May 29, 1934. A. H. MARTY 1,961,006

HOLLOW METALLIC STRUCTURE

Filed May 8, 1929 3 Sheets-Sheet 1

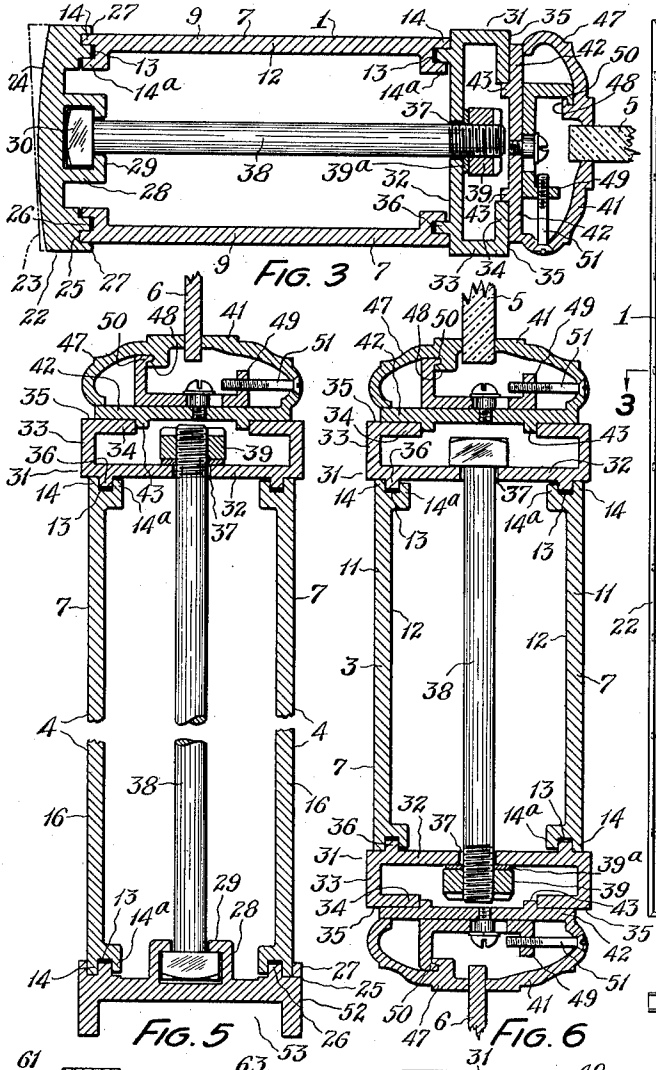


FIG. 3

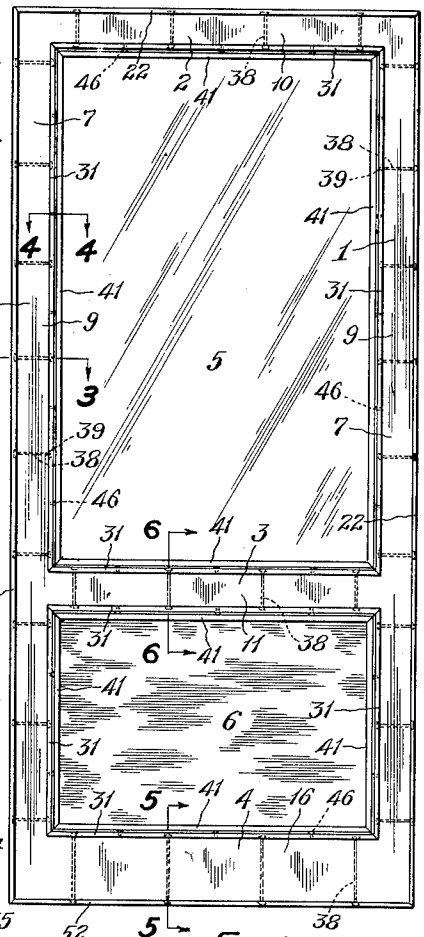


FIG. 1



FIG. 2

FIG. 5

FIG. 6

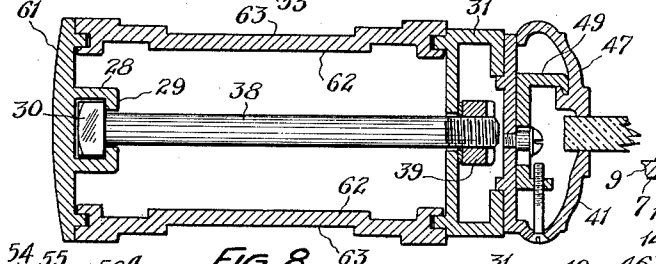


FIG. 8

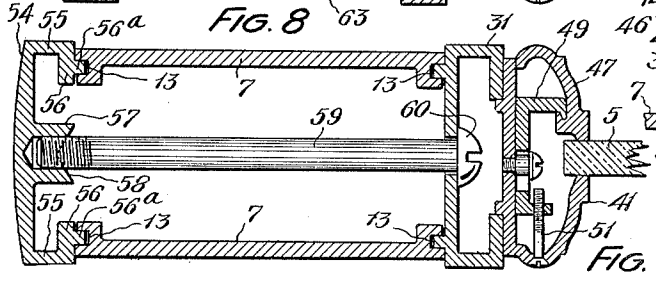


FIG. 7

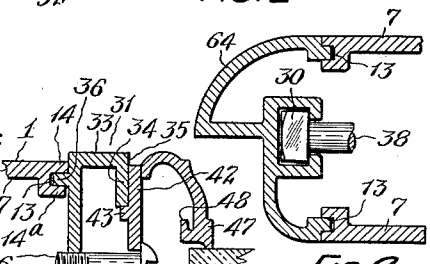


FIG. 4

FIG. 9

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HOLLOW METALLIC STRUCTURE

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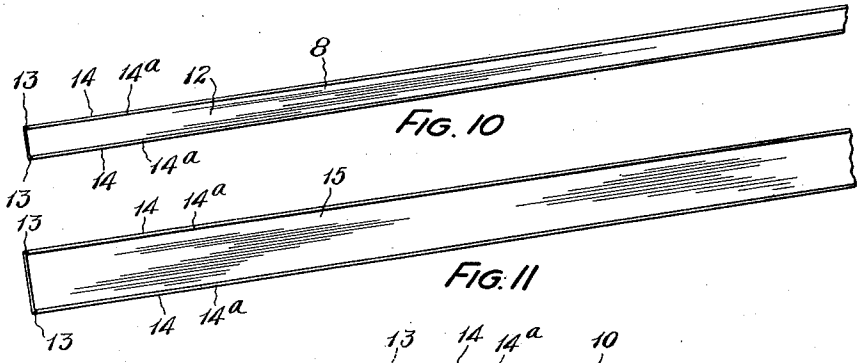


FIG. 10

FIG. 11

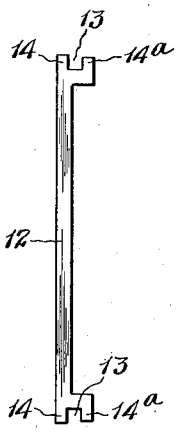


FIG. 12

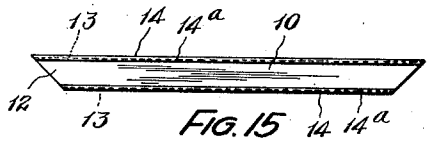


FIG. 15

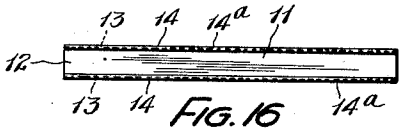


FIG. 16

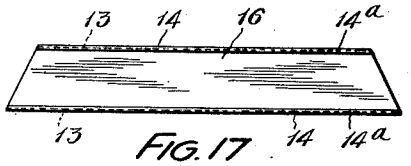


FIG. 17

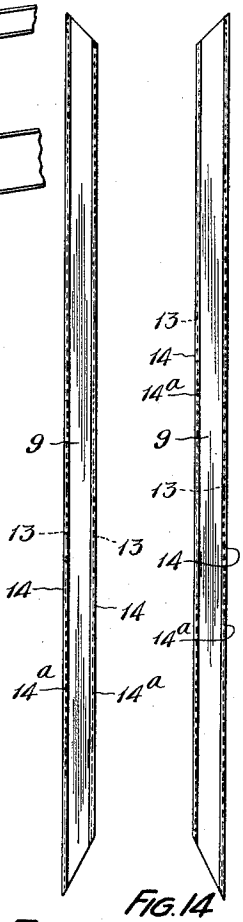


FIG. 13

FIG. 14

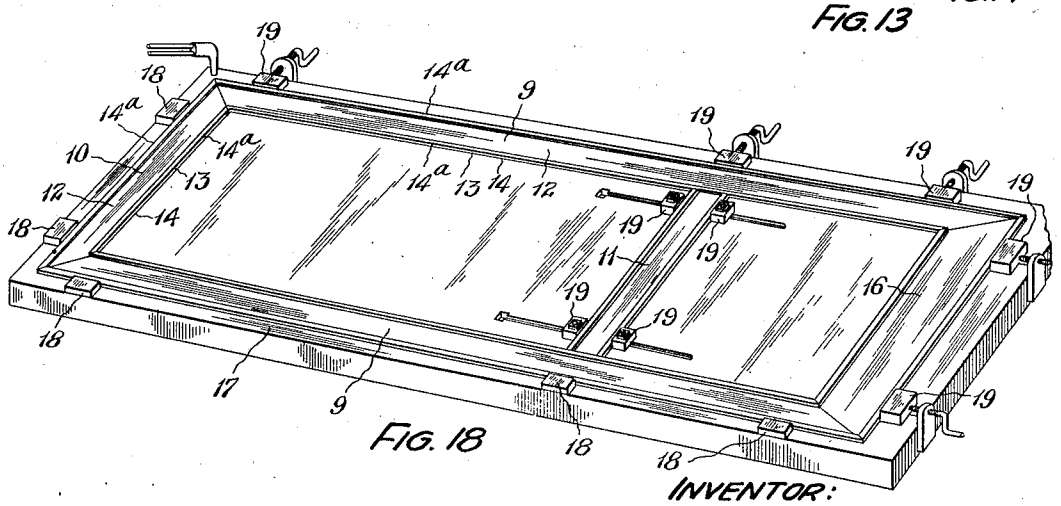


FIG. 18

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HOLLOW METALLIC STRUCTURE

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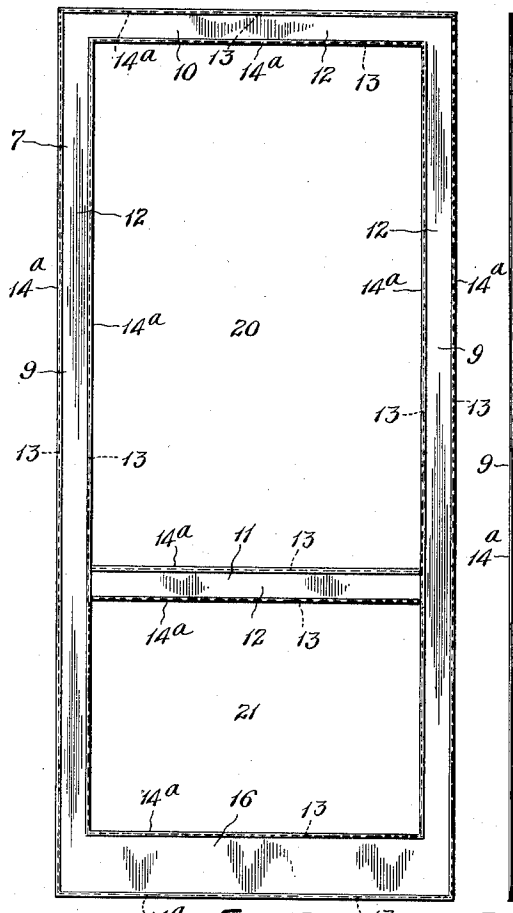


FIG. 19

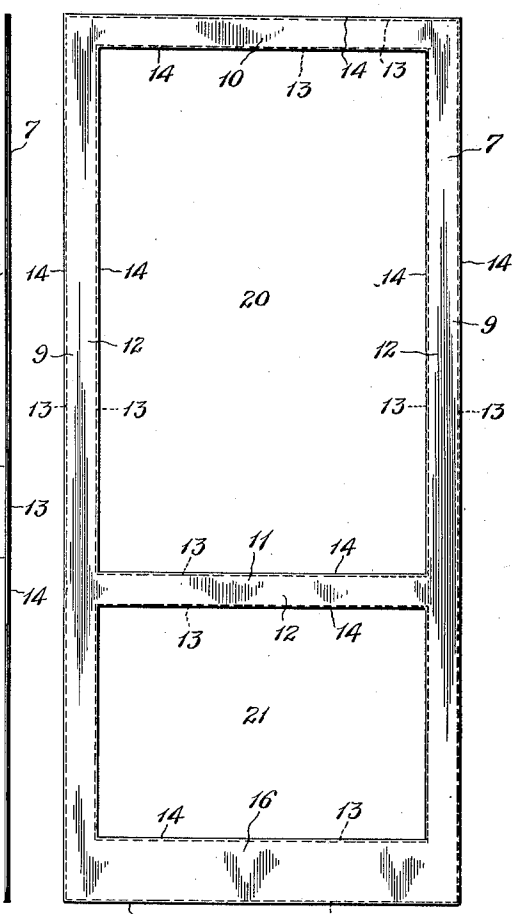


FIG. 20

FIG. 21

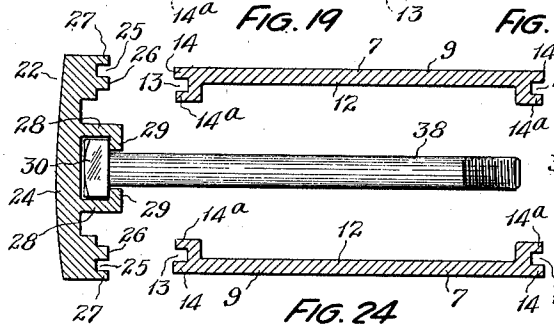


FIG. 24

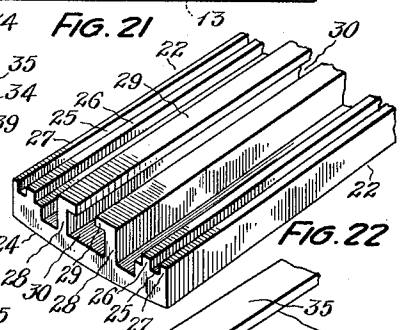


FIG. 22

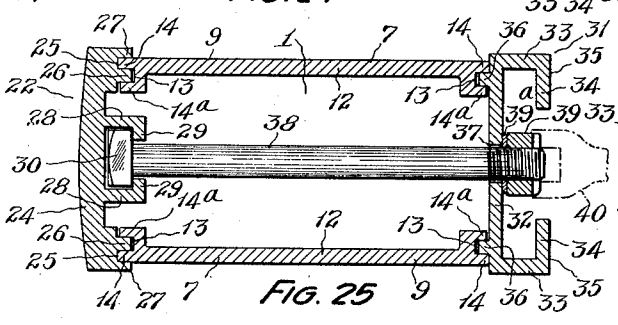


FIG. 25

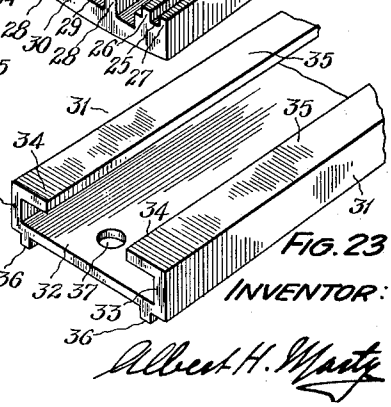


FIG. 23

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Patented May 29, 1934 1,961,006

UNITED STATES PATENT OFFICE

1,961,006

HOLLOW METALLIC STRUCTURE

Albert H. Marty, Cleveland, Ohio

Application May 8, 1929, Serial No. 361,293

30 Claims. (Cl. 189—46)

This invention relates to improvements in hollow metallic structures such as doors, sash, transoms, casings, partitions, composite hollow tubular members and the like; more specifically, in the embodiment illustrated and described, this invention relates to an improved hollow metallic door.

One object of this invention is to produce a door of this type which is artistic in appearance, light in weight and simple and durable in construction.

A further object of this invention is to produce a door which is assembled from a series of simple parts.

A further object of this invention is to produce such a composite door in which the means for connecting the component parts of the door structure is entirely concealed from the exterior.

A further object of this invention is to produce a hollow metallic door, the component parts of which are economical to manufacture and readily assembled.

A further object of this invention is to develop a door which can be fabricated in a shop having the usual simple metal working equipment.

A further object of this invention is to produce a new type of connecting joint and a new type of connection for the component parts of hollow metallic structures.

A further object of this invention is to produce a metallic door which can readily be disassembled without distroying, disfiguring or distorting any of the component parts.

A further object of this invention is to produce a hollow metallic door which can readily be altered in respect to its hanging or locking from one type to another, with a minimum of expense and labor, and which can be readily repaired.

A further object of this invention is to provide a metallic door in which all of the component elements of the stiles and rails and the glass holding members are held in rigid alinement and in which the alinement is not effected by the connecting means.

Further objects and advantages of this invention will appear from the following description and from reference to the accompanying drawings.

These annexed drawings and description set forth in detail certain means embodying this invention, such disclosed means constituting, however, but a few of the forms in which the principle of this invention may be applied.

In said annexed drawings Figure 1 is a side elevation of an improved door constructed in accordance with my invention, in its completed form and prior to the application of a lock, hinges, knobs, checks, catches or other auxiliary hardware.

Figure 2 is a bottom plan view of the completed door shown in Figure 1.

Figure 3 is an enlarged fragmentary sectional view taken from the plane indicated by line 3, 3 in Figure 1, showing the construction of one of the stiles of this improved door.

Figure 4 is a fragmentary sectional view taken from the plane indicated by line 4, 4 in Figure 1 to show a certain detail of construction.

Figure 5 is a fragmentary enlarged vertical sectional view taken from the plane indicated by line 5, 5 in Figure 1, showing the construction of the bottom rail of this improved door.

Figure 6 is an enlarged vertical section taken from the plane indicated by line 6, 6 in Figure 1, showing the construction of the middle rail of this improved door.

Figure 7 is a view similar to Figure 3, but showing a slightly modified form of stile and rail construction capable of being produced in accordance with this invention, including a modified form of connecting means.

Figure 8 is another view similar to Figure 3, but showing a modification of several important elements of this invention.

Figure 9 is a fragmentary view similar to a portion of Figure 3, showing a somewhat different type of stile edge bar adapted for use with this invention.

Figure 10 is a broken perspective view of one of the long pre-formed side plate bars used for making certain of the elements used in the construction of the stiles, top rail and middle rail of the particular door illustrated in Figure 1.

Figure 11 is a corresponding view of a similar pre-formed side plate bar used for making certain of the elements used in the construction of the bottom rail of this door.

Figure 12 is an enlarged end elevational view of the bar shown in Figure 10.

Figures 13 and 14 are side elevational views of stile elements cut to length from the bar shown in Figure 10 and suitably mitred at their ends for producing side plates for use in the construction of the door shown in Figure 1.

Figures 15 and 16 are side elevational views of a top rail element and middle rail element respectively, suitably cut from the bar shown in Figure 10 and mitred for producing side plates for use in the construction of the door shown in Figure 1.

Figure 17 is a side elevational view of a bottom rail element suitably cut from the bar shown in Figure 11 and mitred for producing side plates for use in the construction of this door.

Figure 18 is a perspective view showing the method of assembling one set of the elements illustrated in Figures 13 to 17 upon a fixture, prior to a welding operation.

Figure 19 is an elevational view of one of the finished door side plates after completion of the welding operation and after the removal of the side plate from the fixture illustrated in Figure 18, that surface of this plate shown being the one which eventually faces toward the interior of the door.

Figure 20 is an end elevational view of this door side plate.

Figure 21 is an obverse elevational view of the door side plate shown in Figure 19, this figure showing that surface of the door plate which eventually faces toward the outer side of the door.

Figure 22 is an enlarged fragmentary detached perspective view of a certain pre-formed edge bar used as the closure member for the outer edge of the door.

Figure 23 is a similar fragmentary detached perspective view of a corresponding edge bar used as a closure member for the inner or panel side of the door stiles or rails.

Figure 24 is an enlarged detached sectional view of a series of the essential elements used in the construction of the stile of this improved door, properly alined with each other ready for assembling.

Figure 25 shows the completion of the assembling of the essential elements of the stile shown in Figure 24, this view corresponding with Figure 3 in every respect except that certain elements necessary for mounting the glass have been added to the structure shown in Figure 25 to form the completed structure shown in Figure 3.

As stated, the disclosure illustrated and described shows this invention applied to the construction of a hollow metallic door. The drawings illustrate mainly a preferred form of this door, but a few modifications as to certain details, are also shown.

I shall first describe the preferred form of this invention which is illustrated in completed form in Figures 1 to 6 inclusive.

In these figures, and with particular reference to Figure 1, 1, 1 indicate the stiles, 2 indicates the top rail, 3 indicates the middle rail and 4 indicates the bottom rail of this improved door. The door shown is provided between its top and middle rails with a panel of glass 5 which is suitably mounted on the door structure, as will hereinafter be described. This door is further provided between its middle and bottom rails with an opaque plate 6 formed of metal or other suitable material and supported by means similar to those used for supporting the glass 5.

The main supporting strength members for this door are the side plates 7 shown assembled into the door in Figure 1 and shown in detached views in Figures 19, 20 and 21. Inasmuch as these side plates constitute a very important feature of this invention, their construction will be described before describing the elements associated therewith, and before the method of assembling these side plates into a door is described. These side plates 7 are preferably made from relatively flat preformed long bars suitably cut to length, mitred and then welded at their abutting ends, all as clearly shown in Figures 10 to 18 inclusive, which illustrate the steps required to form one of the side plates illustrated in Figures 19, 20 and 21.

Referring to Figures 10 to 18 inclusive, 8 represents a long pre-formed side plate bar from which the stile side plate elements 9, the top rail side plate elements 10 and the middle rail side plate elements 11 are cut. As illustrated in Figure 12 this pre-formed side plate bar 8 consists of substantially flat main body portion 12 formed at each edge with a groove 13 between lips 14 and 14*a*. It will be noted that one face of the lip 14 is in alinement with a face of the main body portion 12 and the other lip 14*a* is somewhat shorter than the lip 14, measured from the bottom of the groove 13. The bar 8 may be pre-formed by any well known process such as rolling, drawing or pressing, but is preferably formed by the process known as extruding. Referring to Figure 11, 15 represents a pre-formed side plate bar which is similar to the side plate bar 8 in every respect except that it is wider. This bar 15 is used to supply the bottom rail side plate element 16. This bar 15 is also preferably formed by an extruding process.

After the various elements required to form one complete side plate have been properly cut and mitred as shown in Figures 13 to 17 inclusive, they are assembled in a fixture which may consist of a plate 17 upon which are mounted suitable fixed stops 18 and adjustable blocks 19 so spaced and so mounted as to securely hold the various elements in the desired relative positions. After these elements have been so supported, they are welded or otherwise integrally connected, the method suggested in the drawings being welding by means of an acetylene torch. It is understood that the abutting edges may be beveled or otherwise prepared for the particular type of welding or other connecting means to be employed. The welding is preferably done on the inner or concealed faces of these side plates in order to reduce the amount of finish required on the outer face to the least possible, and it will be accordingly noted that these side plate elements are placed with the flat faces down upon the flat surfaces of the fixture plate 17. The flat face thus produced on the side plate will eventually form the outside face of the door.

After the completion of this welding operation this side plate is released and removed from the welding fixture, whereupon it is sanded or ground at the weld so as to remove any burs or other irregularities, and so as to remove any discoloration or oxidation. This side plate is then polished and wire brushed or surface finished in any other manner desired. This side plate then appears as shown in Figures 19, 20 and 21. It will be apparent that this side plate forms an integral unitary structure free from abutting joints. It will also be evident that this structure is provided with a continuous groove 13 and continuous lips 14 and 14*a* running around the entire outer periphery thereof. It will further be evident that a continuous groove 13 and continuous lips 14 and 14*a* run around the edges of the panel openings 20 and 21 of the door side plate thus formed.

For the door illustrated in these drawings two side plates 7 are required. These side plates are suitably spaced one from the other in parallel relation and are assembled into a rigid door structure with the aid of certain pre-formed edge bars which form closures for the opening between these side plates. Two types of these edge bars

are preferably provided, one type to serve as a closure member for the outer periphery of the door and the other type to serve as a closure for the edges of the openings 20 and 21 formed in the door.

The outer edge bar 22 is illustrated in a detached fragmentary perspective view in Figure 22, and is provided with a body portion 24, which may be slightly curved on its outer face, as illustrated. This outer edge bar is further formed with two continuous tongues 26, two continuous grooves 25 adjacent to and on the outer side of said tongues, and two continuous cover lips 27, forming the outer walls of said grooves. This outer bar is further formed with walls 28 intermediate of the tongues 26, forming a groove between them which is partially closed by lips 29 formed on the inner ends of the walls 28. The walls 28 and the lips 29 thus comprise a continuous projection extending inwardly and enclosing a continuous passage and having a continuous slot in its inner wall providing access to the passage thus forming a T groove 30 running continuously for the full length of the outer edge bar 22.

The inner or panel edge bar 31 is illustrated in a detached fragmentary perspective view in Figure 23. This bar is provided with a substantially flat body portion 32, two side wall portions 33 and two re-entrant lips 34 on the side portions 33. The body portion of this panel edge bar is further formed with two tongues 36 and perforations 37. The tongues 36 are preferably spaced the same distance apart as the tongues 26 on the outer edge bar. The faces 35 of the re-entrant lips 34 are preferably substantially in the same plane.

The method of assembling the outer edge bars 22 and the inner or panel edge bars 31 with the side plates 7 will now be described and can be best understood by referring to Figure 24. This figure illustrates, in cross-section, a pair of side plates 7, an outer edge bar 22, and an inner or panel edge bar 31, all of which parts have been described above. This figure further shows a bolt 38 provided with a head, inserted in the T slot 30 of the outer edge bar 22. This figure also shows a spring lock washer 39*a* and a nut 39 adapted to engage the threads on the bolt 38. The relation between the size of the head of this bolt 38 and the groove 30 is such that the head will have sliding engagement with the groove and, at the same time, will be retained in the groove by means of the lips 29. It will be understood that a number of these bolts 38 will be inserted in the groove 30 prior to the assembling of the parts, the number depending on the spacing desired in the completed door. A suitable spacing of these bolts will appear from an inspection of the completed door, as illustrated in Figure 1, where the bolts 38 are shown in dotted lines.

In the assembling of the door, the side plates are held in properly spaced relation and the outer edge bars are moved into a position so that the tongues 26 on the outer edge bars enter the grooves 13 of the side plates, on the outer periphery of the side plates, these tongues and these grooves being preferably a friction fit, one with the other, so that the outer edge bars and the side plates will require some force to cause them to interengage and so that they will remain in engagement one with the other, due to the friction of these tongues in the groove and thus insure the formation of a rigid structure. Thereupon the inner or panel edge bars 31 are moved into position so that the tongues 36 will register with the groove 13 surrounding the openings 20 and 21 in the side plates. At the same time it is necessary to cause the bolts 38 to register with the openings 37 which can easily be done by sliding the bolt heads in the groove 30. The tongues 36 of the inner edge bars are then forced into the grooves 13, which are likewise a friction fit, similar to the fit between the tongues 26 and the outer groove 13. The spring lock washers 39*a* are then slipped over the bolts and the nuts 39 is screwed on the threaded end of the bolts 38, whereby edge bars 22 and 31 are drawn tightly toward each other and toward the edges of the side plates. For the purpose of turning the nuts 39, slots are provided in the outer faces thereof and a special screw driver such as is fragmentarily shown in broken lines at 40 may be provided for this purpose.

The position of the parts, after the assembling operation just described, is shown in Figure 25. It will be apparent from an inspection of the joints between the side plates 7 and the outer edge bar 22 and the inner or panel edge bar 31 that the ends of the lips 14 serve as a thrust surface against which the outer and inner edge bars are drawn, one lip 14 contacting the bottom of the groove 25 and the other lip 14 contacting the body portion 32 of the inner edge bar 31. A further inspection of these joints will clearly show slightly open spaces between the ends of the tongues 26 and 36 and the bottoms of the corresponding grooves 13. Further inspection will also show that clearance is provided at the end of lips 14*a*. The cover lip 27 further covers the contacting joint between the end of the lip 14 and the bottom of the groove 25. It should be noted that the engagement of the lip 14 with groove 25 is preferably a friction fit similar to the fit of the tongue 26 in the groove 13. It will be apparent that this assembled structure, as illustrated in Figure 25, is rigidly held together by the frictional tongue and groove engagement of the side plates and the edge bars. It will also be evident that the contacts between the faces of the lips 14 and the outer and inner edge bars will be perfect due to the fact that clearance is provided between the ends of all other lips or tongues and grooves, and that these clearances will insure that there will be nothing to interfere with the formation of a tight contact between the ends of the lips 14 and the edge bars. This tightness is essential not only for the purposes of appearance, but also to prevent the infiltration of an excessive amount of moisture which would be likely to have a deteriorating effect upon the interior of the door structure. In order to more effectively cover up this joint, the cover lip 27 has been provided on the outer edge bar 22 which effectively conceals the contact between the outer edge bar and the side plates. This same type of cover lip might be formed on the inner edge bar 31 as will be readily apparent, the cover lip being omitted from this inner edge bar so as to show two alternative types of construction. It will also be apparent that the means for rigidly connecting these edge bars with the side plates is entirely concealed and inaccessible from all sides of the stile except from the open face of the inner edge bar 31, and that this clamping member is entirely enclosed within the outside dimensions of the stile. It will also be apparent that the inner edge bar in effect forms a channel which encloses the nut 39, washer 39*a* and the end of the bolt 38, and that the depth of this channel is greater than the greatest height of

any of the above parts which it encloses so that none of the parts project beyond the face 35 of the flanges 34.

Reference to Figure 3 will disclose the fact that the lips 14*a* are not essential to a tight tongue and groove interengagement between the side plates 12 and the outer edge bar 22 and they may therefore be omitted when the lip 27 is provided, without departing from the scope of this invention. The frictional engagement of the tongue 14 in the groove 25 results in the formation of a substantial composite structure. It should be noted that it is immaterial, in the broader aspects of this invention, whether the tongues are associated with the edge bars and the grooves with the side plates or visa versa. In its broadest aspects the side plates may comprise perfectly flat plates whose edges serve as tongues for engagement with suitable recesses or shoulders on the edge bars.

Referring now to Figure 3 which shows the structure whose assembling has just been described with reference to Figures 24 and 25, with the addition of certain other parts necessary for the mounting of the panel and for the production of a complete door. These additional parts consist essentially of a glass holding member 41 provided with a base 42 which is adapted to seat on the faces 35 of the inner edge bar 31. This base 42 is further provided with a pair of shoulders 43 which are accurately spaced apart a distance slightly greater than the space between the re-entrant lips 34, these shoulders together constituting a tongue which is accordingly a tight friction fit between the flanges 34, thus forming a tongue and groove connection between the glass holding member 41 and the panel edge bar 31. It will be understood that these shoulders 43 are formed continuously throughout the extent of the holding member. As shown in Figure 4, the base 42 is further provided with perforations 44 at suitable intervals and the inner or panel edge bar 31 is formed with threaded openings 45 alined with the openings 44. A series of screws 46 are passed through the perforations 44 and engage the threaded openings 45, whereby the shoulders 43 are drawn into the opening between the flanges 34 until the base 42 of the glass holding member 41 tightly engages the faces 35 of the panel edge bar 31, thus positively and accurately alining the glass holding member 41 with the panel edge bar 31. A further member required to support the panel is a glass clamping member 47 which, in the form shown, is provided with a lip contacting the glass and a second lip adapted for sliding engagement with the base 42 of the glass holding member 41. This glass clamping member 47 is provided with a reversed lip 48, this lip being reversed in the sense that it points in a direction opposite to its clamping movement. Also mounted for sliding movement on the base 42 is a bracket 49 provided at one end with a reversed lip or hook member 50 adapted to interlock with the reversed lip 48 and provided at its other end with a screw element 51 adapted to draw said bracket 49 and hence said clamping member 47 toward the glass 5. These glass holding and glass clamping members form the subject of my co-pending patent application Serial No. 316,999, and hence it is not considered necessary to describe this structure in further detail in this application.

The structure just described above with reference to Figures 24, 25 and 3, specifically show the construction of the left hand stile of the door as shown in Figure 1. It will be apparent that the construction of the right hand stile of the door will be exactly the same as Figure 3 except that it will be opposite hand. Likewise the cross sectional view through the top rail of this door, as shown in Figure 1, will be exactly the same as that shown in Figure 3, as all of the elements comprising this top rail are exactly the same as those of the stiles.

Referring now to Figure 5 which represents a cross sectional view through the bottom rail of the door, all of the parts are substantially the same as those shown in Figure 3, except for the greater width of the side plates 7 at this point and except for a slightly different form of bottom edge bar 52. The difference in the side plate follows from the fact that the relatively deeper bar 15 is used in the bottom rail instead of the bar 8. The bottom edge bar 52 is different from the outer edge bar 22, but only in respect to the bottom face of this bar, the essential difference being that this bottom edge bar 52 is provided with a channel 53. This channel is provided in this bottom edge bar to show the preferable form of bar used in those cases where the door is intended to be controlled by a bottom hinge, this hinge usually having a tongue which fits into this groove 53 as will be readily understood by those skilled in this art. If the door is provided with side hinges, this bottom edge bar 52 may be of exactly the same cross section as the outer edge bar 22. It will also be noted that the opaque panel 6 is held in place by the clamping members associated with the bottom rail, and that these panel holding elements are substantially the same as the corresponding elements described with reference to Figure 3.

Referring now to Figure 6 which represents a cross sectional view through the middle rail of the completed door, as shown in Figure 1, it will be apparent that both the upper and lower edges of this section show the use of the inner or panel edge bars 31 which are adapted to be tightly drawn together against the side plates 7 by means of the usual bolt 38. Both of these inner edge bars are exactly of the same construction as that described in Figure 3 and the glass and opaque panel holding and clamping members are likewise of the same general construction as those described in connection with Figure 3, and are rigidly alined with the inner edge bars in the same manner.

In order to facilitate the assembling of the door, the edge bars are preferably made of one continuous length and suitably mitred at their abutting ends as clearly shown in Figure 1. As the initial step in the assembling, an outer edge bar and a corresponding inner edge bar are then preferably assembled at one of the stiles or rails. This assembling of a pair of corresponding outer and inner edge bars is then continued until all of the edge bars are mounted in place. The bolts 38 then are rigidly drawn up to clamp the edge bars against the side plates. This forms a strong, substantial and rigid supporting frame for the door. After this structure has been completed, the glass or panel holding members 41 are put into position and are tightly drawn into place by means of the screws 46. Thereupon the glass or other panel material is temporarily mounted in place, the brackets 49 having been previously mounted on the members 41. The glass clamping member 47 is then put in place and suitably drawn against the glass, thus forming a door which is complete and ready for the attachment of hinges, locks, knobs, checks, catches and other

essential controlling hardware, which need not be described in detail as it forms no part of this invention.

In some cases it may be desirable to hold the bolts 38 in predetermined spaced positions in the T shaped groove 30 to facilitate assembling. This can easily be done by pinching the walls of the groove slightly on each side of the bolt head after the bolts have been properly spaced to aline with the openings 37 in the inner edge bar. In some cases, also, it is advantageous to insert the nuts 39 in the groove 30 and reverse the bolt so that its head will seat in the inner edge bar. In this case the bolt head is preferably slotted and the nut is preferably square and of such a size as to slidably fit in the groove. In this event these nuts should be clamped in the groove 30 in the manner described above for the bolt head so that they will not become accidentally displaced.

It will be noted that the outer edge bars, as illustrated in Figure 3, are made relatively heavy so that they will be adaptable for securing hinges, locks or other hardware as may be desired. For some types of doors it will be desirable to use edge bars which are beveled, as shown in broken lines at 23 in Figure 3, and such bars or bars having any other desired contour may, of course, be used without departing from the spirit of this invention.

It will be apparent that all of the frame members of these doors are thoroughly interlocked against lateral displacement and are positively alined one with the other and that this alinement is independent of the connecting means except insofar as the connecting means serve to hold the alining means in engagement.

The disassembling of this door is easily accomplished by performing the assembling steps in the reverse order. Accordingly, in order to take this door apart or obtain access to the interior, it is first necessary to turn the small and almost invisible screws 51 thereby releasing the glass clamping member 47 and permitting the removal of the glass or other panel. The heads of the screws 46 will then be accessible and these can be turned, permitting the removal of the glass holding member 41. The nuts 39 of the main frame connecting bolts 38 are then accessible and can be removed, whereupon the inner and outer edge bars may be removed from the side plates. If the separation cannot be effected manually, due to the frictional engagement of the parts, a few taps with a wood mallet will accomplish the desired separation without injury to the parts. It will be evident that this separation is effected without straining, difiguring or distorting any of the component parts of this door frame. It is also important to note that this door can easily be altered. If, for instance, the door is to be changed from a side hinged door to a bottom hinged door, or from a right hand hung door to a left hand hung door, it is only necessary to replace or interchange the edge bars. The above construction also facilitates the making of repairs as will be readily understood.

It will be apparent that the small clamping bar tightening screw 51 is the only connecting element which is visible or accessible from the outer surface of the door. These screws are, therefore, the key to the disassembling of the door. It will also be clear that these screws are no part of the main frame of the door, nor of its connecting means, and that the means for rigidly connecting the side plates and the outer and inner edge bars is completely concealed and inaccessible when the glass mounting elements are in place.

Another advantage of the construction described is that this type of door readily lends itself to manufacture in a large number of different types and sizes.

As door or the like made in accordance with this invention will be required to satisfy various types of designs and artistic requirements as well as different sizes, different cross-sections will be required for different locations and purposes and various modifications may be made to suit the requirements. Figures 7, 8 and 9 illustrate a few of the many modifications which may be made in this invention as applied to a door without departing from its scope.

Figure 7 illustrates a modified form of outer edge bar and of the connecting means. This edge bar 54 is formed with side walls 55, terminating with re-entrant flanges 56 upon which the tongues 56*a* are formed for engagement with the grooves 13 in the side plates 7. This construction is intended to provide slightly greater resiliency and to save weight where thickness of outer wall is not needed, without sacrificing the substantial appearance of the construction shown in Figure 4. This outer edge bar 54 is further formed with a continuous enlargement 57 provided with a V-shaped face 58 and tapped at intervals for threaded engagement with the screws 59 provided with the slotted heads 60. The V-shaped face 58 is provided for the purpose of facilitating the engaging of the screw 59 with the tapped opening as will be understood. This outer edge bar is further characterized by the omission of the cover lips 27 shown on the previously described outer edge bars.

Figure 8 illustrates a modified form of stile with an outer edge bar 61 somewhat lighter than the outer edge bar 22, not provided with the cover lip 27 and of a width corresponding with the distance between the outer faces of the side bars. Figure 8 further shows a modified pair of side plates 62, which are formed with a sunk body portion 63. This and many other modifications may be made in the side plates to satisfy the artistic requirements of particular installations without departing from the scope of this invention.

Figure 9 illustrates a still further modified form of outer edge bar 64 which is especially adapted for use with doors mounted in series and without the usual intervening jambs or casings.

While the above description has implied the hinged mounting of the door described, it will be apparent that the same construction may be used for revolving doors.

It will also be evident that this door may be formed with a montant between the top rail and middle rail by welding additional side bar elements to the top rail elements and middle rail elements in the same manner as the middle rail elements are now welded to the stile elements.

In its broader aspects this invention is not limited to two side plates as three or more side plates may be assembled in parallel relation and a corresponding number of tongues may be provided in the outer and inner edge plates, and the same held in engagement by one or more rows of connecting bolts. While this invention has been shown and embodied in a door and has been described in detail in this application, it is apparent that the distinctive features of this invention are equally applicable to other similar struc-

tures such as sash, transoms, casings, partitions and other structures of like type. This present disclosure should, therefore, be considered as typical and I do not desire to be limited to the application of this invention to a door nor to the exact construction shown.

What I claim is:

1. A cover bar for use as a closure member in a hollow metallic structure, said bar formed substantially centrally with a T groove and with a tongue on each side of said T groove, said tongues being spaced laterally from said T groove, and projecting from one face of said bar.

2. A cover bar for use as a closure member in a hollow metallic structure, said bar being formed substantially centrally with a T groove and formed with an additional groove on each side of said T groove and spaced therefrom.

3. In a hollow composite stile for a door or the like, an edge bar forming one of the wall members of said stile, said edge bar having a substantially plane exterior face and formed interiorly of the stile, with a T groove, and means co-operating with said groove adapted to hold said edge bar in said stile.

4. In a hollow stile for a door or the like, a pair of side plates each formed with a groove at each edge thereof, cover bars each formed with a pair of spaced tongues adapted to engage said grooves and means adapted to draw said tongues into said grooves.

5. In a hollow stile for a door or the like, the combination of a plurality of side plates, a pair of edge bars, one of said edge bars being provided interiorly of the stile with a T-shaped groove, and means associated with said groove adapted to hold said edge bars in contact with said side plates.

6. In a hollow stile for a door or the like, the combination of a plurality of side plates, an outer edge bar, a panel edge bar, said edge bars and said side plates being provided with tongue and groove interengagement and means for holding said edge bars and said side plates in interengagement.

7. In a hollow stile for a door or the like the combination of a pair of side plates and a pair of edge bars, said side plates and said edge bars being provided with tongue and/or groove elements adapted to form frictional interengagement with each other and means adapted to draw said tongue and groove elements into engagement with each other.

8. In a hollow composite stile for a door or the like, an edge bar forming one of the edge wall members of said stile, in combination with a pair of side plates forming the side walls of said stile and adapted to engage said edge bar, means adapted to draw said edge bar into contact with the edges of said side plates and means adapted to cover the contact lines between said edge bar and said plate.

9. In a hollow stile for a door or the like, the combination of a plurality of side plates, an outer edge bar, a panel edge bar, said edge bars being adapted to interengage the edges of said side plates, means for drawing said edge bars toward each other and toward said side plates, said means being entirely enclosed within the side plates and within the outer extremities of said edge bars.

10. In a hollow stile for a door or the like, the combination of a plurality of side plates, an outer edge bar, a panel edge bar, a glass holding member, means adapted to rigidly hold said edge bars and said side plates in interengaged position, said means being entirely concealed by said side plates, outer edge bar, panel edge bar and glass holding member.

11. In a hollow stile for a door or the like, the combination of a plurality of side plates, a pair of edge bars, a screw element slidably mounted in one of said edge bars and adapted to draw the pair of edge bars toward each other and against the edges of the side plates, said screw element being located entirely within the outer surfaces of the stile.

12. In a hollow stile for a door or the like, having sides and outer and inner faces, the combination of a plurality of side plates, a pair of edge bars, means associated with said edge bars and adapted to draw these bars toward said side plates, said means being concealed from the sides and outer face of the stile.

13. In a hollow stile for a door or the like, the combination of a plurality of side plates, an outer edge bar, a panel edge bar, a mounting for glass or the like removably secured to said panel edge bar and means comprising an adjustable element adapted to draw said edge bars toward each other and toward the side plates, said adjustable element being entirely concealed while said glass mounting is in place.

14. In a hollow stile for a door or the like, the combination of a pair of side plates adapted to form the side walls of the stile, outer edge bars adapted to form the outer walls of the stile, panel edge bars adapted to form the inner walls of the stile and means adapted to clamp said side plates and said edge bars rigidly together, said clamping means being operable only from the inner face of the panel edge bar.

15. In a hollow stile for a door or the like, the combination of a plurality of side plates, a pair of edge bars, one edge bar being formed with a T shaped groove and the other being formed with a cavity, and an element adapted to clamp said edge bars against said side plates and being provided with two shoulders, one of said shoulders being positioned within the T shaped groove and the other being positioned within said cavity.

16. In a hollow stile for a door or the like, in combination a pair of side plates, an outer edge bar adapted to engage the outer edge of said side plates and an inner edge bar adapted to engage the inner edges of said side plates, one of said edge bars being provided with a shoulder and the other of said edge bars being provided with a perforation, a screw element engaging said shoulder and passing through said perforation and adapted to draw said edge bars against the edges of the side plates.

17. In a hollow stile for a door or the like, the combination of a plurality of side plates, an outer edge bar provided with a T groove, an inner edge bar provided with an opening, and a clamping element, one end of said clamping element being slidably mounted in said T groove and the other end being adapted to pass through said opening, and means associated with said clamping element for drawing said edge bars toward each other and toward said side plates.

18. In a hollow stile for a door or the like, the combination of a plurality of side plates, a pair of edge bars, one of said edge bars being provided with a T shaped groove interiorly of the stile, and the outer edge bar provided with a perforation, means associated with said groove and with said perforation, adapted to draw said edge bars toward each other and against said side plates.

19. In a hollow stile for a door or the like, the combination of a plurality of side plates, an outer edge bar, a panel edge bar, a glass holding member, means adapted to hold said side plates, edge bars and glass holding member in contact, and independent means for holding them in parallel relation with each other.

20. In a door construction or the like, in combination a hollow stile comprising side and edge walls, an edge bar forming one of the walls of said stile, means comprising a plurality of elements, for holding said edge bar in said stile, and a glass holding member, said edge bar comprising two faces, the first face engaging said side walls and the second face adapted to support said glass holding member and provided with a cavity adapted to accommodate one of the elements of said connecting means.

21. A relatively thin metallic side plate for use as one of a pair of opposed side walls of a hollow door or the like, having portions adapted to form stiles and top and bottom rails and fashioned with a continuous groove around the outer periphery thereof.

22. A side plate for use as one of the side walls of a door or the like, comprising stile and rail sections and an opening formed by said stile and said rail sections, said plate formed with a continuous groove around the outer periphery of said side plate and with a continuous groove around the periphery of said opening.

23. In a hollow metallic structure, a plurality of side plates of substantially the same size and adapted to form opposite side walls of the structure, edge bars adapted for interengagement with the edges of said side plates, said interengagement comprising positive means for holding said side plates in spaced relation, and means for maintaining the interengagement of said side plates with said edge bars.

24. In a hollow metallic structure, a plurality of side plates substantially of the same dimensions and adapted to form the side walls of the structure, having outer edges defining the outer periphery of the side plates and having inner edges defining an opening in the side plates, edge bars adapted to hold the outer edges of said plates in spaced relation, and edge bars adapted to hold the inner edges of said plates in spaced relation, and means adapted to hold said side plates and said edge bars rigidly in engagement with each other.

25. In a hollow metallic structure a plurality of side plates provided with openings, edges defining the outer periphery of the side plates and edges defining the openings in the side plates, edge bars adapted for tongue and groove engagement with the outer periphery of said side plates and edge bars adapted for tongue and groove engagement with the edges defining the openings in said plates and means adapted to hold said side plates and said edge bars in engagement.

26. In a hollow stile for a door or the like, the combination of a panel edge bar, connecting means adapted to hold said edge bar in rigid engagement with said stile, a glass holding member adapted to conceal said connecting means, fastening means adapted to removably attach said glass holding member to said panel edge bar, a panel of glass and a clamping member adapted to clamp said glass, said clamping member and said glass being adapted to cover said fastening means.

27. In a door construction, the combination of a hollow stile formed with side walls, a cover bar formed with a T groove interiorly of said stile, the edge of said side walls and said cover bar being provided with tongue and groove interengagement, and means, cooperating with said T groove, adapted to hold said bar in rigid engagement with said stile.

28. In a hollow door or the like, the combination of a stile having side walls and face walls, one of said face walls comprising a removable cover bar, and a screw element slidably mounted in said cover bar, and means including said screw element adapted to draw said cover bar toward said side walls.

29. A hollow stile for a door of the like, having side walls and outer and inner face walls, in which one of said face walls has tongue and groove engagement with said side walls and is adapted to move perpendicularly outwardly from said stile, and means, comprising a screw element, for drawing said movable face wall inwardly toward said stile.

30. An edge bar for use as a closure for the edge of a hollow metallic door or the like, said bar having an outer and an inner face, and being fashioned with a continuous projection extending inwardly from the inner face, said projection being formed with a continuous passage interiorly of said projection and a continuous slot intersecting one of the walls of said projection providing access to said passage.

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