

Nov. 30, 1926.

1,608,672

J. A. RAPPAPORT

TUBULAR CONSTRUCTION MATERIAL

Filed Oct. 26, 1922

3 Sheets-Sheet 1

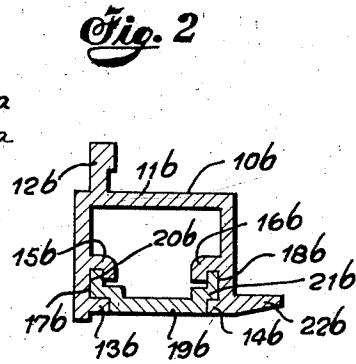
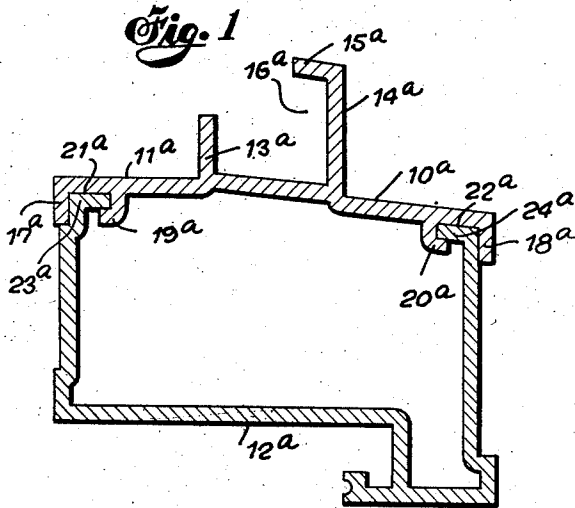


Fig. 3

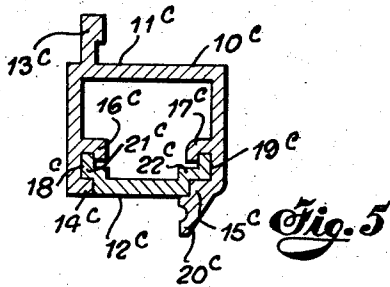


Fig. 4

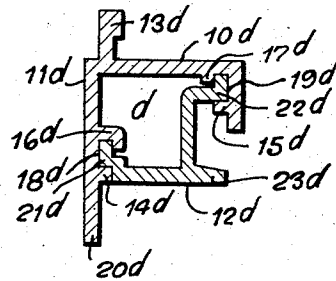
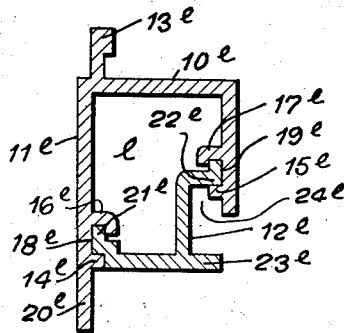


Fig. 5



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Nov. 30, 1926.

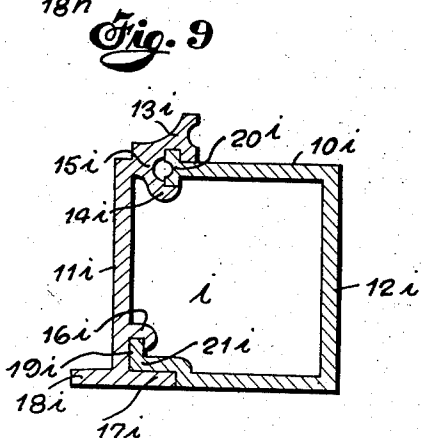
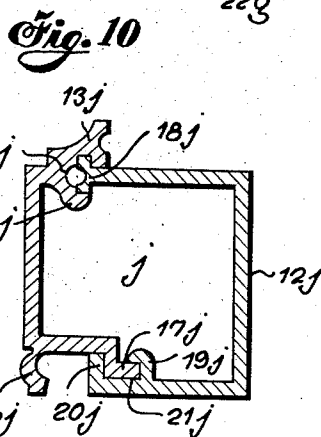
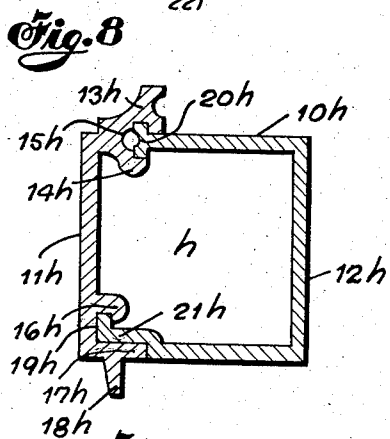
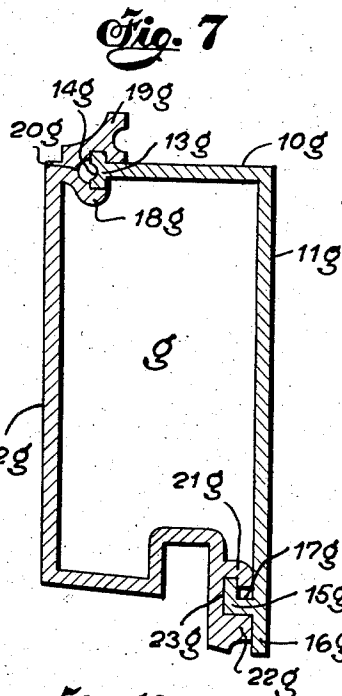
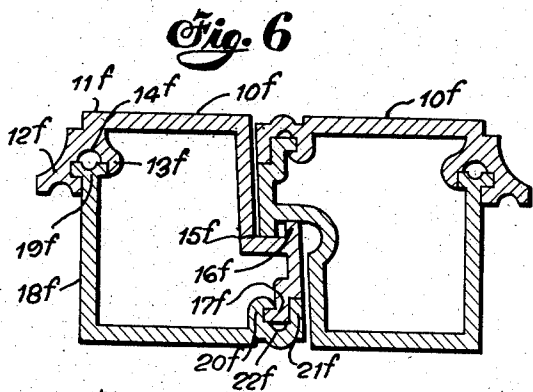
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TUBULAR CONSTRUCTION MATERIAL

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3 Sheets-Sheet 2



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1,608,672

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TUBULAR CONSTRUCTION MATERIAL

Filed Oct. 26, 1922

3 Sheets-Sheet 5

Fig. 11

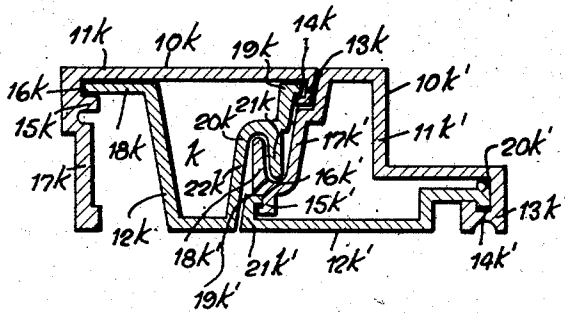


Fig. 12

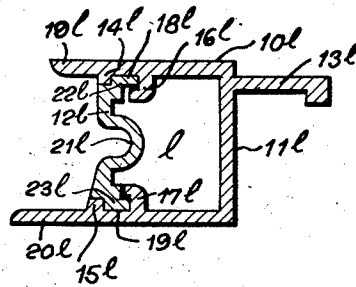


Fig. 13

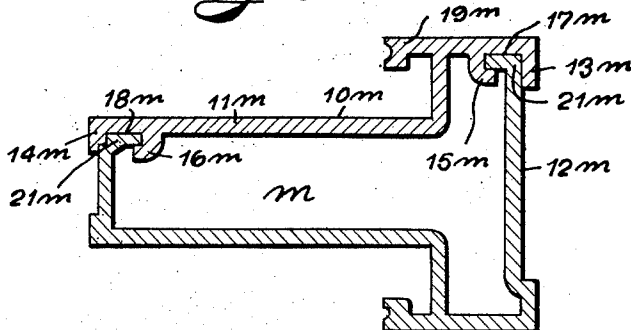
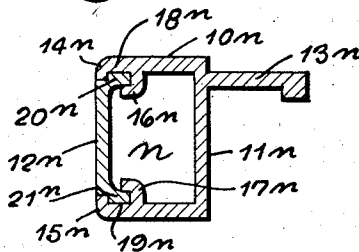


Fig. 14



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UNITED STATES PATENT OFFICE.

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TUBULAR CONSTRUCTION MATERIAL.

Application filed October 26, 1922. Serial No. 598,984.

My present invention relates to tubular construction materials, especially for the metal frames of doors, windows and the like. Such tubular metal parts are often complicated, are comparatively difficult to manufacture, and are rather expensive as ordinarily made. In some cases such tubular members cannot be conveniently fabricated at all, due to the particular complicated shapes which such members may be required to possess.

It is an object of the invention to provide a metal tubular member for the frames of doors, windows and the like, which can be manufactured conveniently and cheaply, however complicated its form may be.

It is another object of the invention to provide a metal tubular member for the frames of doors, windows and the like, which shall be made from extruded bronze, or equivalent metal, in such a manner that the necessary parts constituting the tubular member may be fabricated in a simple, accurate and expeditious manner, resulting in a superior product having any desired cross section, however complicated, for use in a wide variety of cases for which the much more expensive substitutes now offered for sale would not ordinarily be available.

In the accompanying specification I shall describe, and in the annexed drawing show, several illustrative embodiments of the present invention. It is, however, to be understood that my invention is not limited to the illustrative embodiments thereof herein shown and described for purposes of illustration only.

Referring to the drawings, wherein I have illustrated the aforesaid illustrative embodiments of the present invention:

Figure 1 is a cross-sectional view of one form of tubular construction comprising, in the present instance, a transom bar;

Figure 2 is a similar view showing another embodiment of the present invention, in the form of a transom sash top rail;

Figure 3 is a similar view showing still another embodiment of the present invention in the form of a sash stile;

Figure 4 is a similar view showing an embodiment of the present invention in the form of a transom sash bottom rail;

Figure 5 is a similar view of another embodiment of the present invention in the form of a casement lower sash bottom rail;

Figure 6 is a similar view of still another embodiment of the present invention in the form of cooperating door stiles for swinging casement doors;

Figure 7 is a similar view of still another embodiment of the present invention in the form of a transom bar;

Figure 8 is a similar view of another embodiment of the present invention in the form of a hinge stile;

Figure 9 is a similar view of still another embodiment of the present invention in the form of a top rail;

Figure 10 is a similar view of still another embodiment of the present invention in the form of an intermediate hinge stile;

Figure 11 is a similar view of another embodiment of the present invention in the form of cooperating lower and upper sash meeting rails;

Figure 12 is a similar view of still another embodiment of the present invention in the form of a lower sash bottom rail;

Figure 13 is a similar view of still another embodiment of the present invention in the form of a mullion; and

Figure 14 is a similar view of still another embodiment of the present invention in the form of a top rail.

Before describing the method and product of the present invention in detail, it may be desirable briefly to point out the shortcomings and the disadvantages of the present state of the art to which the present invention belongs. In making hollow tubular members for metal door and window constructions, according to the practice that has hitherto prevailed, it has been customary to form such tubular members of several sections by welding, brazing, or some similarly difficult and expensive metal-joining process. The resulting product is not only expensive, but also comparatively impractical, especially considering the great necessity of providing construction materials of the character set forth above, which shall have long life and wear, and which shall possess the necessary weatherproof properties. Certain forms in which these products were desired

to be made could not be made at all by extruding bronze or equivalent metal in the usual way, nor by pressing the same out of steel.

5 By means of the present invention, the disadvantages pointed out above are substantially avoided, and numerous advantages of great commercial and mechanical value obtained.

10 Outlining, first, the method of the present invention, more or less briefly, the same comprises forming tubular construction materials of the general character specified above, in two, three, or more, cooperating sections.

15 This may be done by extruding bronze or equivalent metal in the desired shapes. The cooperating sections are so arranged that certain of such sections are provided with one or more flanged or otherwise suitably shaped

20 portions to cooperate with corresponding grooves in the other section or sections. The cooperating sections may be locked together by inserting the flanges of the one section or sections into the corresponding grooves

25 of the other section or sections. In this way, particularly as a result of the irregularities which inevitably are to be found in the flanged portions of the tubular section members and in the grooves of the cooperating

30 tubular section members, the various sections will be securely locked together in tubular form by their frictional contact, without the use of welding, brazing or other expensive metal-joining process.

35 Turning now to the various illustrative embodiments of the present invention, and referring more particularly to the embodiment shown in Figure 1 of the drawing, the transom bar comprising said illustrative embodi-
40 ment has the form of a hollow tubular member generally designated by reference character 10^a and consisting of two tubular section members, designated by reference character 11^a and 12^a respectively.

45 The tubular section member 11^a, which, like the tubular section member 12^a, may readily be made by extruding bronze or equivalent metal, is provided with the up-
50 standing flanges 13^a and 14^a, of which the flange 14^a is slightly wider than the flange 13^a and is provided with the flange member 15^a. In this way there is provided a recess 16^a which it is desirable that the transom bar shall possess. The tubular section member 11^a is provided with the downwardly
55 turned flanges 17^a and 18^a which cooperate with the respective angular flanges 19^a and 20^a respectively, for providing grooves 21^a and 22^a, for a purpose subsequently to be described in greater detail.

60 The remaining tubular section member 12^a, there being in the embodiment now being described but two such section members, is provided with a plurality of inwardly turned
65 flanges 23^a and 24^a for cooperation with the

flanged portions 17^a, 18^a, 19^a and 20^a defining the respective grooves 21^a and 22^a of the tubular section member 11^a.

It may here be noted that in determining the shape to be given to the various tubular section members which are to be assembled to form the hollow tubular construction member, such a shape is chosen for each member as will enable the member to be readily made by extruding bronze or equivalent metal, and so that there will be as few tubular section members and as few joints as possible. The number of sections will depend, of course, upon the particular cross-section of the tubular member to be constructed. The form which each section member shall have depends also upon the necessary forms or shapes of the flanges and corresponding grooves, which should be distributed in such a way as to enable the tubular member to be readily fabricated and assembled so as to possess the maximum weatherproof and wearing qualities.

Two tubular section members 11^a and 12^a are joined by sliding the flanges 23^a and 24^a into the respective grooves 21^a and 22^a of the section 11^a. Due to the minute natural irregularities of the flanged portions 23^a and 24^a and of the corresponding grooves 21^a and 22^a, the two sections will closely and tightly fit together to form a rigid weatherproof tubular member, in this case, a transom bar, without the use of welding, brazing or other expensive metal-joining operation.

In Figure 2 I have shown a transom top rail, generally designated by reference character 10^b, and consisting of a section member 11^b, provided with the upstanding flange 12^b and the flanged portions 13^b and 14^b cooperating with the corresponding angular flanges 15^b and 16^b, respectively, to form and define the respective grooves 17^b and 18^b. Cooperating with the section member 11^b is the section member 19^b which is provided with the angular flanged portions 20^b and 21^b for fitting into the corresponding grooves 17^b and 18^b, respectively. The manner of assembling this tubular construction device, comprising a transom sash top rail, will be clear from the detailed description of the transom bar 10^a appearing in the earlier portions of this specification. It may here be noted that the section member 11^b is provided with the integral weatherstrip 22^b which is preferably of T-shaped cross-section.

Referring to Figure 3 of the drawing wherein I have illustrated a sash stile, generally designated by reference character 10^c, the same comprises a section member 11^c provided with the upstanding flange 13^c and the flange portions 14^c and 15^c cooperating with the angular flange portions 16^c and 17^c, respectively, to define the respective grooves 18^c and 19^c. It will be noted that

the flange member 15° has an extension in the form of an integral weather-strip 20°. The section member 12° is provided with the angular flanged portions 21° and 22° for cooperation with the grooves 18° and 19° of the other section member 11°. The manner of assembling this form of the invention is the same as for the form shown in Figure 1 of the drawing, as set forth in detail above.

Referring now to Figure 4 of the drawing, I have here shown a transom sash bottom rail generally designated by reference character 10^d and comprising a tubular section member 11^d and a tubular section member 12^d. The section 11^d is provided with the upstanding flange 13^d and the flanged portions 14^d and 15^d which cooperate with the respective flanges 16^d and 17^d to define the respective grooves 18^d and 19^d. It will be noted that the section member 11^d is provided with an extension in the form of an integral weather strip 20^d.

The section member 12^d is provided with the angular flanges 21^d and 22^d cooperating with the respective grooves 18^d and 19^d. The section member 12^d is also provided with the integral weather strip 23^d which is preferably of T-shaped cross-section. The manner of assembling this device is the same as for the device shown in Figure 1 of the drawing and described in detail above.

It will be noted that in the form of invention shown in Figure 4 of the drawing, each section member has two sides, as is also the case with the members shown in Figures 5, 6, 7, 10, 11, and 13; whereas, in the tubular members of the remaining figures of the drawing, such members are made up of sections of which one forms but one side of the tubular device and the other member forms the remaining three sides of the device. It will also be noted that the tubular members thus far described have been made up of two sections, which is true of all of the tubular devices shown in the drawings; although it is, of course, to be understood that the tubular device may be made up of three or more sections, if desired or necessary.

Referring now to Figure 5 of the drawing, the device illustrated therein comprises a casement lower sash bottom rail, generally designated by reference character 10^e, and consisting of the section members 11^e and 12^e. The section member 11^e includes the upstanding flange 13^e and the flanged portions 14^e and 15^e cooperating with the angular flanges 16^e and 17^e to define the respective grooves 18^e and 19^e. The section 11^e also has the integral weather strip 20^e.

The section member 12^e is provided with the angular flanges 21^e and 22^e for cooperation with the respective grooves 18^e and 19^e. The section member 12^e is provided with the integral flange 23^e providing a recess 24^e

when the tubular member is assembled in the manner described in detail above for the transom bar 10^a.

Referring to Figure 6 of the drawing, where I have shown the two cooperating door stiles of a pair of swinging casement doors, the stile generally indicated by reference character 10^f comprises a section member 11^f which includes the flange members 12^f and 13^f defining a groove 14^f. The section member 11^f also includes the angular indentation 15^f and the integral weather strip 16^f. The member 11^f is also provided with the angular flange 17^f. The section member 18^f is provided with the flanged edge 19^f for cooperating with the groove 14^f and with the flanges 20^f and 21^f defining between them the groove 22^f for receiving the angular flanged portion 17^f of the member 10^f.

The cooperating tubular member 10^f is constructed substantially similarly to the tubular member 10^e and need not be further described here. The manner of assembling the tubular members 10^e and 10^f will be substantially clear from the description earlier in this specification of the manner of assembling the transom bar 10^a.

In Figure 7 I have shown a member which may serve as a transom bar. This member, generally designated by reference character 10^g, comprises a tubular section member 11^g and a cooperating tubular section member 12^g. The member 11^g comprises the flanged portion 13^g, the flange being T-shaped and being cupped at the point 14^g. At its other end the section 11^g is provided with the angular flange 15^g and the extension 16^g. It will be noted that the angular flange 15^g defines a groove 17^g for a purpose subsequently to be described in greater detail.

The cooperating section 12^g is provided with the flanges 18^g and 19^g defining between them a groove 20^g for the reception of the T-shaped flange 13^g. At its other end the section 12^g is provided with the angular flange 21^g and the flanged portion 22^g defining between them the groove 23^g for the reception of the angular flange 15^g. The manner of assembling the sections 11^g and 12^g in the fabrication of the tubular member 10^g will be substantially clear from the foregoing portions of the specification describing the manner of assembling the transom bar 10^a.

In Figure 8 of the drawing I have shown a hinge stile, generally designated by reference character 10^h, and comprising the sections 11^h and 12^h. The section 11^h comprises the flanged members 13^h and 14^h defining between them the groove 15^h. At its other end the section 11^h is provided with the hooked flange portion 16^h and the flange 17^h which includes an integral weather strip 18^h. The hooked flanged member 16^h and

the flange 17^h define between them a groove 19^h.

The section 12^h comprises the T-shaped flange 20^h for cooperation with the groove 15^h of the section 11^h. At its other end the section 12^h includes the angular stepped flanged portion 21^h for cooperation with the groove 19^h of the section 11^h. The manner of assembling this device and the advantages of the same in use are the same as for the devices described in the previous portions of this specification.

The top rail shown in Figure 9 of the drawing and designated by reference character 10ⁱ consists of a section 11ⁱ and a cooperating section 12ⁱ. The section 11ⁱ includes the flanged members 13ⁱ and 14ⁱ including between them the groove 15ⁱ. At its other end the section 11ⁱ is provided with the hooked flange member 16ⁱ and the flange 17ⁱ which includes, as an extension thereof, the integral weather strip 18ⁱ. The members 16ⁱ and 17ⁱ define between them the groove 19ⁱ. The section 12ⁱ includes the T-shaped flange 20ⁱ and the angular stepped flange portion 21ⁱ. The flange 20ⁱ cooperates with the groove 15ⁱ while the flange 21ⁱ cooperates with the groove 19ⁱ. Otherwise the manner of assembling this device and the advantages of the same in use are the same as for the device described in the earlier portions of this specification.

The intermediate hinge stile shown in Figure 10 of the drawing and generally designated by reference character 10^j includes a section 11^j and the cooperating section 12^j. The section 11^j comprises the flanged portions 13^j and 14^j defining between them the groove 15^j. The section 11^j is provided with the integral channeled strip 16^j and the angular flange 17^j.

The section 12^j is provided with the T-shaped flange 18^j which cooperates with the groove 15^j of the section 11^j, and with the hook-shaped flange 19^j and the flanged portion 20^j defining between them the groove 21^j for cooperation with the flange 17^j of the section 11^j. It will be noted here that each of the sections has a flange and a groove for cooperating with the respective groove and flange of the other section. The manner of assembling this device and the advantages of the same in use will be substantially clear from the descriptions of the analogous devices in the earlier portions of this specification.

The meeting rails shown in Figure 11 of the drawing are respectively designated by reference characters 10^k and 10^{k'}. The meeting rail 10^k comprises a section 11^k and a cooperating section 12^k. The section 11^k is provided with the hooked flange portion 13^k defining a groove 14^k. At its other end the section 10^k is provided with the integral flange 15^k, defining a groove 16^k, and with

the integral extension 17^k. The section 12^k is provided with the flange 18^k for cooperation with the groove 16^k, while at its other end this section is provided with the flange 19^k for cooperation with the groove 14^k of the section 11^k. The side 20^k of the section 12^k is generally upwardly and outwardly inclined and includes a tongue-like extension 21^k defining a groove 22^k.

The other meeting rail 10^{k'} comprises a section 11^{k'} and a cooperating section 12^{k'}. The section 11^{k'} comprises the angular flange 13^{k'} defining a groove 14^{k'}. At its other end the section 11^{k'} includes the angular flanged portion 15^{k'} defining a groove 16^{k'}. The side 17^{k'} of the section 11^{k'} is generally upwardly and outwardly inclined and includes a tongue-like projection 18^{k'} defining a groove 19^{k'}. The section 12^{k'} includes the T-shaped indented flange portion 20^{k'} for cooperation with the groove 16^{k'}.

The detailed features of this construction have been claimed in a co-pending application of mine filed of even date herewith and entitled "Meeting rails for windows and the like," and need not therefore be described in greater detail here. It is sufficient to state that the manner of assembling the meeting rails just described, and the advantages of the same in use follow from their construction as illustrated, and will otherwise be apparent from the description of the other embodiments of this invention in the earlier portions of this specification.

The lower sash bottom rail illustrated in Figure 12 of the drawing and generally designated by reference character 10^l comprises a section 11^l and a cooperating section 12^l. The section 11^l is provided with the upstanding L-shaped flange 13^l and with the flanges 14^l and 15^l cooperating with the hook-shaped flanges 16^l and 17^l to define the grooves 18^l and 19^l respectively. The section 11^l is furthermore provided with the extensions 19^l and 20^l.

The cooperating section 12^l has the central channeled and indented portions 22^l and 23^l for cooperation with the respective grooves 18^l and 19^l. Otherwise the manner of assembling this device and the advantages of the same in use are the same as for the devices described in the earlier portions of this specification.

The mullion shown in Figure 13 of the drawing and generally designated by reference character 10^m comprises the sections 11^m and 12^m, of which the section 11^m comprises the flanged portions 13^m and 14^m cooperating with the hook-shaped flanged portions 15^m and 16^m to define the respective grooves 17^m and 18^m. The section 11^m has the flange portion 19^m.

The section 12^m is provided with the angular flanges 20^m and 21^m for cooperation with the respective grooves 17^m and 18^m of

the section 11ⁿ. The manner of assembling this device and the advantages of the same in use are apparent or will readily suggest themselves from the earlier portions of this specification.

In Figure 14 the top rail, generally designated by reference character 10ⁿ, consists of the sections 11ⁿ and 12ⁿ, of which the section 11ⁿ is provided with the upstanding L-shaped flange 13ⁿ and the flanged portions 14ⁿ and 15ⁿ cooperating with the hook-shaped portions 16ⁿ and 17ⁿ for defining the respective grooves 18ⁿ and 19ⁿ. The section 12ⁿ is provided with the flanged portions 20ⁿ and 21ⁿ for cooperation with the respective grooves 18ⁿ and 19ⁿ of the section 11ⁿ. The manner of assembling the device and the advantages of the same in use will be apparent from the descriptions in the earlier portions of this specification.

Summarizing the features of the above described embodiments of the present invention, it is to be noted that I am the first to make a tubular metal construction material without the use of brazing, welding or similarly expensive and unsatisfactory metal-joining operation. While I prefer to use the method of extrusion for forming the various tubular sections, various other metal-working processes may be used for this purpose, although I prefer to extrude the various sections of bronze or equivalent metal.

The choice of the form for the various tubular sections cooperating to form the tubular members, depends upon the feasibility of extruding the metal where this process is used, as is preferred. It is also preferred that the joints of the various sections shall be so arranged as to avoid exposing such joints to the weather. It is also preferred that the joints shall be so located as to be as little visible as possible, thus giving the device a more neat and finished appearance.

The advantages of the foregoing constructions are that their fabrication saves much time, labor and material, and results in a more rigid structure without the use of welding, brazing or similar expensive metal-joining processes. Furthermore, the various sections are locked together and cannot separate even when subjected to unusual strains and stresses, as during fires. Constructions using these materials are more compact and

more weatherproof than the competing materials hitherto used in their stead.

What I claim is:

1. A tubular member for metal window frames and the like, comprising a plurality of sectional elements at least one of which has a main web portion and at least one pair of cooperating flange portions disposed adjacent an edge of said main web portion and transversely thereto, one of said flange portions having an edge portion thereof turned inwardly towards the cooperating flange portion to thus provide a channel, the other of said sectional elements having one or more flange portions each extending transversely to the main web portion of said last-mentioned sectional element and fitting into said channel.

2. A member for metal window frames and the like, comprising a sectional element having a main body portion provided with a pair of cooperating flange portions adjacent at least two of the laterally disposed portions of said main body portion and disposed transversely thereto, one of the flange portions of each pair of cooperating flange portions having an edge portion thereof turned inwardly toward the cooperating flange portion of the pair, the edge portions of at least two such pairs of cooperating flange portions being turned away from each other.

3. A member for metal window frames and the like, comprising a sectional element having a main body portion provided with a pair of cooperating flange portions adjacent at least two of the laterally disposed portions of said main body portion to thus provide a plurality of channels, one of the flange portions of each pair of cooperating flange portions having an edge portion thereof turned inwardly toward the cooperating flange portion of the pair, the edge portions of at least two such pairs of cooperating flange portions being turned away from each other, in combination with a cooperating sectional element having a main body portion and a plurality of flange portions extending transversely to such main body portion of said last-mentioned sectional element and fitting into said channels.

In testimony, whereof, I have signed my name to this specification this 30th day of September, 1922.

JACOB A. RAPPAPORT.