

H. P. A. A. EICHMANN.
HOLLOW FIREPROOF DOOR.
APPLICATION FILED APR. 23, 1909.

972,102.

Patented Oct. 4, 1910.

4 SHEETS—SHEET 1.

Fig. 1.

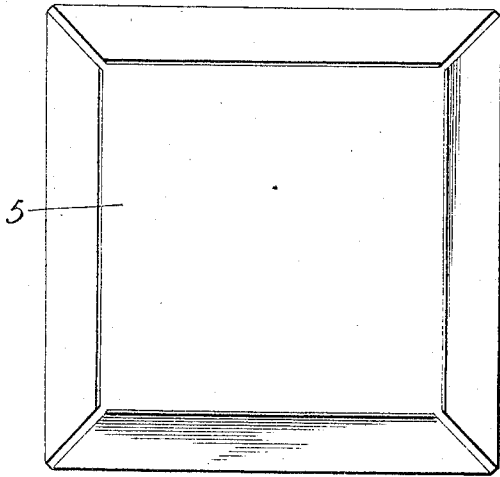


Fig. 2.

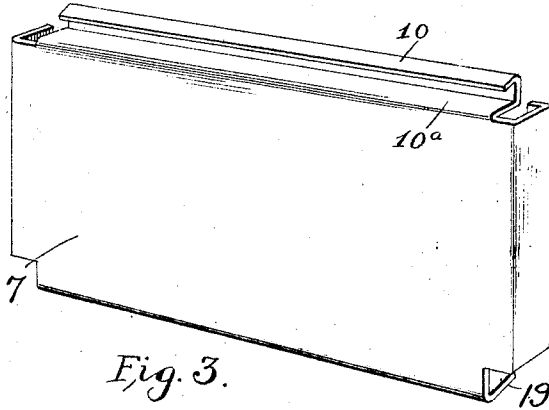
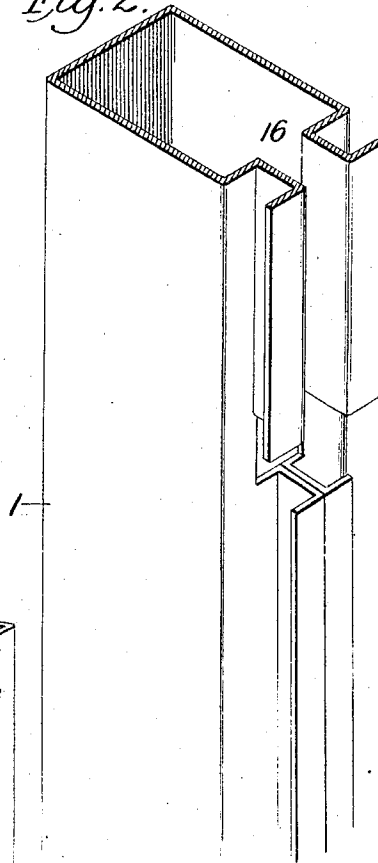


Fig. 3.

Fig. 5.

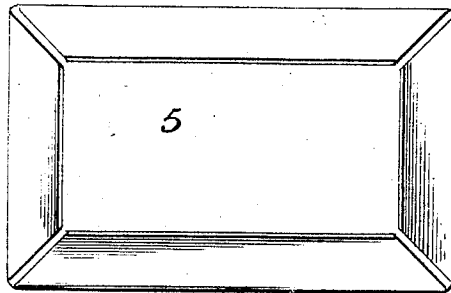
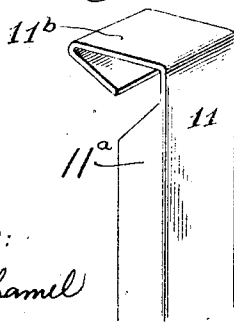


Fig. 4.



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Chas. W. Foster

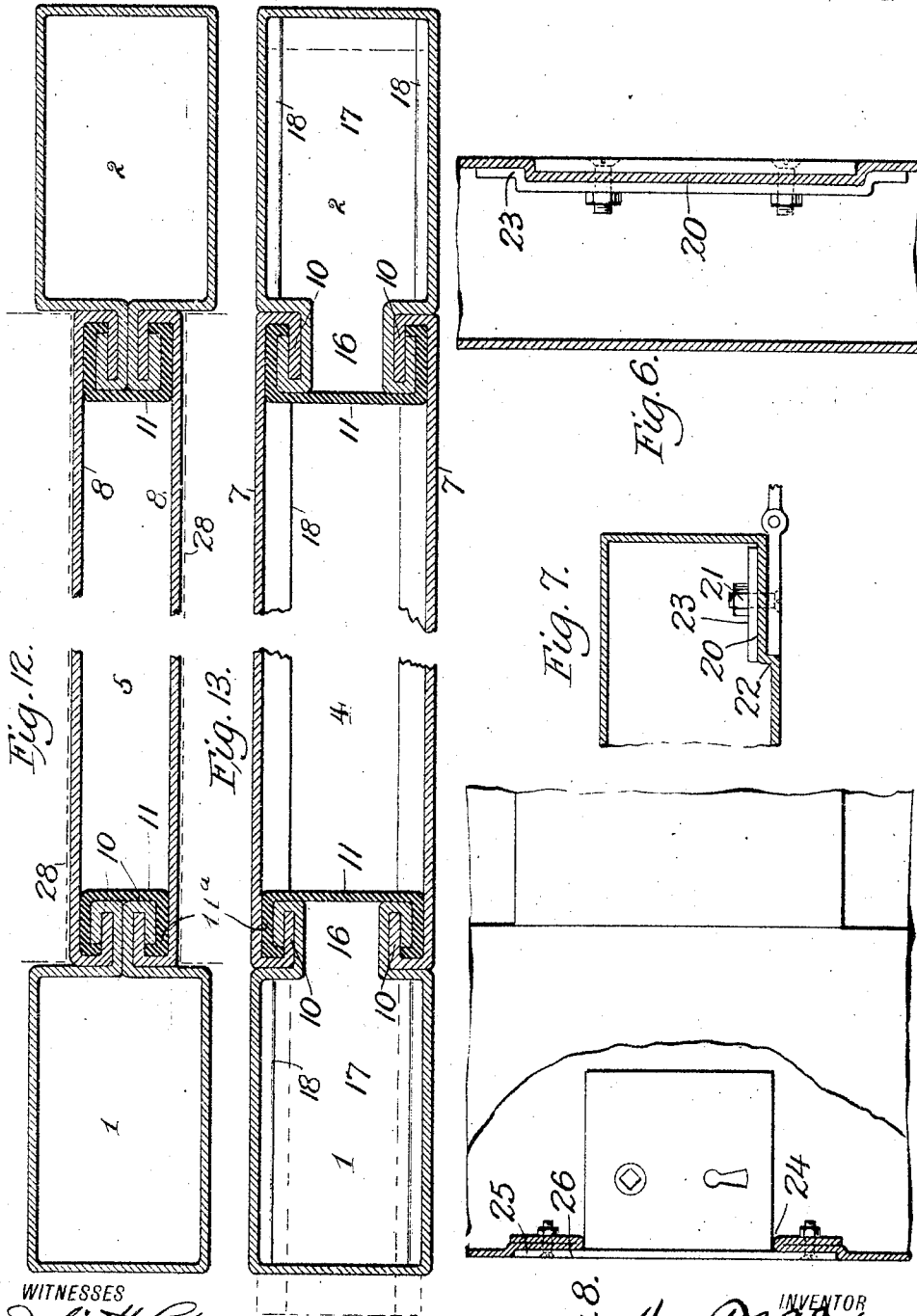
ATTORNEY

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4 SHEETS—SHEET 2.



WITNESSES
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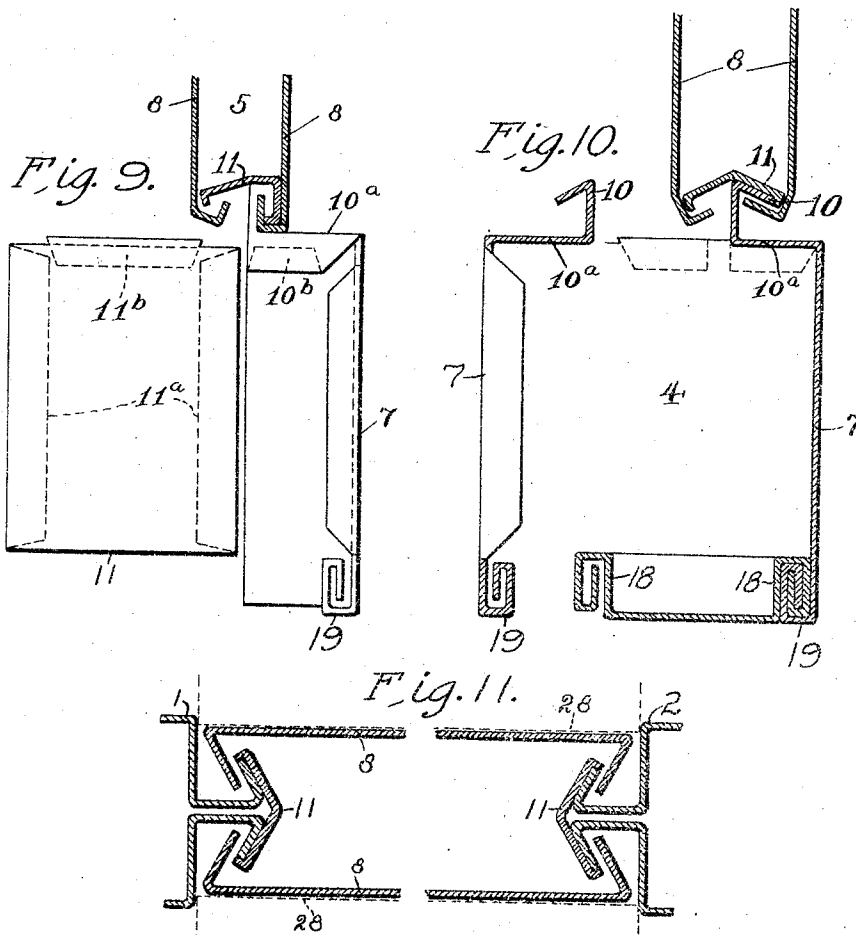
Fig. 8. INVENTOR
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4 SHEETS—SHEET 3.



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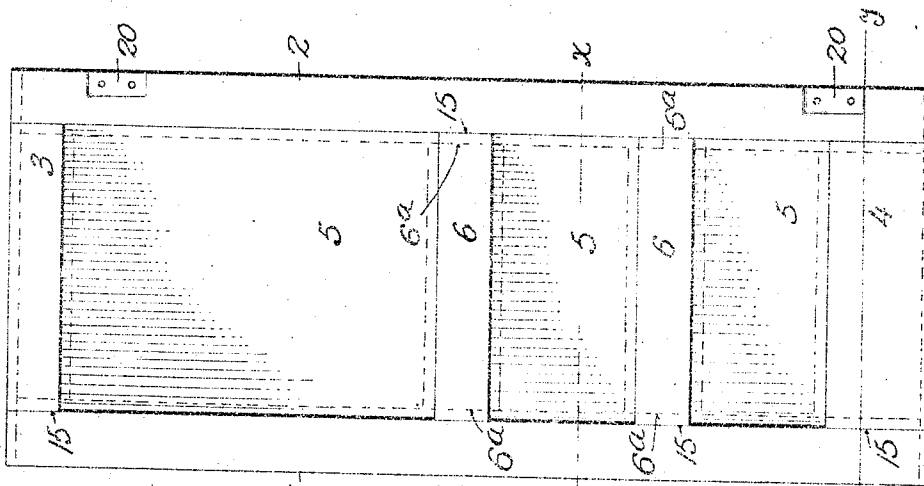
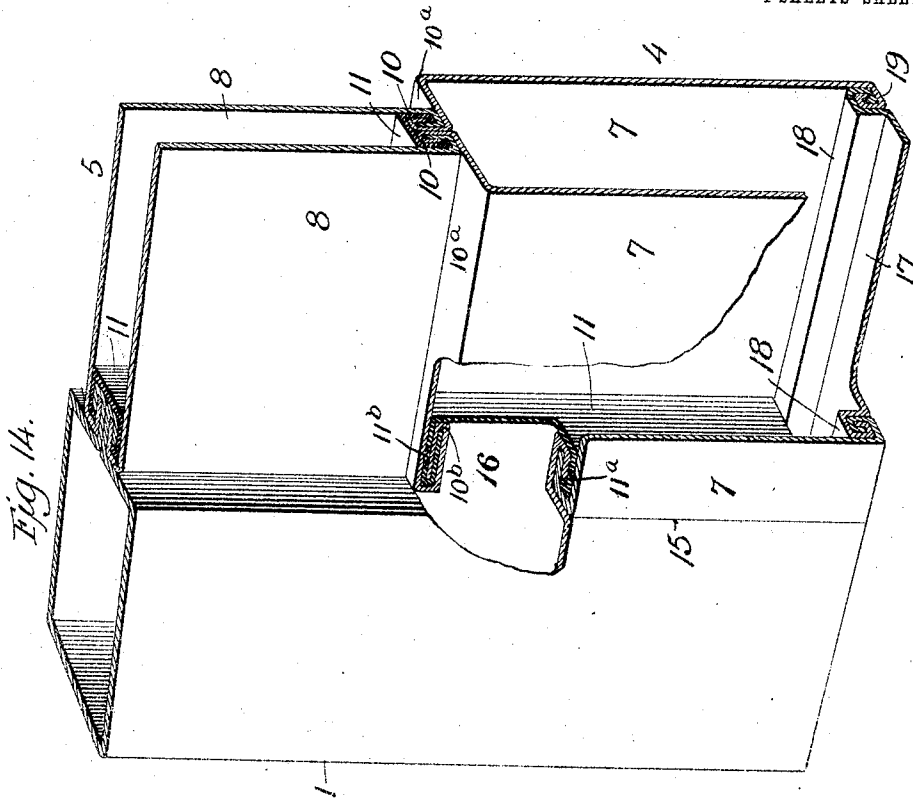
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4 SHEETS—SHEET 4.



WITNESSES
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Fig. 15.
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UNITED STATES PATENT OFFICE.

HENRY P. A. A. EICHMANN, OF CORONA, NEW YORK, ASSIGNOR OF ONE-HALF TO
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HOLLOW FIREPROOF DOOR.

972,102.

Specification of Letters Patent.

Patented Oct. 4, 1910.

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To all whom it may concern:

Be it known that I, HENRY P. A. A. EICHMANN, a citizen of the United States of America, residing at Corona, borough of Queens, city of New York, in the county of Queens and State of New York, have invented certain new and useful Improvements in Hollow Fireproof Doors, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to hollow metal doors for buildings, houses and the like. Heretofore doors of this kind have been built up of metal sections joined together by folding and interlocking their edges aided by screws and bolts and other fastening devices.

The object of my efforts is to produce a more rigid, strong and durable door of this kind which will be less liable to collapse or sag and which can be constructed at less expense and without the use of solder, screws, bolts or rivets.

To this end my invention consists in the peculiar features and combinations of parts more fully described hereinafter and pointed out in the claims.

Figure 1 is a detail view of a panel half. Fig. 2, a stile member. Fig. 3, a rail half. Fig. 4, a key-brace. Fig. 5, an intermediate rail-half. Figs. 6, 7 and 8, views of lock and hinge devices. Fig. 9 shows the key-brace in process of going into loose position. Fig. 10 shows the key-brace in loose position, and the opposite rail member going loosely into place. Fig. 11 is a diagrammatic view showing the manner in which the rail and panel members are loosely placed for the application of pressure. Figs. 12 and 13 show horizontal sections through line *x x* and *y y* of Fig. 15. Fig. 14, a perspective view partly in section and cut away to better show the stile, rail and panel connections, and Fig. 15, a front elevation of the finished door.

The reference numerals 1 and 2 denote respectively the left and right hand door stiles, each of which is formed out of a single sheet of metal. To these stiles are secured top and bottom hollow sheet metal rails 3 and 4 with hollow panels 5 and brace-rails 6 intervening. In the right hand stile 2 are formed two countersinks 20 stamped or otherwise

depressed to receive the wing of an ordinary butt hinge and so that the latter will lie flush with the outer surface of the stile when it is fastened in place by the screw bolts 21. The depressing of the metal to form the countersink 20 leaves a transverse wall or web 22 (Figs. 6 and 7) which together with a reinforcing plate 23 acts as a lateral stiffener to prevent the sheet metal from buckling or bending under the weight of the door. While these lock and hinge formations constitute a minor part of my invention the means and mode of securing the sheet metal members or sections of the door proper together are the principal elements upon which I lay the greatest stress, and they will now be described in detail.

Each panel and rail brace consists of two duplicate sheet metal halves provided at its four surrounding edges with foldable flanges adapted to be first placed, as seen in Fig. 11, in position to be afterward folded down, interlocked and rigidly interclenched by means of dies 28 shown in dotted lines, so that when the compressing operation is finished the parts will lie in the relative position seen in Figs. 12, 13 and 14. To still further add strength and stability to the door, I employ what will for convenience be called a brace-key 11, because it serves both as a key to lock the edges of the sections together and as a brace to hold apart the two sheet metal halves which compose each rail, panel and brace section.

7, 7 represent the two halves composing the rail members 3 and 4.

The numerals 8, 8 (Fig. 14) denote two duplicate shells constituting the panel halves. The two braces 6 are each also composed of two duplicate shells having integral locking flanges 6^a at their edges which interlock with the stiles at their ends and with the panel halves.

As seen in Fig. 14, the edges of the top attaching flanges of the rail halves 7, where they are brought together and joined to the panel flanges, are first pressed into the form of two longitudinal open hooks 10 placed back to back, and the interlocking open edges of the panel halves 8 are oppositely bent to enter them. The key-brace 11 is formed with flanges 11^a, the whole brace being sub-

stantially C-shaped in cross-section and passing over and embracing these four assembled hook-shaped flanges. It will be seen by reference to Fig. 14 that the key braces 11 unite the opposite panel pieces, as 7, 7 or 8, 8, to each other and also to the stiles, by means of their side flanges 11^a; and that they also unite the intumed edge flanges, as those designated 10^a of panel section 7, at their ends, by means of the flange 11^b at the ends of the key braces, which interlock with flanges 10^b of the panel sections. The vertical attaching flanges of the panels 5 and brace-rails 6 are likewise joined to the stiles 1 and 2. When all of the folds of metal at said seams or joints are pressed and clenched together, all interstices within are pressed out and closed, thereby producing a limited stiff and permanent seam which clenches all the sections together and which acts like a solid integral rib of metal to prevent the door from sagging or warping either laterally or vertically, as well as to increase its power to resist heat in case of fire, and severe strains and stresses.

It should be understood that suitable mandrels, not shown, are inserted within the hollow members before the outside clenching pressure by the dies is brought to bear on the seams. The result of such pressure on the peculiarly formed and assembled edges coils the two sheets simultaneously, thereby tightening and stiffening the metal sheets after the manner of tightening a drum head. It will be noticed that flush joints 15, where the ends of the rails and braces are secured to the stiles, contain five folds of metal including the vertically placed brace-key 11 which spans the gap 16 (Fig. 13) between the opposite sides of the door to still further brace and tie the joint rigidly against collapsing inwardly or spreading outwardly.

The bottom of the lower rail 4 (Figs. 10, 13 and 14) is closed by a sliding sheet metal closure 17 provided with longitudinal oppositely facing hook-shaped edges 18 struck up out of its own metal like the other interlocking edges, and which engage corresponding formations 19 along the inside edges of the opposite halves 7, 7 of the rail. The top rail 3 is closed along the upper edge in the same way.

Although I have called the elongated web 11 which connects and braces the opposite sides of the hollow door along the seams, a "key-brace", it may not necessarily perform the function of a key, but might be applied to interiorly connect the opposite sides of the door without the key effect. One of its principal functions is to stiffen the door at the seams both longitudinally and transversely by tying the opposite sheets of the door against spreading apart or against coming together, and to add lateral rigidity to the

whole structure. When all the several sheets and separate parts have been pressed and clenched together they are intended to remain so permanently in contradistinction to a knock-down door. It is also apparent that my device might be varied in many other ways, that would suggest themselves to those skilled in the art, without escaping the spirit and scope of the invention; therefore, I do not limit myself to the exact structure herein shown.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a sheet metal door composed of panel, stile and rail sections, the combination with said rails and stiles, of pliable flanges along the edges of the latter and around the panel recess, a pair of panel members having corresponding pliable flanges adapted to engage and interlock said stile and rail flanges, and an interior brace-key having a longitudinal opening which receives said other members, whereby the key embraces the latter and serves to stiffen and brace the joint.

2. In a sheet metal door composed of hollow panel, stile and rail sections, the combination with said sections, of pliable interlocking integral flanges, panel halves provided with corresponding pliable flanges, and a substantially C-shaped internal pliable key-brace, whereby when pressed together said flanges and key will form a stiffening and strengthening joint and rib in the door.

3. A sheet metal door composed of panel, stile and rail portions having integral pliable flanges which project into the panel recess, in combination with a panel composed of two duplicate halves composing the front and back of the panel, integral pliable flanges on the edges of said halves arranged and adapted to interlock those on the other members whereby pressure brought to bear on all the loosely assembled flanges rigidly clenches the flanges, stretches said halves, and sets the panel permanently in the door.

4. A hollow sheet metal door composed of stile, rail and panel sections interiorly secured together at their contiguous edges by integral interlocking flanges constituting seams, in combination with an interior cross-brace composed of an elongated web of metal which connects the interior opposite sides of the door.

5. A hollow metal door composed of the usual stile, panel and rail sections, in combination with seams formed out of the interclenched contiguous edges of said sections, and a longitudinal interior cross-web connecting the opposite sides of the door at the seams.

6. A hollow metal door having a hollow sheet metal rail member recessed to receive a lock, said recess being formed by slitting the

metal to leave pliable wings or lips which are folded or doubled backward upon the interior of the main sheet to form reinforcements and perforated to receive fastening devices, and said metal around the lock recess being depressed to form a countersink for the face plate of a lock.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY P. A. A. EICHMANN.

Witnesses:

FRANK PAUL,
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