Nov. 8, 1966 C. L. MEEHAN 3,284,117

MULTI-PIECE CLIP

Filed June 23, 1964

Fig. 1

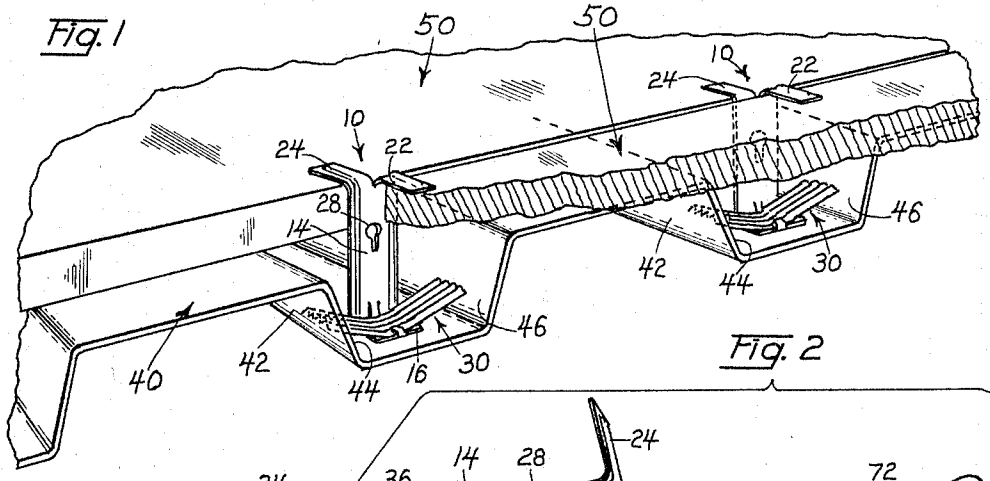



Fig. 2

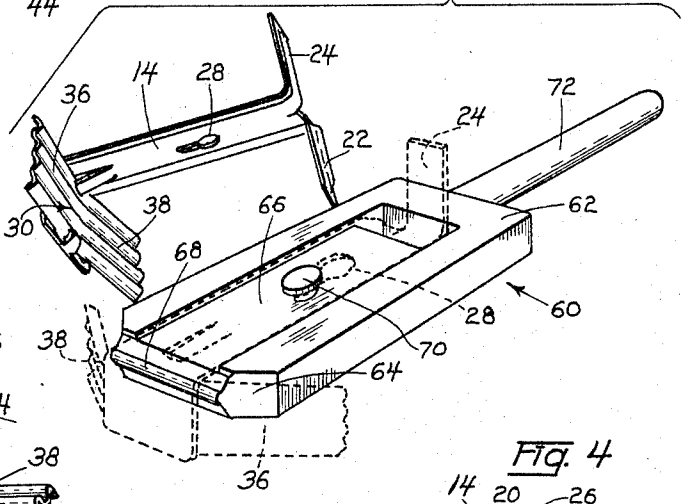



Fig. 3

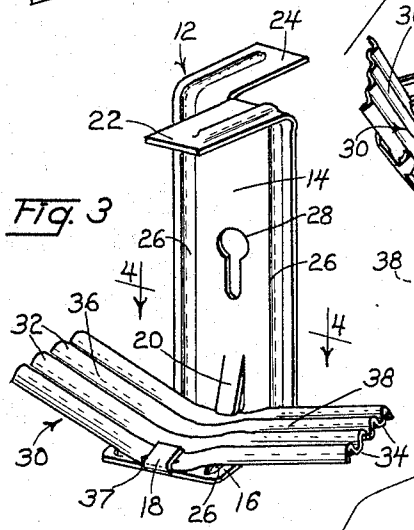



Fig. 4

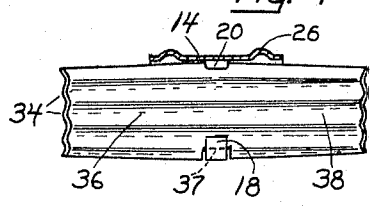



Fig. 5




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# MULTI-PIECE CLIP

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6 Claims. (Cl. 287—189.35)

The present invention relates to fasteners for securing members together, and more particularly, to fasteners for securing one or more panel members to a channel member.

In the building of certain types of roof constructions, it has been the practice to provide a roof deck which is supported by and secured to sheet material beams or channels so as to provide a strong composite roof structure having a fire resistant character. Many types of prior art devices for securing the roof deck and sheet material channels together have been proposed, the most successful of which have been mechanical fastening means of various designs. One of the primary difficulties with mechanical fastening means heretofore known is that they become loose when a force from natural elements, for example, is applied to the roof construction. Devices which have been proposed to overcome this problem sometimes require the punching of holes in the panels and channels, but these do not always register properly when the roof is assembled. Much time and effort is also spent in assembling the roof structure with such fastening devices.

The fastener of the present invention can not only be assembled to a roof structure of the type discussed above in a minimum of time, but it also can, to a great degree, withstand separating forces which tend to remove the fastener from the roof structure.

It is, therefore, an object of the present invention to provide a novel fastening means which strongly secures a pair of members such as a roofing deck to a sheet material channel together, and which can be assembled thereto in a fast and efficient manner.

Another object of the present invention is the provision of a novel fastening means which has been strengthened throughout its configuration to withstand forces tending to loosen or weaken it during its use.

Still another object of the present invention is to provide a two piece fastening means which is assembled together in a relatively secure and permanent fashion so as to prevent the separation thereof when securing a roof structure or the like together.

A further object of the present invention is the provision of a novel fastening means which is made of a minimum number of parts, and which can be easily and economically manufactured with presently existing equipment.

In order to facilitate the application of the fasteners contemplated herein, there is disclosed a novel device for properly applying fasteners to a recessed or channel member in a minimum amount of time.

Other objects and advantages of the present invention will become apparent from the following description and accompanying drawings wherein:

FIG. 1 is a fragmentary perspective view of a roof deck and channeled base member as secured to one another by the novel fastening means of the present invention;

FIG. 2 is an exploded perspective view of the novel fastening means and a fastener applying device, and showing a fastener with imaginary lines as it would be mounted on the fastener applying device;

FIG. 3 is a perspective view of the novel fastening means incorporating features of the present invention;

FIG. 4 is a top plan view, partly in section, of the FIG. 3 fastening means as taken on line 3—3 thereof, and particularly showing the blade element of the fastening means; and



FIG. 5 is a fragmentary front elevational view of the fastener applying device as it is used in attaching the fastening means to a channeled base member.

Referring now to the drawings wherein like parts are designated by the same numerals throughout the various figures, a sheet material fastener **10** having an elongated body is shown in FIG. 1 as being associated with a base member **40** having a plurality of channels **42** provided therein, and roof decking panel members **50**. The fastener is preferably made of suitable metal such as spring steel; however, it is to be understood that other materials such as a relatively rigid and strong plastic may be used.

As best seen in FIG. 3, the fastener **10** is provided with a head portion **12** at one end of its elongated body which is adapted to engage the panel members **50**. Extending downwardly from the head portion **12** is a shank portion **14** which terminates in a base portion **16** at the other end of the elongated fastener body. The base and shank portion are respectively provided with a lug member or portion **18** and an upstanding tab **20** for receiving and securing a blade element **30** which is used to secure the fastener to the channels **42** of base member **40** as will presently be described.

The blade element **30** has a substantially V-shape, and is provided with a plurality of longitudinally extending corrugations **32** which aid to strengthen the blade element and provide gripping means **34** at the free extremities thereof. For convenience of discussion, the blade element has been denoted as having a pair of arms **36, 38** which project on each side of the shank portion **14** and extend toward the head portion **12**. Each of the arms **36, 38** and their associated gripping means **34** are adapted to engage the opposed side walls **44, 46** of the channel members **42** so as to secure the fastener in a relatively permanent fashion therewithin. The extent to which the arms project on each side of the shank portion is determined by the distance between the opposed side walls where the fastener is in engagement therewith, and at the same time is positioned in close proximity to the base of the channel members. At this location, the arms **36, 38** will grippingly engage the opposed side walls **44, 46** and will resist, to a great degree, a force tending to remove the fastener from its mounted position.

Once the mounting of a fastener within a channel member **42** has been accomplished, the oppositely extending finger portions **22, 24** of the head portion **12** will then be able to receive the panel members **50** and hold them in a predetermined relation relative to the channel member.

From an inspection of FIGS. 3 and 4, it will be observed that the lug member **18** of the base portion and the tab **20** of the shank portion securely holds the blade element **30** relative to the elongated fastener body. The lug member **18** is bent or deflected into the notch **36** provided in the blade element and overlaps a portion of the concave and corrugated top surface thereof so as to prevent lateral movement and aid the tab **20** in its effort to prevent relative separating movement between the blade element and the elongated fastener body. The tab **20** is struck from the shank portion **14**, and engages the concave and corrugated top surface of the blade element adjacent one side thereof which is opposite to the side of the blade element containing notch **36**. The relative location of the lug member **18** and tab **20** on the base portion and shank portion respectively is such as to provide an engagement with the blade member along the mid portion thereof to hold the blade element to the base portion. If either the lug member **18** or tab **20** engaged the arms **36, 38** of the blade element, they would be subjected to the flexing of the blade and might possibly be deformed to allow escapement of the blade element.

It has been found that a fastener having the construction just described will retain the panel members **50** to the base member **40** in a relatively secure fashion, and will resist, to a great degree, any force tending to separate the members. This is due to the fact that the shank and base portions cooperate to flatten and thereby lengthen the blade element **30** when a longitudinal force of a nature tending to remove the mounted fastener from the channel member is applied so as to cause the gripping means of the blade element to aggressively engage the opposed side walls **44, 46** and resist withdrawal of the fastener. The built in resiliency of the blade element throughout its entire length, and the manner in which it cooperates with the shank and base portion of the elongated fastener body to engage the opposed side walls of the base member are important features of the present invention as will be readily apparent.

Weakening or destruction of the elongated fastener body is substantially hindered by the strengthening ribs **26** which are provided throughout the entire length of the fastener body. The ribs **26** will strengthen the fastener body in much the same way as the corrugations **32** strengthen the blade element and provide a structurally strong and rigid fastener.

The preferred form of the fastener of the present invention is substantially as illustrated in FIG. 3 of the drawings. It should be understood, however, that the fastener may be made in one piece instead of the two piece form shown in the drawings. In such a case, the blade element will also be the base portion of the fastener body, and will be integrally secured to the shank portion thereof. Further, the head portion **12** may take different forms and shapes instead of having a pair of oppositely extending finger portions for engaging a pair of panel members. It may be possible, for example, to provide a single finger portion having the same width as the shank portion for engaging a single panel member. Or, it may be possible to provide a plurality of U-shaped stepped portions for securing a plurality of panel members in superimposed relation to one another. Such forms and modifications of the fastener are to be construed in an illustrative sense only as being exemplary of some of the possible forms and modifications.

The fastener **10** may be conveniently applied to the channels **42** by deflecting the arms **36, 38** into engagement with the opposed side walls **44, 46** of the channels. One form of fastener applying device which repeatedly and successfully accomplishes the mounting of the fastener within the channels is designated by the numeral **60** in FIGS. 2 and 5 of the drawings. The fastener applying device **60** is provided with a U-shaped body portion **62**, the free extremities of the arms of such body portion having a tapered end surface **64** for engagement with the arms **36, 38** of the fastener blade element **30**. Slidably received within the U-shaped body portion recess is a block member **66** having an end portion **68** for engaging part of the blade element intermediate the tapered end surfaces **64**. Secured to and projecting from one face of the block member **66** is a headed pin **70** which is used to attach the fastener to the applying device so as to facilitate the insertion of the fastener within the channels.

FIG. 2 of the drawings illustrates a fastener **10** and fastener applying device **60** just prior to their association with one another, and a dotted line configuration of a fastener in mounted and secured position on the fastener applying device. The mounting of the fastener to the fastener applying device is easily accomplished by aligning the headed pin **70** of the slidable block member **66** with the keyhole shaped recess **28** formed in the shank portion **14** of the fastener. The headed pin **70** is then inserted within the largest opening of the keyhole shaped recess. Movement of the fastener toward the bight portion of the U-shaped body member **62** will thereafter position the shank of the headed pin **70** within the elongated



opening of the keyhole shaped recess **28** for detachably securing the fastener to the fastener applying device.

After the fastener **10** has thus been assembled to the fastener applying device **60**, it is ready for insertion within one of the channels **42**. The fastener applying device can then be grasped by its handle means **72** for positioning the fastener within one of the channels. The manner in which the fastener is associated with the fastener applying device just prior to the mounting thereof within one of the channels is shown in FIG. 5.

When the fastener **10** has been assembled to the fastener applying device **60** and then positioned within one of the channels **42**, it is ready to be mounted in a relatively secure position within such channel. A hammer **80** or other suitable tool means can be driven against the handle **72** for applying an impacting force to the fastener. The force from the hammer will be received by the arms of the U-shaped body portion and transmitted to the deflectable arms **36, 38** of the blade element to force them into engagement with the opposed walls **44, 46** of a channel. This will cock the deflectable arms **36, 38** and permit the gripping means **34** formed at the free extremities thereof to engage the opposed side walls. The end surface **68** of the slidable block member **66** will aid in holding the blade element while it is being driven into engagement with the opposed side walls.

After a fastener has been mounted within a channel **42**, the fastener applying device **60** may be easily removed therefrom by simply grasping the handle and pulling the headed pin within the circular opening of the keyhole shaped recess **28** to permit a relative separating movement of the fastener applying device from the fastener.

It will be observed that while the slidable block member **66** can be moved within the U-shaped housing members **62** toward the handle **72** for accommodating fasteners of different sizes, the end surface **68** of the slidable block member **66** is prevented from moving beyond the tapered end surfaces **64** of the U-shaped body member. This allows the end surface **68** of the block member to cooperate with the tapered end surfaces **64** in engaging the blade element and assuring that the fastener is properly mounted within one of the channels **42**.

From the foregoing, it will be appreciated that the fastener of the present invention can be readily assembled to a recessed member and secured in place by a suitable tool which engages a deflectable portion of the fastener for driving it into position. Removal of the fastener from its mounted position is a relatively difficult matter requiring a great deal of pull-out strength due to the inherent nature of the fastener to resist withdrawal from the recessed member by the aggressive engagement with the opposed side walls thereof. The saving of time and effort in securing the fastener into position, and the manner in which it tenaciously resists withdrawal or separation from its mounting evidences the functionality and practicability of the disclosed fastener.

It will also be appreciated that the fastener applying device accomplishes the placement of a fastener within a recessed or channel member in a novel and unique manner, and in a minimum amount of time. The desirability of the fastener applying device is also indicated by the manner in which it repeatedly and properly applies fasteners in mounted position within such recessed or channel members.

Although specific embodiments have been shown and described, it is with full awareness that many modifications thereof are possible. The invention is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim:

**1.** A fastener for use in securing at least one complementary panel member to a complementary channel member having opposed side walls including an elongated body member having a head portion at one end

for securing the complementary panel in predetermined relation to the channel member, a shank portion extending downwardly from said head portion and terminating in a base portion at the other end of said elongated body member which extends substantially normal to said shank portion, said shank and base portion being provided with means for receiving and securing a substantially V-shaped blade element including a deflectable lug portion associated with said base portion for acceptance within a notch provided in said blade element along one side thereof and an upstanding tab struck from said shank portion for engaging the concave surface of said V-shaped blade element adjacent the side thereof opposed to that in which the notch is provided, said blade element having free extremities which extend toward said head portion and lie outside of the boundary of said shank portion, a plurality of longitudinally extending corrugations formed in said blade element to strengthen the same and provide gripping means at the free ends of said blade element for engaging the opposed side walls of the channel member, the shank and base portion of said elongated body member cooperating to flatten said blade element when a longitudinal force is applied to said fastener whereby to cause said gripping means to aggressively engage said opposed side walls and resist withdrawal of said fastener.

2. The fastener as set forth in claim 1 wherein said elongated body member is provided with strengthening ribs extending throughout the head, shank and body portions thereof.



3. The fastener as defined in claim 1 wherein said head portion comprises a pair of oppositely extending finger portions each lying substantially normal to said shank portion for engaging one side face of a pair of complementary panel members.

4. The fastener as set forth in claim 1 including means for attaching said fastener to a device for applying said fastener to said channel member.

5. The fastener as defined in claim 1 wherein said means for attaching said fastener to said applying device comprises a keyhole shaped recess for receiving attachment means formed on said applying device.

6. A device for applying a fastener having a deflectable blade to opposed side walls of a complementary channel member including means for securing said fastener to said device, means for engaging said deflectable blade, and means for receiving an impacting force from a tool means to deflect said blade into engagement with the opposed side walls of said channel member to resist withdrawal of said fastener.

**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,695,973 | 12/1928 | Olsson | 52—489 |
| 2,427,393 | 9/1947 | Eckel | 189—36 X |
| 2,910,155 | 10/1959 | Bradner | 189—35 X |


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