April 23, 1940. W. YOUNG 2,197,824

DOOR SEALING MEANS

Original Filed July 12, 1937

Fig. 2.

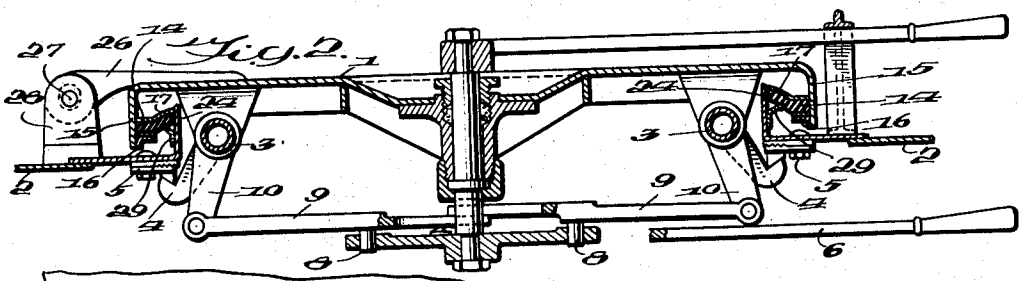


Fig. 1.

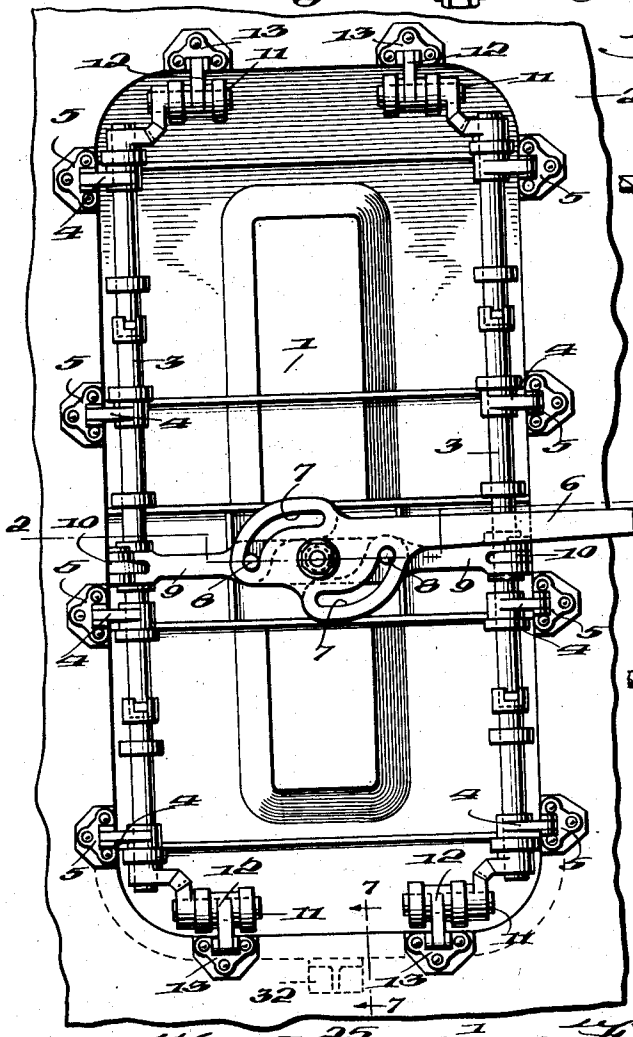


Fig. 3.

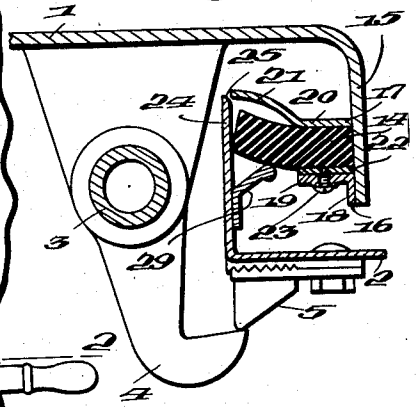


Fig. 4.

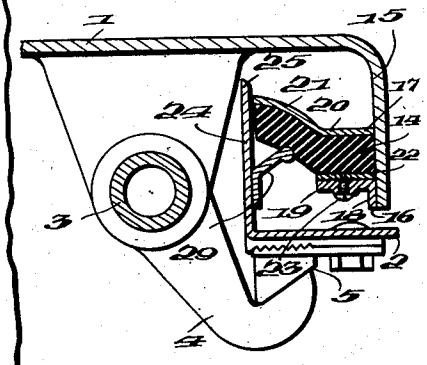


Fig. 5.

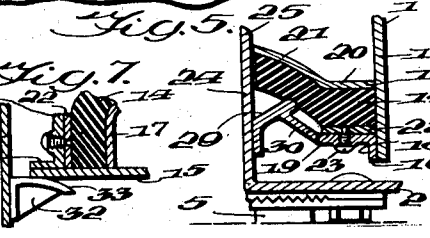


Fig. 6.

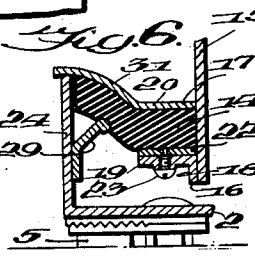


Fig. 7.

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UNITED STATES PATENT OFFICE

2,197,824

DOOR SEALING MEANS

William Young, Washington, D. C.

Original application July 12, 1937, Serial No. 153,221. Divided and this application June 30, 1938, Serial No. 216,806

18 Claims. (Cl. 114—117)

My invention relates to sealing means for doors, hatches or other closures and it has for its principal object the provision of means for rendering doors and the like water-tight, gas-tight, and weather-tight as well as flame tight.

The present application is a division of my copending application Serial No. 153,221, filed July 12, 1937, now Patent No. 2,140,570, of December 20, 1938, the latter application being a continuation in part of my application Serial No. 123,500, filed February 1, 1937.

The primary feature of the invention consists in providing a door or the like with a strip of relatively flexible sealing material and with a rigid member interposed between the strip and the door, and in having means surrounding the opening to be closed by the door which is adapted to be in such contiguous relation with said rigid member when the door is closed as to prevent the passage of flames from one side of the door to the other and which is also adapted to press the sealing strip against the rigid member.

Another feature of the invention consists in providing a door or the like with a relatively flexible strip of sealing material and with a rigid member overlapping the inner face of the strip which is provided with a portion offset rearwardly from the strip, means surrounding the opening to be closed by the door being provided to deflect a portion of the sealing strip rearwardly as the door is being moved toward closed position and for compressing the portion of the strip against the offset portion of the rigid member when the door is fully closed.

A further feature of the invention resides in providing the inner face of the door with a relatively flexible sealing strip and with a plate-like member overlapping the inner face of the strip and having a portion offset rearwardly therefrom, means surrounding the opening to be closed by the door being arranged so as to be contiguous to the plate member when the door is closed and to also deflect a portion of the sealing strip rearwardly when the door is being closed and to compress the strip against the offset portion of the plate member when the door is fully closed.

Other and more specific features of the invention residing in advantageous forms, combinations and relations of parts, will hereinafter appear and be pointed out in the claims.

In the drawing, wherein the invention is shown as applied to a bulkhead of a ship,

Figure 1 is an elevational view of the inner face of the door and adjacent portions of a bulkhead.

Figure 2 is a detail sectional view taken on line 2—2 of Figure 1.

Figure 3 is a fragmentary sectional view of adjacent portions of the door and bulkhead illustrating the door in a partially closed position.

Figure 4 is a view corresponding to Figure 3 illustrating the door in fully closed position.

Figure 5 is a view similar to Figure 4 illustrating a modified form of the invention.

Figure 6 is another view similar to Figure 4 illustrating another modified form of the invention.

Figure 7 is a fragmentary sectional view taken on line 7—7 of Figure 1.

While the invention has been illustrated as applied to a bulkhead and its associated door, it will be apparent that it is not limited in its application to doors of this type but, on the contrary, is capable of application to substantially all types of closures generally.

Referring more particularly to the drawing, 1 indicates a metal door which is hingedly mounted upon a bulkhead 2 for closing an opening in the latter. The particular mechanism illustrated for securely locking the door in closed position is claimed in my copending application Serial No. 153,221 heretofore referred to and it comprises rotatable shafts 3 which extend lengthwise along the rear face of the door adjacent opposite side edges thereof and are respectively provided with a plurality of hooks or shouldered members 4 for cooperating with brackets 5 rigidly secured to the bulkhead. Pivotally mounted upon the door intermediate the shafts 3 is a lever 6 having eccentric slots 7 for receiving pins 8 which project laterally from links 9 pivotally connected at their outer ends to arms 10 with which the shafts 3 are respectively rigidly provided. It will thus be seen that rotation of the lever 6 will impart movement to the shafts 3 so as to cause the hooks 4 to move relatively to their respectively cooperating brackets 5.

The door securing mechanism may also include two pairs of auxiliary shafts 11 which are respectively mounted adjacent the top and bottom edges of the door, each of the shafts being provided with a hook 12 for cooperating with an adjacent bracket 13. Motion may be imparted to the auxiliary shafts from the main shafts 3 through the intermediacy of suitable gearing.

The sealing means which forms the subject-matter of the present application includes a relatively flexible strip of sealing material 14 which is disposed on the inner face of the door and extends longitudinally along each of the edges

thereof. The sealing strip may be of any suitable material, such, for example, as rubber, and it projects inwardly from inturned or rearwardly projecting marginal flanges 15 with which the door may be advantageously provided.

Rigidly secured to the flanges of the door by any suitable means, such as by welding, are laterally spaced members 16 and 17, respectively, between which the sealing strip is adapted to be inserted for connection to the door. Member 16 may advantageously be in the form of an angle, one leg 18 of which is secured to the adjacent marginal flange of the door and the other leg 19 of which overlaps the outer face of the strip adjacent its inner edge. The member 17 is disposed rearwardly of the sealing strip and may be conveniently of plate-like form having an inner portion 20 adapted to overlappingly engage a portion of the rear face of the strip and an outer portion 21 which is offset rearwardly from the portion of the strip adjacent its inner edge so as to be normally disposed in spaced relation thereto.

While the space between the leg 19 of angle member 16 and the inner portion 20 of plate member 17 may be only slightly narrower than the thickness of the sealing strip so that by compressing the latter it may be inserted within the space and thus be firmly held in position, it is preferred to make the space sufficiently wide to accommodate filler plates 22 as well as the sealing strip. By employing filler plates of varying thickness, sealing strips of varying thickness may likewise be employed. Suitable cement or other supplementary means may be used, if desired, in securing the sealing strip in position.

To maintain the filler plates in place, they are each provided with one or more elongated openings to receive the inner ends of screws 23 which are screw threaded in leg 19 of angle member 16. While the screws may engage the sealing strip to retain it in place, this has been found unnecessary, if, as is preferred, filler plates of sufficient thickness are employed that the portion of the strip engaged thereby is maintained under compression. The sealing strip is preferably inserted between members 16 and 17 before the filler plates are inserted, and in order that the plates may be easily pushed or driven in place and at the same time subject the strip to compression, the inner corners of the plates adjacent their rear faces may be suitably rounded, as indicated.

Surrounding the opening in the bulkhead is an outwardly extending flange 24 which, when the door is closed, is adapted to be so contiguous with and yet not necessarily engage the inner portion of plate 17 that flames cannot pass from one side of the door to the other and that flames originating on the inside of the door cannot reach and thus destroy the sealing strip. In all forms of the invention illustrated in the drawing, with the exception of Figure 6, the flange 24 is adapted to overlap and be contiguous with the inner edge of the offset portion 21 of the plate member and in order that the outer edge of the flange may pass beyond the plate member 17 and thus not interfere with proper closure of the door, the outer end portion of the flange is beveled or inclined, as indicated at 25, so that, as the door approaches closed position, the incline or bevel of the flange will serve to properly position or center the door with respect to the opening, the door being enabled to shift laterally or adjust itself slightly by having the openings in the hinge butts 26 of the door of somewhat greater diameter than the pins 27 which hingedly connect the door to brackets 28 mounted on the bulkhead. The openings for the hinge pins are also elongated to permit the door in its final closing movement to be moved bodily at substantially right angles to the bulkhead.

Since there may be a tendency for the door to sag on its hinges, a bracket 32 may be so positioned on the bulkhead below the door opening that in the event the door does sag the marginal flange on the bottom thereof will engage the upper inclined surface 33 of the bracket to move the door upwardly into proper position for complete closure.

Rigid with the flange 24 and having a portion spaced laterally therefrom is a member 29 which is adapted to coact with the sealing strip. As shown in Figure 3 of the drawing, member 29 is adapted to engage the outer portion of the sealing strip and deflect it rearwardly as the door approaches closed position and, as shown in Figure 4, it is so arranged that, when the door is fully closed, it firmly compresses the outer portion of the sealing strip against the offset portion 21 of the plate member 17. The sealing effect which is thus produced is not only obtained by maintaining the strip under compression but it is also obtained by reason of the strip being deflected rearwardly. In the event, therefore, it should become impossible to subject the sealing strip to the desired compression by reason of the door having become distorted or deformed, or for other reasons, the sealing effect of the strip will not be entirely destroyed if such a degree of closure of the door can be effected as will result in deflecting the strip rearwardly only a limited extent, because the resistance of the strip to deflection, as distinguished from compression, will serve to maintain the strip in effective engagement with the outer end of member 29.

Member 29, may, if desired, be provided with a laterally projecting flange 30, as shown in Figure 5, which is adapted to bridge the space between the portion of member 29 which engages the sealing strip and the outer edge of leg 19 of the angle member 16. By thus providing member 29 with a portion whose outer edge is disposed contiguous to the outer edge of leg 19 when the door is closed, the exposed outer surface of the sealing strip will be substantially entirely covered and flames from fire which may occur on the outside of the door will be prevented from reaching the sealing strip.

Instead of having the flange surrounding the door opening project beyond the inner edges of plate member 17, as in the preferred form of the invention, the plate member may be of greater width, as indicated at 31 in Figure 6, so as to provide an abutment for the inner edge of the flange surrounding the door opening. In this embodiment of the invention, the flange surrounding the door opening is, of course, of less depth than in the forms of the invention illustrated in the other figures of the drawing but the sealing strip will be as effectively protected from flames on the inside of the door and member 29, which is rigid with the flange, cooperates with the sealing strip in the manner heretofore described.

From the foregoing, it will be perceived that a sealing means is provided which is capable of effectively rendering a closure water-tight, gas-tight, and weather-tight, as well as flame tight, and which may be applied to practically every type of closure irrespective of the character of

securing mechanism with which it may be equipped. It is, of course, manifest that various modifications and rearrangements of the parts of the specific structures illustrated and described may be made without departing from the spirit and scope of the invention as defined in the appended claims.

What I claim is:

1. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material disposed on one face of the door adjacent a marginal edge thereof, a rigid member mounted on the door and interposed between said strip and the face of the door adjacent thereto, said member having an offset portion disposed in spaced relation to a portion of said strip, and rigid means adjacent an edge of the opening to be closed by the door for deflecting said portion of the strip toward the offset portion of said rigid member as the door is being moved toward closed position and for compressing said portion of the strip against said offset portion when the door is fully closed.

2. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material arranged along one of the marginal edges of the door and projecting inwardly therefrom into overlapping relation with one face of the door, means for securing said strip to the door adjacent said marginal edge of the latter, said means comprising a rigid member interposed between the strip and the face of the door overlapped thereby, said member being provided with an offset portion spaced from a portion of the strip remote from said marginal edge of the door, and rigid means adjacent an edge of the opening to be closed by the door for deflecting said portion of the strip toward said offset portion of the rigid member as the door is being moved toward closed position and for compressing said portion of the strip against said offset portion when the door is fully closed.

3. Sealing means for a door, hatch or other closure having marginal flanges extending at an angle to one face thereof, said sealing means including a strip of relatively flexible material extending longitudinally of the edges of the door and projecting inwardly from said marginal flanges into overlapping relation with said face of the door, a member rigid with said marginal flanges and interposed between said strip and the face of the door adjacent thereto, said member having an offset portion disposed in spaced relation to a portion of said strip, and means adjacent an edge of the opening to be closed by the door for deflecting said portion of the strip toward the offset portion of said member as the door is moved toward closed position and for compressing said portion of the strip against said offset portion when the door is fully closed.

4. Sealing means for a door, hatch or other closure having marginal flanges extending at an angle to one face thereof, said sealing means including a strip of relatively flexible material arranged along the edges of the door and projecting inwardly from said marginal flanges into overlapping relation with the said face of the door, means carried by said marginal flanges for securing said strip to the door, said securing means comprising a plate-like member interposed between said strip and the adjacent face of the door, said plate-like member having an offset portion spaced from said strip adjacent the edge thereof remote from said marginal flanges, and rigid means adjacent an edge of the opening to be closed by the door for deflecting toward the offset portion of said member the portion of the strip spaced therefrom as the door is being moved toward closed position and also for compressing said portion of the strip against said offset portion when the door is fully closed.

5. Sealing means for a door, hatch or other closure having marginal flanges extending at an angle to one face thereof, said sealing means including a strip of relatively flexible sealing material extending longitudinally of the edges of the door and projecting inwardly from said marginal flanges in overlapping relation with said face of the door, a plate-like member rigid with said marginal flanges and interposed between said strip and said face of the door, said member having an offset portion spaced from a portion of said strip, means surrounding the opening to be closed by the door adapted to be disposed in contiguous relation with said offset portion of said member when the door is closed to prevent the passage of flames from one side of the door to the other, and means rigid with said last named means for deflecting toward the offset portion of said member the portion of the strip spaced therefrom as the door is being closed and also for compressing said portion of the strip against said offset portion when the door is closed.

6. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material arranged along one of the marginal edges of the door and projecting inwardly therefrom into overlapping relation with one face of the door, a plate-like member mounted on the door and interposed between said strip and said face of the door, said member having an offset portion spaced from the portion of the strip remote from said marginal edge of the door, and a plurality of laterally spaced rigid means mounted adjacent the edges of the opening to be closed by the door, one of said means being adapted to be disposed in contiguous relation with said offset portion of the plate-like member when the door is closed and the other of said means being adapted to deflect toward said offset portion the portion of the strip spaced therefrom as the door is being moved toward closed position and also being adapted to compress said portion of the strip against said offset portion when the door is fully closed.

7. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material arranged along one of the marginal edges of the door and projecting inwardly therefrom into overlapping relation with one face of the door, means for securing the strip to the door adjacent said marginal edge of the latter, said means comprising a plate-like member interposed between the strip and the said face of the door, said member having an offset portion spaced from the portion of the strip remote from said marginal edge of the door, a flange surrounding the opening to be closed by the door adapted to be disposed in contiguous relation with the offset portion of said plate-like member when the door is closed, and means rigid with respect to said flange for deflecting toward said offset portion the portion of the strip spaced therefrom as the door is being moved toward closed position and for compressing said portion of the strip against said offset portion when the door is fully closed.

8. Sealing means for a door, hatch or other

closure including a strip of relatively flexible sealing material disposed in overlapping relation to one face of the door and extending longitudinally of and adjacent to one of the marginal edges of the latter, one edge portion of said strip being secured to the door along said marginal edge and being immovably held with respect to the door and the other edge portion of the strip being movable with respect to the door and being located intermediate opposite marginal edges of the latter, rigid means interposed between the door and said movable portion of the strip and having a portion normally spaced from the latter, a flange surrounding the opening to be closed by the door adapted to be disposed in contiguous relation with said portion of the rigid means when the door is closed, and means carried by said flange for deflecting said movable portion of the strip toward said portion of the rigid means as the door is being moved toward closed position and for compressing the movable portion of the strip against the said portion of the rigid means when the door is fully closed.

9. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material arranged along one of the marginal edges of the door and projecting inwardly therefrom into overlapping relation with one face of the door, a rigid member mounted on the door and interposed between the strip and said face of the door, said member having an offset portion spaced from the portion of the strip remote from said marginal edge of the door, a flange surrounding the opening to be closed by the door adapted to be disposed in contiguous relation with the offset portion of said rigid member when the door is closed, and means rigid with respect to the flange for deflecting toward said offset portion the portion of the strip spaced therefrom as the door is being moved toward closed position and also for compressing said portion of the strip against said offset portion when the door is fully closed, the free edge of the flange surrounding the door being beveled so as to coact with said offset portion of the rigid member as the door is being closed to center the door with respect to the opening.

10. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material arranged along one of the marginal edges of the door and projecting inwardly therefrom into overlapping relation with one face of the door, said strip having inner and outer faces and its inner face being disposed nearest the said face of the door, a rigid member mounted on the door in overlapping relation to the inner face of said strip, said member having an offset portion spaced from the inner face of the portion of the strip remote from said marginal edge of the door, and means adjacent the edge of the opening to be closed by the door adapted to overlap the exposed outer face of the sealing strip when the door is closed and to be disposed in contiguous relation with adjoining portions of the door to prevent the passage of flames from one side of the door to the other, said means having a portion for deflecting toward said offset portion of the rigid member the portion of the strip spaced therefrom as the door is being closed and also for compressing said portion of the strip against said offset portion when the door is closed.

11. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material arranged along one of the marginal edges of the door and projecting inwardly therefrom into overlapping relation with one face of the door, said strip having inner and outer faces and its inner face being disposed nearest the said face of the door, a rigid member mounted on the door in overlapping relation to the inner face of said strip, said member having an offset portion spaced from the inner face of the strip adjacent the portion thereof remote from said marginal edge of the door, a flange surrounding the opening to be closed by the door adapted to be in contiguous relation with the offset portion of said rigid member when the door is closed, and means rigid with respect to the flange adapted to overlap the exposed outer face of the sealing strip and to be disposed in contiguous relation with adjoining portions of the door when the door is closed, said means having a portion for deflecting toward said offset portion of said member the portion of the strip spaced therefrom as the door is being closed and for compressing said portion of the strip against said offset portion when the door is closed.

12. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material extending longitudinally of one of the marginal edges of the door with one edge disposed adjacent said edge of the door and the other edge disposed intermediate said edge of the door and the edge opposite thereto, a member rigid with the door having a portion adjacent the edge of the strip intermediate said marginal edges of the door, a flange adjacent the edge of the opening to be closed by the door adapted to be disposed in contiguous relation with said portion of said member when the door is closed to prevent the passage of flames from one side of the door to the other, and means rigid with respect to said flange for maintaining the strip of sealing material under compression when the door is secured in closed position.

13. Sealing means for a door, hatch or other closure including a strip of relatively flexible material arranged along the marginal edges of the door and projecting inwardly therefrom into overlapping relation with one face of the door, said strip having inner and outer faces and its inner face being disposed nearest the said face of the door, a rigid member mounted on the door having a portion adjacent the edge of the strip remote from the adjacent marginal edge of the door, a flange surrounding the opening to be closed by the door adapted to be disposed in contiguous relation with said portion of the rigid member when the door is closed to prevent flames on one side of the door from reaching said sealing material, and means rigid with said flange adapted to overlap the exposed outer face of said sealing material and to be disposed in contiguous relation with adjoining portions of the door when the door is closed to prevent flames on the other side of the door from reaching said sealing material, said means having a portion for compressing the sealing material against said rigid member when the door is closed.

14. Sealing means for a door, hatch or other closure having marginal flanges extending at an angle to one face thereof, said sealing means including a strip of relatively flexible material projecting from said marginal flanges into overlapping relation with said face of the door, a member rigid with said marginal flanges and interposed between the strip and said face of the door, said member having a portion adjacent the edge of the sealing strip remote from the

adjacent marginal flange of the door, a flange surrounding the opening to be closed by the door and adapted to be disposed in contiguous relation with said portion of the said rigid member when the door is closed to prevent the passage of flames from one side of the door to the other, and means rigid with respect to said flange for compressing said sealing material against said rigid member when the door is closed.

15. Sealing means for a door, hatch or other closure having marginal flanges, said sealing means including a strip of relatively flexible sealing material mounted on the inner face of the door inside of said marginal flanges and extending longitudinally of the latter, said strip having inner and outer faces and its inner face being disposed nearest the inner face of the door, a member rigid with said marginal flanges arranged in overlapping relation with the inner face of said strip, and a flange surrounding the opening to be closed by the door having means adapted when the door is closed to cover the exposed outer face of the sealing strip and to be disposed in such contiguous relation with portions of the door adjoining the latter as to prevent flames on the outside of the door from reaching the sealing strip, said means having a portion for compressing the sealing material against said member when the door is closed.

16. Sealing means for a door, hatch or other closure having marginal flanges, said sealing means including a strip of relatively flexible sealing material mounted on the inner face of the door inside of said marginal flanges and extending longitudinally of the latter, said strip having inner and outer faces and its inner face being disposed nearest the inner face of the door, a member rigid with said marginal flanges arranged in overlapping relation with the inner face of said strip, an additional member rigid with said marginal flanges and projecting inwardly therefrom into overlapping relation with a portion of the outer face of said strip, and means surrounding the opening to be closed by the door adapted to cover the exposed outer surface of the sealing strip when the door is closed and to be disposed in contiguous relation with the inner portion of the member overlapping the outer face of said strip to prevent flames on the outside of the door from reaching the sealing strip, said means having a portion for compressing the sealing strip against the member arranged in overlapping relation with the inner face thereof.

17. In a device of the character indicated, the combination of a door having marginal flanges, with a bulkhead, hatch or the like having an opening to be closed by the door, a strip of relatively flexible sealing material mounted on the inner face of the door inwardly of said marginal flanges and extending longitudinally of the latter, said door including a rigid portion affording a backing for said strip arranged in overlapping relation with one face thereof, a member mounted on the bulkhead and surrounding said opening for overlapping the opposite face of said strip, said member when the door is closed being in contiguous relation with portions of the door adjacent the last named face of the strip so as to provide a barrier preventing flames reaching said strip from the outside of the door, and means rigid with said member for compressing said sealing strip against said rigid portion of the door when the door is closed.

18. In a device of the character indicated, the combination of a door having marginal flanges, with a bulkhead, hatch or the like having an opening to be closed by the door, a strip of relatively flexible sealing material mounted on the inner face of the door inwardly of said marginal flanges and extending longitudinally of the latter, said door including a rigid portion affording a backing for said strip arranged in overlapping relation with one face thereof, a member rigid with said marginal flanges of the door and projecting inwardly therefrom into overlapping relation with a portion of the opposite face of said strip, and means mounted on the bulkhead and surrounding said opening for overlapping the exposed surface of said last named portion of the strip, said means when the door is closed being in contiguous relation with the inner portion of said member so as to provide a barrier preventing flames reaching said strip from the outside of the door, and said means including a portion for compressing the sealing material against said rigid portion of the door when the door is closed.

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