

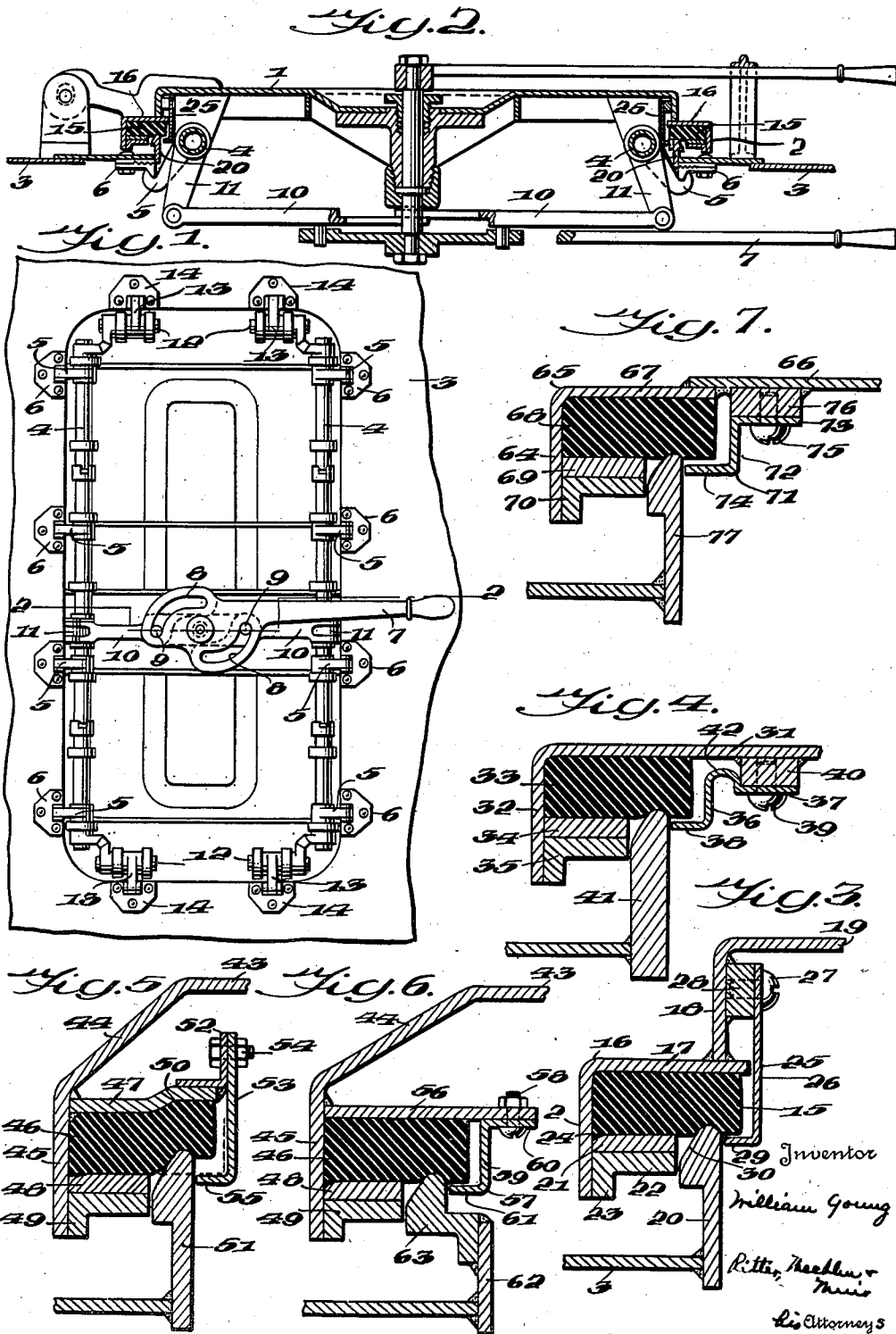
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DOOR SEALING MEANS

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DOOR SEALING MEANS

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9 Claims. (Cl. 114—117)

My invention relates to improvements in sealing means for doors, hatches or other closures of the character shown in my copending application Serial No. 216,806, filed June 30, 1938, Patent Number 2,197,824 dated April 23, 1940, and it has for its principal object the provision of simple and effective means for rendering doors and the like flame-tight as well as water-tight, gas-tight and weather-tight.

A primary feature of the invention consists in providing a door or the like with a strip of relatively flexible sealing material and with means for enclosing or housing portions of the strip which, together with means surrounding the opening to be closed by the door for compressing the sealing material when the door is closed, forms a barrier preventing flames on one or both sides of the door from reaching the sealing strip.

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 illustrating what is now regarded as preferred embodiments of the invention:

Figure 1 is an elevational view of a door and adjacent portions of a bulkhead of a ship.

Figure 2 is an enlarged sectional view taken on line 2—2 of Figure 1.

Figure 3 is a still further enlarged sectional view taken on a line corresponding to line 2—2 of Figure 1 of only one side edge of the door and adjacent portions of the bulkhead, the door securing mechanism being omitted.

Figures 4, 5, 6 and 7 are views similar to Figure 3 illustrating modified forms of the invention.

For purposes of illustration, the invention has been shown as applied to a bulkhead and its associated door, but it is to be understood and will be readily apparent to those skilled in the art that it may be used with equal facility with practically all types of doors.

Referring more particularly to the drawing, 1 indicates a metal door having marginal flanges 2 which is hingedly mounted upon a bulkhead 3 for closing an opening in the latter. Any desired or suitable mechanism, such, for example, as shown in my Patent No. 2,140,570, dated December 20, 1938, may be employed for securely locking the door in closed position. This mechanism, chosen for purposes of illustration only, comprises rotatable shafts 4 which extend lengthwise along the rear face of the door adjacent opposite side edges thereof, each of the shafts

being provided with a plurality of hooks or shouldered members for cooperating with brackets 6 adjustably secured to the bulkhead. Pivotally mounted upon the door intermediate the shafts 4 is a lever 7 having eccentric slots 8 for receiving pins 9 which project laterally from links 10 pivotally connected at their outer ends to arms 11 with which the shafts 4 are respectively rigidly provided. Being thus connected to the shafts, rotation of the lever 7 will impart movement thereto so as to cause the hooks 5 to move relatively with respect to their cooperating brackets 6.

The door securing mechanism may also include two pairs of auxiliary shafts 12 which are respectively mounted adjacent the top and bottom edges of the door, each of the shafts being provided with a hook 13 for cooperating with an adjacent bracket 14. Motion may be imparted to the auxiliary shafts from the main shafts 4 by suitable gears.

The sealing means for the door includes a relatively flexible strip of sealing material 15 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 yielding or compressive material, such, for example, as rubber, and it is arranged on the door so as to project inwardly from the marginal flanges 2 thereof.

In the form of the invention illustrated in Figures 2 and 3 of the drawing, the marginal flange along each edge of the door comprises one of the flanges of an angle member 16, the other flange 17 of the angle member being rigidly secured, as by welding, to the outer end of a rearwardly projecting portion or flange 18 with which the main body or plate portion 19 of the door may be conveniently integrally formed. The flange 17 of the angle member affords a rigid backing for the inner face of the strip of sealing material 15 against which it may be compressed when the door is closed. The means for compressing the sealing material against its backing may be in the form of a flange or other suitable member 20 which surrounds the opening to be closed by the door and it is so positioned with respect to the sealing strip as to engage the latter intermediate its inner and outer side edges.

In addition to being cemented to the angle member 16, the sealing material is firmly secured to the door by a filler plate 21 which is adapted to be inserted between the outer face of the strip and the flange or plate portion 22 of a member 23 which is rigidly secured to the adjacent marginal flange of the door in any suitable manner,

such as by welding. The filler plate 21 is preferably of greater thickness than the space between the outer face of the sealing strip and the inner face of flange 22 so that the sealing strip will be compressed against the backing plate as the filler plate is driven or inserted in place. To facilitate insertion of the filler plate between the sealing strip and flange 23, one corner of the plate is preferably beveled or inclined as indicated at 24. If desired, suitable removable means (not shown) may be used for retaining the filler plates in place.

The outer end of flange 22 of member 23 is arranged so as to be in such contiguous relation with the flange 20 surrounding the door opening when the door is closed as to prevent flames on the outside of the door from reaching the sealing strip, and to prevent flames on the inside of the door from reaching the sealing strip the inner edge portion of the latter is enclosed by a member 25. This member is of angular shape having a plate portion 26 which is removably secured adjacent its inner end by screws or the like 27 to a metal strip 28 which is welded or otherwise connected to the flange 13 of the door plate 19. Portion 26 of member 25 extends beyond flange 17 of angle member 16 into overlapping relation with the inner side edge of the sealing strip and terminates in a flange 29 which overlaps the outer face of adjoining portions of the strip. The free edge of the flange 29 is arranged so as to be in such contiguous relation with the flange 20 surrounding the door opening when the door is closed as to prevent flames on the inside of the door from reaching the sealing strip. It will thus be seen that the flange surrounding the door opening and the portions of the members carried by the door which overlap the outer face of the sealing strip form an effective barrier preventing flames from reaching the sealing material.

While the flange surrounding the door opening may be formed as an integral part of the bulkhead or the like, it will be found more desirable, it is believed, to form it as a separate member and then rigidly secure it to the bulkhead in any suitable manner, such as by welding. The outer end of the flange 20 may be conveniently enlarged, as indicated in Figures 2 and 3, and its outer corner is preferably beveled, as indicated at 30, so as to cooperate with the outer end of flange 22 of member 23 during closing movement of the door and thus center the door with respect to the door opening and insure proper cooperation with adjacent portions of members 23 and 25 when the door is fully closed. Those skilled in the art will appreciate that the outer end of the portion of the flange 20 at the free edge of the door need not be beveled, since the bevels on the portions of the flange at the hinged edge of the door as well as at the top and bottom of the door will function to properly position the door before the portion of the flange at the free edge of the door could function to accomplish that purpose.

In the form of the invention illustrated in Figure 4, the sealing strip is shown as applied to a door of conventional form having a main body or plate portion 31 which is integrally formed with marginal flanges 32. The strip of sealing material 33 is arranged in engagement with the main body portion 31 of the door and the latter, therefore, affords a rigid backing for the strip. The strip is secured to the door in the same manner as in the form of the invention shown

in Figures 2 and 3, namely, by a filler plate 34 which is inserted between the outer face of the strip and a member 35 rigidly secured to the door.

In Figure 4, the inner edge portion of the sealing strip is enclosed or housed by an angularly shaped member having a web 35 and oppositely projecting flanges 37 and 38, respectively. The flange 37 is removably secured by screws or the like 39 to a strip of metal 40 which is preferably welded to the inner face of the door, while flange 38 is arranged in overlapping relation with the outer face of the sealing strip.

To prevent flames on the inside of the door from reaching the sealing strip, flange 38 is disposed in such contiguous relation when the door is closed with the flange 41 surrounding the door opening, and to prevent flames on the outside of the door from reaching the sealing strip, member 35 is likewise arranged when the door is closed in contiguous relation with flange 41. As shown in Figure 4, the flange surrounding the door opening may be of substantially uniform thickness instead of being enlarged at its outer end as is the flange 20 of Figures 2 and 3.

Should the door be subjected to undue heat, it may expand to such an extent as to cause the free end of flange 38 to press so tightly against the flange 41 that considerable difficulty might be encountered in opening the door. To prevent this from occurring, the angularly shaped member carried by the door may be yieldable laterally by joining the web portion 35 thereof to the flange 37 by a curved portion 42.

In the form of the invention illustrated in Figure 5, the main body portion 43 of the door is formed with inclined portions 44 which terminate in marginal flanges 45. With doors of this type, the sealing strip 46 instead of being backed up by the main portion of the door may be backed up by a plate 47 which extends inwardly from the marginal flanges and is rigidly secured thereto in any suitable manner, such as by welding. The sealing strip may be secured in place in the same manner as in Figures 2, 3 and 4, that is by a filler plate 48 which is driven into place between the sealing strip and a member 49 secured to the marginal flanges of the door. If desired, the portion of the backing plate 47 remote from the marginal flanges of the door may be offset, as indicated at 50, so as to be normally disposed in spaced relation to the rear face of the inner edge portion of the sealing strip. When, however, the door is moved to closed position, the flange 51 surrounding the door opening deflects the sealing material rearwardly from the dotted line position shown and firmly compresses it against the offset portion 50 of the backing plate.

Secured to the backing plate, as by welding, is an angle 52 which affords convenient means to which an angular member 53 for enclosing the inner edge portion of the sealing strip may be removably secured by bolts 54. Member 53 extends from the backing plate into overlapping relation with the inner edge of the sealing strip and terminates in a laterally projecting flange 55 which overlaps the outer face of the sealing strip. This flange and member 49 cooperate with the flange 51 surrounding the door opening in the same manner as corresponding parts of other forms of the invention heretofore described to prevent flames from reaching the sealing material.

In Figure 6, illustrating another form of the invention, substantially the same type of door is shown as in Figure 5 and the sealing strip, the securing means therefor and corresponding parts of the door are, therefore, designated by similar reference numerals. The backing plate 56 for the sealing material is, however, not offset as in Figure 5 and extends a substantial distance beyond the inner edge of the sealing strip so as to afford a portion to which a member 57 of substantially Z-shape may be removably secured by bolts 58. Member 57 has a web 59 overlapping the inner side edge of the sealing strip and oppositely projecting flanges 60 and 61, the former being secured to the backing plate and the latter being arranged in overlapping relation with the outer face of the sealing strip.

The member surrounding the door opening shown in Figure 6 is of different form than the corresponding member in other forms of the invention and comprises a plate 62 which is welded or otherwise secured to the bulkhead and an angle form member 63 which may advantageously be welded to the outer portion of the plate 62. The outer end of member 63 is similar in shape to the outer end of flange 20 of Figure 3 for example and, when the door is closed, it similarly cooperates with adjacent portions of the members carried by the door for preventing flames from reaching the sealing material.

The form of the invention illustrated in Figure 7 is somewhat similar to that illustrated in Figure 4. The marginal flanges 64 of the door, however, form one leg of angle members 65 which are rigidly secured, as by welding, to the main body or plate portion 66 of the door. The leg 67 of the angle member which is secured to the door plate forms a backing for the sealing strip 68 secured to the door by the filler member 69 interposed between the sealing strip and the member 70 connected to the marginal flanges. The inner side edge of the sealing strip is enclosed by an angularly shaped member 71 having a web 72 and oppositely projecting flanges 73 and 74, flange 73 being removably secured as by screws 75 to a metal strip 76 welded or otherwise secured to the door plate and the flange 74 being arranged in overlapping relation with the outer face of the sealing strip.

The flange 77 surrounding the opening to be closed by the door is of the same construction as that disclosed in Figure 3 and it is adapted to cooperate with the sealing strip to compress it against the backing 67 and to cooperate with adjacent portions of the member 70 and the flange 74 to prevent flames from reaching the sealing material.

While each of the illustrated embodiments of the invention includes means for preventing flames on the outside of the door from reaching the sealing strip as well as means for preventing flames on the inside of the door from reaching the strip, it will be appreciated that these two means function independently of each other and, in installations where there is possibility of flames occurring on only one side of the door, the means protecting the sealing strip from flames on the other side of the door may, of course, be omitted. It is manifest that various modifications and rearrangements of the parts of the specific structures illustrated and described herein 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 clo-

sure having marginal flanges, said sealing means including a strip of relatively flexible sealing material mounted on the door inside of said marginal flanges with its inner face in overlapping relation with the inner face of the door, a flange surrounding the opening to be closed by the door, the outer edge of said flange being engageable with said strip intermediate its inner and outer edges to compress a localized portion of the strip when the door is closed, and means secured to the door for enclosing the portion of said strip adjacent its inner edge, said means having a portion arranged in overlapping relation with the outer face of the strip, and said flange when the door is closed being in contiguous relation with said portion of said means so as to provide a barrier preventing flames reaching said strip from the inside of the door.

2. 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 door, inside of said marginal flanges with its inner face in overlapping relation with the inner face of the door, a flange surrounding the opening to be closed by the door, the outer edge of said flange being engageable with said strip intermediate its inner and outer edges to compress a localized portion of said strip when the door is closed, and means for enclosing the portion of said strip adjacent its inner edge, said means being removably secured to the door and terminating in a laterally extending portion overlapping the outer face of the strip, said flange when the door is closed being in contiguous relation with said portion of said means so as to provide a barrier preventing flames reaching said strip from the inside of the door.

3. 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 door inside of said marginal flanges with its inner face in overlapping relation with the inner face of the door, a rigid backing for the inner face of said strip, a flange surrounding the opening to be closed by the door, the outer edge of said flange being engageable with said strip intermediate its inner and outer edges for compressing a localized portion of the strip against said backing when the door is closed, and means rigid with the door forming with said backing a housing for the portion of the strip adjacent its inner edge, said means having a portion overlying the outer face of the strip, and said flange when the door is closed being in contiguous relation with said portion of said means so as to provide a barrier preventing flames reaching said strip from the inside of the door.

4. 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 door inside of said marginal flanges with its inner face in overlapping relation with the inner face of the door, a rigid backing for the inner face of said strip, a flange surrounding the opening to be closed by the door, the outside edge of said marginal flange being engageable with said strip intermediate its inner and outer edges for compressing a localized portion of the strip against said backing when the door is closed, and means carried by the door having angularly disposed portions respectively arranged in overlapping relation with the inner side edge of the strip and with the

outer face of the strip adjoining said side edge, said flange when the door is closed being in contiguous relation with the portion of said means overlapping the outer face of the strip so as to provide a barrier preventing flames reaching said strip from the inside of the door.

5. 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 door inside of said marginal flanges with its inner face in overlapping relation with the inner face of the door, a flange surrounding the opening to be closed by the door, the outer edge of said flange being engageable with said strip intermediate its inner and outer edges for compressing a localized portion of the strip when the door is closed, and a member carried by the door having a web and oppositely projecting flanges, one of the flanges of said member being secured to the door adjacent the inner side edge of said strip and the other flange of said member being arranged in overlapping relation with the outer face of the strip adjoining the said side edge thereof, the flange surrounding the door opening being in contiguous relation with said last named flange of said member when the door is closed so as to provide a barrier preventing flames reaching said strip from the inside of the door.

6. 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 the marginal flanges thereof, a member rigid with said marginal flanges affording a backing for the inner face of said strip, a flange surrounding the opening to be closed by the door engageable with said strip intermediate its inner and outer edges for compressing the strip against said backing when the door is closed, and means mounted on said member for enclosing the portion of said strip adjacent its inner edge, said means having a portion overlapping the outer face of said strip, and said flange when the door is closed being in contiguous relation with said portion of said means so as to provide a barrier preventing flames reaching said strip from one side of the door.

7. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material mounted on the door with its inner face in overlapping relation with the inner

face of the door, a flange surrounding the opening to be closed by the door engageable with said strip intermediate its inner and outer edges for compressing the strip when the door is closed, and means rigid with the door affording a housing for said strip, said means having laterally spaced portions respectively overlapping the outer face of said strip, said flange when the door is closed extending between said laterally spaced portions into engagement with the sealing means and being in contiguous relation with both of said portions so as to provide a barrier preventing flames on either side of the door from reaching said strip.

8. Sealing means for a door, hatch or other closure including a strip of relatively flexible sealing material mounted on the door with its inner face in overlapping relation with the inner face of the door, a flange surrounding the opening to be closed by the door engageable with said strip intermediate its inner and outer edges for compressing the strip when the door is closed, members rigid with the door respectively having portions projecting toward each other in overlapping relation with the outer face of said strip, said flange when the door is closed being adapted to extend between said portions into engagement with the sealing strip and being in contiguous relation with both of said portions so as to provide a barrier preventing flames on either side of the door from reaching the strip.

9. 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 one face of the door, a member rigid with said marginal flanges having a portion extending from the outer side edge of the strip into overlapping relation with the outer face of the strip, an additional member carried by the door having a portion extending from the inner side edge of the strip into overlapping relation with the outer face of the strip, and a flange surrounding the opening to be closed by the door adapted to extend between said portions of said members when the door is closed into engagement with said strip for compressing it, said flange being in contiguous relation with the said portions of both of said members when the door is closed so as to provide a barrier preventing flames on either side of the door from reaching the strip.

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