March 28, 1967 E. J. DE RIDDER 3,310,923

SNAP LOCK CONSTRUCTIONS

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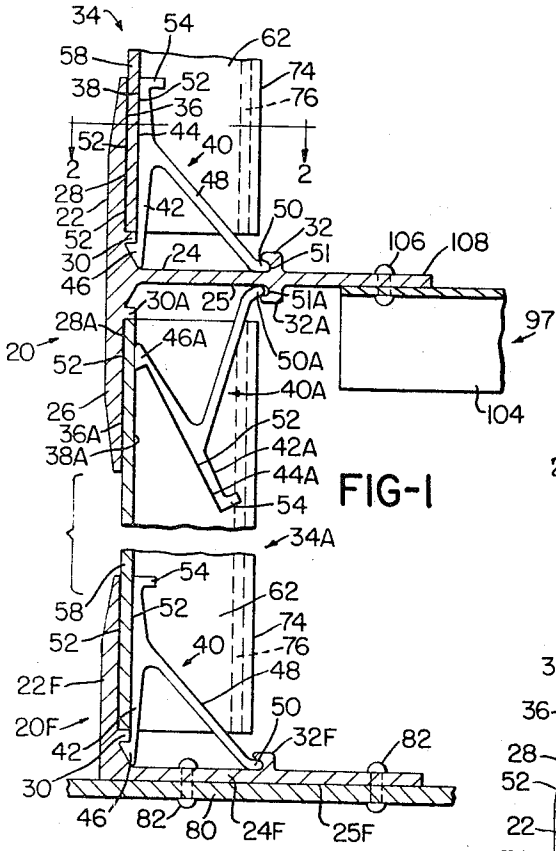


FIG-1

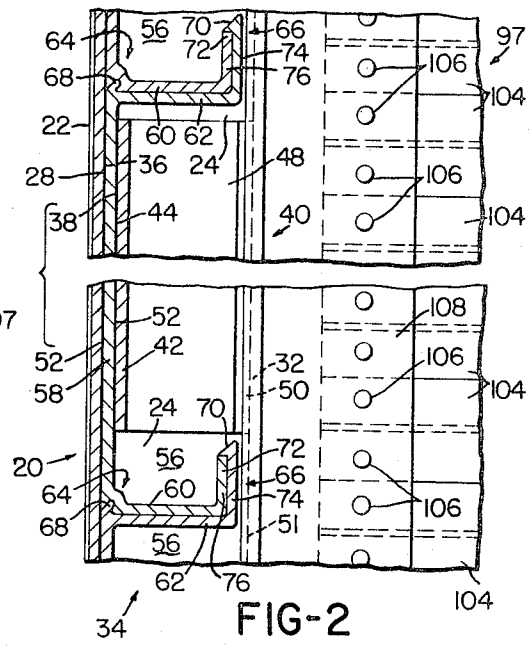


FIG-2

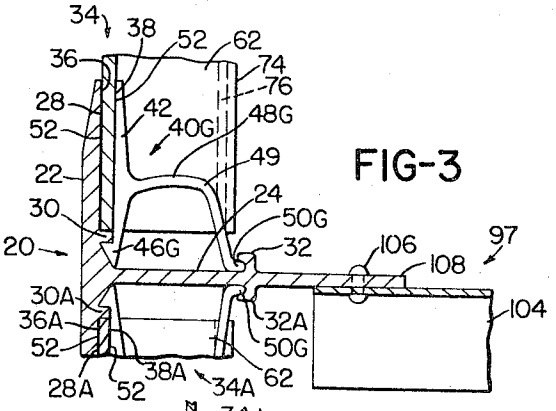


FIG-3

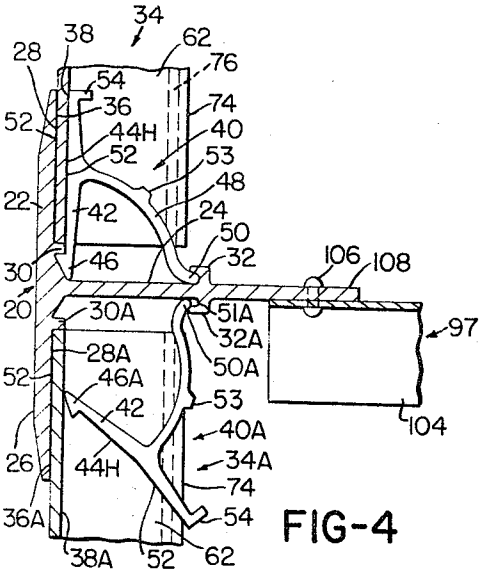


FIG-4

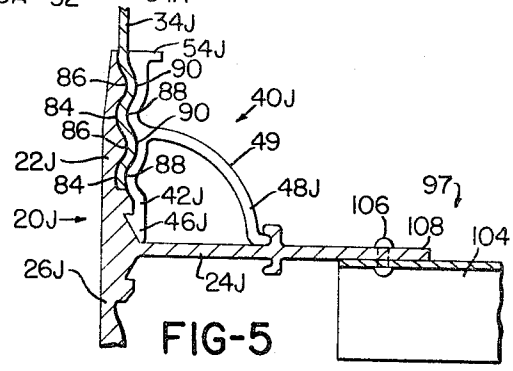


FIG-5

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SNAP LOCK CONSTRUCTIONS

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FIG-6

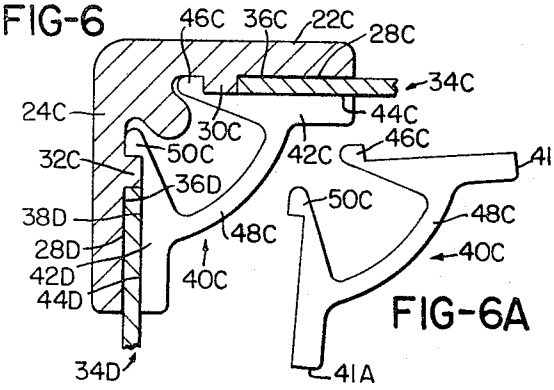


FIG-6A

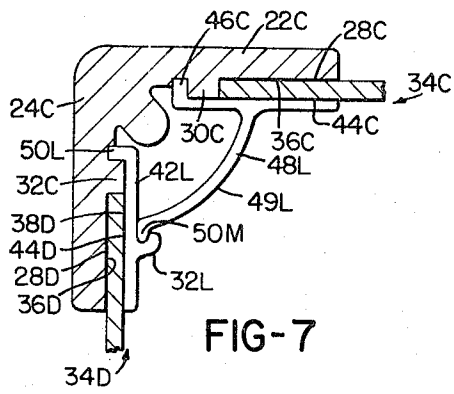
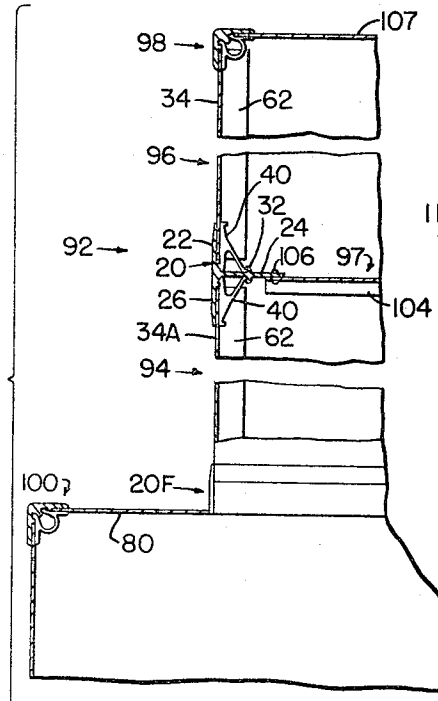


FIG-7



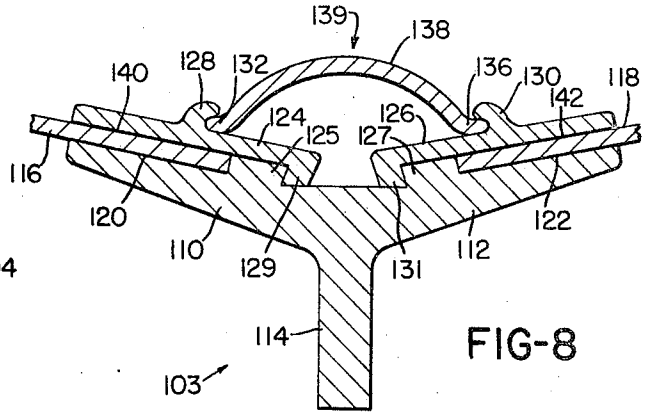


FIG-8

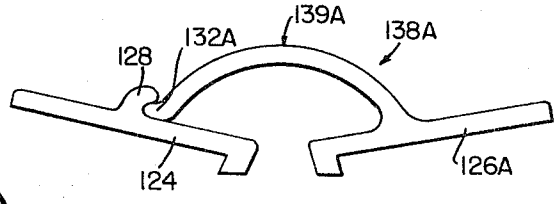


FIG-9

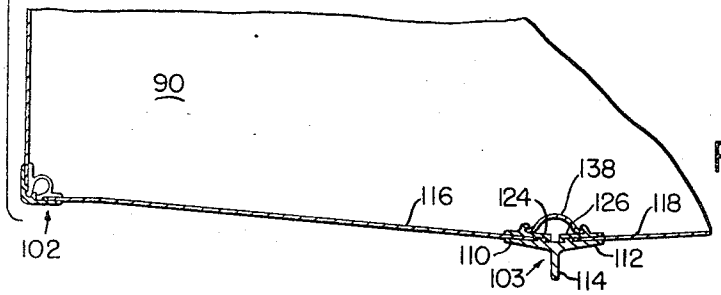


FIG-10

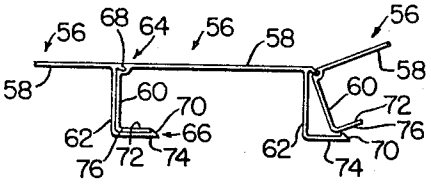


FIG-11

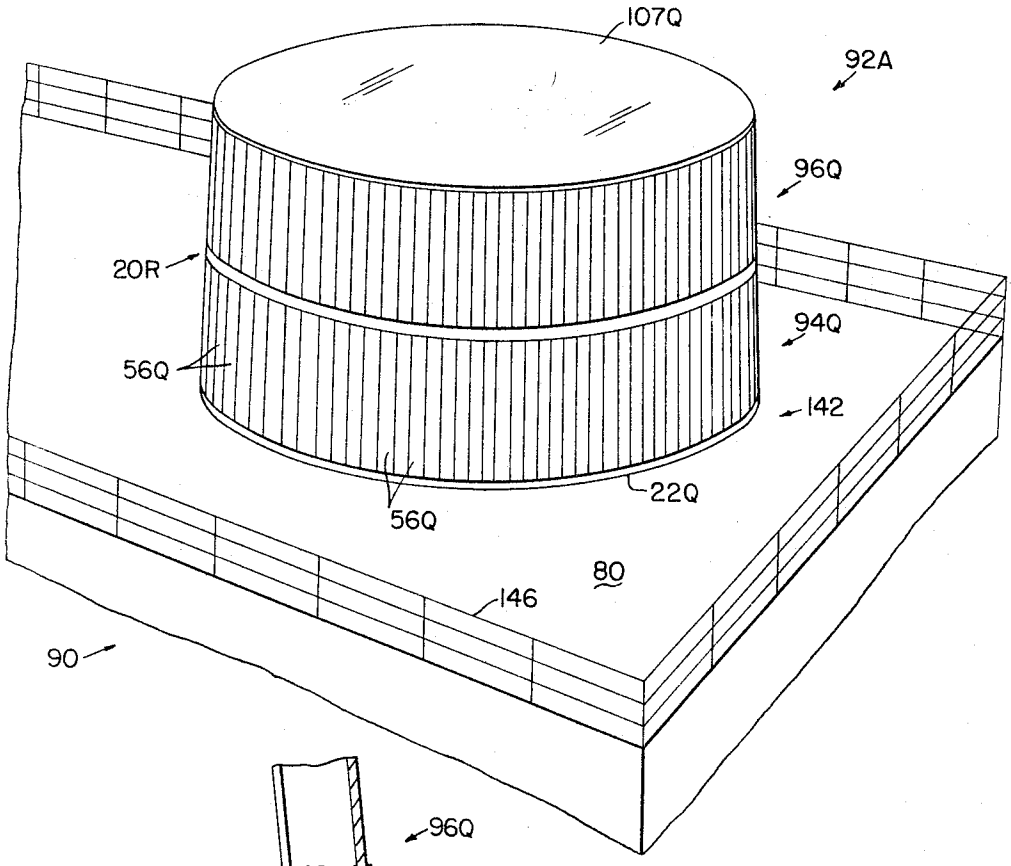
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SNAP LOCK CONSTRUCTIONS

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FIG-12



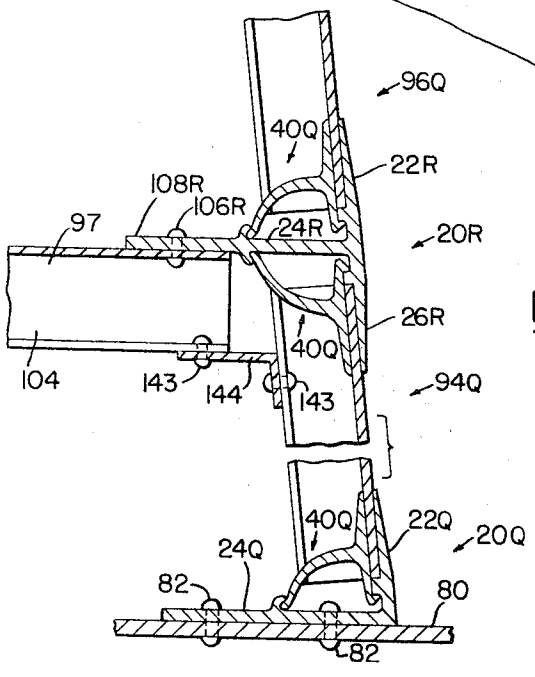


FIG-13

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United States Patent Office 3,310,923 Patented Mar. 28, 1967

3,310,923

SNAP LOCK CONSTRUCTIONS

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Continuation of abandoned application Ser. No. 109,438, May 11, 1961. This application Feb. 4, 1966, Ser. No. 533,756

6 Claims. (Cl. 52—502)

This application is a continuation of Ser. No. 109,438, entitled, "Snap Lock Constructions and Method of Assembling the Same," filed May 11, 1961, now abandoned.

This invention relates to snap lock constructions and the like which are produced in connection with relatively simple extruded components. These components may be used efficiently to erect various building constructions, such as ship deck houses and the like.

Frame members, partitions and locking members of this invention are readily extruded, rolled or otherwise formed as desired, and are readily assembled together in an efficient and secure manner.

The frame members have partition receiving flanges which also have hook receiving ledges. The frame members also have fulcrum receiving flanges with fulcrum receiving ledges which receive fulcrum edges of the locking members. The locking members may also have partition engaging plates and hook edges which hook with the hook receiving ledges and hold the partions against the partition receiving flanges.

This produces a very efficient snap lock construction.

Accordingly, it is an object of this invention to provide a building construction having one or more of the features herein disclosed.

Another object of this invention is to provide components having one or more of the features herein disclosed.

Another object of this invention is to provide a method of assembling a building or the like and having one or more of the features herein disclosed.

Other objects of this invention are apparent from this description and/or the accompanying drawings, in which:

FIGURE 1 is a vertical cross section of an embodiment of this invention.

FIGURE 2 is a cross section along the line 2—2 of FIGURE 1.

FIGURE 3 is an embodiment similar to FIGURE 1, but showing a slightly different locking member.

FIGURE 4 is an embodiment similar to FIGURE 3, and showing a further different locking member.

FIGURE 5 is another embodiment somewhat similar to FIGURE 3, but showing another embodiment of the locking member.

FIGURE 6 is a cross section of a frame member and locking member suitable for use in locking the corner joint of two partitions.

FIGURE 6A is an elevation of the locking member of FIGURE 6.

FIGURE 7 is a cross section of a corner construction somewhat similar to FIGURE 6 but showing a slightly different embodiment.

FIGURE 8 is a cross section of a construction suitable for use as a keel in a ship or the like.

FIGURE 9 is an elevation of a locking member slightly different from that shown in FIGURE 8, but applicable to the frame member of FIGURE 8.

FIGURE 10 is a diagrammatic vertical cross section of a ship and deckhouse which may be constructed largely of the components shown in the various figures of this application.

FIGURE 11 is a cross section or elevation of a partition made of channel members for use with this invention.

FIGURE 12 is a diagrammatic view of another ship construction and deckhouse construction.

FIGURE 13 is a typical cross section of a frame and partition construction somewhat similar to that shown in FIGURE 1, but with a slanting construction applicable to FIGURE 12.

Certain adjectives and other words of directional description are used herein, such as upper, lower, sidewise, vertical, horizontal, etc. These words or adjectives are used for brevity of description. However, it is to be understood that such words have not been used for limitation, and that the members described thereby may be in other positions or directions than those specifically mentioned by these words.

This invention may be used in connection with various building constructions, such as ship constructions with deckhouses and similar constructions.

Referring first to FIGURES 1, 2 and 10, a ship or other construction may have a frame member **20** which may have first, second and third frame flanges angularly disposed with respect to each other and indicated respectively by numerals **22**, **24** and **26**. The flanges **22** and **26** may be partition receiving flanges. The flange **24** may be substantially at a 90 degree angle with respect to both the flanges **22** and **26** and may be a fulcrum receiving flange.

The first frame flange **22** may have a partition or deckhouse sidewall receiving frame surface **28** and a hook receiving ledge **30** adjacent to the partition receiving frame surface **28**. The second frame flange **24** may have a fulcrum receiving ledge **32**.

A partition or deckhouse sidewall **34** may have one partition side **36** adjacent to the partition receiving frame surface **28**. The partition **34** may also have the other partition side **38** exposed for engagement by a locking member **40**.

The locking member **40** may have a parition engaging plate **42** with its engaging plate side **44** engaging said other partition side **38**. The locking member **40** may have a hook edge **46** engaging and hooking said hook receiving ledge **30** of the flange **22**.

The locking member **40** may have a fulcrum plate **48** integral with the partition engaging plate **42** and having a fulcrum edge **50** engaging said fulcrum receiving ledge **32**. The ledge **32** may have a groove **51** to receive the fulcrum edge **50**.

The locking member **40** may be forcibly deformed, as by hammering at **54**, into locking engagement with the frame member **20** and partition **34**.

The partition receiving frame surface **28**, the partition sides **36** and **38**, and the partition engaging plate side **44** may be adhesively secured together, as indicated by the numeral **52** wherever such numeral **52** is applied. The adhesive may be applied to one or both of the adjoining surfaces before the parts are locked together.

The third frame flange **26** may be integral with the first frame flange **22** and may be oppositely directed from said first frame flange **22** at an angle of 180 degrees, or any other desired angle. The third frame flange **26** has a second partition receiving frame surface **28A** and a second hook receiving ledge **30A** adjacent to said second partition receiving frame surface **28A**. The second frame flange **24** has a second fulcrum receiving ledge **32A**. A second partition or deckhouse sidewall **34A** is oppositely directed from said first named partition **34** and has one second partition side **36A** adjacent said second partition receiving frame surface **28A**. The second partition **34A** also has its other second partition side **38A** exposed for engagement by a second locking member **40A**. The sec-

ond locking member has a second partition engaging plate 42A with its engaging second plate side 44A engaging or engageable with said other second partition side 38A and with a second hood edge 46A engaging or engageable and hooking or hookable with said second hook receiving ledge 30A.

Said second locking member 40A has a second fulcrum edge 50A which engages said second fulcrum receiving ledge 32A, which has a groove 51A.

The second locking member 40A may be forcibly deformed or deformable, by hammering or the like at 54, into locking engagement with the frame member 20 and with said second partition 34A in a manner similar to the joining procedure at first frame flange 22.

In FIGURE 1, the second locking member 40A is shown in full lines in a position to be deformed by hammering or the like. This may be accomplished by hammering upon the head 54, upwardly in FIGURE 1, to deform and force the locking member 40A into a position corresponding to that shown with respect to locking member 40, whereby the hook 46A will be hooked over the ledge 30A, and the side 44A will be brought into engagement with the side 38A. However, previously to this deformation, adhesive may be applied to the side 44A (and the side 38A, if desired), as well as to the sides 28A and 36A, so that when the locking member 40A has been driven into locked position, the sides or surfaces 28A, 36A, 38A and 44A will be adhesively secured together in a manner similar to the corresponding surfaces at the upper part of FIGURE 1. However, only one of each of the adjoining surfaces need be covered with adhesive, if desired.

If desired, the partitions 34 and 34A, the locking members 40 and 40A, and the flanges 22 and 26 may be made the same in detail, but oppositely directed. That is, there are mirror image constructions on both sides of flange 24.

FIGURE 2 shows a cross section transverse to FIGURE 1, taken along the line 2—2 of FIGURE 1. The description heretofore given applies to partitions 34, locking member 40 and flange 22 and other members with reference numerals used in FIGURE 1. The same description also applies to the partition 34A, locking member 40A, and flange 26 as is readily understood, and therefore a description of the partition 34A, locking member 40A, and flange 26 is not repeated, since such description would merely add the capital letter A to the reference numerals used on the members above flange 24.

In FIGURES 2 and 11, partition 34 may be made of a plurality of interlocked channel partition members 56, each having respectively a main flat body 58 and two partition member flanges 60 and 62. The channel members 56 are interlocked at 64 and 66. The locking construction at 64 includes a tongue and groove arrangement 68. The locking construction at 66 includes a hook 70 and a straight locking edge 72 respectively on flange bends 74 and 76, which are connected to the flanges 62 and 60, respectively.

The channel partition members 56 are interlocked by having adjacent channel members 56 slanting with respect to each other, as shown in FIGURE 11, before they are applied to the frame members 20 and 20F, so that the tongue and groove construction 68 may be preliminarily engaged and thereafter the channel partition members 56 are aligned or swung or pivoted about construction 68 to bring the flanges 60 and 62 and the flange bends 74 and 76 into contiguous relationship with the hook 70 hooking over the straight edge 72 in locking engagement. Suitable tools may be used for forcing the members 60, 62, 74, 76 and 70, 72 into contiguous engagement.

The main flat body 58 of the respective channel partition members 56, FIGURES 2 and 11, each forms a part of said one partition side 36, FIGURE 1, which is adjacent to said partition receiving frame surface 28.

The other partition side 44 is also made from each respective main flat body 58 and such composite partition side 44 is exposed for engagement by a plurality of locking members 40.

There are a plurality of locking members 40 which engage the parts of the various partition sides 44 which lie respectively between said partition member flanges 60 and 62. That is, there is a locking member 40 for each interlocked channel partition member 56, and each of these locking members 40 are placed between the flanges 60 and 62 of each channel partition member 56.

FIGURE 6 shows a corner construction which may have part of the same description which has been correspondingly applied to the upper part of FIGURE 1. However, to make the description of FIGURE 1 apply to FIGURE 6, FIGURE 1 should be considered as having been rotated clockwise for 90 degrees, so that the first frame flange 22 of FIGURE 1 corresponds to the first frame flange 22C of FIGURE 6. Likewise, the second frame flange 24 of FIGURE 1 corresponds to the second frame flange 24C of FIGURE 6. Other members of FIGURE 6 which correspond to similar members of FIGURE 1 have been designated by the reference numerals 46C, 30C, 28C, 36C, 44C, 34C, etc. Also fulcrum 50 of FIGURE 1 corresponds to fulcrum and hook 50C of FIGURE 6. Fulcrum ledge 32 of FIGURE 1 corresponds to fulcrum ledge and combined hook receiving ledge 32C of FIGURE 6. The second flange 24C of FIGURE 6 has been provided with another partition receiving frame surface 28D. Another partition 34D is adjacent to said another partition receiving frame surface 28D. Said another partition 34D has another partition side 44D exposed for engagement by another partition plate 42D to engage said another partition 34D. Members 38D, 36D, 42D, and 44D have structures which are similar to members 38, 36, 42, and 44 of FIGURE 1.

FIGURE 6A shows the locking member of FIGURE 6 by itself. The hook 46C may be placed adjacent the ledge 30C, and if necessary, the locking member 40C may first be hammered at 41 to place the hook 46C adjacent the ledge 30C. The locking member 40C may first be engaged at the fulcrum ledge 32C by hammering at 41A, and thereafter the surface 41 may be hammered to drive the hook 46C in place. In this construction either 46C or 50C may be considered the fulcrum and/or the hook member as is obvious.

Many of the members of FIGURE 7 may be compared to similar members of FIGURES 1 and 6 where FIGURE 1 has been rotated clockwise. Certain members are identical in function with the members of FIGURE 6, which also have been compared with FIGURE 1. For example, the following members of FIGURE 7 may have the same function as in FIGURE 6: 34C, 28C, 22C, 46C, 36C, 44C, 30C, 24C, 32C, 38D, 44D and 34D. However, a fulcrum piece 42L may have a hook at 50L and a fulcrum ledge 32L into which the fulcrum 50M is inserted. After these members have been assembled as shown in FIGURE 7, the joining piece 48L may be hammered at 49L to deform and drive the members in locking engagement.

The parts at the bottom of FIGURE 1 may be considered to be identical in operation and construction with a portion of part 24 and with parts above 24 in FIGURE 1, with the exception that the lower parts of partition 34 at the upper part of FIGURE 1 correspond to the lower parts of partition 34A at the bottom of FIGURE 1.

At the lower part of FIGURE 1, the member 80 may be considered to be the deck of a ship or the like, such as shown in FIGURE 10. The frame member 20F may be the same as the upper part of frame member 20, and the flange 22F may be considered to be identical in function with the flange 22. The flange 24F may be considered to be identical with flange 24, except that all parts below the lower surface 25 of flange 24 have been cut away to produce the straight lower surface 25F of the flange 24F. However, frame member 20F may be made

directly as an extrustion without cutting parts of a frame member **20**. A few of the parts at the bottom of FIGURE 1 which correspond to those at the upper part of FIGURE 1 have been designated by similar numbers with the suffix F added and such members are not further described, since they may be identical to corresponding members at the top of FIGURE 1. The flange **24F** may be secured to the deck **80** by a plurality of rivets **82**, so that the flange **24F** is securely held against the deck **80**. All of the other unnumbered parts at the lower part of FIGURE 1 may be identical with similar parts at the top of FIGURE 1.

FIGURE 3 shows a construction substantially similar to that of FIGURE 1 and all of the parts of FIGURE 3 may be substantially identical with all of the parts of FIGURE 1, whether shown or not in FIGURE 3. However, the locking members **40G** of FIGURE 3 have been modified in comparison to the locking members **40** and **40A** of FIGURE 1. The fulcrum plate **48G** of FIGURE 3 is curved as shown in FIGURE 3, so that the fulcrum plate **48G** may be hammered at the point **49** to deform the same into engagement with the partition **34**. In this construction, if desired, the head **54** of FIGURE 1 may be omitted, so that no hammering need be made on the partition engaging plate **42**, and the parts may be deformed merely by hammering at the point **49**. In this case the fulcrum plate **48G** may be originally curved sufficiently so the hook **50G** and fulcrum **48G** may be inserted in place without hammering, and then the plate **48G** may be hammered at **49** to clamp the parts together.

In FIGURE 4, the construction may be substantially the same as in FIGURE 3, except that the hammering head **54** has been applied to the plate **42** and a hammering lug **53** has been provided at the place corresponding to **49** of FIGURE 3, where hammering may be done to deform the locking member. In FIGURE 4, hammering is first performed on the head **54** until the hook **46** has been engaged with the ledge **30**, as shown in the upper part of FIGURE 4. Since the plate **42** of FIGURE 4 may have its partition engaging side **44H** slightly curved or angled, as shown in the lower part of FIGURE 4, the lug **53** is hammered after the initial hammering at **54** has been completed. This hammering on the lug **53** straighten out the partition engaging side **44H** into a straight construction, as shown in the upper part of FIGURE 4. All of the other parts of FIGURE 4 may be identical with FIGURE 1, and hence the description and illustration of such other parts are not repeated.

In FIGURE 5, the parts may be substantially the same as in FIGURE 1. However, the parts have been changed considerably, such as by providing undulations **84** and **86** in the flanges **22J** and **26J**, which otherwise correspond to flanges **22** and **26** of FIGURE 1. Flange **24J** may be substantially identical with flange **24**. The locking member **40J** may have a plate **42J** and a hook **46J**. However, the plate **42J** may have undulations **88** and **90** which cooperate with the undulations **84** and **86** to lock the bottom of partition **34J** therebetween. The locking member **40J** may be hammered at head **54J** into place, and, if desired, some further hammering may be provided, such as at the point **49**, as in FIGURE 3. The partition **34J** need not be made of a plurality of channels, as shown in FIGURE 4, but may be a single sheet which has had its edge rolled to provide the undulations **84** and **86** before assembly.

FIGURE 10 shows a ship with a hull **90** of any desired depth and it may have a ship deck **80** to correspond with the ship deck **80** of FIGURE 1. A deck house **92**, which may be rectangular or curved in plan view, may be placed on the deck **80**. The deck house may be made with a lower deck house compartment **94** and an upper deck house compartment **96**. The sidewalls of the lower compartment **94**, which are shown partly in cross section and partly in elevation in FIGURE 10, may be produced as shown in the lower part of FIGURE 1, while the sidewalls of the upper compartment **96** may be formed by the sidewalls shown in the upper part of FIGURE 1. The flange **24** and the floor construction **97** of FIGURE 1 may support the floor construction **97** of FIGURE 10. The corner joints at **98**, **100**, **102**, etc., may be made as shown in FIGURES 6 and/or 7, while the keel **103** may be formed as shown in FIGURE 8 or 9.

The floor construction **97** of FIGURE 1 and other similar figures may include a plurality of I or T beams **104** with their upper flanges side by side and riveted at **106** to the extension **108** of flange **24**.

A roof **107** may be provided of any suitable construction.

FIGURE 8 shows a construction which may be used as the keel **103** of FIGURE 10. The keel piece **103** may have first, second and third flanges **110**, **112** and **114** respectively. The first and second flanges **110** and **112** may have respective first and second partition receiving frame surfaces **120** and **122**, and first and second hook receiving ledges **125** and **127** respectively. First and second bottom forming partitions **116** and **118** are placed adjacent the said partition receiving surfaces **120** and **122**. First and second locking member parts **124** and **126** have respective partition engaging surfaces **140** and **142** and also have respective hook edges **129** and **131**. The locking member parts **124** and **126** are forcibly urged by hammering deformable third locking member part **138** at **139** to force said partition engaging surfaces **140** and **142** into engagement with said partitions **116** and **118** and to force the hook edges **129** and **131** into hooked and wedging engagement with the hook ledges **125** and **127**.

The third flange **114** forms the keel for the ship.

The parts **124** and **126** are placed on flanges **110** and **112**. The deformable member part **138** originally is sufficiently bowed so ends **132** and **136** may be placed in hooks **128** and **130**, after which the deformable member part **138** may be hammered at **139** to force the various parts into place.

FIGURE 9 shows a locking member somewhat similar to that shown in FIGURE 8. This member may be used similarly and with the frame members **110**, **112** and **114** of FIGURE 8. The hook **124** of FIGURE 9 may be identical with hook **124** of FIGURE 8 and is adapted to hold a partition **116** substantially identically as in FIGURE 8. The hook member **126A** of FIGURE 9 is integral with the deformable locking member part **138A** of FIGURE 9. The locking member part **138A** may be hammered at **139A** to lock the parts in place in a manner similar to FIGURE 8. The application of the construction of FIGURE 9 to the construction of FIGURE 8 is obvious since the remaining parts of FIGURE 8 are unchanged. Hence it is believed the operation of FIGURE 9 is obvious and any further description is deemed unnecessary.

FIGURES 12 and 13 show how the various previous embodiments of this invention may be used to produce a curved, cylindrical or frusto-conical deck house **94A**.

If the deck house **92A** is to be somewhat frusto-conical, the frame member **20Q** and frame flange **24Q** of FIGURE 13 may be forcibly deformed by rolling or bending into a large arc or circle **142**, FIGURE 12, by bolting or riveting the flange **24Q** at **82** in the horizontal arc or circle **142**. The frame member **20Q** may be made substantially similar to the frame member **20F** of FIGURE 1 except that the flange **22Q** of FIGURE 13 may be slanted inward slightly to impart the slant to the frusto-conical upper and lower sidewalls **94Q** and **96Q** of the deck house **92A**. However, for some purposes, the flange **22Q** may be considered substantially perpendicular to the flange **24Q**.

The locking members **40Q** of FIGURE 13 may be similar to any of the locking members of the previous embodiments. The locking members **40Q** may be slightly changed during the hammering operation to accommodate the slanting wall construction.

The double frame member **20R** may correspond to the frame member **20** of FIGURES 1, 3 and 4 or **20J** of FIGURE 5. The same slant heretofore described may be imparted to the flanges **22R** and **26R** of the frame member **20R** to produce the frusto-conical construction, if desired. However, for some purposes, the flanges **22R** and **26R** may be considered substantially perpendicular to the flange **24R**.

The floor **97** may be also bolted or riveted at **143** to an angle member **144**, as well as at **106R** to the floor support **108R** as in previous embodiments.

The frame **20R** may be forced into a circle by a rolling operation or by forcible curving or bending thereof.

A roof **107Q** may be provided of any suitable construction substantially in the same manner as in FIGURE 10.

The side channel members **56Q** may have their side flanges, corresponding to side flanges **60** and **62** of the previous embodiments infinitesimally bent to compensate for the circular, curved or conical construction. Likewise the side flanges corresponding to flanges **60** and **62** may be infinitesimally spread apart at their lower ends to compensate for the larger diameter of horizontal cross sections of the frusto-cone at the bottom as compared to the top. However, since the diameter of the horizontal cross-sectional circles of the frusto-cone are so large in comparison to the widths of the side channel members, these variations are substantially negligible.

A suitable rail **146** is diagrammatically illustrated, and it may be varied as desired.

Suitable doors, port holes, etc., not shown, may be used as desired.

The frame members and the channel members and other similar members such as the locking members may be formed by extrusion. The dies used for making such extrusions may be of a relatively simple nature. These extrusions may be made of any suitable material, such as aluminous material which may be commercially pure aluminum, or suitable aluminum alloys or other material which is relatively light and/or non-corrosive in the presence of water and the like.

It is thus to be seen that relatively simple, efficient constructions and methods have been provided by this invention.

While the form of the invention now preferred has been disclosed as required by the statutes, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

1. In combination: a frame member having two angularly joined first and second frame flanges, said first frame flange having a partition receiving frame surface and a hook receiving ledge means adjacent said partition receiving frame surface, said hook receiving ledge means being substantially perpendicular to said first frame flange and parallel to said second frame flange while having a flat free end, said second frame flange having a fulcrum receiving ledge; a partition having one partition side adjacent said partition receiving frame surface and having the other partition side exposed for engagement by a locking member, said partition having an end engaging said ledge means and having said other partition side coplanar with said free end of said ledge means; and a locking member having a partition engaging plate with its engaging plate side engaging said other partition side and with a hook edge engaging and hooking said hook receiving ledge means, said locking member having a fulcrum edge engaging said fulcrum receiving ledge, said locking member to be forcibly deformed into locking engagement with said frame member and partition by first having its fulcrum edge engaging said fulcrum receiving ledge so as to fulcrum thereagainst in order to cause said hook edge to be forced into hooking engagement with said hook receiving ledge means and lock therewith while said plate compresses said partition against said partition receiving frame surface to lock said partition to said frame member, said hook edge having a cam surface for initially camming along said other partition side and onto said free end of said ledge means with a smooth transition therebetween whereby said hook edge can then hook with said ledge means after further fulcruming of said locking member.

2. A combination according to claim **1** in which said partition receiving frame surface, said partition sides, and said partition engaging plate sides are adhesively secured together.

3. A combination according to claim **1** in which said fulcrum edge is part of a fulcrum plate integral with said partition engaging plate.

4. A combination according to claim **1** in which said fulcrum edge is part of a fulcrum plate integral with said partition engaging plate, and in which said fulcrum plate is curved to be forcibly deformed while said locking member is being forcibly deformed into locking engagement with said frame member and partition.

5. A combination according to claim **4** in which said fulcrum plate has a lug to be hammered to be forcibly deformed, and said partition engaging plate has a head to be hammered to deform said locking member.

6. A combination according to claim **1** in which said first flange, said partition and said partition engaging plate have undulating surfaces which aid in locking them together.

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