Nov. 8, 1966 H. M. RIEGELMAN 3,283,455

FRAME CONSTRUCTION FOR MULTIPLE PANELS

Filed July 6, 1964

Fig. 1

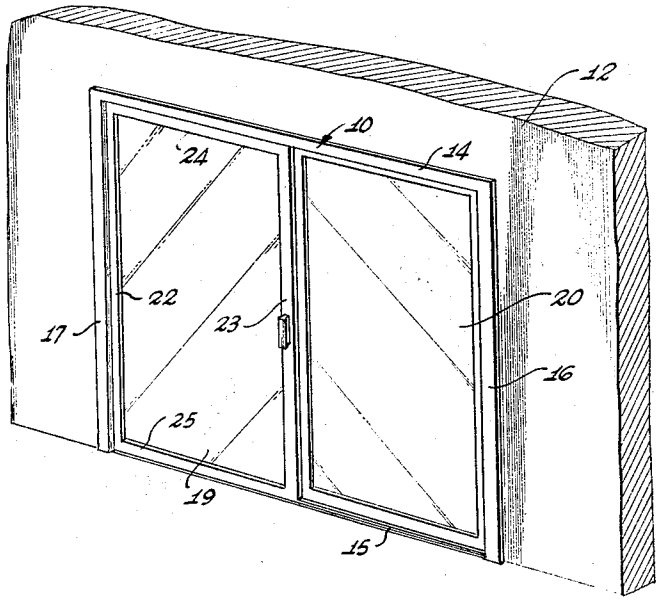


Fig. 2

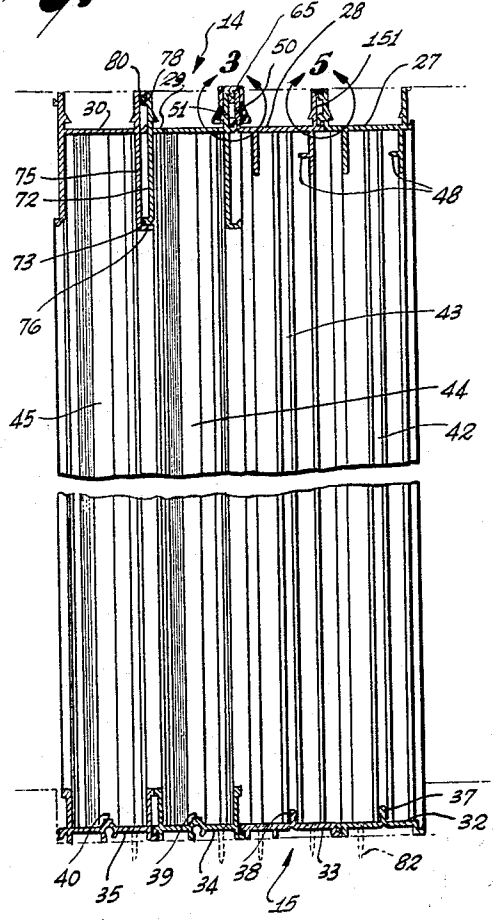


Fig. 3

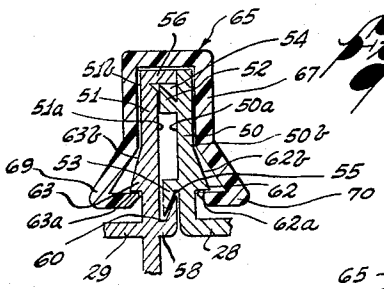


Fig. 4

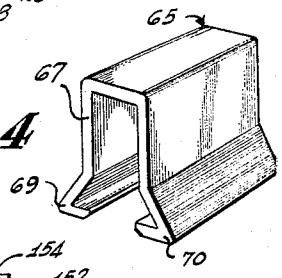
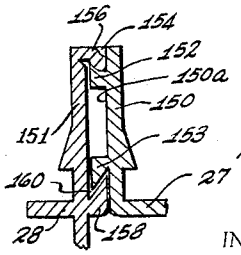


Fig. 5



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FRAME CONSTRUCTION FOR MULTIPLE PANELS

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This invention relates generally to the art of frame construction for multiple panel arrangements such as windows, doors and the like wherein a wide variety of different combinations of sliding and fixed panels may be mounted in a common frame. More particularly, this invention relates to a novel multi-track and channel frame construction which can be rapidly and easily tailored to accommodate any desired combination of panels.

Sliding door or window construction commonly includes an aluminum-framed glass door or window which slides open from a lock jamb in a direction towards a normally fixed glass panel, usually closely adjacent and parallel thereto. Sliding screen doors are also frequently mounted within the same frame for sliding movement parallel to the other panels. All of the panels are normally mounted on the sill of the frame which is conventionally set in a wall opening. The sill of the window frame is usually provided with cooperating means, such as parallel upstanding fins, which act as runners for bottom rollers mounted in both the sliding glass panel and the sliding screen door. In some cases, one or more of the sliding panels may be "top-hung." The top-hung panel, generally speaking, has a pair of upper rollers which are adapted to slip into a longitudinal channel provided in the head member of the frame structure. Bottom rollers for such top-hung panels are also provided as in the past.

The lock stile of the sliding glass panel engages the lock jamb of the frame structure when the panel is in its closed position and, at the same time, the other stile of the sliding panel interlocks with a stile of the fixed panel. Suitable weather stripping is usually positioned on the two interlocking stiles. The other fixed stile of the stationary or fixed panel can be secured to a fixed jamb of the frame. The fixed panel can also be held to the frame by means of upper and lower brackets wedged into the head and sill tracks of the frame.

It will be apparent from the foregoing description that window and door constructions may embody a wide variety of diverse panel arrangements and mounting configurations. In the past, it has always been necessary to know well in advance of actual frame assembly the precise type and arrangement of the panels to be used, so that appropriate head, sill and jamb members of the frame could be manufactured with the proper number and type of channels and fins required by the contemplated panel arrangement. This meant that a completely different frame had to be separately manufactured for each different combination of panels having different channel and track requirements.

In view of the diversity of panel arrangements encountered in the building industry, inventories of different frame members for every panel arrangement likely to be encountered must be maintained. The inconvenience and high cost of maintaining such inventories will be readily appreciated. Hence, designers of sliding door and window constructions, as well as builders in the field, have long recognized the need for a single type of frame construction which can be readily adapted in the field to meet the track and channel requirements of any panel arrangement, regardless of the number of panels involved or the particular mounting means employed. The present invention fulfills this need.

Accordingly, it is an object of the present invention to provide a new and improved frame construction for doors, windows and the like, which overcomes the above and other disadvantages of the prior art.

Another object is to provide a multiple channel and/or frame construction for windows, doors and the like which is adaptable to a wide range of different panel arrangements and supporting configurations.

A further object of this invention is the provision of a new and improved frame construction for windows, doors, and the like, wherein the frame is capable of simple and reliable assembly in the field to meet the channel and track requirements of a diversity of panel arrangements.

Still another object is to provide a multitrack and channel window and/or door frame comprising individual single track and/or channel frame member units which are selectively assembled together to meet the channel and track requirements of any panel arrangement.

Yet another object of the present invention is the provision of a multiple channel and/or track frame construction for windows, doors and the like, wherein the head, sill and jamb members of the frame each comprise a plurality of sub-assembly frame units which are selectively assembled to accommodate any arrangement of panels, regardless of the number of panels or their individual mounting requirements.

A still further object of this invention is to provide a plurality of individual channel and/or track sub-assembly units adapted to accommodate specific panel members and capable of cooperative assembly to make up larger frame members which can accommodate any combination of such panel members in any desired order.

Another object is to provide individual single track and/or channel frame units which interlock with each other to provide as many tracks and/or channels as desired.

The above and other objects and advantages of this invention will become apparent from the following description, when taken in conjunction with the accompanying drawings of illustrative embodiments thereof, and wherein:

FIGURE 1 is a perspective view of a typical sliding door or window construction capable of utilizing a frame construction in accordance with the present invention;

FIGURE 2 is a sectional profile view through a frame construction in accordance with the present invention, and illustrates the interlocking sub-assambly units which make up the head and sill members of the frame;

FIGURE 3 is an enlarged, fragmentary sectional view of the area **3** in FIGURE 2;

FIGURE 4 is an enlarged, perspective view of a clip element which may be used to hold interlocking sub-assembly units of a frame member together; and

FIGURE 5 is an enlarged, fragmentary sectional view of the area **5** in FIGURE 2, and illustrates an alternate approach for holding interlocked sub-assembly units of a frame member together.

Referring now to the drawings, and particularly to FIGURE 1 thereof, a window and/or door frame **10** is set in the usual manner in an opening in a building wall **12**. The frame **10** is preferably fabricated from extruded aluminum head, sill and jamb frame members **14**, **15**, **16** and **17**, respectively, which are suitably formed to provide cooperating flanges, ridges and channels which engage and accommodate the sashes of a sliding panel member **19**, a fixed panel member **20** and any number of additional sliding and fixed panel members (not shown). The sash of each panel member is also preferably fabricated from extruded aluminum frame mem-

bers including left and right stile members **22**, **23** and upper and lower rail members **24**, **25**, respectively.

The present invention is concerned primarily with the construction of the frame **10** to provide a multiplicity of channel and track arrangements for accommodating any desired number of panels, including any combination of fixed and sliding panels, and regardless of whether or not the panels are top-hung from the head member of the frame or supported primarily by the sill member.

The construction of the frame **10** is best observed in FIGURE 2 of the drawing. By way of example, a frame construction is illustrated which is suitable for four panel members. However, it is to be understood that the frame construction may be readily adapted to accommodate either a greater or lesser number of panel members without in any way departing from the spirit and scope of the invention.

As shown in FIGURE 2, the head member **14** of the frame **10** is comprised of a plurality of head sub-assembly units **27**, **28**, **29** and **30**, each sub-assembly unit defining the head channel structure for a single, specific panel member. Each of the individual sub-assembly units **27–30**, inclusive, interlocks directly with each of its next adjacent sub-assembly units to make up the overall structure of the head frame member **14**.

Similarly, the sill member **15** of the frame **10** is comprised of a plurality of sill sub-assembly units **32**, **33**, **34** and **35**, each sill sub-assembly unit providing a single track **37**, **38**, **39**, **40**, respectively, for accommodating the bottom rollers or other guide means of specific panel members. As in the case of the head sub-assembly units **27–30**, each of the sill sub-assembly units **32–35** interlocks directly with each of its next adjacent sill sub-assembly units to make up the overall structure of the sill frame member **15**.

The jamb members **16**, **17** of the frame **10** are likewise each made up of a plurality of sub-assembly units **42**, **43**, **44**, **45**, as observed in FIGURE 2. However, it is not necessary that the sub-assembly units **42–45** of each jamb member interlock with each next adjacent sub-assembly unit in the same jamb member, since the jambs are automatically aligned in their proper positions when they are joined with the head and sill members **14**, **15**, respectively, which do embody interlocking sub-assembly units.

It will be appreciated that the specific channel and/or track configurations provided by the head and sill sub-assembly units **27–30** and **32–35**, respectively, are unimportant insofar as the present invention is concerned. Hence, although the head sub-assembly units **27** and **28** each provide short wall channels having a horizontal ledge **48** for supporting a top-hung panel member, whereas each of the head sub-assembly units **29** and **30** have longer walls providing deeper channels, it is to be understood that the sub-assembly units may define the structure of other types of channels as well, and the channels may be presented in any order dictated by the needs of the specific panel arrangements contemplated. Similarly, the sub-assembly units **32–35** of the sill frame member **15** may or may not define channels in addition to tracks, or may define channels without any tracks or runners. In this connection, note that the sill sub-assembly units **34** and **35** each define channels in addition to tracks, whereas the sill sub-assembly units **32** and **33** interlock to provide a flush surface between the latter sub-assembly units rather than provide a channel defining wall.

Referring now to FIGURES 2–5 of the drawings, the various ways in which the head sub-assembly units **27–30** may be interlocked and held fast will become apparent. FIGURE 3 illustrates the interlock structure between the short wall sub-assembly unit **28** of the head member and the longer wall sub-assembly unit **29**.

Each of the head sub-assembly units **28**, **29** is provided with an upstanding flange **50**, **51**, respectively, substantially perpendicular to the head member **14**. The flanges **50**, **51** extend the full length of the head member **14** and are on the opposite side of the head member from that intended to engage the panel members. The flange **50** is provided with a pair of integral upper and lower ribs **52**, **53**, respectively, on the outer face **50***a* of the flange **50**. The ribs **52**, **53** are parallel to each other and extend the full length of the head member **14**. The upper face of the rib **52** and the lower face of the rib **53** are both grooved along the full length of the ribs to define oppositely directed, substantially triangular pockets between the ribs and the outer face **50***a* of the flange **50**.

The flange **51** of the head sub-assembly unit **29** is also provided with a pair of upper and lower ribs **56**, **58**, respectively, projecting from the outer face **51***a* of the flange **51**. The upper face of the lower rib **58** is grooved along its length to define a substantially triangular pocket **60** between the rib and the outer face **51***a* of the flange **51**. In this connection, the lower rib **53** of the flange **50** and the lower rib **58** of the flange **51** are positioned vertically relative to each other so that they interlock in complementary fashion when the sub-assembly uints **28**, **29** are brought into engagement with each other. Hence, the triangular portion of the rib **53** of the finage **50** enters the triangular groove **60** adjacent the flange **51** whereas the triangular portion of the rib **58** of the flange **51** enters the triangular pocket **55** of the flange **50**.

The upper rib **56** of the flange **51** is preferably in the form of a small lip or bead perpendicular to the outer surface **51***a*. The rib **56** is positioned vertically along the flange **51** so that the upper apex of the rib **52** of the flange **50** abuts the lower face of the rib **56** when the lower ribs **53** and **58** of the two flanges are interlocked as shown in FIGURES 2 and 3. The relative widths of the grooves or pockets **55**, **60** and of the interlocking lower ribs **53**, **58** are such that there is little or no horizontal play between the sub-assembly units **28** and **29**. In addition, the relative vertical spacing between the ribs **52**, **53** of one sub-assembly unit and the ribs **56**, **58** of the other sub-assembly unit is such that vertical play between the pair of sub-assembly units is likewise eliminated.

The angled faces of the lower ribs **53**, **58**, provided by the grooves **55**, **60**, respectively, simplify interlocking assembly of the sub-assembly units **28**, **29** since there is sufficient clearance so that it is easy to pivot the upper ribs **52**, **56** into proper position about the lower ribs **53**, **58**. Otherwise, it might be feasible to interlock the two sub-assembly units only by longitudinally sliding one unit into the other.

The inner surfaces **50***b* and **51***b* of the flanges **50**, **51**, respectively, are each provided with an integral rib **62**, **63**, respectively, at the same vertical level. The ribs **62** and **63** run the full length of the head member **14** and each of these ribs provides a lower ledge face **62***a*, **63***a* perpendicular to their respective flange faces **50***b*, **51***b*, respectively. The ribs **62**, **63** taper inwardly as they rise along their respective flanges and thereby define inclined plane surfaces **62***b*, **63***b*, respectively.

Referring to FIGURES 2–4, a spring clip element **65** of metal, plastic or the like, is provided with a channel-shaped main body portion **67** and a pair of integral, dependent resilient legs **69**, **70**. When the clip **65** is passed over the upper portion of the flanges **50**, **51**, the clip legs **69**, **70** are forced apart by the inclined plane surfaces **62***b*, **63***b* provided by the flange ribs **62**, **63**, respectively, until the legs pass over the latter ribs and spring inwardly to engage the underside of the ribs at the ledge faces **62***a*, **63***a*, whereby the clip element **65** is locked in place. Locking of the clip element **65** in this manner simultaneously locks the head sub-assembly unit **28** to the head sub-assembly unit **29**. The clip elements **65** are typically between one and two inches in length and are installed at eighteen inch intervals along the length of the head member **14** wherever two sub-assembly units are interlocked.

Referring now again to FIGURE 2, it will be apparent that the sub-assembly unit **28** has an additional upstanding flange **151**, similar to its flange **50** previously described, but having the complementary rib configuration previously described in connection with the flange **51** of the head sub-assembly unit **29**. This is true of every sub-assembly unit, i.e., each unit is provided with a pair of upstanding flanges for engagement with each of its next adjacent sub-assembly units, but the interlocking rib arrangement of each of the flanges is complementary rather than identical. Hence, in assembling the sub-assembly units to form the head member **14** of the frame **10**, it is merely necessary to directly interlock the structure of one sub-assembly connecting flange with the complementary connecting flange structure of another sub-assembly unit.

As best observed in FIGURE 2, a similar direct interlocking arrangement is provided for coupling sub-assembly units having long channel-defining walls to other sub-assembly units having walls of similar length. In this regard, although the same interlocking flange arrangement may be used for the long walls as that used for coupling short wall units to long wall units or other short wall units, the longer walls can sometimes be used to advantage to enhance the rigidity of the coupling arrangement. In this connection, note the manner in which the head sub-assembly unit **29** interlocks with the sub-assembly unit **30**. The sub-assembly unit **29** is provided with a long channel-defining wall **72** having an intergral rib **73** along its outer face at the lower end thereof. The sub-assembly unit **30** is also provided with a long channel-defining wall **75** having an integral rib **76** along its outer face at the lower end thereof. The rib **76** is grooved along its length to define a complementary pocket for receiving the rib **73** of the sub-assembly unit **29**. The ribs **73, 76** interlock in substantially the same manner as the lower ribs **53, 58** in FIGURE 3. However, because of the increased vertical spacing between the lower ribs **73, 76** and the corresponding upper ribs **78, 80**, the rigidity of the coupling arrangement is somewhat enhanced.

Referring now more particularly to FIGURE 5 of the drawings, there is shown a means of locking adjacent sub-assembly units together without the necessity of using a plurality of clip elements **65**. In this connection, the reference numerals **151–160** in FIGURE 5 designate like connection structure as that designated by the reference numerals **51–60** in FIGURE 3. In the embodiment of FIGURE 5, the interlocked head sub-assembly units **27, 28** are held together by dimpling the upper rib **156** of the flange **151** so that the rib **156** extends into the groove or pocket **154** defined by the upper rib **152** and the outer flange surface **150***a* of the flange **150**. It is not necessary, however, that the upper rib **156** be bent downwardly along its full length. Merely dimpling the rib **156** at spaced intervals of approximately eighteen inches has proven to be satisfactory in practice.

As best observed in FIGURE 2, the sub-assembly units **32–35** of the sill member **15** are interlocked solely to insure proper alignment, and the sub-assembly units are not permanently locked together prior to installation of the sill member **15** into the wall opening. In this connection, the various sill sub-assembly units **32–35** are installed within the wall opening by any appropriate fastening means, such as screws or nails **82** passing through each of the sill sub-assembly units.

In practice, the builder or supplier of the door and/or window structures need only maintain a supply of frame member sub-assembly units capable of satisfying the track and channel requirements of each type of panel member which may be installed. For any particular panel arrangement, the appropriate sub-assembly units are selected for the head, sill and jamb members of the

frame and are assembled in the field in substantially the manner shown in FIGURES 2–5 of the drawings.

It will be apparent from the foregoing that, in particular forms of my invention have been illustrated and described, various modifications can be made without departing from the spirit and scope of my invention. Accordingly, I do not intend that my invention be limited, except as by the appended claims.

I claim:

1. In a frame construction, a frame member, comprising:

a plurality of separate, individually formed subassembly units in side by side relation, each of said sub-assembly units providing structure for accommodating a specific panel member, each of said sub-assembly units having a pair of connection flanges, each connection flange having integral structure for direct physical interlocking in mating engagement with integral structure of one of the connection flanges of any other sub-assembly unit.

2. In a frame construction for doors, windows and the like, a frame member comprising:

a plurality of separate sub-assembly units placed side by side, each of said sub-assembly units providing structure for accommodating a specific panel member, each of said sub-assembly units having first and second connection flanges parallel to each other and extending the length of said frame member, said first connection flange of each sub-assembly unit having a plurality of ribs which interlock with a plurality of ribs on said second connection flange of an adjacent sub-assembly unit;

and means for locking the connection flanges of adjacent sub-assembly units together.

3. A frame structure as set forth in claim **2**, wherein said locking means includes a deformed portion of the rib of one connection flange in interlocking engagement with the rib of another connection flange.

4. A frame structure as set forth in claim **2**, wherein the interlocking surfaces of at least one pair of ribs from adjacent sub-assembly units are tapered to permit pivotal engagement of said sub-assembly units during assembly of the overall frame member.

5. A frame member as set forth in claim **2**, wherein said locking means includes a resilient clip element in engagement with the interlocked connection flanges of an adjacent pair of sub-assembly units.

6. A frame member as set forth in claim **5**, wherein the connection flanges of adjacent sub-assembly units include an additional rib on each connection flange, each additional rib providing a first surface for expanding said clip element during installation and providing a second surface for resisting removal of said clip element following installation.

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