

June 25, 1968

E. W. COLLARD

3,389,527

SNAP-TOGETHER WINDOW WALL FRAMING AND JOINING CONSTRUCTION

Filed April 30, 1965

2 Sheets-Sheet 1

Fig. 1

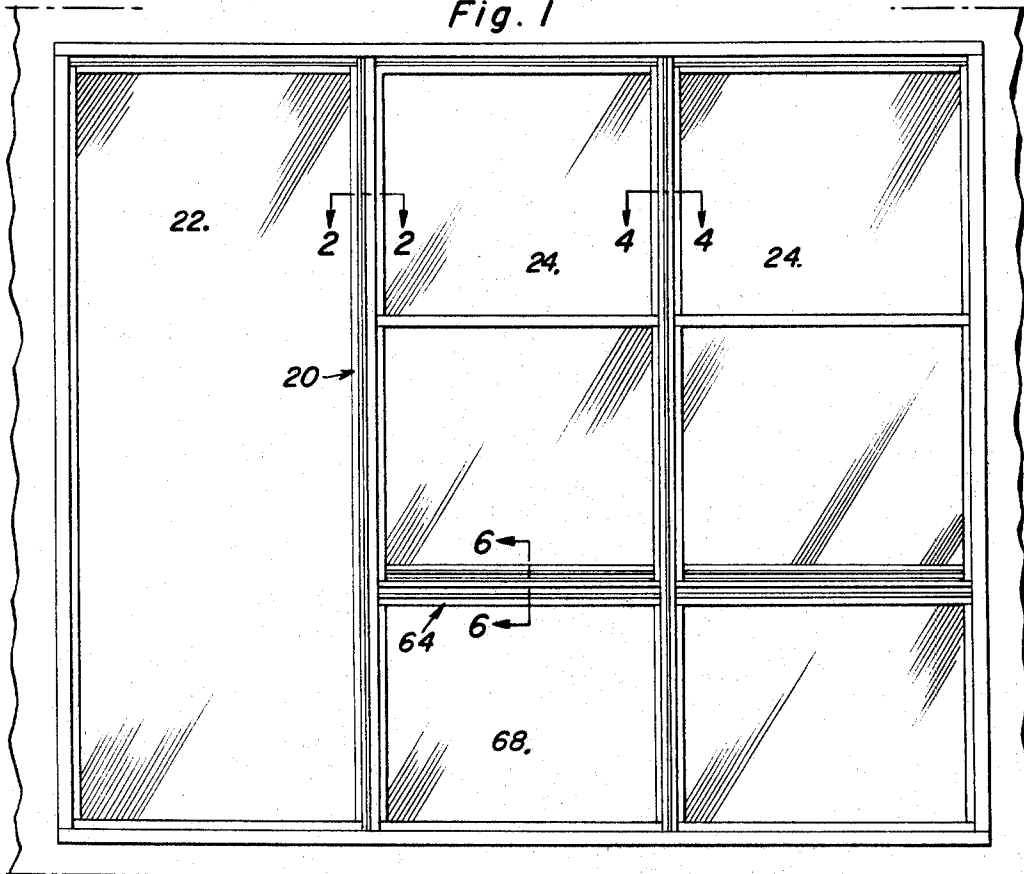


Fig. 2

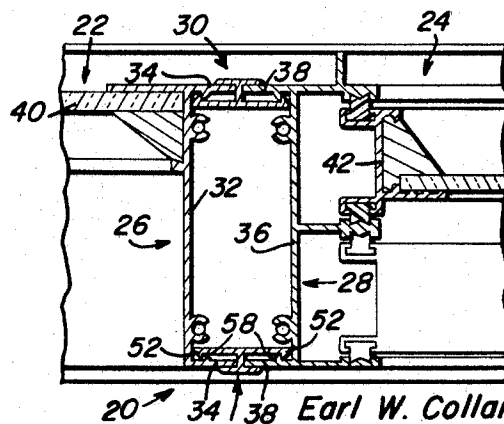
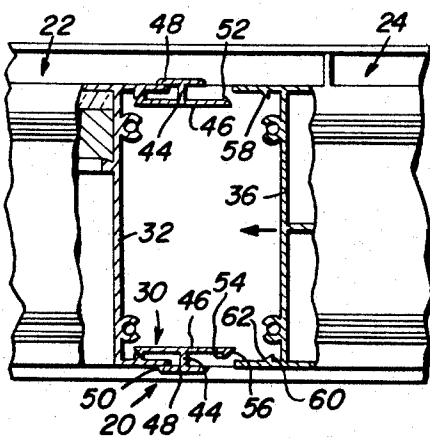


Fig. 3



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Fig. 4

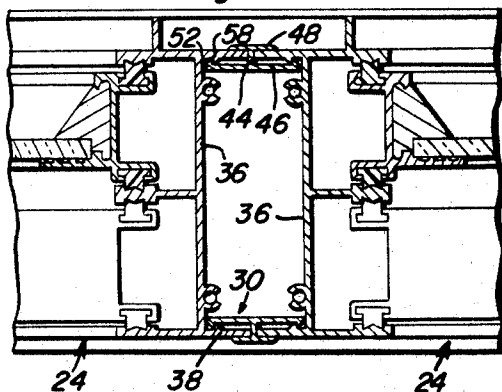


Fig. 5

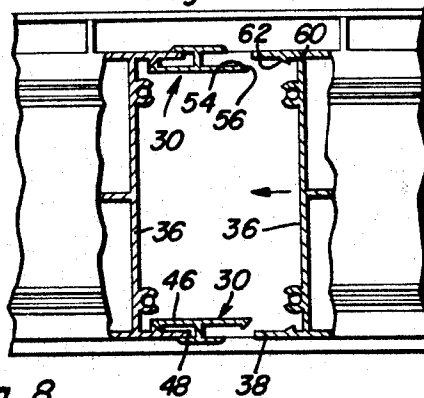


Fig. 6

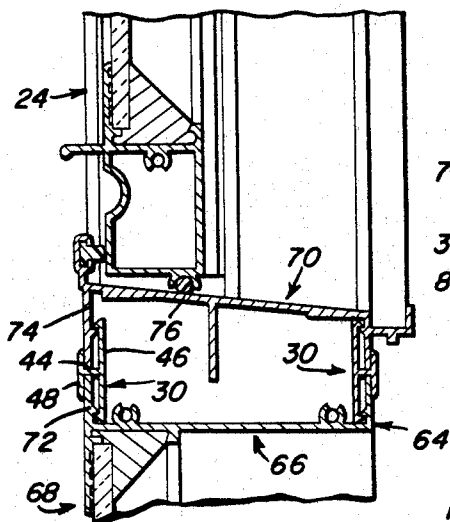


Fig. 8

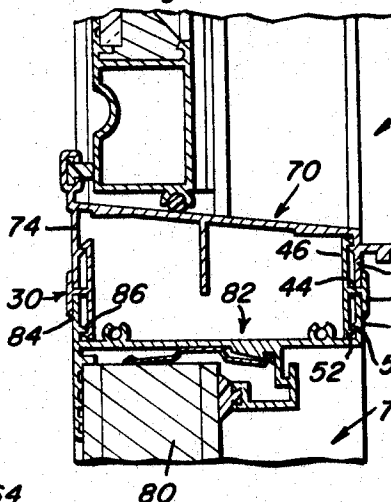


Fig. 10

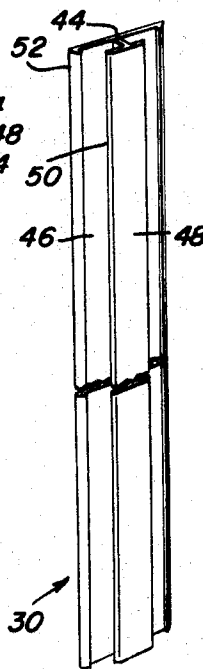


Fig. 7

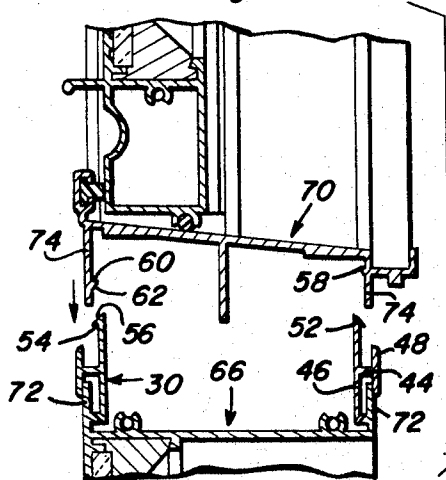
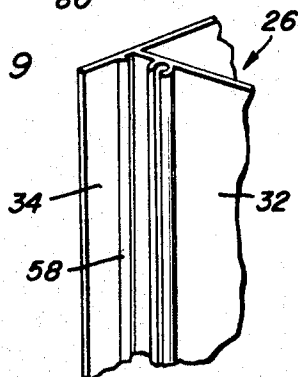


Fig. 9



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SNAP-TOGETHER WINDOW WALL FRAMING AND JOINING CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

A window wall unit wherein opposed generally U-shaped rails have the corresponding flanges thereof interlocked by a pair of elongated joining strips consisting of web-connected laterally projecting parallel plates which receive therebetween the flanges of the adjoining rails. The portion of one of the strip plates associated with each rail flange is provided with a locking projection thereon constructed to, through a slight flexing of the plate, engage behind a similar locking projection on the flange upon a movement of the rails toward each other so as to effect a permanent locking of the rails to each other.

The present invention is generally concerned with curtain wall construction incorporating a plurality of adjacent window or curtain wall units, and more particularly relates to a novel means for integrally joining the adjacent edges of the units and forming tubular structural members therebetween.

While various metal, generally aluminum, snap-on systems have been used in store front and curtain wall construction for several years, these have primarily involved the concealing of mechanical fasteners through the use of snap-on face or back plates, and not for the purpose of mulling one basic unit to another basic unit. Conventional mullions consist of stiffening members secured in place by fastening the opposite ends thereof to the head and sill, or by sliding the mullion into the adjacent window members before the basic units are installed in the wall opening, or by using screws to secure the mullion to the basic units. A removable cover plate is then often installed to cover up the mechanical fasteners, generally by a snap-on method. Contrary to these conventional construction methods, it is a primary object of the instant invention to provide a construction wherein the basic window or panel units are directly mulled to each other through the use of a snap-on or snap-together system. This is achieved in a manner whereby, through the use of elongated locking strips, the adjacent framing members of the individual units form the actual mullion itself as the units are locked together.

In conjunction with the formation of mullions through the interlocking of the adjacent units, it is a significant object of the invention that these mullions be in the nature of a truss-like box with the joining strips not only interlocking the adjacent edges of the units and forming the tubular structural members therebetween, but also providing a finished exterior so as to eliminate any necessity of providing cover plates.

Further, it is an object of the instant invention to provide a system whereby once the window wall units are positioned in place and mulled together, they are permanently fixed relative to each other and cannot be removed other than by actually destroying the mulling members.

In addition, it is a significant object of the present invention to provide a system of mulling together basic window wall units quickly, securely and economically, requiring only the provision of a pair of locking strips between the adjoining sides of adjacent units and the moving of the units laterally toward each other so as to effect a snap-on engagement of the strips therewith.

Likewise, it is a significant object of the instant invention to provide a snap-together system which is equally adaptable for use in forming both the vertical mullions between adjacent basic units and the horizontal transoms between superimposed units.

Basically, the construction of the instant invention involves the utilization of joining or interlocking strips consisting of web-connected laterally projecting parallel plates which receive therebetween the flanges of the adjoining framing rails of a pair of adjacent basic units. In addition, the portion of one of the plates associated with each rail is provided with a locking projection thereon which is so constructed as to lie over, through a slight flexing of the plate, and engage behind a similar locking projection on the unit rail upon a lateral movement of one rail toward the other, thereby effecting a permanent locking of the units.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is an elevational view of one form of curtain wall including a plurality of interlocked basic window or panel units;

FIGURE 2 is an enlarged partial cross-sectional view taken substantially upon a plane passing along the line 2-2 in FIGURE 1 and illustrating the snap-together mullion construction between a double-hung window unit and a picture window unit;

FIGURE 3 is a view of the construction of FIGURE 2 indicating the manner in which the box mullion is formed and the units are joined;

FIGURE 4 is an enlarged partial cross-sectional view taken substantially upon a plane passing along the line 4-4 in FIGURE 1 and illustrating the interlocked mullion construction utilized between adjacent double-hung windows;

FIGURE 5 is a view similar to FIGURE 4 illustrating the units of FIGURE 4 just prior to the interlocking thereof;

FIGURE 6 is a partial enlarged cross-sectional view taken substantially upon a plane passing along the line 6-6 in FIGURE 1 and illustrating the interlocked construction of the tubular unit or transom between the sill of an upper double-hung window and the head of a lower picture window;

FIGURE 7 is a view similar to FIGURE 6 illustrating the manner in which the units are assembled into interlocking engagement;

FIGURE 8 is a view similar to FIGURE 6 illustrating the adaptability of the basic construction of the instant invention to yet another combination of panels, this involving the utilization of a lower unit containing a wide decorative panel rather than the glass panel of FIGURE 6;

FIGURE 9 is a partial perspective view illustrating a portion of one of the unit rails having the interlocking full length projection thereon; and

FIGURE 10 is a perspective view of the locking or mounting strip of the instant invention utilized in joining the adjoining rails of adjacent units.

Referring now more specifically to the drawings, it will immediately be appreciated that the construction of the instant invention is equally adaptable to the formation of both vertical and horizontal structural members between adjacent window wall units in a curtain wall construction as well as between various different types of basic units. For purposes of illustration, the vertical structural members have been herein referred to as mullions and

the horizontal structural members have been referred to as transoms, however, it should, of course, be appreciated that these terms in themselves are not to constitute limitations on this invention.

Turning first to FIGURES 2 and 3, it will be noted that these figures detail a vertical mullion or mullion construction 20 between a picture frame unit 22 and a double-hung window unit 24. The mullion 20 basically includes the adjoining rails or stiles 26 and 28 of the adjacent units 22 and 24 and a pair of elongated full length mounting strips 30. The rail or stile 26 includes a transverse web 32 and two outwardly or laterally directed full length edge flanges 34 while the rail 28 includes a transverse web 36 and two laterally or outwardly directed full length edge flanges 38. It will, of course, be appreciated that both rails 26 and 28 incorporate inwardly directed panel mounting flanges adapted to accommodate and mount the particular panels or units received therein, for example, the fixed glass panel 40 of the unit 22 or the vertically sliding sashes 42 of the unit 24.

Referring to FIGURES 9 and 10 in conjunction with FIGURES 2 and 3, it will be noted that each of the mounting or locking strips 30 includes an elongated web 44 of a width greater than the thickness of the flanges 34 and 38 of the adjacent rails 26 and 28. In addition, the strip 30 has a pair of full length transversely orientated plates 46 and 48 integral with the opposite edges thereof, these plates 46 and 48 projecting an equal distance beyond the opposite sides of the web 44 with the inner plate 46 being substantially wider than the outer plate 48. The outer longitudinal edges of the plate 48 are slightly rounded as at 50 so as to smoothly blend it into the outer surfaces of the adjacent flanges 34 and 38 without any sharp projections, these plates 48 eliminating the necessity of providing separate cover plates or panels.

Referring now to the wider plate 46, it will be noted that a full length locking projection 52 is provided along each longitudinal edge thereof and projects laterally therefrom toward the plane of the other plate 48. Each of these projections 52 includes a perpendicular planar inwardly facing locking shoulder 54 and an outwardly facing camming surface 56 sloping gradually and smoothly toward the outer extremity of the locking shoulder 54.

Each of the rail flanges 34 or 38 also includes a full length locking rib or projection 58 extending perpendicularly inward relative to the corresponding flange. Each of the flange projections 58 includes a planar perpendicular locking shoulder 60 thereon, this shoulder 60 facing in the opposite direction from the strip projection shoulder 54 and toward the web of the corresponding rail, either 26 or 28. In addition, each of the projections 60 includes an outer camming surface 62 sloping smoothly and gradually toward the outer extremity of the corresponding shoulder 60 and facing outwardly from the corresponding web.

In interlocking the adjoining rails 26 and 28 of two adjacent units 22 and 24, the corresponding flanges 34 and 38 thereof are coplanarly aligned and the mounting strips 30 positioned therebetween with the narrower plates 48 facing outwardly. The flanges 34 and 38 are then inserted between the parallel plates 46 and 48 with the outer surfaces of the flanges bearing against the inner surfaces of the corresponding plate 48 and with the flange projection camming surfaces 62 engaged against the strip projection camming surfaces 56. Thereafter, the rails 26 and 28 and in fact the entire units 22 and 24 are moved laterally inward with the camming surfaces 56 and 62 acting against each other so as to cause a slight outward flexing of the edges of the wider plate 46 until the flange projections 58 have passed beyond the strip projections 52 at which time the plate 46 resiliently returns to its normal position snapping the projections 52 thereon behind the flange projections 58 and engaging the corresponding shoulders 54 and 60 so as to fixedly lock the rails 26 and 28 together. It will be appreciated that the width of the strip web 44 is substantially equal to the

combined thickness of each flange 34 or 38 and the height of the projections 58 thereon. Further, the flange projections 58 are to be located inward of the outer edges of the flanges a sufficient distance so as to provide for a substantial seating of the flange edges against the strip web 44 while the outer edges of the inner plate 46 seat against the opposed rails web 32 and 36. In this manner, both a tight and permanent joint is provided in a highly simple and convenient manner. Incidentally, if so desired, slight clearances can be provided between the aforementioned longitudinal edges and the adjoining webs so as to accommodate some expansion and contraction, this clearance in no way affecting the permanence of the joint or the overall rigidity of the interlocking of the units. Referring again to the snapping interlock of the rails, it will be noted that each of the flanges 34 and 38 engages against the inner surface of the corresponding portion of the plate 48 prior to the camming outward movement of the corresponding edge of the plate 46, this tending to stabilize the strip 30 and allow for the relative movement between these plates 46 and 48 so as to pass the flange projection 58.

The detailed description supra illustrates the basic concepts and constructions of the invention while FIGURES 4-8 illustrate adaptations of this system to other and closely related situations. For example, FIGURES 4 and 5 illustrate a box mullion formed in accordance with the instant invention between a pair of basic double-hung window units 24 and as such, the corresponding significant features thereof have been accorded the same reference numerals used in conjunction with the detailed description of FIGURES 2 and 3, this description applying equally to FIGURES 4 and 5.

FIGURES 6 and 7 illustrate the utilization of the concepts of the instant invention in the formation of a horizontal tubular support member or transom 64 between the head 66 of a subjacent picture window unit 68 and the sill 70 of a superjacent double-hung window unit 24. In this embodiment, the mounting strips 30, containing all of the features detailed supra, extend horizontally and are engaged, also in the manner detailed supra, between the vertically projecting flanges 72 and 74 of the head 66 and sill 70. It will be noted that the outer or lefthand vertical flange 74 of the sill 70 is substantially wider than the inner flange thereof so as to provide the desired sill slope and as a result thereof, the longitudinal edge of the mounting or locking strip 30 does not seat against the sill web 76. However, inasmuch as the lower edge of the flange 74 seats against the strip web 44, the stability and permanence of the interlock is in no way affected, in that movement of the flange sill 74 in any direction is precluded by the strip plates, web and projection. The actual interlocking of the head 66 and sill 70, as illustrated in FIGURE 7, is also, of course, effected in the manner described supra in connection with the embodiment of FIGURES 2 and 3.

FIGURE 8 differs from the embodiment of FIGURES 6 and 7 in that the lower basic unit 78 contains a decorative panel 80 rather than the glass panel of the basic unit 78. However, by providing the head 82 of this unit with outwardly extending edge flanges 84 having full length camming surface projections 86 thereon, this unit 78 can similarly be mullied to an adjacent unit, for example 24, utilizing the mounting strips 30 detailed supra.

From the foregoing, it will be appreciated that a highly novel construction has been defined, this construction involving the provision of tubular structural members between adjacent and basic window wall or curtain wall units in a manner which merely requires a lateral moving of the adjacent units toward each other and into snap-lock engagement with a pair of intermediate full length mounting or locking strips. Further, it will be appreciated that the interlock achieved thereby is productive of both a highly stable construction and a permanent joint incapable of being pulled apart without physically destroying the members involved.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. For use in joining adjacent panel units, a box mullion, said box mullion comprising a first elongated rail, a second elongated rail parallel to and adjacent said first rail, each rail having a generally planar web, said webs being spaced laterally from each other, an inwardly projecting flange along each edge of both webs, the flanges on the corresponding edges of the two webs projecting inwardly toward each other in a common plane and terminating in spaced relation to each other, a separate mullion strip positionable between each pair of corresponding flanges, each mullion strip including an elongated web and a pair of elongated plates affixed to the strip web transversely thereacross, said plates defining therebetween a pocket for the reception of the pair of inwardly projecting corresponding flanges, each flange having an inner and an outer face, an elongated locking projection projecting laterally from the inner face of each flange at an intermediate position between the rail web and the free edge of the flange and in inwardly spaced relation to said free edge, a complementary locking projection on the strip plate overlying the inner face of the flange, the outer face of each flange and the overlying strip plate having flat meeting surfaces, the depth of each flange receiving strip pocket being substantially equal to the thickness of the associated flange and projection thereon.

2. The construction of claim 1 wherein the plate of each strip overlying the outer faces of the associated flanges is relatively narrower than the associated second plate, each flange, between the locking projection thereon and the spaced free edge thereof, being of a width greater than the transverse distance between the adjacent free edges of the strip plates for engagement of the outer face of the flange with its overlying plate prior to a locked engagement of the complementary locking projections.

3. For use in joining adjacent panel units, a box mullion, said box mullion comprising a first elongated rail, a second elongated rail parallel to and adjacent said first rail, each rail having a generally planar web, said webs being spaced laterally from each other, an inwardly projecting flange along each edge of both webs, the flanges on the corresponding edges of the two webs projecting inwardly toward each other in a common plane and terminating in spaced relation to each other, a separate mullion strip positioned between each pair of corresponding flanges, each mullion strip including portions overlying both the inner and outer faces of the adjacent flanges, and means on one face of each flange and the overlying portion of the mullion strip interlocking the mullion strip to the flange, and consequently locking the rails together and forming a box mullion therewith, the means interlocking each flange to the overlying portion of the mullion strip consisting of a lateral projection on an intermediate portion of said one face of the flange in inwardly spaced relation to the free outer edge of the flange, and a lateral projection on the overlying portion of the strip, said projections extending in opposite directions and generally overlapping each other, the strip projection being located between the flange projection and the corresponding rail web so as to prevent an outward withdrawal of the flange from between the two overlying portions of the strip, the second face of each flange engaging against its overlying strip portion, the strip portion projection being located at the outer edge of the strip portion, the strip portion having the projection thereon being wider than the strip portion overlying the second

face of the corresponding flange, the second face of each flange being flat, the strip portion overlying each second flange face also being flat for enabling a lateral sliding movement therebetween, each flange, between the lateral projection and the spaced outer edge thereof, being of a width so as to engage the outer edge portion of the second face thereof against its overlying strip portion prior to a location of the strip projection between the flange projection and the corresponding rail web.

4. For use in joining adjacent panel units, a box mullion, said box mullion comprising a first elongated rail, a second elongated rail parallel to and adjacent said first rail, each rail having a generally planar web, said webs being spaced laterally from each other, an inwardly projecting flange along each edge of both webs, the flanges on the corresponding edges of the two webs projecting inwardly toward each other in a common plane and terminating in spaced relation to each other, a separate mullion strip positioned between each pair of corresponding flanges, each mullion strip including portions overlying both the inner and outer faces of the adjacent flanges, and means on one face of each flange and the overlying portion of the mullion strip interlocking the mullion strip to the flange, and consequently locking the rails together and forming a box mullion therewith, the means interlocking each flange to the overlying portion of the mullion strip consisting of a lateral projection on an intermediate portion of said one face of the flange in inwardly spaced relation to the free edge of the flange, and a lateral projection on the overlying portion of the strip, said projections extending in opposite directions and generally overlapping each other, the strip projection being located between the flange projection and the corresponding rail web so as to prevent an outward withdrawal of the flange from between the two overlying portions of the strip, the second face of each flange engaging against its overlying strip portion, the flange projection including a locking shoulder facing the web and a camming surface leading thereto from the opposite side of this projection, the corresponding overlying portion of the strip being capable of a slight lateral flexing so as to enable a riding of the strip projection over said camming surface and into engagement behind the shoulder, the strip projection including a locking shoulder facing away from the rail web and a camming surface leading thereto from the opposite side of this strip projection for sliding engagement with the first mentioned camming surface during the mounting of the strip on the flange, the strip portion projection being located at the outer edge of the strip portion, the strip portion having the projection thereon being wider than the strip portion overlying the second face of the corresponding flange, the second face of each flange being flat, the strip portion overlying each second flange face also being flat for enabling a lateral sliding movement therebetween, each flange, between the lateral projection and the outer edge thereof, being of a width so as to engage the outer edge portion of the second face thereof against its overlying strip portion prior to a location of the strip projection between the flange projection and the corresponding rail web.

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