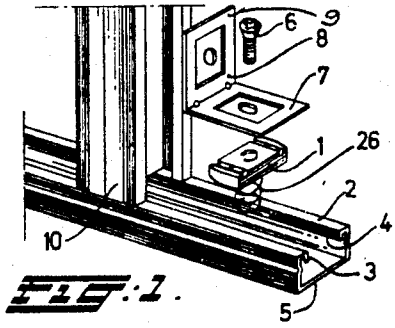

FIG. 1.

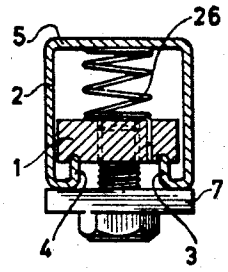

FIG. 2.

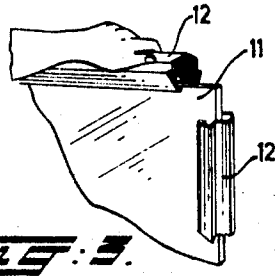

FIG. 3.

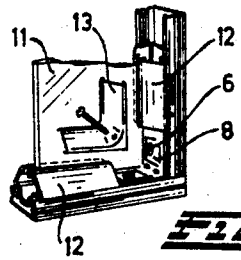

FIG. 4.

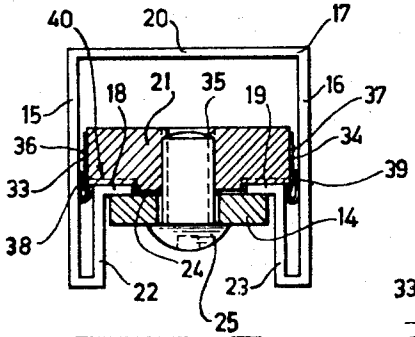

FIG. 5.

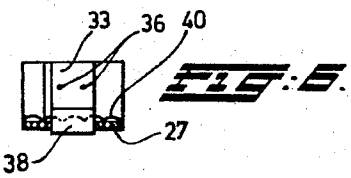

FIG. 6.

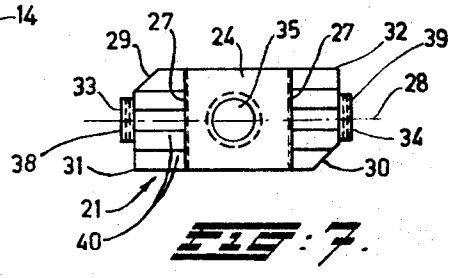

FIG. 7.

STRUCTURE FOR THE ASSEMBLY OF ADJUSTABLE FRAMEWORK

Filed July 21, 1966 Sheet 2 of 3

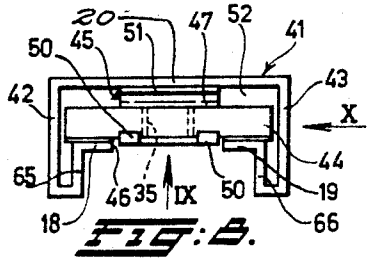

FIG:8.

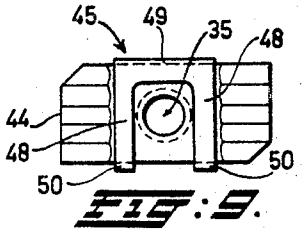

FIG:9.

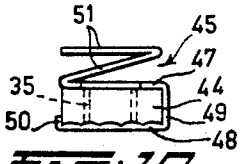

FIG:10.

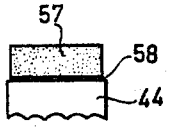

FIG:11.

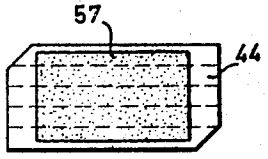

FIG:12.

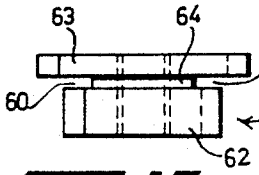

FIG:13.

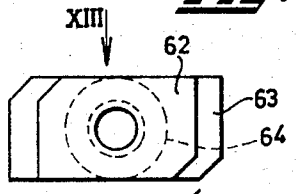

FIG:14.

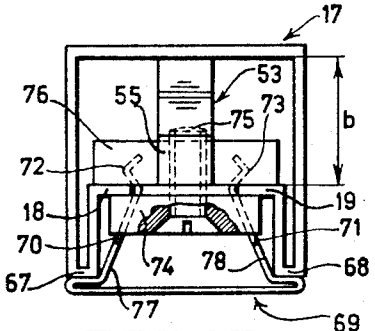

FIG:15.

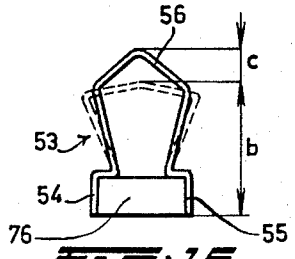

FIG:16.

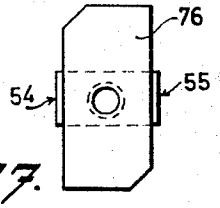

FIG:17.

STRUCTURE FOR THE ASSEMBLY OF ADJUSTABLE FRAMEWORK

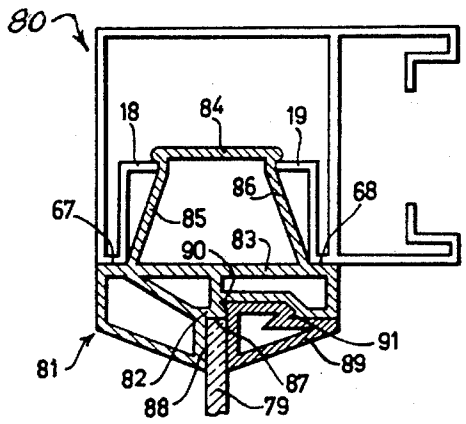

Fig: 18.

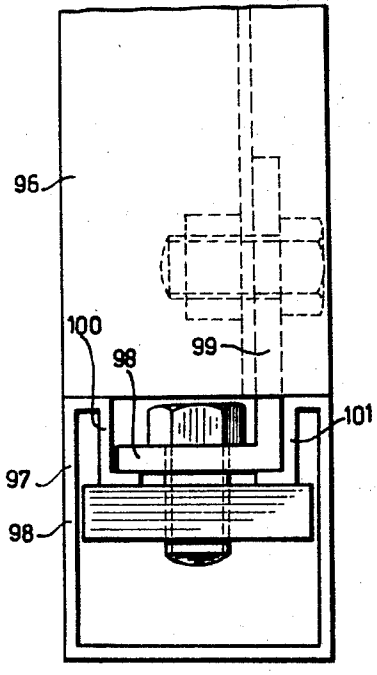

Fig: 20.

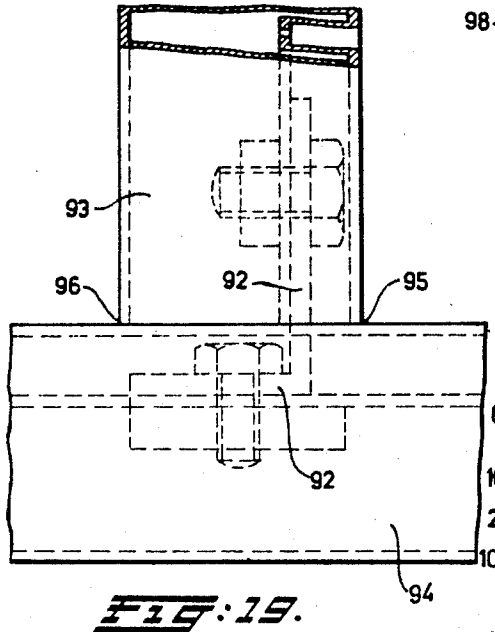

Fig: 19.

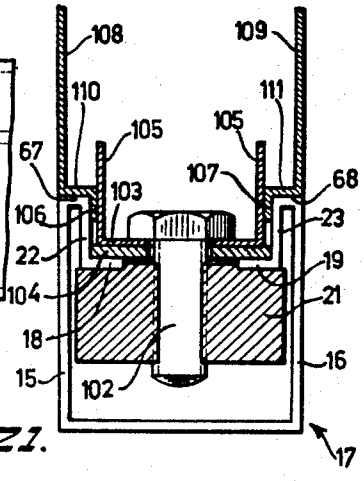

Fig: 21.

United States Patent Office 3,429,601
Patented Feb. 25, 1969

3,429,601

STRUCTURE FOR THE ASSEMBLY OF ADJUSTABLE FRAMEWORK

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Filed July 21, 1966, Ser. No. 566,963
U.S. Cl. 287—189.36 1 Claim
Int. Cl. F16b *1/00;* E04b *2/58*

My invention relates to an improved structure for the assembly of adjustable framework from profilated channel shaped members or struts formed of sheet metal and of substantially square U-section, the ends of the legs of the U being inwardly bent. It was already known in the art to construct panelled partitions in buildings and all kinds of support frames by means of such channel members and to make connections by means of special oblong nuts constructed to fit inside the channel, the breadth of the nuts being smaller than the spacing between the inwardly bent leg ends of the channel member (see U.S.A. Patent 2,345,650).

It is an object of my invention to bring an improvement of these known constructions in view of the difficulty that until now it could not be avoided that connecting parts such as bolt heads and angle brackets protruded above the open channel side. This caused the risk of damage by pushing against those parts and also the protruding parts complicated the covering of the open channel sides by means of finishing strips and disturbed the desired flat bearing surface in frameworks for bearing gutters and all kinds of supports.

It is also an object of my invention to improve the rigidity by a more favourable positioning of connecting angle brackets in the corners of the framework.

It is another object of my invention to simplify the finishing of panel constructions and to improve the appearance thereof.

A further object is to adapt the shape of nuts and attachments to the nut for self locating them in place within the channel members which have an improved cross sectional channel shape.

A still further object is the improvement of finishing strips, moulding strips and panel locating strips to be inserted in the improved channel members.

These and other objects and advantages and the new means by which they are obtained will become apparent from the following description with reference to several embodiments represented in the drawing.

In the drawing:

FIGURE 1 is a ghost view representing a detail of an inner corner of a frame structure composed of members of known shape.

FIGURE 2 is a cross section through a channel shaped member at the place where a connection is carried out by means of a self-locating nut according to well-known principles.

FIGURE 3 is a perspective view of a detail showing the provision of finishing strips on a panel according to a known system.

FIGURE 4 is a perspective view to FIGURE 3 showing the positioning and finishing of the panel accommodation in a corner of the frame.

FIGURE 5 is a cross section comparable to that of FIGURE 2 but comprising an improvement according to the present invention.

FIGURE 6 is a side elevation, and

FIGURE 7 is a view of a nut employed in the embodiment of FIG. 5.

FIGURE 8 is a modification of the embodiment shown in FIGURES 5–7.

FIGURE 9 shows a plan view of the nut employed in FIG. 8.

FIGURE 10 represents a side elevation to FIGURE 9.

FIGURE 11 is a side elevation of a nut bearing another embodiment of a resilient member compared with the resilient members for self-locating purposes of the nut which are applied in the foregoing figures.

FIGURE 12 is a plan view to FIG. 11.

FIGURE 13 is a side view in the direction of arrow XIII in FIG. 14 of a modification of the shape of the nut with respect to foregoing figures.

FIGURE 14 is a plan view to FIG. 13 from below.

FIGURE 15 is an end view of a channel member bearing a finishing strip and of a nut placed therein bearing a modified resilient locating member.

FIGURE 16 is a side view of the resilient nut locating member as applied in FIG. 15.

FIGURE 17 is a plan view from below to FIG. 16.

FIGURE 18 is a cross-section of a channel member and of a moulding strip accommodated therein for bearing a panel plate.

FIGURE 19 is a side view of a connection comparable to FIG. 1 but wherein an angle bracket has found a more favourable position which is made possible by the present invention.

FIGURE 20 shows in a side view and partly in cross section a modification with respect to FIG. 19.

FIGURE 21 shows in a cross section an application of the invention for accommodating panels as a part of double walled partitions.

As shown in FIGURES 1 and 2 it was already known to apply an oblong nut, which can be introduced into a channel shaped member **2** by bringing its longitudinal axis in the longitudinal direction of the profilated element **2** and passing it between the inwardly bent parts **3** and **4** of the legs of the channel member **2** and thereupon turn the nut through 90° whereupon as shown in FIG. 1 the legs **7** and **9** of an angle bracket **7** can be fixed on the open sides of the channel members **2** and **10** by means of screw bolts **6** which are screwed into the nut **1**, the latter being maintained in the desired place during the assembly by a spring **26**. The angle piece **8** bears upon on the outside of the profilated channel element **2**. For many supporting frames the legs **7** of angle brackets or other connecting pieces must be made of much thicker metal strips than shown in FIG. 1, e.g. of a thickness as shown in FIG. 2, where also another type of bolt screw is shown.

One of the disadvantages of such protruding connecting parts is shown in FIG. 4, where a panel **11** which has been provided as illustrated in FIGURE 3 with elastical metal finishing strips **12**, is secured in a frame, wherein an angle bracket **8** is fastened in each of its corners. The strips must be cut off so that they meet the leg ends of the angle bracket **8** which protrude above the surface of the channel members and additional finishing angle pieces **13** must be added in order to obtain a decent finish. This implies an increase of the cost of labour and stock parts.

The embodiment of the present invention according to FIGURE 5 shows that a fastening piece such as a leg **14** of an angle bracket is countersunk in between the inwardly bent parts **22** and **23** (inner legs) of the main legs **15** and **16** of the U-shaped channel member **17**. The connecting piece **14** bears upon two inwardly flanged edges **18** and **19** of the inner legs **22**, **23** at a distance from the channel bottom **20**, sufficient to accommodate the fastening nut **21** in the space between the bottom **20** and the supporting flanges **18** and **19**.

The distance between the flanges **18** and **19** corresponds with the dimensions of a square **24** which protrudes from the head of the fastening nut **21** (see also FIGURE 7), the height of this square being smaller than the thickness of material of the flanges **18**, **19**. The square **24** can be used for self-locating the nut **21**, by choosing its dimensions so large that it is resiliently clamped between the

edges of the flanges **18** and **19**, for which purpose further small ribs or a grid profile can be provided along the sides of the square, as is diagrammatically indicated by the lines **27** in FIGURE 6. The nut **21** is passed through the slit between the flanges **18, 19** in a position wherein its longitudinal direction of the channel member **17** and thereupon the nut is turned along 90° into the position shown in FIG. 5 which is made possible because two diagonally opposite corners **29** and **30** (FIG. 7) are bevelled. The rectangular corners **31** and **32** prevent the nut **21** being turned further than about 90° because these corners strike after the turn against the inner sides of the legs **15, 16** of the member **17**.

Instead of a spring **26** for self locating purposes of the nut **21** as shown in FIG. 2 the embodiment of FIGS. 5–7 has blade springs **33, 34** arranged on the longitudinal sides of the nut body. In the present embodiment the blade springs **33, 34** are fixed on the sides of the nut **21** by means of spot welds **36** and **37** and the outwardly bent over ends **38** and **39** ensure self-locating of the nut **21** against the walls **15** and **16** by resilient frictional engagement during the time that the bolt **25** has not yet been screwed into the nut hole **35**. Ribs as denoted by **40** are provided on the head face of the nut **21**, which can be obtained by simply impressing when the nut is punched out or stamped. The said ribs **40** ensure a proper engagement with the flat lower faces of the flanges ribs **19** and **18** when the latter are enclosed between a nut **21** and a connecting piece **14** by tightening the bolt **25** in the nut bore **35**.

In FIG. 8 the channel element **41** has a smaller depth compared with FIG. 5 because the legs **42** and **43** of the U-shaped channel section are chosen shorter. The nut **44** (see also FIGURES 9 and 10) is not provided with a square protruding part **24** as in FIG. 7, but the middle part of the nut face bearing the ribs **40** is at the level of the bottom of the furrows between the ribs and this middle part of the nut **43** bears a blade spring member **45**, which replaces the spring members **38** and **39** shown in FIGURES 5–7 but engages again two opposite longitudinal sides of the nut **44**. Before the nut **44** is introduced through the slit **46** between the flanges **18** and **19** into the channel **47** the nut **44** is shoved into the part of the spring which is bordered by two parallel spring parts **47** and **48** and an interconnecting side part **49**. The spring part **48** comprises two legs each on one side of the nut boring **35** and the opposite spring part **47** may be provided with an opening (not shown) through which the end of a bolt to be screwed into the nut can extend. The outer set off ends of the legs **48** grip over the edge of the nut **44** opposite to the spring side **49**. The spring part **47** bearing against the bottom of the nut **44** is one part of a Z-shaped spring member **51** which is compressed from the position of FIG. 10 to that of FIG. 8 when the nut **44** is introduced into the channel **52**. In the final position as shown in FIG. 8 the spring part **51** bearing on one side upon the bottom **20** of the channel **52** and on the opposite side against the nut **44** presses the latter resiliently against the flanges **18** and **19**.

The nut **44** can be inserted easily at any point along the channel element **41** and is held in place by spring **45** until a bolt is screwed into the hole **35**.

FIGURES 15–17 show that for the same purpose but for deeper channels a two-legged blade spring **53**, engaging by its outer ends **54** and **55** two opposite longitudinal sides of a nut **44** can be applied for the same purpose. When bringing the nut **44** in its desired place in the channel member **17** the part **56** of the spring blade **53** is compressed into the position shown in FIG. 15 and by dotted lines in FIG. 16, by which the length of the spring is reduced by a distance *c* and the spring bridges resiliently the distance *b*. The FIGURES 11 and 12 show that for shallow channel members **8** as shown in FIG. 8 instead of the spring **45** a cushion **57** of elastic material such as foam plastic or sponge rubber can be fastened by means of an adhesive layer **58** on a face of the nut **44**. The cushion **57** will be resiliently compressed when the nut is introduced in the channel **52**.

FIGURES 13 and 14 relate to a nut **59** wherein the flanges **18** and **19** of the channel member **17** or **41** can be enclosed in spaces **60** and **61** between a head part **62** and a bottom part **63** of the nut, which are interconnected by a neck part **64** fitting in the slit **46** (FIG. 8) between the flanges **18, 19**. This kind of nuts can be applied in special cases wherein the height of the space between the inner legs **65, 66** of a channel member **41** should be filled out by the nut head **62** or if the nut is used for fastening a member bearing upon the shoulders **67** and **68** of a channel member **17**.

FIG. 15 shows a finishing strip **69**, made of metal or plastic material for covering the open side of a channel member **17**. It is to be understood from the cross section of FIG. 15, that the profile **69** has two resilient side walls **70** and **71** and the ridges **72** and **73** at the outer ends thereof are passed between the flanges **18, 19** and lock the covering strip **69** in its pressed down position wherein it bears upon the shoulders **67, 68** of the member **17**. At the place where a connecting piece **74** is fastened by means of the bolt **75** and the nut **76** parts of the side walls **70** and **71** are cut away so that there only remain wall parts **77** and **78** protruding inwardly.

FIG. 18 shows how a panel or glass plate **79** can be secured in a channel member **80** by means of a moulding strip **81** which can be made of resilient plastic material. The main part **82** of the moulding strip comprises a medium wall **83** bearing upon the shoulders **67** and **68** of the channel member **80** and provided with inwardly protruding walls **85, 86** comparable as to their shape and function with the walls **70** and **71** of the finishing strip **69** of FIGURE 15. However in FIG. 18 of the ends of the walls **85** and **86** are interconnected by a wall **84**. On the other side the wall **83** is provided with a hollow structure having bearing surfaces **87, 88** for the outer edge and one edge side of the plate **78**. When the latter has been placed in this bedding **87, 88** the enclosure of the plate edge is completed by means of an additional strip part **89** which has a greater flexibility than the strip part **82** and is locked by means of a protruding edge **90** which is pressed into a corresponding groove of the main strip part **82** and an opposite edge **91** on the latter cooperating with a corresponding groove in the strip part **89**.

In the side view of FIG. 19 just as in FIG. 1 a connection is shown in a framework at the meeting point where the end of a vertical channel member **93** is supported by a horizontal channel member **94** and a connection is made between the two by means of an angle bracket piece **92**.

However, according to the present invention and contrary to FIG. 1 no connecting parts extend outside the channels.

Moreover it can be stated that the corner of the angle piece **92** does not coincide with the corners **95** or **96** and therefore there is no danger of bending the angle bracket in its corner as in the constructions of FIG. 1.

The same advantages are obtained in the connection shown in FIG. 20 between two channel members **96** and **97**, having their open sides not in the same plane but in planes enclosing an angle of 90°. In this case a short leg **98** of the angle piece **99** is arranged transversely between the inner legs **100** and **101** of the channel member **97**.

In FIG. 21 a U-shaped gutter **103** is fastened in a channel member **17** by means of nuts **21** and bolts **19** as described before. The bottom of the thin walled gutter **103** bears upon the flanges **18** and **19** of the channel member **17** by the intermediary of a strip **104** and the upright walls **105** of the gutter **103** are at a small distance from the upright inner legs **22, 23** of the member **17**. Into these clearances the re-entering edges **106, 107** of metal panel plates **108, 109** are inserted. The walls of these panel plates are flush with the outer sides **15, 16** of the channel member **17**, and the shoulders **110, 111**,

which connect the panel walls with the re-entering edges **106, 107** bear upon the shoulders **67, 68** of the channel member **17**.

What I claim is:

1. Structural means comprising in combination at least one channel shaped member having side walls and a connecting wall defining a space therebetween and provided with an ever open opening through one side thereof communicating with said space, said side walls having portions turned inwardly upon themselves through said ever open opening and extend for a substantial distance into said space toward said connecting wall, the free end parts of said inwardly turned side wall portions being inwardly turned towards one another to provide flanges disposed in a plane parallel to the plane of said connecting wall, a nut received by said space inwardly of said flanges and bearing against the inner faces of said flanges, a connecting element having a through bore received by said space inwardly of the ever open opening and bearing upon the outer faces of said flanges, and a threaded bolt extending through said bore in the connecting element and received by said nut so that the nut, the connecting element and the bolt are completely housed within said space in the channel shaped member inwardly of the ever open open side of the channel shaped member to present a flat bearing surface for bearing gutters and other kinds of supports.

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WAYNE L. SHEDD, *Assistant Examiner.*

U.S. Cl. X.R.

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