SNAP LOCKING STRUCTURAL DEVICE

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ABSTRACT OF THE DISCLOSURE

A pair of similar relatively rigid, elongated, U-shaped channel means are mounted in spaced oppositely arranged substantially parallel relation. The side edge portions of each of the U-shaped channel means have similarly integral angularly incised portions forming lip means converging toward each other and toward the bottom of the channel but spaced therefrom and from each other to define a central elongated opening for receiving the longitudinal edge portions of a corrugated means. The edge portions of the corrugated means include locking lug means adapted to snap into abutting and locking engagement with the lip means upon insertion of the edge portion of said corrugated means through the longitudinal extending opening in the channel means.

The present invention relates to a new and novel snap locking structural device, and more particularly to a lightweight type of manually assembled structural interconnection. In the present invention, a first channel means is provided which may be mounted in any desired operative position, this channel means being adapted to receive a corrugated means in the form of a sheet-like member which is adapted to readily snap into place through a longitudinally extending opening provided in the channel means. This arrangement permits the two means to be readily manually snapped into operative relationship and to be positively locked in place.

This type of construction is especially suitable for assembling various structural assemblies such as canopies and awnings, storage or utility buildings, wall and office partitions, truck bodies, portable swimming pool walls, and similar products. It is important with this type of application that the elements be quickly and easily assembled and once in assembled position positively locked in place, and yet at the same time permitting them to be separated when and if desired.

In the present invention, a channel means and a cooperating corrugated means are provided, the channel means having a longitudinally extending opening for receiving the corrugated means, and the corrugated means having locking means thereon which cooperates with the incised lip means provided on the channel means for locking the elements in place.

The channel means may be formed of relatively rigid material and the corrugated means formed of relatively flexible material, the flexible construction of the corrugated engagement with the lip means permitting sufficient deformation to move the elements into operative relationship without requiring excessive manual effort.

The locking means on the corrugated means is in the form of integral offset portions, these offset portions sloping outwardly from the corrugated means away from the adjacent longitudinally extending edge of the corrugated means so that a camming effect is obtained as the corrugated means is forced into the opening in the channel means causing the corrugated means which is of flexible construction to be deformed and allowing it to pass through the opening whereupon the resilient nature of the corrugated means permits it to snap into operative locked relationship.

The corrugated means will be positively locked in position since when in operative position the outer edges of the integral offset portions of the corrugated means are substantially flush with the inner edges of the incised lip means provided on the channel means.

An important advantage of the present invention is that no special tooling of the channel means is required, and it may be simply manufactured as an extrusion or as a roll-formed shape.

Furthermore, there is no alignment problem axially of the elements since they may be interconnected with one another in any relative axial relationship with one another.

Even though the channel means and corrugated means are positively locked to one another in the sense that the corrugated means cannot be withdrawn through the opening provided in the channel means, the channel means and corrugated means can be separated if desired by sliding the corrugated means out of the channel means.

In a modified form of the invention, an arrangement is provided wherein the corrugated means can be readily snapped into operative position relative to a pair of channel means which have been disposed in fixed spaced operative relationship with respect to one another.

An object of the present invention is to provide a snap locking structural device which can be readily manually snapped into operative position and which positively locks in place, and yet which at the same time can be readily separated when desired.

Another object of the invention is to provide a snap locking structural device including a channel means which requires no special tooling of the channel means.

Still another object of the invention is the provision of a snap locking structural device wherein the elements may be snapped into place in any relative axial position thereby presenting no alignment problems when assembling the apparatus.

A further object of the invention is to provide a snap locking structural device wherein a corrugated means can be snapped into operative position within a pair of channel means which have been disposed in fixed operative relationship with respect to one another.

A still further object of the invention is the provision of a snap locking structural device which is quite simple and inexpensive as well as lightweight in construction and yet which at the same time is quite sturdy and easy to use.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a front elevation partly broken away of the present invention;
FIG. 2 is a sectional view taken substantially along line 2--2 of FIG. 1 looking in the direction of the arrows;
FIG. 3 is a sectional view taken substantially along line 3--3 of FIG. 1 looking in the direction of the arrows;
FIG. 4 is a sectional view through a modified form of the invention; and
FIGS. 5--8 inclusive are sectional views through various modified forms of the channel means of the present invention.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, a first form of the invention is illustrated in FIGS. 1--3 inclusive and includes a channel means 12 and a corrugated means 14. As illustrated in this form of the invention, a second channel means 12' is provided, this second channel means being substantially identical in
construction with the first described channel means 12 and having the same components thereof provided with the same reference numerals primed.

The channel means as well as the corrugated means may be formed of suitable metallic substances or plastic and the like, and in a typical example, both the channel means and the corrugated means may be formed of aluminum. The construction and dimensions of the components are such that the channel means is of relatively rigid construction while the corrugated means is of relatively flexible construction so that it may be readily deformed when moving it into position so that they may each be positioned adjacent a land of the corrugated means. It will be noted as seen in FIG. 2 that with this relationship, wherein these screws are mounted adjacent a land of the corrugated means, the corrugated construction permits the screws to be readily threaded into operative position by a screwdriver which may be disposed directly over the screws when they are threaded into operative position.

Referring now to FIG. 4, a modified form of the invention is illustrated wherein a corrugated means 50 is provided of substantially identical construction to the corrugated means 14 previously described.

The channel means in this form of the invention is indicated generally by reference numeral 60 and is of similar construction to the channel means previously described in that it includes a bottom wall 62 and a pair of side walls 64 and 66 which have formed at the opposite ends thereof inturned lips 68 and 70. The corrugated means 50 is provided with integral offset portions 52 for engaging the inner edges of the inturned lips as in the previous modifications.

The only difference in the construction shown in FIG. 4 is that the inner ends of the inturned lips 68 and 70 are spaced a substantially greater distance from the bottom wall 62 of the channel means than in the previous modifications, or in other words the side walls 64 and 66 are of substantially greater dimension perpendicular to bottom wall 62 than in the previous modifications.

With the arrangement shown in FIG. 4, it will be understood that a channel means similar to channel means 12 may be operatively associated with the same also. After the channel means 60 and 12 have been assembled in fixed operative relationship with respect to one another, in order to insert the corrugated means 50 in operative position, it may be snapped into place within channel means 60 and then lifted up into the phantom line illustrated so as to clear the lower channel means 12 whereupon the lower portion of the corrugated means may be moved directly over the opening in the lower channel means 12, wherein the corrugated means 50 may be moved downwardly to snap into place within the lower channel means and into the solid line operative position as shown in FIG. 4 relative to the upper channel means 60.

The channel means may have various cross sectional configurations in accordance with the use and particular application involved. For example, referring again to FIG. 3, the channel means 20 may be modified as illustrated in phantom line 74 so as to include as an integral part thereof that portion which is indicated in phantom lines in FIG. 3 so as to reinforce the channel means and to enable it to be effectively mounted in a larger opening which might be substantially complementary to the outer configuration of that portion illustrated in phantom lines.

Referring now to FIG. 5, a modified cross sectional configuration of the channel means is illustrated wherein a pair of opposite longitudinally extending walls 78 and 80 are joined by a central web 82. A pair of integral inturned lip portions 84 and 86 are provided at one end of walls 78 and 80 for defining with the web 82 a first channel for receiving a corrugated means. A similar pair of longitudinally extending inturned lips 88 and 90 are provided at the opposite ends of walls 78 and 80 to provide a second channel for receiving a corrugated means, it being apparent that the corrugated means mounted in the two channels defined by this form of the invention would be substantially aligned with one another.

Turning now to FIG. 6, a further modification of the invention is illustrated. In this form of the invention, a pair of substantially parallel longitudinal extending walls 94 and 96 are provided at the outer edges thereof with integral longitudinally extending inturned lips 98 and 100 defining a space for receiving a corrugated means. The inner edges of walls 94 and 96 are shown interconnected by integral generally curved portion 104 of the particular configuration illustrated which permits the channel means to be mounted in certain particular applications in an effective manner.
Turning now to FIG. 7, still another form of the invention is illustrated. As seen in this figure, a pair of substantially parallel longitudinally extending wall portions 110 and 112 are provided, these wall portions being interconnected by a central web portion 114. A first pair of integral inturnd lips 116 and 118 define with web 114 a first channel for receiving a corrugated means. In a similar manner, a second pair of longitudinally extending inturnd lips 120 and 122 provided at the opposite ends of walls 110 and 112 define with web 114 a second channel for receiving a corrugated means.

A pair of substantially parallel longitudinally extending walls 124 and 126 extend at substantially right angles to wall 110 and have integral inturnd lips 128 and 130 extending longitudinally along the outer edges thereof and defining with wall 110 a channel for receiving a further corrugated means.

Walls 132 and 134 extend at generally right angles from wall 112, walls 132 and 134 being substantially parallel with one another and having integral longitudinally extending internal lips 136 and 138 formed at the outer edges thereof which define with wall 112 another channel for receiving a corrugated means.

It is apparent that the channel means illustrated in FIG. 7 is adapted to support four corrugated means disposed at generally right angles to one another, or in other words, adjacent ones of the corrugated means supported by the channel means shown in FIG. 7 would be supported substantially perpendicularly to one another.

Referring now to FIG. 8, a still further modified form of the invention is illustrated. In this figure, the channel means is indicated generally by reference numeral 140 and includes a first pair of substantially parallel wall portions 142 and 144 which have formed at the outer edges thereof integral inturnd lips 146 and 148. Integral longitudinally extending ribs 150 and 152 are formed on walls 142 and 144 respectively and define in combination with the lips 146 and 148 a first channel for receiving a corrugated means.

Substantially parallel wall portions 154 and 156 extend generally perpendicularly from wall portions 142 and 144, a connecting web portion 158 extending between the points of intersection of the walls 142, 154 and 144, 156.

Walls 154 and 156 have formed at the outer edges thereof longitudinally extending inturnd lips 160 and 162. Walls 154 and 156 also include longitudinally extending ribs 164 and 166 which define with the lips 160 and 162 a second channel for receiving a corrugated means.

It is apparent that when the corrugated means are supported in operative position within the two channels defined in FIG. 8, the corrugated means will be supported in substantially perpendicular relationship to one another.

It is apparent from the foregoing that there is provided according to the present invention a new and novel snap locking structural device of lightweight construction which can be readily manually snapped in operative position in a quick and easy manner. This snapping into place is facilitated by the resilient construction of the corrugated means, this corrugated construction permitting it to readily deform for entering the opening in the associated channel means. In addition, the sloping relationship of the integral offset portion locking means facilitates this deformation and enables the corrugated means to be snapped into operative position, and at the same time enables the locking means to snap behind the inner edges of the inturnd lips formed on the channel means for positively locking it in position wherein the outer edges of the integral offset portions are substantially flush with the inner edges of the inturnd lips. It will be noted that after the corrugated means has been snapped into the operative position shown, it cannot be withdrawn through the opening in the channel means, but it may be slid out of the channel means by moving the corrugated means and the channel means axially with respect to one another. No special tooling of the channel means is required since it may be formed as a simple extrusion or roll-formed shape. There is no alignment problem in snapping the corrugated means into operative position since it may be snapped into the channel means regardless of the relative axial position thereof. The overall arrangement is quite simple and inexpensive and lightweight in construction, and yet at the same time is quite sturdy and easy to use.

We claim:

1. A snap locking structural device comprising a pair of similar, relatively rigid, elongated, U-shaped channel means mounted in space substantially parallel relation, corrugated means formed of relatively flexible material, the opposite side edge portions of each of the U-shaped channel means having similar integral angularly inturnd portions forming lip means converging toward each other and toward the bottom of the channel but spaced therefrom and from each other to define a central elongated extending opening for receiving the longitudinal edge portions of said corrugated means including locking means therein spaced inwardly from the adjacent edge thereof by a distance substantially equidistant from the lips of one channel means are spaced from the bottom thereof, said locking means being adapted to snap into place and to engage the said lip means upon insertion of said edge portions of said corrugated means through said longitudinally extending opening in said channel means, said lips of said other channel means being spaced from the bottom thereof a distance at least equal to twice the first mentioned distance to permit said corrugated means to be readily inserted in operative position after said channel means have been mounted in operative position.

2. A device as defined in claim 1 wherein said corrugated means includes a plurality of lands interconnected with one another by sloping connecting surfaces, alternate ones of said lands lying in a first plane, and another plurality of alternate lands lying in a second plane disposed substantially parallel with said first plane.

3. A device as defined in claim 2 wherein said locking means comprises integral offset portions formed in said lands.

4. A device as defined in claim 1 wherein said locking means includes integral offset portions formed in said corrugated means, a first plurality of offset portions being formed adjacent one of the longitudinal edges of said corrugated means and a second plurality of integral offset portions being formed adjacent the opposite longitudinal edge of said corrugated means, adjacent ones of the offset portions of each plurality of offset portions extending in opposite directions from said corrugated means.

5. A device as defined in claim 1 wherein said locking means on said corrugated means includes a plurality of integral offset portions, each of said offset portions being disposed adjacent one of the longitudinally extending edges of said corrugated means, each of said offset portions being angularly disposed with respect to the adjacent corrugated means portions and sloping outwardly away from said adjacent portions and away from the adjacent longitudinal edge of the corrugated means.

6. A device as defined in claim 1 wherein said locking means comprises a plurality of integral offset portions formed in said corrugated means, said offset portions being angularly related to the corrugated means so that when the corrugated means has been snapped into operative position, the outermost edges of said integral offset portions are disposed substantially flush with the innermost edge of the associated inturnd lip means.

7. A device as defined in claim 1 wherein said locking means includes a plurality of integral offset portions formed in said corrugated means, a first plurality of offset portions being disposed adjacent one of the longitudinally extending edges of said corrugated means, a second
plurality of integral offset portions being formed adjacent the opposite longitudinally extending edge of the corrugated means, adjacent ones of said offset portions in each of said plurality of offset portions extending in opposite directions from said corrugated means and being angularly disposed with respect to the adjacent parts of the corrugated means and sloping outwardly away from the corrugated means in a direction away from the adjacent longitudinally extending edge of the corrugated means.

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