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Murphy

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[54] **ROOF ASSEMBLIES FOR BUILDING STRUCTURES**

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[73] Assignee: **Vercon Products, Inc.**, Charlotte, N.C.

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[21] Appl. No.: **367,600**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 160,018, July 6, 1971, abandoned, which is a continuation-in-part of Ser. No. 85,533, Oct. 30, 1970, abandoned.

[52] **U.S. Cl.** **52/92**; 52/94; 52/584; 52/715

[51] **Int. Cl.²** **E04B 7/02**

[58] **Field of Search** 52/92, 94, 582, 584, 715

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Attorney, Agent, or Firm—Caesar, Rivise, Bernstein & Cohen

[57] **ABSTRACT**

Roof assemblies for building structures comprising a ridge assembly for connecting one end of a first parallel and coplanar set of rafters and a second parallel and coplanar set of rafters and a ridge assembly for connecting one end of the first set of rafters to the corresponding end of the second set of rafters. The second set of rafters are disposed at an angle with respect to the first set to form a pitched roof. A tie bar is connected between the corresponding end portions of the angularly disposed rafters to strengthen the roof assembly. Fascia means are provided for closing the free end of the rafters. The rafters are adapted for supporting planar roof panels thereon. The rafters are supported on the upper end of plural studs forming a wall of the structure, via associated wall plates. A tie pin is disposed within pin retainers which are mounted within aligned slots in the rafter adjacent the free end thereof. The tie pin serves as a means for connecting the tie bar to the rafter. A clip is provided to connect adjacent roof panels to one another on the rafters.

14 Claims, 9 Drawing Figures

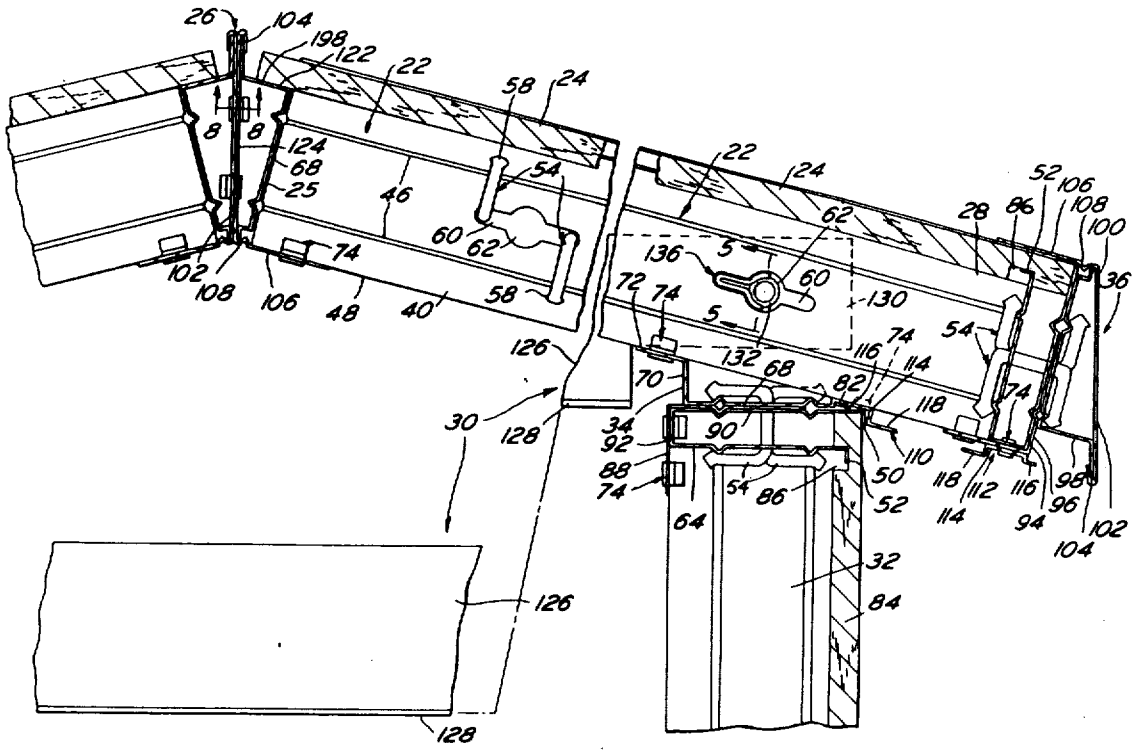


FIG. 1

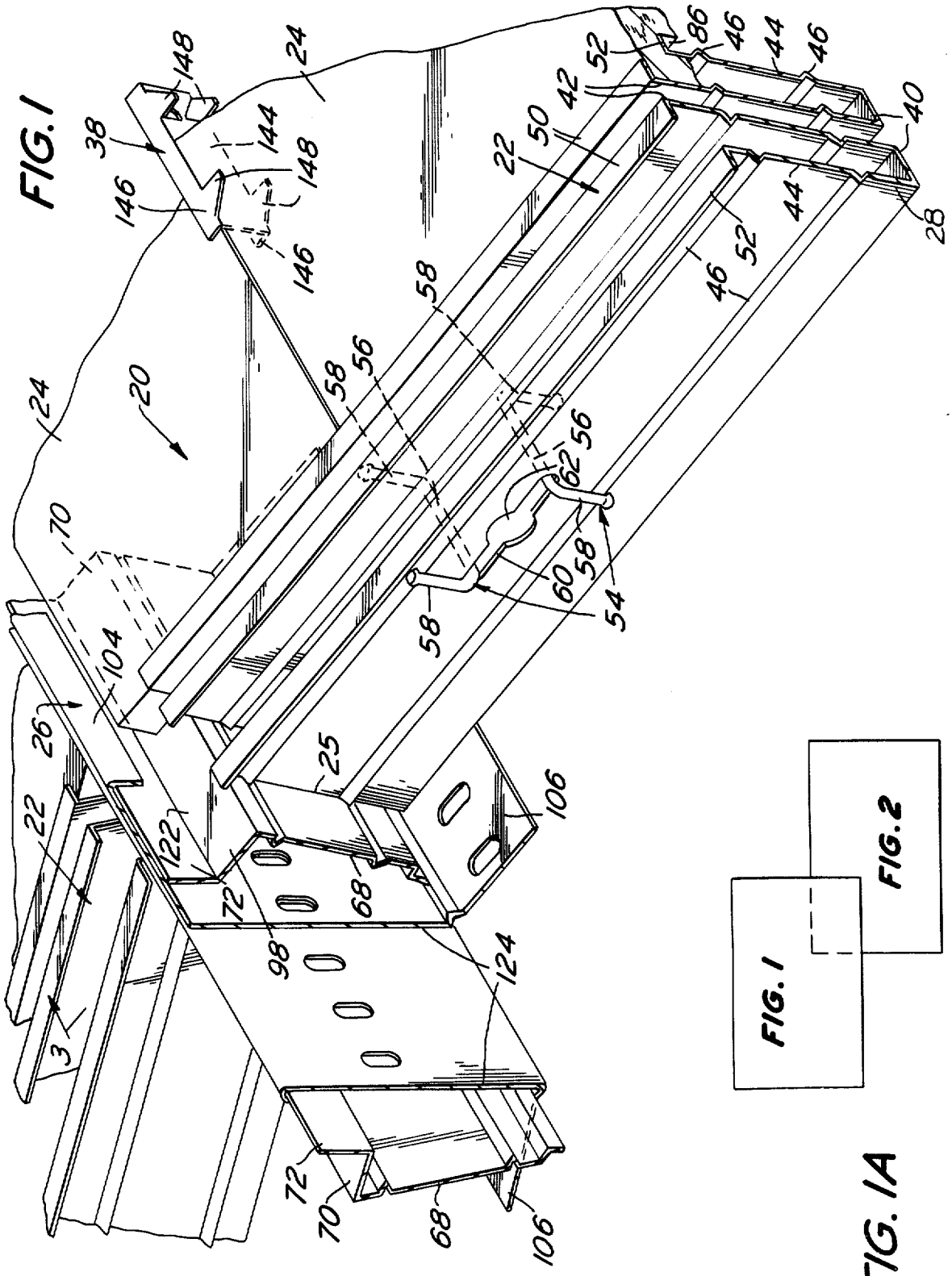

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FIG. 2
FIG. 1

FIG. 1A

FIG. 2

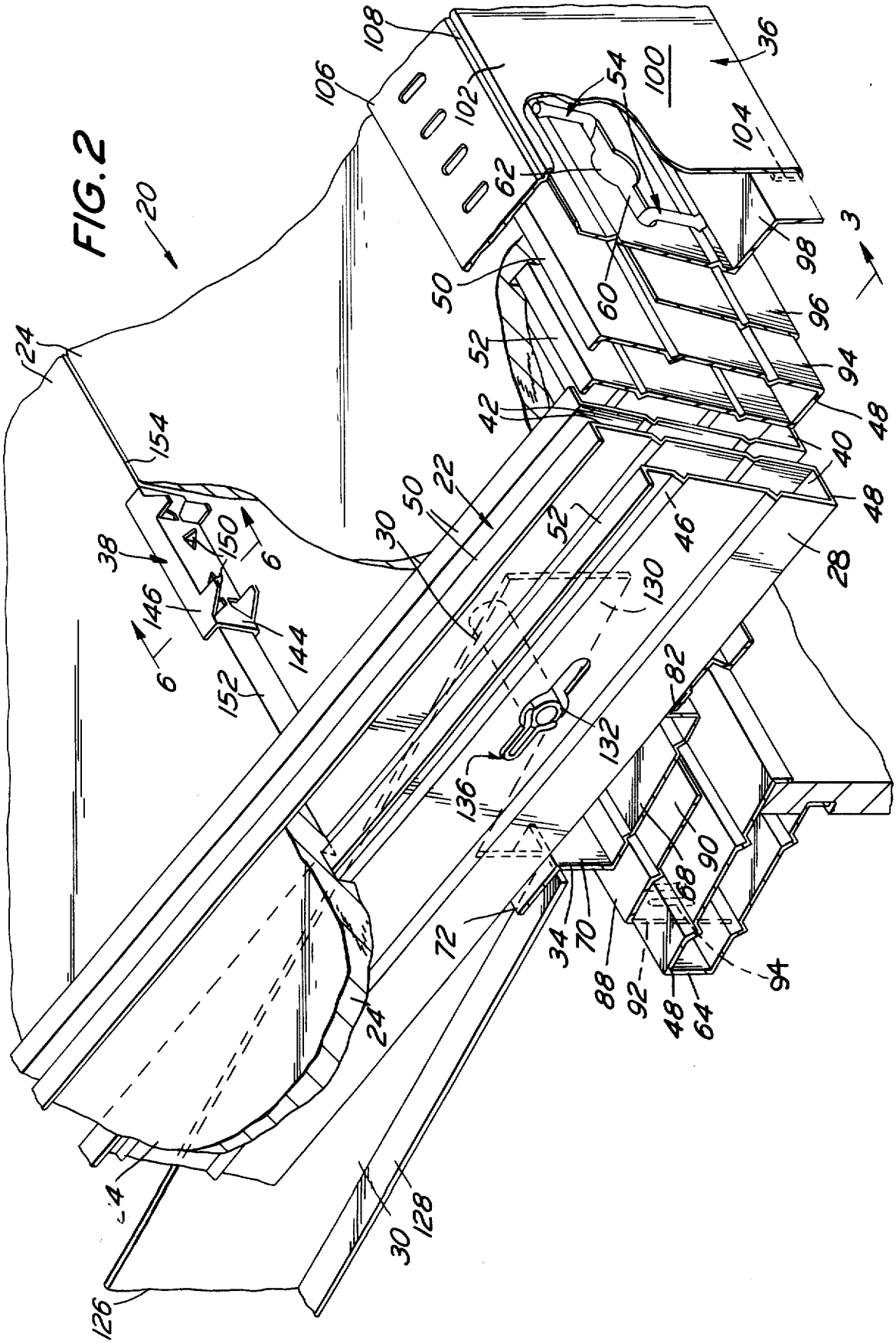
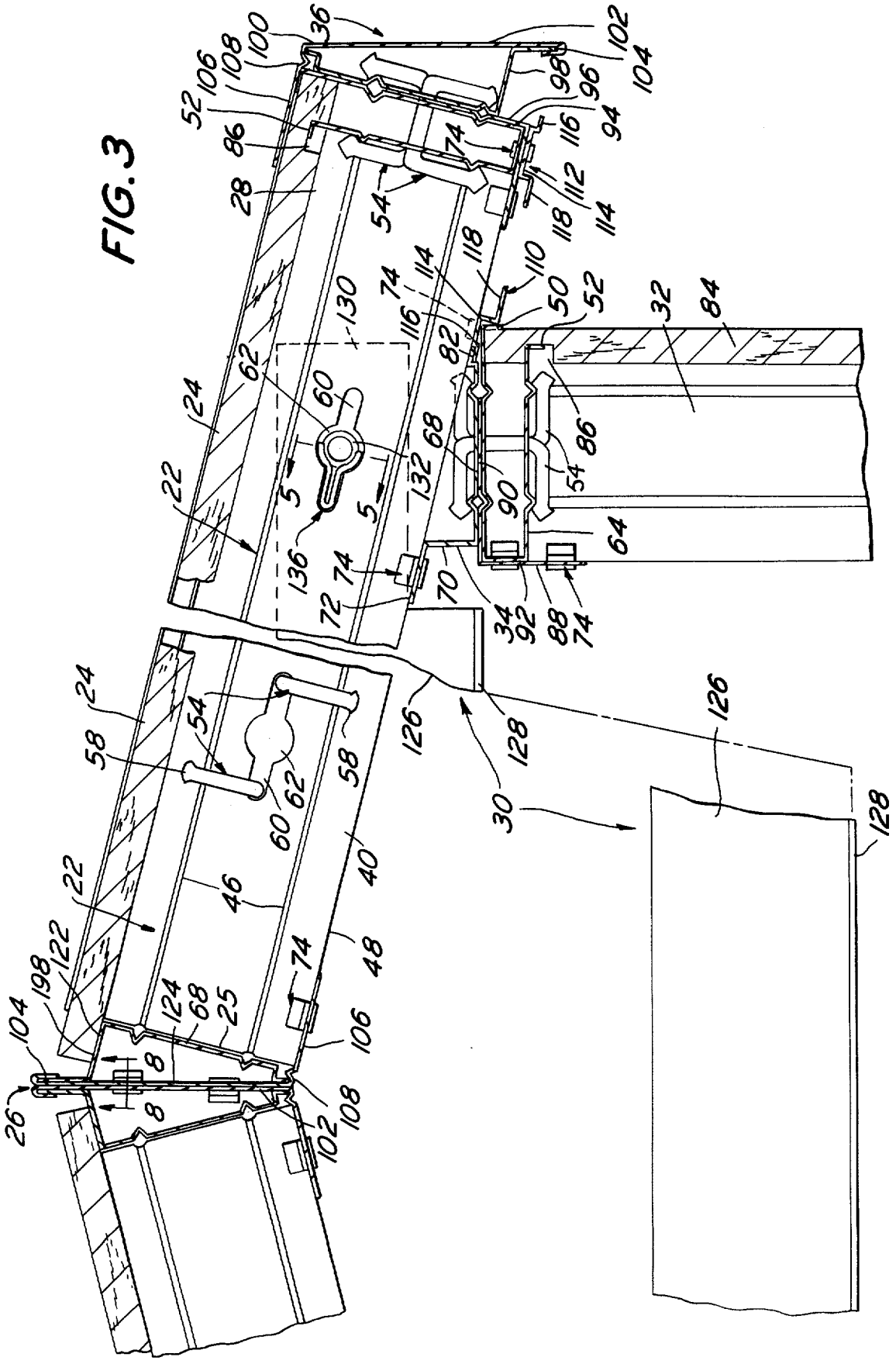

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90
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72
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92
64
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128
126

FIG. 3


36
100
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114
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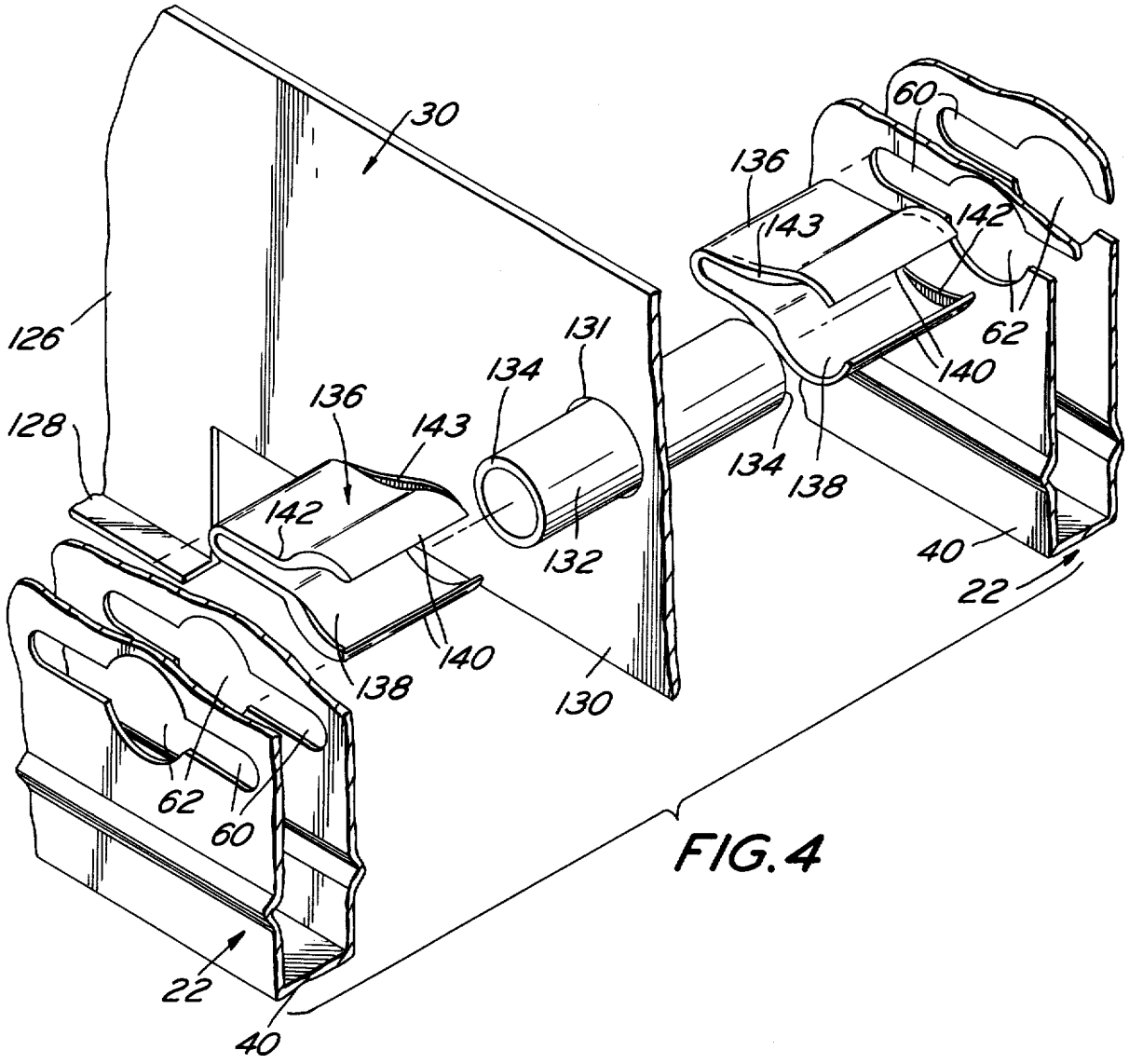

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FIG. 4

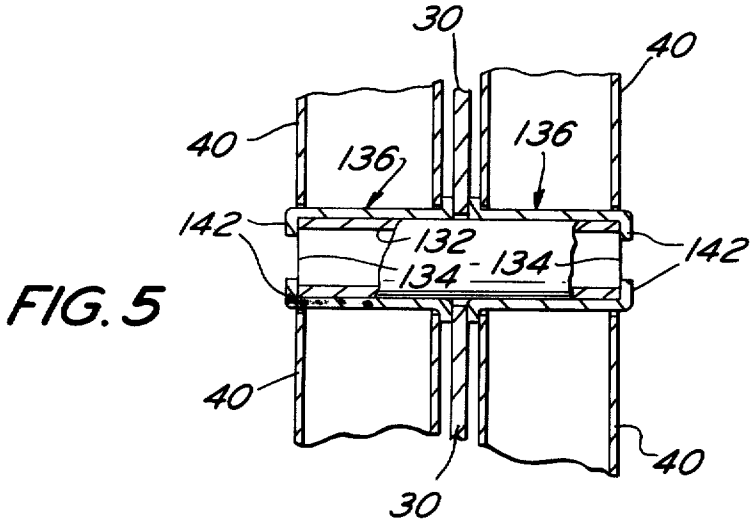

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FIG. 5

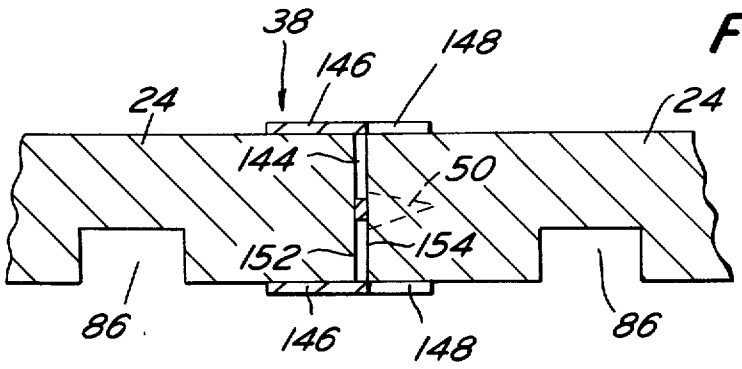


FIG. 6

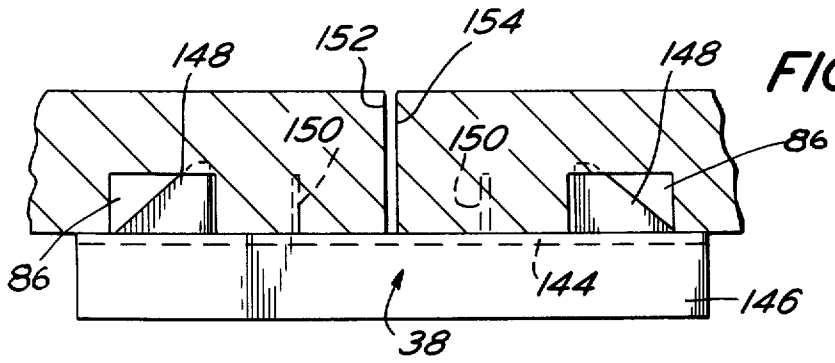


FIG. 7

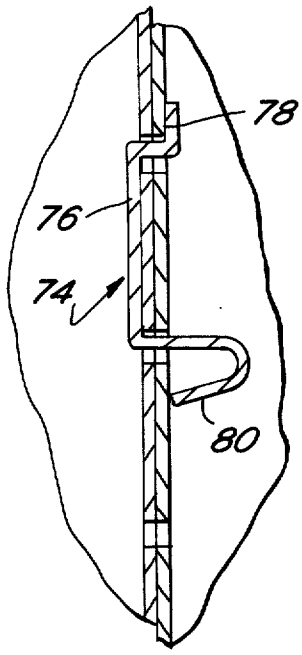


FIG. 8

ROOF ASSEMBLIES FOR BUILDING STRUCTURES

This application is a continuation-in-part of co-pending application Ser. No. 160,018 filed on July 6, 1971, now abandoned and entitled "Modular Building" which is in turn a continuation-in-part of Application Ser. No. 85,533 filed on Oct. 30, 1970, now abandoned and entitled "Building Structures".

The present invention relates generally to buildings and more particularly to building systems including the use of standardized roof assemblies.

A large number of perfabricated and modular housing systems have been formulated over the years, but for various reasons, there has been little acceptance or success with such systems.

The prefabricated systems which have been presented for commercial use are generally comprised of a large number of components that are usually not standardized, and therefore must be constructed by skilled craftsman with careful attention to plans.

Furthermore, such systems have generally been unattractive in appearance, such that any savings in cost has not been proved to be an incentive to the adoption of such systems, particularly in low and middle cost housing.

As the shortage of housing grows, the need has deepened for an effective modular building that can easily be constructed by unskilled workmen with standardized components and at a low cost.

In the above mentioned application Ser. No. 160,018, whose disclosure is incorporated by reference herein, there is disclosed and claimed novel studs which are standardized and can be readily fabricated from roll steel stock when needed. The standardized studs eliminate the need for large inventories of parts, which heretofore has been required of prior art housing systems. Furthermore, the studs are so configured as to enable a large number of parts, such as wall panels, to be readily connected without special tools by relatively unskilled labor and without the use of nails or threaded fastening means. Further still, the joints between the panels connected by the studs are not exposed and do not require spackling, tape or other retaining means. In addition to the above noted features, the stud also includes openings to permit the assembly of electrical wiring, piping, heating and ventilating ducts therethrough.

As disclosed, the studs basically comprise a pair of half-stud members held together by rotating clamps. The halfstud members are preferably of identical construction, each including a first longer wall and a second shorter wall, the first and second walls run generally parallel to each other and are connected by a bridging section. Each wall terminates in a free edge tab portion. The two half-stud members are disposed against each other in such a way that the longer first wall of each half-stud member is immediately adjacent to the other, such that the respective tabs of the first and second parallel walls extend away from each other. A vinyl separator is interposed between the adjacent first flat parallel walls and possesses an exterior seal at one end and an interior seal at the other end.

The walls are erected by providing an exterior panel having longitudinal grooves formed in the interior surface adjacent its vertical edge. A half-stud member is attached to the panel at its vertical edge with the tab of

a second parallel wall of the first half-stud member being received in the longitudinal groove of the panel. The exterior panel with its half-studs is then so positioned with respect to a previously erected wall panel (which already has a half-stud associated therewith) so that the half-stud of the previously erected wall panel and the nearest half-stud of the panel about to be erected, may be secured together by rotating clamps after a vinyl separator has been interposed between the first parallel walls of the two half-studs.

Also disclosed in said application Ser. No. 160,018 is a novel spring clip to enable a half-stud member to be simply and securely fastened to a horizontal wall plate. The clip has other fastening functions, one of which being to secure the half-stud members to a supporting brace.

The clip essentially comprises a body portion from which a tab portion extends at one end thereof, with the spring finger extending from the other end of the body portion. The clip is adapted to snap into a pair of slots that exist in the adjacent walls that are to be secured together. To that end, the tab portion of the clip is simply slipped into one of the slot pairs and the spring finger is passed through the other slot pairs and allowed to move in a locking position.

In co-pending application Ser. No. 339,796, filed on Mar. 9, 1973, U.S. Pat. No. 3,867,802 whose disclosure is incorporated by reference herein, there is disclosed a floor support assembly for modular building systems. Like the novel studs of application Ser. No. 160,018, the floor support assembly is formed of standardized parts which can be fabricated when needed, can be put together by relatively unskilled workmen without special tools and can be used to serve as heating and/or cooling duct work.

The floor support assembly comprises a joist, a beam having a joist supporting ledge and a locking clip for connecting the joist to the beam. The joist includes an elongated bottom wall portion and a pair of sidewalls projecting along the length of the bottom wall at an angle thereto so as to form a generally V-shaped member. Each sidewall of the joist includes a ledge extending therealong. The ledges are coplanar and are adapted to be received within respective grooves in a floor panel to support the floor panel thereon.

The joist itself is supported at its end by the ledge of the beam and is connected to the beam by a rod-like clip.

The clip includes an elongated body portion, a short leg and a long leg projecting laterally from opposed ends of the body portion and in the opposite direction thereto. The long leg terminates in a projecting ear. The short leg of the clip extends through an opening in the bottom wall of the joist adjacent the end and an aligned opening in the ledge disposed thereunder. The long leg of the clip extends through an opening in the sidewall of the joist's flange with the projecting ear thereon extending into an opening in the beam.

The beam includes a flanged portion for connection to a similar beam to form a hollow beam section which not only serves as a support for other floor joists, but also serves as heating and/or cooling duct.

In co-pending application Ser. No. 358,193, filed on May 7, 1973, whose disclosure is incorporated by reference herein, there is disclosed foundation assemblies for modular building systems. Like the studs of application Ser. No. 160,018 and the floor support assemblies of application Ser. No. 339,796, the foundation assem-

blies are formed of standardized parts, which can be fabricated when needed, and can be put together by relatively unskilled workmen without special tools. As disclosed, the foundation assemblies basically comprise sill means and a wall plate connected thereto. The wall plate serves to support a plurality of elongated half-stud members on which vertical wall panels are mounted.

In one embodiment, the sill plate is mounted directly on and is connected to a concrete foundation element and comprises a sill plate and a sill locking plate. A flanged stud tie plate is interposed between the sill locking plate and the wall plate and serves to expedite the mounting of the stud members. In another embodiment, the sill means is mounted on a vertically extending pier for supporting the sill plate and associated structure above the ground. In that embodiment, the sill means comprises a sill plate, a sill locking plate and a beam support angle having a portion connected to the pier and the sill plate for supporting the beam of a floor support assembly. In yet another embodiment, the sill means is mounted directly on the ground and includes a channel-like mud sill and a mud plate adapted to be staked to the ground and having a resilient portion for urging the mud sill into secure engagement with the ground. In still another embodiment, a corner bracket is provided for interconnecting two sill means and associated structural components to support a corner of a foundation assembly. In yet another embodiment, a hollow floor support beam of a floor support assembly is mounted above the ground on a vertically extending pier. The pier is connected to the floor support assembly via a pair of interconnected beam support angles.

Heretofore, various roof assemblies for modular building systems have been proposed, but such systems have suffered from various deficiencies, such as for example, they require large inventory of specially fabricated parts, they are complex, they require skilled workmen or special tools for assembly and are relatively expensive.

It is a general object of this invention to provide roof assemblies which overcome the above described disadvantages of prior art roof assemblies.

It is a further object of this invention to provide novel roof assemblies formed of standardized components which can be fabricated when needed, and can be readily assemblied by relatively unskilled workmen without special tools.

It is a further object of this invention to provide a novel clip for connecting roof panels to one another.

These and other objects of this invention are achieved by providing a roof assembly for a building including a planar roof panel, a rafter having a free end for supporting the roof panel directly thereon and an elongated tie bar connected to the rafter adjacent its free end. The rafter is supported adjacent its free end on the upper end of a vertical wall stud by a top wall plate and comprises a pair of elongated members held together by clamp means. The rafter includes another end which is supported and abuts an elongated and normally extending ridge pad and ridge member. The free end of the rafter abuts an elongated and normally extending end plate and associated fascia means. The tie bar is connected to the rafter adjacent the free end thereof, via a rafter tie pin. A channel-like clip is provided to connect adjacent roof panels to one another.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view, partially in section, of a portion of a roof assembly in accordance with this invention;

FIG. 1*a* is a schematic representation of the arrangement of FIGS. 1 and 2 in order to clearly show the details of the entire roof assembly;

FIG. 2 is a perspective view of another portion of the roof assembly;

FIG. 3 is a sectional view taken along line 3—3 of FIGS. 1 and 2;

FIG. 4 is an exploded perspective view of a portion of the assembly shown in FIG. 2;

FIG. 5 is an enlarged sectional view taken along line 5—5 of FIG. 3;

FIG. 6 is a sectional view of a pair of adjacent wall panels which are connected by a clip in accordance with one aspect of this invention;

FIG. 7 is a sectional view of a pair of adjacent roof panels which are connected by the clip shown in FIG. 6 but oriented differently than shown therein; and

FIG. 8 is a sectional view showing means for connecting portions of the roof assembly to one another.

Referring now in greater detail to the various figures of the drawing wherein like reference characters refer to like parts, a roof assembly in accordance with this invention is shown generally at **20** in FIG. **1**.

Assembly **20** basically comprises a plurality of rafters **22** for supporting a plurality of roof panels **24**, such as plywood sheets, thereon. The rafters are arranged in two angularly related sets, each set includes a plurality of parallel and coplanar rafters forming a side of a pitched roof. The rafters of one set are aligned with the rafters of the other set with one end **25** of the rafters of each set being connected to the corresponding end of the rafters of the other set by a normally extending ridge assembly **26**. The assembly **26** forms a roof peak. The free end **28** of each rafter of one set is connected to the free end of a corresponding rafter of the other set by respective tie bars **30** (FIG. **2**). The tie bars **30** serve to brace the rafters **22** and thus strengthen the roof assembly. Each rafter **22** is supported adjacent its free end **28** on the upper end of a vertical wall stud **32** by a wall plate **34**. An elongated fascia assembly **36** abuts the free ends of associated rafters to close the rafters and provide additional support for the roof panels mounted thereon. The roof panels **24** are connected to one another via a plurality of connection clips **38**.

In accordance with a perferred aspect of this invention, the individual components forming the roof assembly **20**, except for the plywood roof panels, connecting clamps and tie bars, are formed of roll steel stock such as **20** gauge roll steel stock, and can be readily fabricated when needed.

This feature is of considerable importance in the housing construction industry where heretofore, the maintenance of large inventories was required in order to permit the construction of buildings from standard-type parts. Needless to say, such large parts inventories result in increased overall building costs due to the increased storage and handling costs attendant with such inventories. Furthermore, by eliminating large inventories, the problem of having surplus parts left over once the building is completed, is minimized, if not eliminated.

As can be seen in FIGS. **1** and **2**, each rafter **22** comprises a pair of identical elongated members **40**. Each

member is of the same shape as the half-stud members shown and described in application Ser. No. 160,018 and comprises a first longer wall **42**, a second shorter wall **44**, with the walls **42** and **44** being generally parallel to each other and possessing longitudinal crimps **46** for strengthening purposes. The walls **42** and **44** are joined together by a bridging section **48** and terminate in free edge tabs **50** and **52**, respectively, which define a space therebetween. The two elongated members are disposed against each other in such a way that the longer first wall of each member is immediately adjacent the corresponding wall of the other, whereby the respective free edge tabs of the first and second parallel walls extend away from each other.

The two elongated members **40** are secured together by means of rotating clamps **54** like those shown and described in application Ser. No. 160,018. The clamps **54** are basically U-shaped and are comprised of a base **56** and a pair of legs **58**. The rotating clamp **54** is inserted through aligned slots **60** in the walls of the elongated members **40**. The slot **60** includes an enlarged central portion **62** so that when the legs of the clamp are inserted through the slot, the legs are in actual contact with crimps **46** in each of the second shorter walls **44** of the elongated members **40**.

The insertion of the rotating clamp **54** is usually done in such a manner that the legs **58** are passed through the narrow portions of the slot **60** in each of the first and second walls **42** and **44**. The clamp **54** is then rotated about base **56** as an axis so that the legs **58** are rotated away from the slot and into a transverse direction with respect to the elongated member.

The legs **58** are so dimensioned and spaced with respect to each other that they are separated by a distance slightly less than the distance between the convex crimps **46** in the parallel second shorter wall **44**. Thus, as clamp **54** is rotated into the transverse direction, the legs **58** exert an inward force upon the second shorter walls **44**, thereby uniting the two elongated members **40** to form a unitary rafter. In actual practice, it is preferred that two rotating clamps **54** be used for each pair of elongated members **40**.

The rafters **22** of one set are connected to and mounted on a top plate **34** (FIG. 2). The top wall plate is an elongated member which in turn is mounted on an elongated top sub-wallplate **64**. The top sub-wallplate **64** is in turn mounted on the top ends of a plurality of vertical wall studs **32**, only one of which can be seen (see FIG. 3). The wall studs **32** are of identical construction to those disclosed in application Ser. No. 160,018.

As can be seen in FIG. 3, the top wallplate **34** comprises a base wall **68** having a flange **70** projecting normally from one side thereof. The flange **70** terminates in an angularly extending lip **72**. The lip extends at the same angle with respect to the base wall of the top plate as the degree of the pitch of the roof such that the lip abuts the bridging section **48** of the rafters. The lip **72** includes a plurality of transversely extending slots (not shown). The slots are provided to align with longitudinally extending slots (not shown) in the bridging section of the elongated members making up each of the rafters, such that a spring clip **74** can be inserted in the aligned slots to secure the rafter to the top wall plate. The spring clip **74** is of similar construction to that disclosed in application Ser. No. 160,018 and basically comprises a body portion **76** from which a tab portion **78** extends at one end and a spring finger **80** extends at the other end.

In FIG. 8 there is shown the manner in which a typical spring clip **74** is utilized to connect two components having aligned slots therein. To that end, the tab portion **78** of spring clip **74** slipped into an aligned slot pair and the spring finger **80** is passed through another adjacent aligned slot pair and allowed to move into a locking position, thereby securing the two components together.

As can be seen in FIG. 3, the other side of the top wallplate **68**, i.e. the side opposed to the flanged side, terminates in a portion **82** which is offset at an angle from the basewall **68** and is coplanar with the lip **72**. Accordingly, the offset portion also abuts the bridging section **48** of the rafter **22** and thus serves to provide additional support therefore.

The top sub-wallplate **64** is an elongated member of identical construction to the elongated members **40** forming the rafters **22** and is mounted across the upper ends of the plural wall studs **32** forming a wall of the building structure. The top sub-wallplate **64** serves to hold the upper edge of a vertical wall panel **84** in place by securing its top horizontal edge within the space defined between the free edge tabs **50** and **52** of the top sub-wallplate, with free edge tab **52** being disposed within a horizontal groove **86** in the wall panel adjacent its edge.

The top sub-wallplate is connected to the upper ends of the wall stud **66** via a stud tie plate **88**. The stud tie plate is an elongated member comprising a horizontal base portion **90** and a vertical flanged portion **92** projecting normally therefrom. The base portion **90** includes an opening (not shown) and a longitudinal crimp for locking and strengthening purposes. The flanged portion **92** includes a plurality of transverse slots **94** which align with longitudinal slots (not shown) in the wall studs and with transverse slots (not shown) in the bridging section of the top sub-wallplate **64**. Spring clips **74** are inserted in the aligned slots to complete the connection between the top sub-wallplate and the vertical wall studs **66**.

The top wallplate **34**, the stud tie plate **88** and the top sub-wallplate **64** are secured together by means of rotating clamps **54** in an identical manner to the manner in which the elongated members **40** are connected to each other to form a rafter.

As can be seen in FIGS. 2 and 3, the free end **28** of the rafters **22** of each set is closed by a respective elongated fascia assembly **36** which extends normally to the rafters of that set. The fascia assembly comprises a rafter end plate **94**, whose construction is identical to that of the elongated members **40**, a rafter tie plate **96**, whose construction is identical to the stud tie plate **88**, an elongated sub-fascia **98** and an elongated fascia **100**. The rafter end plate serves to support the edge of a roof panel **24** between its free edge tabs **50** and **52**, with tab **52** disposed within groove **86** in the panel (see FIG. 3). The rafter end plate **94** is secured to the end of the rafters by the elongated rafter tie plate **96** in the same manner as the manner in which the stud tie plate **88** secures the top sub-wallplate **64** to the upper ends of the wall studs **32**, i.e. via spring clips **74** extending through aligned slots in the adjacent components.

The sub-fascia **98** is of identical construction to the top wallplate **34** and is connected to the rafter end plate **94** in the identical manner to the manner in which

the top wallplate is connected to the top sub-wallplate **64**, i.e. via rotating clamps **54**.

The fascia **100** includes a base portion **100** terminating at one side thereof in a groove **104**. The groove **104** is formed by bending the base portion back over itself and serves to receive the edge of the lip **72** of the sub-fascia **98** to thereby hold the fascia in place. The other side of the fascia **100** terminates in an angularly extending flange **106**. A crimp **108** extends the entire length of the fascia member closely adjacent to the point at which the flange **106** meets the base **102**. The crimp **102** serves to lock the fascia to the sub-fascia. To that end, the crimp is disposed within the space defined between the offset portion **82** of the sub-fascia **98** and the longer wall **42** of the rafter end plate **94**. The angularly projecting flange **106** of the fascia serves to hold the edge of the roof panel **24** down and in place.

Means are provided to enable a soffit (not shown) to be mounted under the portion of the rafters extending outward from the wall of the building structure to close that portion thereof. To that end, a soffit molding **110** is secured to the rafter immediately adjacent the point at which the rafter meets the wall of the building structure and another soffit molding **112** is connected to the rafter end plate **94**.

As can be seen in FIG. **3**, the soffit moldings **110** and **112** are of identical construction and comprise an elongated base portion having a first lip **116** slightly offset from the plane of the base and extending the entire length of the molding. The molding includes a second lip greatly offset from the base on the opposed side thereof and extending the entire length thereof. A plurality of transverse slots (not shown) are provided in the base of the soffit moldings **110** and **112**. The slots in the base of the soffit molding **110** serve as a means for connecting it to the rafters. To that end, the slots in the base of the soffit molding are aligned with longitudinally extending slots (not shown) in the bridging section **48** of the rafters and spring clips **74** are inserted in the aligned slots to complete the connection. The transversely extending slots in the soffit molding **112** serve as the means for connecting the soffit molding to the rafter end plate **94**. To that end, the slots in molding **112** are aligned with transversely extending slots (not shown) in the bridging section of the rafter end plate and spring clips **74** are inserted in the aligned slots to complete the connection. Once the soffit moldings are connected as shown, a soffit may be readily attached thereto to close the underside of the overhanging rafters.

The ends **25** of the rafters of each set are connected together by the ridge assembly **26** to form the ridge or peak of the roof. The assembly **26** is formed of two identical pairs of components which, as can be seen in FIGS. **1** and **3**, comprise ridge pads **122** and ridges **124**. The ridge pad **122** is of identical construction to the top wallplate **34** and the sub-fascia **98** and the ridge **124** is of identical construction as the fascia **100**.

The ridge **124** supports the ends **25** of each of the rafters **22** of an associated set and is connected thereto by plural spring clips **74**. To that end, a spring clip is inserted within a slot in the flange **106** of ridge **122** and an aligned transverse slot in the bridging section of the elongated member forming the rafter. The end **25** of the rafter abuts the base portion **68** of the ridge pad **122**. As can be seen, the width of the base portion of the ridge pad is of the same dimension as the height of the rafter **22** such that the flange **70** of the ridge pad supports the edge of at least one roof panel **24**, thereby aiding the rafter **22** in supporting said panel.

The two ridges **124** of the ridge assembly **26** are connected to one another to form the roof peak by abutting their base portions **102** such that transverse slots **126** therein (see FIG. **1**) are aligned. Spring clips **74** are inserted in the aligned slots to complete the connection.

Each of the tie bars **30** is connected between the free end **28** of a rafter **22** of one set and the free end **28** of the aligned and corresponding rafter **22** of the other set. The tie bars serve to brace the rafters connected thereto and thereby strengthen the roof assembly.

As can be seen in FIGS. **2** and **3**, the tie bar **30** is an elongated member having a T-shaped cross section formed by a relatively thin web **126** and a strengthening flange **128**. The web and the flange are cut away at each end of the tie bar in order to provide reduced width web **130** portion at each end of the bar. The reduced width portion is interposed between the elongated members forming the associated rafter (see FIG. **4**) closely adjacent the free end thereof. The tie bar is connected to the rafter at this location by a rafter tie pin **132**. The rafter tie pin is a cylindrical member or tube which extends through a hole **134** in the reduced width web portion **130** of the tie bar. The ends **134** of the tie pin are held in place by respective pin retainers **136**. The pin retainers are mounted within aligned slots **60** in the rafters. To that end, the pin retainers are of generally U-shape having an enlarged opening or mouth **138** formed by arcuate sides **140** which fit into the enlarged opening **62** in the slot **60**. The mouth **138** serves to receive the tie pin end to secure it to the rafter. An inwardly projecting flange **142** is provided along the periphery of one side of each pin retainer to act as a stop and thereby prevent the tie pin end disposed therein from sliding longitudinally. An outwardly projecting flange **143** is provided along the periphery of the arcuate portions on the other side of the pin retainer. This flange abuts the surface of the wall of the elongated member contiguous with slot **62** to secure the pin retainer to the member **40**.

In the sectional view of FIG. **5** there is shown the completed connection between the tie bar **30** and rafter **22**. As can be seen, the tie pin **132** is disposed within a pair of pin retainers **136** with its ends abutting the flanges **142** of the respective pin retainers. The tie pin extends through hole **131** in the reduced width web portion **130** of the tie bar to secure the tie bar to the rafter.

In accordance with one aspect of this invention, a novel clip **38** (FIG. **1**) is provided for connecting the roof panels **24**, or any other type of planar panel, to one another edge-to-edge to maintain their surfaces at the same plane even under uneven loading conditions. The clip **38** is also effective when used in conjunction with panels having grooves in their faces closely adjacent the edge, like the roof panels **24** and the wall panels **84**, to prevent the panels from separating during the assembly operation.

As can be seen in FIGS. **2**, **6** and **7**, the connection clip **38** is of generally channel-like shape and comprises a web or a base **144** having a pair of sides **146** projecting normally therefrom and extending the length of the clip. The sides define a space therebetween into which an edge of one roof panel **24** is disposed. Two pair of ears **148** are bent out of the plane of the base to extend normally thereto and in the opposite direction as the

sides **146**. The ears of each pair also define a space therebetween into which the edge of an adjacent roof panel is disposed.

In order to secure the clip to one panel and thereby strengthen the joint between the panels, a pair of pointed tags **150** are bent out of the plane of the base to extend normally thereto and in the direction which the ears extend. The tags are adapted to penetrate into the edge of the panel which is inserted between the ears and thereby affix the clip to that panel. In the sectional view of FIG. **6**, a completed connection between two adjacent roof panels **22** is shown. As can be seen, one edge **152** of one panel is disposed between the sidewalls **146** of the clip **38** and one edge **154** of the other panel is disposed between the ears **148** of the clip with the tags **150** penetrating into the latter edge.

In FIG. **7** there is shown the manner which the clip **38** can be used to hold a pair of adjacent roof panels **24** together during the assembly operation. As can be seen, in such a case the clip is oriented such that one pair of ears **148** is disposed within the groove **86** adjacent one edge of one panel and the other pair of ears disposed within the groove **86** adjacent one edge of the other panel. In order to hold the clip in position, one pointed tag **150** penetrates a portion of one panel adjacent it's edge and the other tag penetrates a corresponding portion of the other panel.

As should be appreciated from the foregoing description, the roof assembly in accordance with this invention is relatively simple and inexpensive, can be fabricated when needed and can be readily assemblied and locked in place utilizing simple clips without skilled labor and without special tools. All of the above features make the roof assemblies ideal building components for producing low cost, yet attractive buildings of various overall designs.

Without further elaboration, the foregoing will so fully illustrate our invention that others may, by applying current or future knowledge, readily adapt the same for use under various conditions of service.

What is claimed as the invention is:

1. A roof assembly for a building including a planar roof panel, a rafter having a free end, said rafter supporting said roof panel directly thereon and an elongated tie bar connected to the rafter adjacent its free end, said rafter being supported adjacent its free end on the upper end of a vertical wall stud by a top wall plate and comprising a pair of elongated members, each of said members including a first longer wall and a second shorter wall, the first and second walls being spaced apart from each other but running generally parallel to each other and connected by a bridging section having an opening therein, each wall terminating in a free edge tab portion, said tabs defining a space therebetween in which an edge of said roof panel is disposed, said members being disposed adjacent each other with their long walls abutting and including aligned openings therein through which quick acting rotating clamp means extend to hold members together, said top wall plate comprising an angularly extending lip on which said rafter is mounted and having an opening aligned with the opening in said bridging section of said elongated member and resilient clip means disposed within said aligned openings and securing said rafter to said top wall plate.

2. The assembly of claim **1** wherein said bridging section includes a slot and wherein said assembly additionally includes a ridge assembly comprising a ridge member including a slot, aligned with the slot in the bridging section of the rafter, with a resilent clip disposed within the aligned slots to connect the rafter to the ridge member.

3. The assembly of claim **2** wherein said ridge means also comprises a ridge pad.

4. A roof assembly for a building including a planar roof panel, a rafter having a free end, said rafter supporting said roof panel directly thereon and an elongated tie bar connected to the rafter adjacent its free end, said rafter being supported adjacent its free end on the upper end of a vertical wall stud and comprising a pair of elongated members held together by clamp means, said rafter including another end which abuts an elongated ridge pad, said ridge pad being disposed normally to the rafter and comprising a base wall having a flange projecting normally from one side thereof and a portion offset from the other side thereof, said flange terminating in an angularly extending lip and a ridge member, said ridge member including a base portion terminating at one side in a groove in which said lip is disposed and at the other side in an angularly extending flange for supporting the other end of the rafter.

5. A roof assembly for a building including a planar roof panel, a rafter having a free end, said rafter supporting said roof panel directly thereon and an elongated tie bar connected to the rafter adjacent its free end, said rafter being supported adjacent its free end on the upper end of a vertical wall stud and comprising a pair of elongated members held together by clamp means, each of said elongated members including a first longer wall and a second shorter wall, the first and second walls running generally parallel to each other and connected by a bridging section, each wall terminating in a free edge tab portion, said free edge tab defining a space therebetween into which the edge of said wall panel is disposed, said rafter being connected to the top end of said wall stud by a top wall plate, said wall plate comprising a base wall having a flange projecting normally from one side thereof, said base wall being disposed on the upper end of said wall stud, said flange terminating in an angularly extending lip, said lip being connected to said rafter, each of said bridging sections of said elongated members including a slot aligned with a slot in the lip of the top wall plate, said slots having a clip inserted therein for connecting the rafter to the top wall plate, said base wall terminates in a portion offset at an angle therefrom and parallel to said lip, said offset portion abutting the bridging section of the rafter and defining a space between itself and the upper end of the vertical wall stud into which a portion of a soffit molding is disposed.

6. The assembly of claim **5** wherein said soffit molding comprises a base portion having a first lip slightly offset therefrom and having a second lip greatly offset therefrom, said first lip being disposed within the space between the offset portion of the top wall plate and the upper end of the wall stud.

7. The assembly of claim **6** wherein the base portion of the soffit molding includes a slot aligned with the slot in the bridging section of the rafter, with a clip being disposed within the aligned slots to connect the soffit molding to the rafter.

8. A roof assembly for a building including a planar roof panel, a rafter having a free end, said rafter supporting said roof panel directly therein and an elongated tie bar connected to the rafter adjacent its free

end, said rafter being supported adjacent its free end on the upper end of a vertical wall stud and comprising a pair of elongated members held together by clamp means, said free end of said rafter abuts an elongated end plate, said end plate being adapted for supporting the edge of said roof panel, said end plate being disposed normally to the rafter and fascia means connected to said end plate, said fascia means comprising a sub-fascia and a fascia, said sub-fascia comprising a base wall having a flange projecting normally from one side thereof and a portion offset from the other side thereof, said flange terminating in an angularly extending lip, said fascia comprising a base portion terminating at one side in a groove in which said lip is disposed and at the other side in an angularly extending flange having a locking crimp therein, said locking crimp being disposed within a space between the offset portion of the sub-fascia and the end plate.

9. The assembly of claim **8** wherein each of said elongated members include a first longer wall and a second shorter wall, the first and second walls running generally parallel to each other and connected by a bridging section, each wall terminating in a free edge tab portion, said free edge tabs defining a space therebetween in which an edge of said roof panel is disposed and wherein the end plate is connected to the free end of the rafter by a rafter tie plate, said tie plate comprising a base interposed between the base of the sub-fascia and the end plate and a flange projecting normally from the base of the tie plate, said flange including a slot aligned with the slot in the bridging section of the rafter with a clip disposed within the aligned slots to connect the rafter to the end plate.

10. The assembly of claim **9** wherein the end plate comprises a first longer wall and a second shorter wall, the first and second walls running generally parallel to each other and connected by a bridging section, each wall terminating in a free edge tab portion, said free edge tabs defining a space therebetween in which an edge of said roof panel is disposed and wherein a soffit molding is connected to the end plate, said soffit molding comprising a base portion having a first lip slightly offset therefrom and having a second lip greatly offset therefrom, said base portion having a slot aligned with the slot in the bridging section of the end plate with a clip being disposed within the aligned slots to connect the soffit molding to the end plate.

11. A roof assembly for a building including a planar roof panel, a rafter having a free end, said rafter supporting said roof panel directly thereon and an elongated tie bar connected to the rafter adjacent its free end, said rafter being supported adjacent its free end on the upper end of a vertical wall stud and comprising a pair of elongated members, each of said members including a first longer wall and a second shorter wall, the first and second walls running generally parallel to each other and connected by a bridging section, each wall terminating in a free edge tab portion, said tabs defining a space therebetween in which the edge of said roof panel is disposed, said members being disposed adjacent each other with their long walls abutting and including openings therein through which rotating clamp means extend to hold said members together, said walls of said elongated members including aligned slots and wherein a rafter pin retainer is disposed within said aligned slots, said pin retainer including a mouth portion in which a portion of a rafter tie pin is inserted, said rafter tie pin extends through a hole in the tie bar adjacent to its end for connecting the tie bar to the rafter.

12. The assembly of claim **11** wherein said pin retainer is generally U-shaped and includes a pair of arcuate lips defining said mouth portion.

13. The assembly of claim **11** wherein at least two roof panels are supported by said rafter, said panels being connected to one another at a common edge by a panel connection clip.

14. The assembly of claim **13** wherein said panel connection clip is a generally channel-like member having a base and a pair of normally projecting sidewalls, said sidewalls defining a space therebetween into which an edge of one panel is disposed, said base including two pair of ears bent out of the plane of the base and into the respective planes of the sidewalls, said ears defining a space therebetween into which an edge of another wall panel is disposed, and at least one pointed tag bent out of the plane of the base to extend normally therefrom and into the edge of one of said panels.

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