

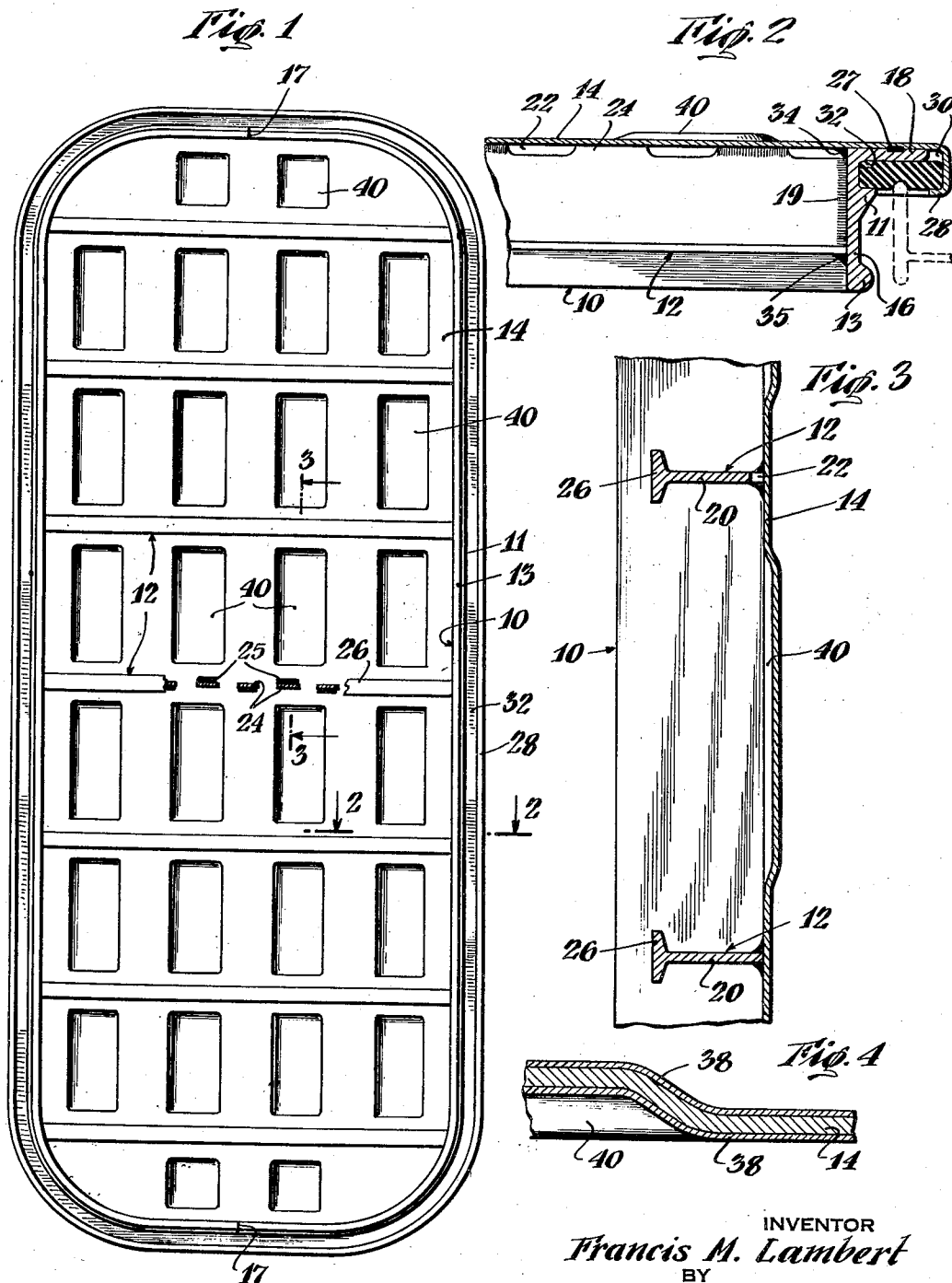
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CORROSION RESISTING BUILT-UP CLOSURE AND METHOD OF MAKING SAME

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CORROSION RESISTING BUILT-UP CLOSURE AND METHOD OF MAKING SAME

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This invention relates to corrosion resisting built-up or assembled closures of a type suitable for use as ship doors or hatch covers and the method of making same.

5 In fabricating a ship door or hatch cover of metal, such as wrought iron, steel, or the like, it is important that the built-up structure be provided with a protective coating or otherwise treated to provide it with corrosion resisting surfaces. In applying or forming the protective coating or surface by some of the more desirable methods, such as hot galvanizing or a form of the well known black oxidizing process, it is necessary to subject the built-up structure to relatively high temperatures varying somewhat with the method used and the type of coating or treatment applied. For example, in hot dip galvanizing a temperature of at least 790° F. is required. Likewise, in some cases, as for example when employing aluminum and various other non-ferrous metals or alloys as the construction material, it is sometimes desirable to subject the fabricated structure to a heat treatment to relieve strains set up in welding or to otherwise improve the properties of the metal.

Where built-up structures have been subjected to relatively high temperatures, such as encountered in hot dip galvanizing, spraying of molten metal, black oxidizing or various forms of heat treatment, the thinner sheet metal panel portions of the built-up structure have heretofore been found to have an undesired fullness after completion of the hot processing. This fullness of the sheet metal portions may arise because of the quicker cooling of the thinner sheet metal portions as compared with the heavier section of the supporting frame members with the result that the sheet metal in cooling from the relatively high temperature tends to contract so much more rapidly than the frame as to place it under a state of tension such that when the frame members have cooled the thin panel portion will tend to bulge and present the undesirable fullness.

One of the objects of the present invention is to provide a new method of making fabricated closures of the type suitable for use as ship doors or hatch covers, wherein the surfaces thereof are rendered corrosion resistant and any fullness occurring in the panel portion thereof is removed.

Another object of the invention is to provide an improvement in the manufacture of corrosion resisting built-up closures having panel portions and supporting frame portions of unequal cross-section wherein the surfaces thereof are coated

by a corrosion resisting substance by hot processing and any fullness caused in the panel portion thereof by the temperature of the hot process is removed by an embossing operation without cracking or otherwise injuring the coating thereon.

Additional objects and advantages of the invention will become apparent upon consideration of the following detailed description and appended claims when read in connection with the accompanying drawing, in which:

Fig. 1 is a view in elevation with parts broken away of a door or hatch cover construction embodying the invention as viewed toward the inner face thereof;

Fig. 2 is an enlarged sectional view of the edge portion thereof taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view of another portion of the door or hatch cover taken on line 3—3 of Fig. 1; and

Fig. 4 is an enlarged sectional view of a portion of the panel indicating a protective coating thereon.

Figs. 1 to 3 of the drawing show, for purposes of illustration, a built-up ship door constructed in accordance with my invention which is able to resist great pressure without buckling and which lends itself readily to hot galvanizing and similar coating processes, as well as to other protective surfacing treatments employing elevated temperatures. While the supporting frame may take different forms, I shall illustrate the invention by reference to a construction embodying a frame of the type disclosed in Design Patent No. 118,162. The door construction comprises a skeleton frame formed of a continuous marginal stiffening member 10 and a plurality of reinforcing ribs 12 with the ends thereof welded to the inner surface of the marginal stiffening member 10. A relatively thin sheet of ordinary carbon steel or other suitable metal is secured on one side of the skeleton frame and turned about the peripheral edge of the marginal member to form a panel portion 14. By way of example, the door illustrated is made up of a marginal stiffening member 10 and reinforcing ribs having a thickness of .25" and a panel having a thickness of .078".

The marginal stiffening member 10 is shown as including a pair of flanges 16 and 18 extending at right angles to each other and generally resembling an L in cross-section. The outward face of the flange 16 is provided with a laterally extending projection 11 suitably spaced from the

flange 18 so as to cooperate therewith in retaining the usual sealing gasket, as more fully hereinafter described. The projection 11 also serves to stiffen the frame. The free end of the flange 16 is thickened and rounded, as at 13 to further stiffen that portion of the frame. The marginal member 10 comprises two lengths of the L-shaped material suitably bent to produce the rounded corners.

The frame is shown as provided with a plurality of reinforcing ribs 12, T-shaped in cross-section. These ribs are welded to the inner surface of the flange 16 of the marginal stiffening member 10, as indicated at 19, Fig. 2. The edges of the web portions 20 of the T-shaped ribs 12 adjacent their line of contact with the panel are provided with cut-outs forming transverse channels 22 at spaced intervals longitudinally thereof, whereby liquid, molten metal or like substance may readily drain from pockets and interstices presented by the fabricated structure when subjected to a coating process to be hereinafter described. The edge portions 24 between the channels 22 may be secured by arc welding in a staggered manner to the panel 14, as shown at 25 in Fig. 1, or may be welded to the panel 14 on both sides of the T stiffener.

The panel 14 besides being welded to the portions 24 of the ribs 12 is secured by a continuous seam weld 27 to the adjacent surface of the flange 18 of the marginal member 10. The outer edge of the panel is turned at right angles about the peripheral edge of the flange 18 and extends parallel to the flange 16 for a short distance where it is turned inwardly at 28 toward the flange 16 to form therewith a channel 30 to receive a sealing gasket 32. The laterally extended projection 11 on the outward face of flange 16 cooperates with the turned edge 28 to retain the gasket 32 in the channel 30.

Additional arc welds are made as at 34 between the panel 14 and the upper inner edge of the marginal stiffening member, as shown in Fig. 2. These welds may be intermittent or continuous. Welds 35 are also provided between the flange portions 26 of the ribs 12 and the adjacent flange 16.

Before treating the surfaces of the built-up closure, it is of course important that the surfaces be cleaned of all rust, scale, grease, and dirt. Such cleaning may be effectively performed by the well known pickling bath. The passages formed by the cut-outs 22 in the reinforcing ribs 12 permit the liquid of the bath, loosened dirt and scale to drain from pockets or interstices presented by the shape of the ribs 12 and their interconnected relation with the stiffening member 10 and panel 14. After removing the built-up closure from the pickling bath and associated washing and drying process, the closure may be sprayed with a coating of molten metal, hot dip galvanized, or otherwise treated, such as by one of the well known forms of black oxidizing, to render the surfaces thereof resistant to corrosive influences. Where a protective coating is applied, such as by immersing the structure in a bath of coating material, the passages formed by the channels 22 also function to enable surplus coating material to drain effectively from the fabricated structure.

The built-up closure is subjected during hot dip galvanizing and similar coating processes to heat of a degree and amount sufficient to cause considerable expansion of the metal of which the closure is made. In cooling, the panel portion being relatively thin, cools first and shrinks until

it reaches atmospheric temperature. The heavier frame and rib members cool more slowly. As they cool they likewise shrink, and as a consequence the whole structure is reduced in size. As these heavier members contract, the panel embraced by the stiffening frame cannot be compressed on account of the thinness of the sheet of metal of which it is made, and consequently it buckles or bulges and shows an undesirable fullness.

This fullness of the panel portions, while not weakening the door construction to any appreciable extent, presents an undesirable appearance. To remove this fullness of the panel portions, an embossment either in the form of paneling, beading, corrugations, or other decorative relief, may be impressed into the panel. In the embodiment illustrated, a form of paneling is shown comprising a plurality of rectangular depressions 40 impressed into the panel 14 on the inner face thereof. Such paneling, however, as well as other forms of embossment, may be impressed into the panel 14 from the outer face thereof, if desired.

Where the embossment is impressed after the hot coating process, such as hot galvanizing, for example, care must be taken not to crack the coating 32, Fig. 4, at the edges of the paneling or other form of embossment. I may avoid cracking the galvanizing or other coating, as the case may be, by forming a die with surface portions of rubber or similar substance in accordance to the relief desired. The edges of the die being resilient operate to spread the strain of the embossing operation so as not to injure the coating contained on the surfaces of the panel. However, if the edges of the die are suitably rounded, the rubber facing may be omitted. Thus, when the built-up product has become sufficiently cooled and the coating hardened, it may be placed in a suitable die and depressions or other relief impressed into the panel to remove the fullness therefrom without danger of cracking the coating. In a door made of members of the relative thicknesses referred to in the specific example hereinbefore mentioned, the undue fullness will be satisfactorily removed by producing spaced embossed areas $\frac{1}{4}$ " in depth.

It is to be understood that the novel features of my invention are not limited to watertight door constructions, but may be utilized to advantage in any fabricated door or like structure incorporating metallic parts of various sizes and thickness. Where the structure need not be watertight, the panel 14 may be perforated or of expanded metal and the peripheral edge thereof turned about the peripheral flange 18 of the marginal stiffening member 10 and welded or otherwise secured to the inner side thereof and the packing 32 omitted.

Since many changes can be made in the above construction and method, and as many apparently widely differing embodiments of this invention can be made without departing from the scope thereof, all matter contained in the above description or shown in the drawing is to be interpreted as illustrative and not as restrictive, except in so far as is necessitated by the prior art and the scope of the appended claims.

I claim:

1. In the manufacture of a built-up metal ship door or hatch cover comprising a panel portion and a supporting frame, in which said frame comprises elements of relatively heavy cross-section as compared with said panel, the steps which comprise forming a corrosion resisting

surface on the door structure, after it has been built up, by a surface treatment conducted at a temperature of at least 790° F., allowing the door to cool to atmospheric temperature, and thereafter embossing said panel to remove bulges or fullness developed therein in the course of the cooling of the door from the temperature of the surfacing treatment.

2. In the manufacture of a built-up metal ship door or hatch cover comprising a panel portion and a supporting frame, in which said frame comprises elements of relatively heavy cross-section as compared with said panel, the steps which comprise immersing the door structure, after it has been built up, in a bath of molten metal and thereby forming a protective coating over the entire door assembly, allowing the door to cool to atmospheric temperature, and thereafter embossing said panel to remove the bulges or fullness developed therein in the course of the cooling of the door from the coating temperature.

3. In the manufacture of a built-up metal ship door or hatch cover comprising a panel portion and a supporting frame, in which said frame comprises elements of relatively heavy cross-section as compared with said panel, the steps which comprise immersing the door structure, after it has been built up, in a bath of molten zinc and thereby forming a protective coating over the entire door assembly, allowing the door to cool to atmospheric temperature, and thereafter subjecting said panel to a controlled embossing treatment to remove bulges or fullness developed therein in the course of the cooling of the door from the coating temperature.

4. In the manufacture of a built-up metal ship door or hatch cover comprising a panel portion and a supporting frame, in which said frame comprises elements of relatively heavy cross-section as compared with said panel, the steps which comprise forming a corrosion resisting surface on the door structure, after it has been built up, by a surface treatment involving heating of the structure throughout to a temperature of at least about 790° F., allowing the structure to cool to atmospheric temperature, and thereafter confining said panel in a resilient embossing die to produce embossed or raised areas thereon and thereby remove the undesired fullness developed in said panel in the course of the cooling of the door from the temperature of the surfacing treatment.

5. In the manufacture of a built-up metal ship door or hatch cover comprising a panel portion and a supporting frame, in which said frame comprises elements of relatively heavy cross-section as compared with said panel, the steps which comprise subjecting the door structure, after it has been built up, to a hot dip metal coating treat-

ment in which said structure is brought to the temperature of the coating bath, allowing the door to cool to atmospheric temperature, and thereafter confining said panel in a resilient embossing die to produce thereon a plurality of regularly spaced raised areas and thereby removing the undesired fullness developed in said panel in the course of the cooling of the door from the temperature of the coating bath.

6. In the manufacture of a built-up metal ship door or hatch cover comprising a panel portion and a supporting frame, in which said frame comprises elements of relatively heavy cross-section as compared with said panel, the steps which comprise assembling said panel and frame into an integral built-up structure, forming a corrosion resisting surface on said built-up structure by a surface treatment in which said structure is brought to a temperature of at least about 790° F., allowing the door to cool to atmospheric temperature, and thereafter subjecting said panel to a controlled embossing treatment to produce thereon a plurality of spaced raised areas sufficient to remove the fullness caused in said panel by the heat treatment while at the same time preventing cracking of the corrosion resisting surface.

7. A built-up metal closure suitable for use as a ship door or hatch cover, comprising a relatively thin metal panel and a relatively thick marginal stiffening member secured to said panel adjacent the edge thereof, said built-up closure having a corrosion resisting surface extending continuously over the entire structure and formed by a surface treatment in which said built-up structure is heated to at least 790° F., said panel also being characterized by the metallographic structure characteristic of a material of like composition that has been stretched during cooling from a temperature of at least 790° F., and being further characterized by a plurality of spaced embossed areas formed thereon after the surface treatment has been applied.

8. A built-up metal closure suitable for use as a ship door or hatch cover, comprising a relatively thin metal panel and a relatively thick marginal stiffening member secured to said panel adjacent the edge thereof, said built-up closure having a coating of corrosion resisting metal thereon extending continuously over the entire assembly of the elements thereof and having been applied by a hot dip treatment, said panel being characterized by the metallographic structure characteristic of a material of like composition that has been stretched during cooling from a temperature of at least about 790° F. and being further characterized by a plurality of spaced embossed areas formed thereon after the hot dip coating treatment.

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