May 20, 1941. H. G. AINSWORTH 2,242,499

DOOR CONSTRUCTION

Filed June 11, 1937 2 Sheets-Sheet 1

Fig. 1.

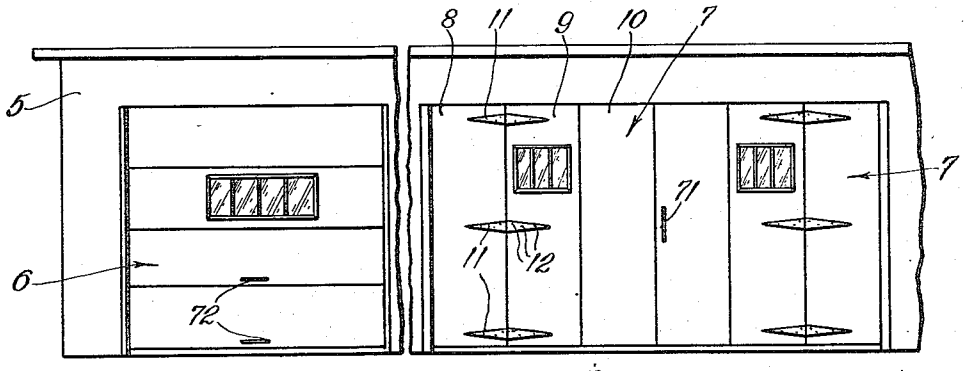


Fig. 2.

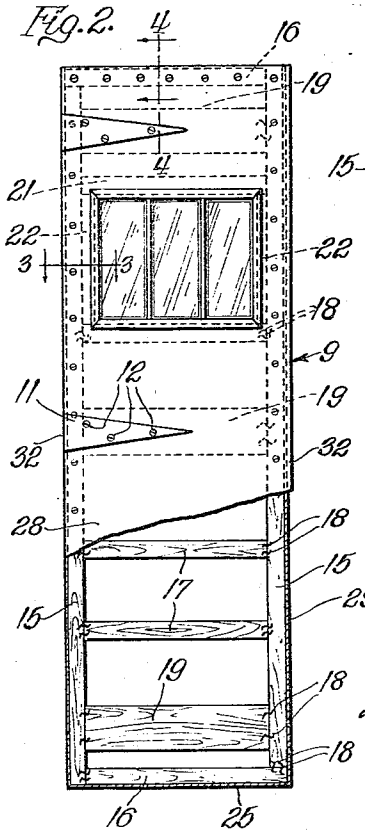


Fig. 3.

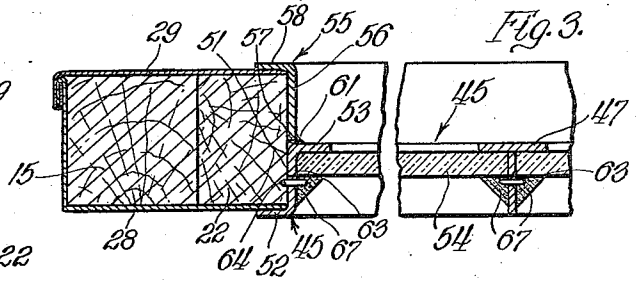


Fig. 4.

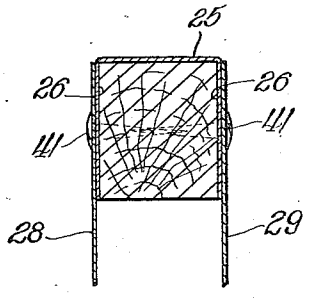
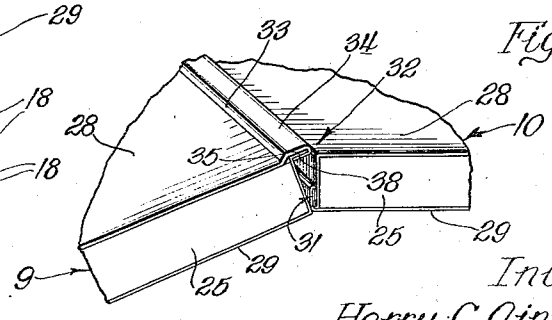


Fig. 5.



Inventor

Harry G. Ainsworth

By Brown, Jackson, Boettcher & Dienner.

Attys

May 20, 1941. H. G. AINSWORTH 2,242,499

DOOR CONSTRUCTION

Filed June 11, 1937 2 Sheets-Sheet 2

Fig. 6.

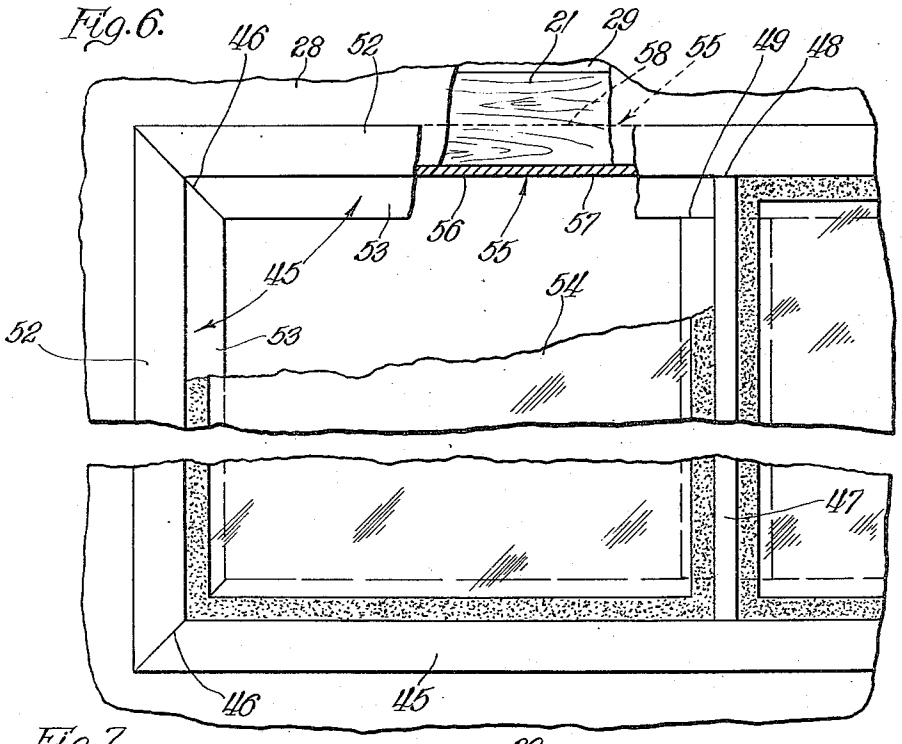


Fig. 7.

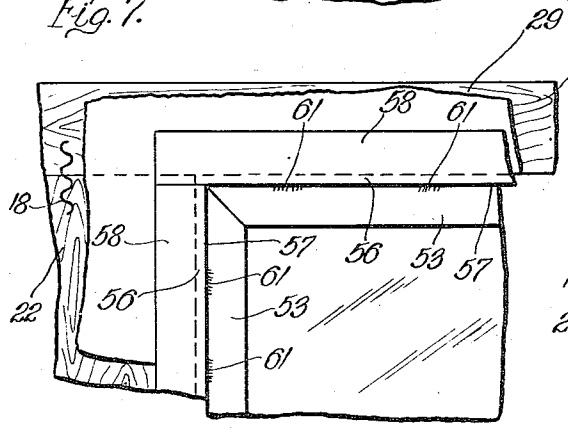
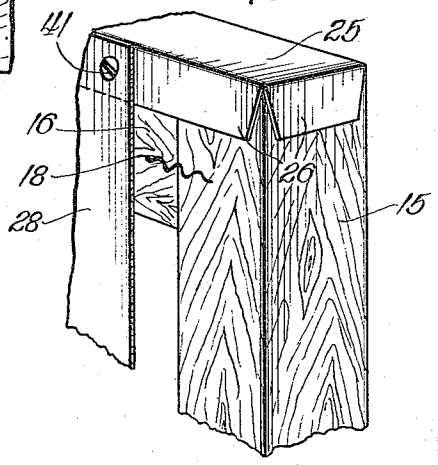


Fig. 9.



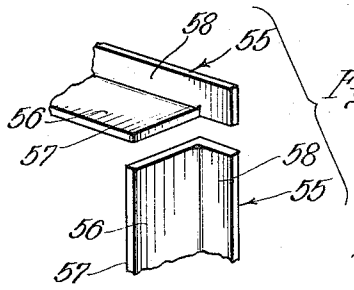


Fig. 8.

Inventor
Harry G. Ainsworth
By Brown, Jackson, Boettcher & Dienner.
Attys

Patented May 20, 1941 2,242,499

UNITED STATES PATENT OFFICE

2,242,499

DOOR CONSTRUCTION

Harry G. Ainsworth, Aurora, Ill., assignor to Richards - Wilcox Manufacturing Company, Aurora, Ill., a corporation of Illinois

Application June 11, 1937, Serial No. 147,667

3 Claims. (Cl. 20—35)

The present invention relates generally to door construction, and more particularly has to do with doors of the type commonly known as metal clad doors, and while in the illustrated construction the invention has been shown as applied to multiple doors that are hinged together so as to open and close with a folding or sliding motion, such as the vertically extending doors or the so-called overhead doors that are now commonly used to close the doorways of garages and other buildings, it is to be understood that the invention is not necessarily to be limited to such multiple door construction as it may readily be applied to the construction of single doors.

In the past, so far as I am aware, it has been the practice in the manufacture of metal clad doors to form the two main face plates of the metal casing of a plurality of metal sheets that are suitably connected together by soldering, lock joint seams and the like, and also to provide in addition edge and end sheets that are suitably connected to such face plates in the same or similar manner, and as the various seams between the several sheets making up the casing lessen materially the rigidity thereof as a whole, it has been preferable to use a substantially solid wooden core or frame structure to which the metal casing is applied in order to obtain the rigidity required in doors of this type. To this end it has been customary to form a solid wooden core structure over which the metal casing is applied. While doors of this type have been successfully used, they are more expensive to manufacture than is desirable in the case of doors used for certain purposes, such as residential garages, etc. Also, while all-metal doors are constructed for use in certain situations, in the case of such doors it is necessary in order to install them that special hardware be provided which makes it necessary to use special tools for installing such hardware, which of course increases the cost of such doors and also the cost of installation thereof. Also, both of these types of doors are relatively heavy and are therefore not particularly adaptable for use in residential garages where it is desirable that the doors be relatively light in weight so that they may be easily and quickly opened and closed without undue effort on the part of the operator.

With the above in view, it is the principal object of the present invention to provide a metal clad door of this type in which the sheet metal casing provides the necessary rigidity whereby the need of providing a solid wooden core is obviated and it is possible to use a skeleton framework of wood, which may be either of rigid or non-rigid construction, around which the sheet metal casing is applied. To this end the casing is formed of two main sheet metal face plates, that are each adapted to form one entire face and one side edge of the door, and two sheet metal end caps suitably applied to such skeleton framework.

Another object of the present invention is to provide new and improved sash means for mounting a glass panel or panels in an opening in a metal clad door.

A further object of the invention is to provide a metal clad door in which the joint between the two main sheet metal plates is so formed as to provide an astragal or flange extending outwardly from the edge of the door adjacent one face thereof that is adapted to lap over the face of the next adjacent door of a multiple door unit so as to cover the joint at the meeting edges of such two adjacent doors.

Other objects and advantageous features of the present invention will be apparent from the following description of the preferred embodiment thereof taken in connection with the accompanying drawings, in which,

Figure 1 is a front view of a portion of a garage illustrating the application of the door of the present invention to vertically extending folding sliding doors and also to overhead folding sliding doors;

Figure 2 is a front face view of a door embodying the principles of the present invention, with the plate of the sheet metal casing forming one face of the door broken away to show the skeleton framework of wood to which the sheet metal casing is applied;

Figure 3 is a sectional view, on an enlarged scale, taken approximately on the plane of the line 3—3 of Figure 2 and showing the construction of the window sash by which a glass panel or panels may be mounted in the door;

Figure 4 is a sectional view, on an enlarged scale, taken substantially on the plane of the line 4—4 of Figure 2 and showing the means for securing the end caps and the two main face plates of the sheet metal casing to the wooden framework;

Figure 5 is an enlarged perspective view of a portion of two doors in partly opened position, illustrating the astragal or flange formed as an integral part of one door that overlaps the adjacent portion of the second door to cover the joint between the doors when the doors are closed;

Figure 6 is a fragmentary view, on an enlarged scale, of a portion of the outer front face of the door and illustrating the window sash construction;

Figure 7 is a fragmentary view, on an enlarged scale, of a portion of the rear or inner face of the door, showing the manner of securing the two members of the window sash structure together after they are applied in place in the opening in the door;

Figure 8 is a fragmentary view, on an enlarged scale, showing the manner of connecting together the ends of the angle bars that form the inner or rear section of the window sash; and

Figure 9 is a fragmentary perspective view, on an enlarged scale, showing the bent over lip portions of the metal end caps that fit over the wooden framework and the manner in which the lips are secured to the framework inside of the main sheet metal face plates.

Referring to the drawings, 5 indicates the front of a garage provided with two door openings, one of which is closed by an overhead type of multiple folding sliding door, indicated as an entirety by the numeral 6, while the other opening is closed by two multiple door units of the vertically extending folding sliding type, each of which is adapted to close half of the opening and is indicated as an entirety by the reference numeral 7. The principles of the present invention may, however, be applied to any type of metal clad door, the units shown at 6 and 7 being illustrative only. Each door unit 7 consists of three door sections 8, 9 and 10, the door 8 being hinged to the door frame on the inner side of the door and connected to the door 9 by a plurality of hinges 11 positioned on the outer faces of such doors and secured thereto by screws 12, while the doors 9 and 10 are connected together by similar hinges (not shown) positioned on the inner faces of the doors as is usual in constructions of this type. In the overhead type of folding door all of the hinges are positioned on the inner face of the doors, and, therefore, they do not show in the illustrated construction.

The several door sections making up the multiple door are all of similar construction, and, therefore, a description herein of the construction of one of such door sections will suffice. As shown in Figure 2, the door is indicated as an entirety by the reference numeral 9 and includes a skeleton framework of wood comprising side members 15, end members 16, and intermediate cross brace members 17 extending between the two side frame members 15 intermediate the end members 16, all of which are suitably secured together by means of corrugated metal fasteners 18. This wooden framework need not be made of heavy material and it is not absolutely necessary that the several parts 15, 16 and 17 thereof be rigidly connected together, as when the metal plates to be hereinafter described are applied around and secured to such framework a rigid construction is provided. Therefore, according to the principles of the present invention, only a relatively light framework of wood, either rigid or non-rigid, as desired, is necessary. As shown, additional wooden cross members 19 of somewhat greater width than the brace members 17 extend between the two side frame members 15 and are secured thereto by metal fasteners 18, such cross members being provided at all points where it is necessary to secure hinges or other hardware to the door, as described below. Also, in all cases where it is desired to apply a window frame in an opening in the door suitable wooden cross members 21 and vertically extending connecting members 22 positioned and secured in place therebetween are provided around said opening, said members being fastened in place by corrugated metal fasteners 18, as shown in Figure 2.

In the preferred form of the invention illustrated a sheet metal end cap 25 provided with four integral lip members 26 (two of which are shown in Figures 4 and 9) that extend at right angles to the main body portion thereof is applied over each end portion of the wooden framework. The end caps are so formed as to fit tightly over the end of the wooden framework so that they will hold in place while the main sheet metal face plates are being applied over the wooden framework as will now be described.

The two main sheet metal face plates 28 and 29 which are made the same length as the door are then applied to the wooden framework. Each of said plates 28 and 29 is adapted to cover one face and one side edge of the door and they are of such a width that the two sets of meeting edges of the two plates can be secured together by lock joint seams as shown at 31 and 32 in Figure 5. It is to be noted, however, that the lock joint seam 31 of the door is so formed that it lies flush against the side edge of the door adjacent the face thereof that is covered by the face plate 29, while the lock joint seam 32 is made in the form of an astragal or flange adapted to overlap the adjacent door so as to close the joint at the meeting edges of the doors when they are in closed position, as will be clearly apparent from the showing of Figure 5. This overlapping astragal is formed by slightly offsetting outwardly the sheet metal plate 28 as shown at 33 and extending the plate laterally beyond the side edge of the door as shown at 34. The edge of the plate 29 is bent around the edge of the door and then outwardly at right angles to the side edge of the door, as shown at 35, and then the outer edge portion of the astragal flange 34 is bent inwardly toward the opposite face of the door to form an inner flange 38. Then the portions 34 and 38 are pressed tightly together to lock the portion 35 of the plate 29 between said portions 34 and 38 of the plate 28. The lock joint seam 31 is made in a similar way except that it is pressed flat against the edge of the door.

After the plates 28 and 29 have been applied to the framework and over the lip portions 26 of the end caps 25, the plates 28 and 29 and the end caps are securely fastened to the end members 16 of the wooden framework by a plurality of screws 41 that extend through holes punched in the plates 28 and 29 and in the lip portions 26 of the end caps 25 as best shown in Figures 4 and 9. This effectively secures both the side plates and end caps to the frame by the same means and makes it unnecessary to use separate fastening means. Thus, according to my invention, a very strong and rigid construction of door is provided without the necessity of providing a rigid wooden framework or core for the door, as the two large sheet metal plates or members that cover the two faces and two edges of the door provide a rigid and substantial structure that is stronger than metal clad doors having face plates made up of a plurality of sheets secured together.

While I have shown in the accompanying drawings and described above the preferred construction in which the end caps 25 are applied

to the ends of the framework before the face plates 28 and 29 are applied, so that the lip portions 26 of the caps 25 lie between the framework and the face plates, it is to be understood that it falls within the scope of the present invention to apply the plates 28 and 29 and end caps 25 to the door so that such end caps will overlap the face plates. This latter construction is particularly advantageous in connection with the upper end of a door that is to be mounted on the outside face of a wall, as the overlapping end cap will prevent rain and moisture from entering between the face plates and the wooden framework.

When it is desired to provide the door with a glass panel or panels, the members 21 and 22 above described are provided in the wooden framework before the sheet metal covering members 28 and 29 have been applied thereover, and while it is preferable to provide the openings in the sheet metal plates 28 and 29 for the reception of the frame that holds the glass panel or panels before such plates are applied to the wooden framework, this is not essential, as the sheet metal may be cut out later if desired, as will be readily appreciated.

The improved window sash construction for holding the glass panel or panels in doors of this type includes an outer sash frame or member composed of four angle iron members or bars, each indicated as an entirety by the numeral 45, that are substantially Z-shaped in cross section and are joined together at their ends by welded miter joints, as at 46 in Figure 6. In the construction illustrated this sash frame is shown as provided with vertically extending partition pieces in the form of T-shaped angle members 47 that are welded, as at 48 and 49, at their upper and lower ends to the upper and lower Z-shaped bars 45 of the frame, but it is to be understood that such partition pieces may be positioned horizontally, or where only one glass panel is desired they may be omitted entirely. This outer sash frame is of such size as to fit snugly within the opening provided in the door with the intermediate portions 51 of the Z-shaped angle bars 45 abutting against the wooden framework formed by the horizontal and vertical members 21 and 22 before described. The outer flanges 52 of the Z-shaped angle bars 45 extend outwardly from such opening and lie flush against the outer surface of the outer covering plate 28, and the inner flanges 53 of such angle bars extend inwardly to provide an abutment against which a pane of glass 54 is adapted to rest when placed in the frame as hereinafter described. This outer window sash section is held in place in the opening in the door by an inner sash section comprising four angle bars 55, the ends of which are welded together in the manner illustrated in Figure 8. The outer surface of one flange 56 of each angle iron frame member 55 comprising the inner sash frame is adapted to abut against the wooden framework formed by the members 21 and 22, and the free edge 57 of each of such flanges is adapted to abut against the adjacent flange 53 of the Z-shaped angle bars as shown in Figure 3, while the flange 58 of each of the angle bars 55 extends outwardly from the opening and lies against the outer surface of the inner covering plate 29 as shown in said figure. The inner and outer window frame members are placed in position in the opening in the plates 28 and 29 and are secured together by welding the flanges 56 of the frame bars 55 of the inner sash member to the flanges 53 of the Z-shaped frame bars 45 of the outer frame section at intermittent points along their meeting surfaces, as shown at 61 in Figures 3 and 7. It will thus be seen that the flanges 58 of the inner frame section act to restrain outward movement of the outer frame section, while the flanges 52 of the outer frame section act to restrain inward movement of such outer frame section, whereby the sash is held securely in position in said opening. By this construction the window sash is securely fixed in position without the use of bolts, rivets, screws or other securing means which may become loosened in use.

The intermediate sections 51 of the Z-shaped angle bar frame members 45 are provided at spaced points therealong with suitable holes 63 extending therethrough for receiving glaziers' points or clips 64 by which the panes of glass 54 are held in position after which the putty, indicated by 67, is applied. Also, where T-bars are used for partition members such bars are provided with similar holes 63 to receive clips 64 as will be readily understood.

The hinges 11 and other hardware such as the latch 71 of the right hand vertical door unit 7 and the lifting handles 72 of the overhead door unit 6 of Figure 1 may readily be applied to door units made up of doors constructed in accordance with the present invention by any carpenter without the use of special tools, such as would be necessary if the entire door was made of metal. According to the present invention, the wooden framework is provided with frame members 19 underlying the points where the hinges 11 are to be secured, and similar wood blocks or members are provided at every other point where the door hardware is to be attached, as for example, under the latch 71 and the handles 72. In attaching the hardware it is only necessary for a carpenter to puch holes through the sheet metal casing with an ordinary awl or punch, such as all carpenters use, and then drive the screws 12 into the wood underlying the metal, as will be readily understood.

While I have shown and described above the preferred construction embodying the principles of my invention, it is to be understood that my invention is not to be limited to the specific details described above, but that, in fact, widely different means may be employed in the practice of the broader aspects of my invention.

I claim:

1. In a metal clad door of the class described, the combination of two spaced apart sheet metal plates forming front and rear face portions of the door and having a window opening therein, a skeleton framework of wood supporting said plates and having frame members outlining said window opening, and a window sash disposed in said opening, said sash comprising a front rectangular frame and a rear rectangular frame, one of said frames being composed of Z-shaped bars and the other frame being composed of L-shaped bars, the outer flanges of said Z-shaped bars and the outer flanges of said L-shaped bars extending outwardly over said sheet metal plates on opposite sides of the door, the web flanges of said Z-shaped bars and of said L-shaped bars being welded together intermediate the outer surfaces of the door to join said front and back frames into an integral structure, a mullion strip composed of a T-shaped bar dividing said sash, the lateral flanges of said T-shaped bar being

welded at the ends of said bar to the inner flanges of said Z-shaped bars, glass panes seated against the inner flanges of said Z-shaped bars and the lateral flanges of said T-shaped bars, sockets in the web portions of said Z-shaped bars and of said T-shaped bars, and removable retaining pins engaging in said sockets for retaining said glass panes in place.

2. In a metal clad closure of the class described, the combination of two spaced apart sheet metal plates forming front and rear face portions of the closure and having a window opening therein, a skeleton framework of wood supporting said plates and having frame members outlining said window opening, and a window sash disposed in said opening, said sash comprising a front rectangular frame and a rear rectangular frame, one of said frames being composed of Z-shaped bars and the other frame being composed of L-shaped bars, the outer flanges of said Z-shaped bars and the outer flanges of said L-shaped bars extending outwardly over said sheet metal plates on opposite sides of the door, the web flanges of said Z-shaped bars and of said L-shaped bars being welded together intermediate the outer surfaces of the closure to join said front and back frames into an integral structure, a mullion strip composed of a T-shaped bar dividing said sash, the lateral flanges of said T-shaped bar being welded at the ends of said bar to the inner flanges of said Z-shaped bars, and glass panes seated against the inner flanges of said Z-shaped bars and the lateral flanges of said T-shaped bars.

3. In a metal clad closure of the class described, the combination of two spaced apart sheet metal plates forming front and rear face portions of the closure and having a window opening therein, a skeleton framework of wood supporting said plates and having frame members outlining said window opening, and a window sash disposed in said opening, said sash comprising a front rectangular frame and a rear rectangular frame, one of said frames being composed of Z-shaped bars and the other frame being composed of L-shaped bars, the outer flanges of said Z-shaped bars and the outer flanges of said L-shaped bars extending outwardly over said sheet metal plates on opposite sides of the door, the web flanges of said Z-shaped bars and of said L-shaped bars being welded together intermediate the outer surfaces of the closure to join said front and back frames into an integral structure, and a glass pane seated against the inner flanges of said Z-shaped bars.

HARRY G. AINSWORTH.