A. S. BARROWS.

FIRE DOOR OR SHUTTER.

APPLICATION FILED FEB. 4, 1920.

1,421,146. Patented June 27, 1922.

2 SHEETS—SHEET 1.

Fig. 1

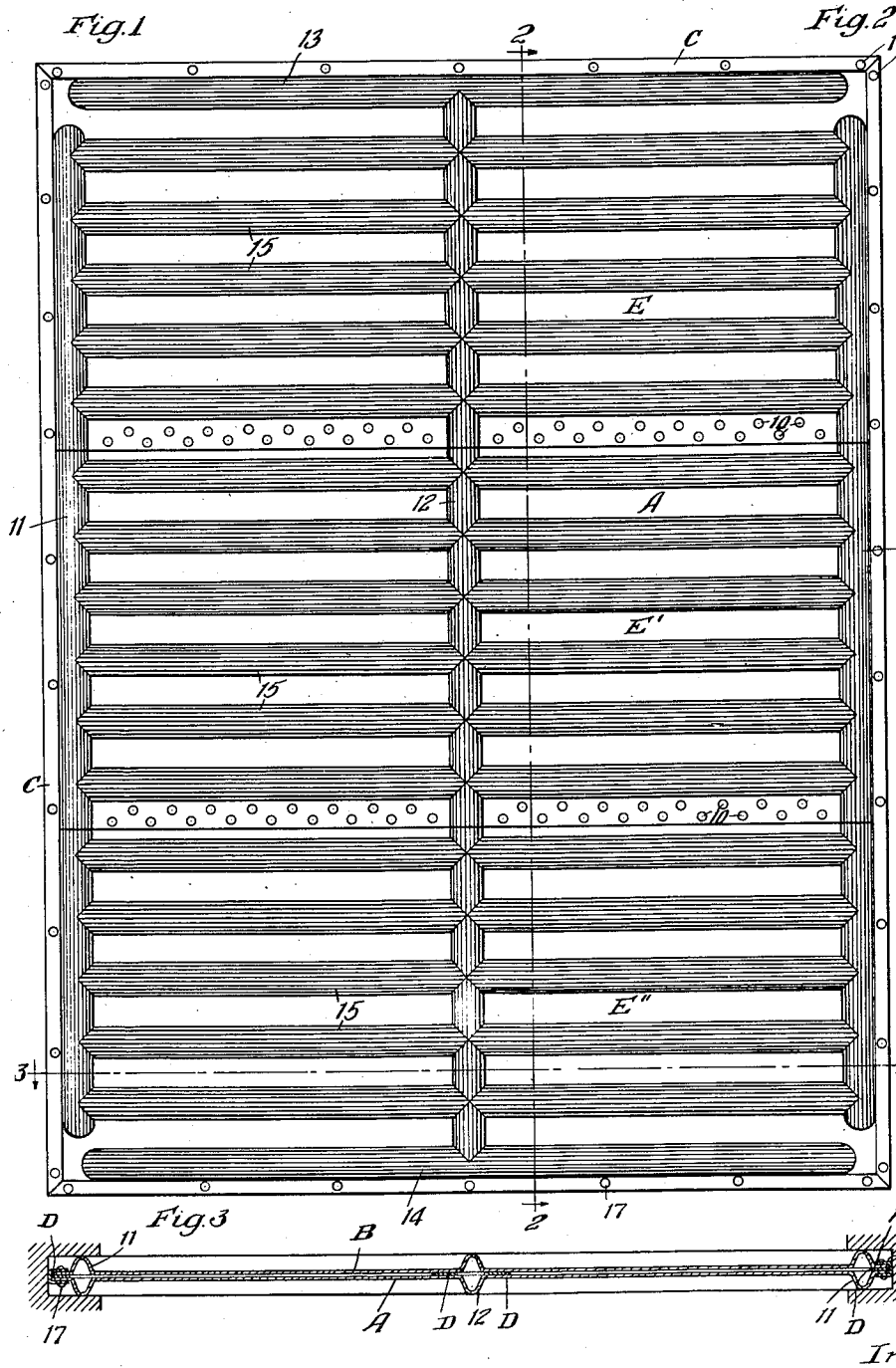


Fig. 2

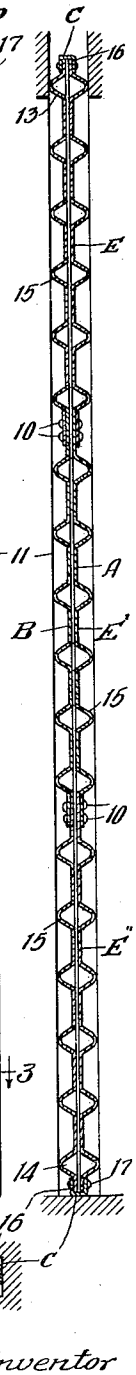


Fig. 3

Inventor
Allan S. Barrows

By Geo. T. Haight
His Atty.

A. S. BARROWS.

FIRE DOOR OR SHUTTER.

APPLICATION FILED FEB. 4, 1920.

1,421,146.

Patented June 27, 1922.

2 SHEETS—SHEET 2.

Fig. 4

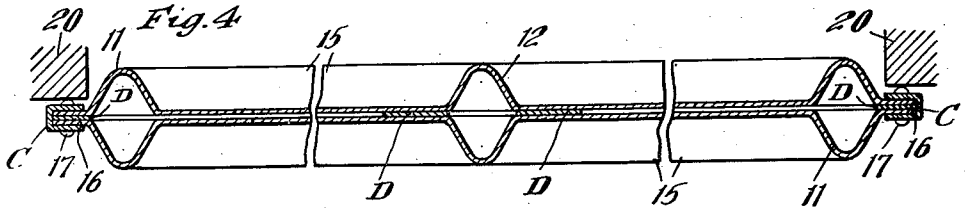
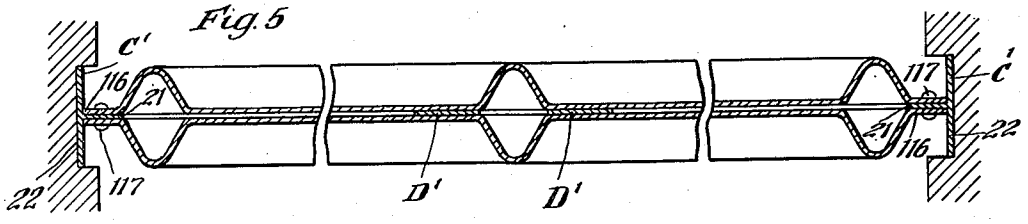


Fig. 5



Inventor
Allan S. Barrows
By Geo. D. Haight
His Atty.

UNITED STATES PATENT OFFICE.

ALLAN S. BARROWS, OF CHICAGO, ILLINOIS.

FIRE DOOR OR SHUTTER.

1,421,146. Specification of Letters Patent. Patented June 27, 1922.

Application filed February 4, 1920. Serial No. 356,224.

To all whom it may concern:

Be it known that I, ALLAN S. BARROWS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Fire Doors or Shutters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in fire doors or shutters.

One object of the invention is to provide an improved fire door or shutter composed principally of sheet metal wherein great strength and rigidity per unit of weight is obtained.

Other objects of the invention are to provide a fire door or shutter of the character indicated which will effectively withstand disintegration, warping and twisting; which will minimize the transference of heat; and which will be of neat and pleasing appearance.

In the drawings forming a part of this specification, Figure 1 is an elevational view of a fire door showing one embodiment of my invention. Figure 2 is a vertical sectional view taken substantially on the line 2—2 of Figure 1. Figure 3 is a horizontal sectional view taken substantially on the line 3—3 of Figure 1. In both Figures 2 and 3, the door is shown associated with a building wall or partition so arranged as to adapt the door for sliding movement vertically. Figure 4 is a view similar to Figure 3, upon an enlarged scale, parts being broken away, and illustrating the manner in which the door would be used with a building wall or partition wherein the door is slid in front of the opening and moved partly thereinto with the edges or periphery of the door in contact with the wall or partition. Figure 5 is a view similar to Figure 4 illustrating a somewhat different construction of door, the arrangement being of that character where the door is adapted to slide horizontally within a suitable recess provided therefor within the building wall or partition.

In said drawings and referring to the construction illustrated in Figures 1, 2 and 3, my improved door is shown as comprised broadly of an outer wall designated by the letter A, an inner wall designated by the letter B, peripheral or marginal binding strips C, and fire-resisting or insulating spacing strips D.

In carrying out my invention, I preferably form each wall of a plurality of sheet metal sections of comparatively thin gauge. Preferably, also, each wall of the door, inner and outer, is of similar construction. As shown, I have formed each wall of three sections, E, E′ and E″, the same having their edges overlapped and rigidly united either by spot-welding or by riveting, the use of rivets being illustrated in the drawings as indicated at 10.

In order to obtain maximum strength and rigidity with comparatively thin gauge sheet metal, each wall of the door is provided with vertically extending edge corrugations 11—11, a center vertically extending corrugation 12, top and bottom edge corrugations 13 and 14, and a plurality of intermediate horizontally extending corrugations 15—15. The edge corrugations 11, 13 and 14 are placed relatively close to and preferably parallel with the peripheral edges of each wall, thereby leaving a flat marginal portion to each wall as indicated at 16 around all four sides.

It is desirable to maintain the two walls of the door in spaced relation so as to thereby obtain a dead air space between the two walls of the door and thus prevent undue circulation and also minimize the transference of heat from one side of the door to the other. In this manner, if one side or wall of the door is subjected to intense heat, the effects thereof will be substantially confined to that particular side or wall of the door and the opposite side or wall of the door left intact and with the necessary strength and rigidity, combined with the frame-forming binding strips, to support the wall of the door which is directly subjected to the heat. To accomplish this result, I provide a plurality of the spacing strips D, preferably four of the same. These strips D extend vertically and two of them are located at the extreme sides of the door between the inner and outer walls and the other two extend vertically and are located on opposite sides of the center vertical corrugation 12, as clearly illustrated in Figure 3. The strips D will be made of any suitable material such as asbestos or other fire-resisting composition.

To rigidly unite the two walls and also form what may be termed a frame of rigid

non-warping construction, I employ the binding strips C around all four edges, each of the strips C being preferably composed of sheet metal and bent to U cross section so as to fit over and substantially seal the edges of the two walls of the door. The edge re-enforcing members C are secured to the walls of the door in any suitable manner, preferably by riveting as indicated at 17.

In actual practice, the gauge of the metal will approximate $\frac{1}{16}$ inch to $\frac{1}{8}$ inch and the depth of the corrugations 11, 12, 13 and 14 will be approximately $1\frac{1}{2}$ inches, so that the over-all thickness of the door will be slightly more than 3 inches. This provides a door which can readily be used in building walls or partitions of average construction.

It will be noted that all of the corrugations or equivalent strengthening indentations, extend outwardly from the plane of the respective wall of the door. Furthermore, these corrugations are merged at right angles to each other, as shown in the drawing, thereby producing great strength because of the fact that the horizontal corrugations will brace the vertical corrugations against collapse and vice versa. The arrangement of corrugations is also such that each wall of the door is individually and independently well adapted to resist strains imposed externally upon it in any direction, either perpendicular to the door or perpendicular to the side edges or perpendicular to the top and bottom edges. Furthermore, the corrugations serve an additional function in that they are individually adapted to compensate for expansion which may take place in the door at different portions thereof. That is to say, the horizontal corrugations are well adapted to compensate for internal stresses set up in the metal which tend to expand the metal in a vertical direction, and such compensation may be said to be localized with respect to each adjacent pair of horizontal corrugations. Similarly, internal stresses set up within the metal tending to expand the metal horizontally will be compensated for by the vertical corrugations. Stated in another manner, it will be observed that each wall of the door is divided into a series of what may be termed rectangular panels each of which is surrounded by corrugations extending vertically and horizontally. If it be assumed that intense heat is applied to any one of said panels and expansion is necessary, it is evident that such expansion will be taken up or localized within the four surrounding corrugations, thereby preventing the transference of warping or twisting or disintegration to other more distant parts of the door. Such expansion as does occur in either wall of the door will be in a direction tending to separate that particular wall of the door from the other wall thereof and hence will prevent the two walls from coming into contact over extended areas which would defeat the purpose of the dead air space and permit communication of the heat from one wall to the other without any material interference. By providing the inherent strength and rigidity in each wall of the door, heretofore mentioned, it is evident that they are mutually adapted to sustain each other and in the event that one wall is subjected to very intense heat causing distortion or softening thereof, nevertheless the other wall will still retain the requisite strength to sustain the weight of the distorted wall.

In the construction shown in Figure 4, the door is made as illustrated in Figures 1, 2 and 3 and need not be re-described. Figure 4 is shown merely to illustrate how the door may be positioned with respect to the wall 20 with the multi-ply marginal portions of the door lying against the wall.

In the construction shown in Fig. 5, the two walls of the door and the strengthening corrugations and indentations are the same as illustrated in Figures 1, 2 and 3. In this form of the door, however, the edges of the walls are framed and united by T-shaped members C′. The webs of the T-shaped members C′, as indicated at 21, are interposed between the flat marginal sections 116 of the walls and the three plies preferably riveted as indicated at 117. The flanges 22 of the T-shaped members C′ are extended perpendicular to the general plane of the door and are preferably of an over-all width corresponding to the over-all thickness of the door proper. In the construction shown in Figure 5, the T-shaped members C′ are well adapted to co-operate with the wall or partition to form an effective seal therewith and thereby prevent air from circulating around the edges of the door. In the construction shown in Figures 1, 2 and 3 this function is served by the edge corrugations 11, 13 and 14 of the door which are preferably seated within corresponding recesses in the building wall or partition. In the construction shown in Figure 5, due to the use of the T-shaped members C′ the outer vertically extending spacing strips are omitted but the intermediate spacing strips D′ are retained.

I have herein shown and described what I now consider the preferred manner of carrying out my invention, but the same is merely illustrative and I contemplate all changes and modifications that come within the scope of the claims appended hereto, and in this connection it will be observed that I have illustrated my invention as employed in a door only although the invention is obviously capable of use in a shutter or the like, and this I consider within the scope of my invention.

I claim:

1. In a fire-resisting door or shutter, the combination with inner and outer sheet metal walls, said walls having their edges overlapped and rigidly united, each wall having a flat marginal portion, each of said walls being provided with a plurality of outwardly-extended integral corrugations dividing the wall into a plurality of panels, each outlined by corrugations adapted to locally compensate for expansion of the metal in any direction in the general plane of the wall, the panels of one sheet metal wall being disposed opposite the corresponding panels of the other sheet metal wall and separated and disconnected therefrom.

2. In a fire-resisting door or shutter, an inner wall and an outer wall composed of sheet metal and united around their peripheries, each of said walls having a flat marginal portion and provided within the area of said flat marginal portion with corrugations extending outwardly from the plane of the flat marginal portions and arranged transversely and lengthwise of the wall and merging with each other, the corrugations extending lengthwise being adapted to compensate for lateral expansion and the transversely extending corrugations being adapted to compensate for vertical expansion of the metal, within said marginal portions, said corrugations also adapting each wall individually to resist internal stresses set up tending to buckle or warp the respective wall.

3. In a fire-resisting door or shutter, the combination with an inner sheet metal wall, of an outer sheet metal wall, and metal frame-forming members extending around the peripheries of the walls and rigidly united therewith to form substantially sealed edges for the door or shutter, each of said walls being provided with a plurality of intersecting corrugations to thereby form each wall into a series of panels with each panel outlined by corrugations, said two walls being spaced apart to provide a dead air space therebetween, all of said corrugations terminating inside of the area defined by the frame-forming members.

4. In a fire-resisting door or shutter, the combination with inner and outer sheet metal walls, each wall having a flat marginal portion and provided with outwardly-extending corrugations within the area defined by said flat marginal portions, said corrugations being arranged lengthwise and transversely of the wall and merging with each other; of spacing strips interposed between the walls of the door; and frame-forming members extending around the peripheries of the two walls and rigidly united with the said flat marginal portions of the latter to form a substantially sealed multi-ply edge-frame.

5. In a fire-resisting door or shutter, the combination with inner and outer walls rigidly united around their peripheries, each of said walls consisting of a plurality of sections of sheet metal having adjacent edges overlapped and rigidly united, said walls being similarly corrugated, each wall having corrugations extending along each edge thereof and a series of corrugations merging with and extending transversely between a pair of the edge corrugations; and means for spacing said walls apart to thereby provide a dead air space.

6. In a fire-resisting door or shutter, the combination with inner and outer sheet metal walls, each of said walls being composed of a plurality of sections having adjacent edges overlapped and rigidly united, each wall having a flat marginal portion and provided with outwardly extended corrugations within the area defined by the said flat marginal portions, said corrugations being arranged lengthwise and transversely of the wall and merging with each other; spacing strips interposed between the walls of the door; and frame-forming members extending around the peripheries of the two walls and rigidly united with the said flat marginal portions of the latter to form a substantially sealed multi-ply edge-frame.

7. In a fire-resisting door or shutter, the combination with outer and inner sheet metal walls, of combined frame-forming and edge-uniting members rigidly united with the edges of said walls, each of said walls being provided with a plurality of outwardly extended integral corrugations dividing the wall into a plurality of panels each outlined by corrugations adapted to locally compensate for expansion of the metal in any direction in the plane of the wall within the area defined by said frame-forming and edge-uniting members, all of said corrugations being spaced inwardly from the edges of said sheet metal walls.

In witness that I claim the foregoing I have hereunto subscribed my name this 14th day of Jan. 1920.

ALLAN S. BARROWS.