

FIRE PROTECTION DOOR ASSEMBLY

Background of The Invention

1. Field of the Invention

The present invention relates to a fireprotection door assembly, and more particularly to a fireprotection door assembly having fireprotection material filled therein.

2. Description of the Related Art

R.O.C. Utility Model Pat. No. 82,036 discloses a door comprising two plates and a plurality of studs. The studs are mounted between the plates to define a cabin, one of studs has a hole thereon for connecting the cabin. A plurality of ribs are provided in the cabin to form a frame of the cabin. Polyurethane is filled in the cabin through the hole. R.O.C. Utility Model Pat. No. 107,146 discloses a door comprising two plates, a plurality of studs, a lock reinforcement member and two hinge reinforcement members. The lock reinforcement member and the hinge reinforcement members are mounted on the two sides of the plates.

However, neither Utility Model Pat. No. 82,036 nor Utility Model Pat. No.107,146 has the fireprotection function. The present invention intends to provide a seal and a fire-protecting material to mitigates and overcome the above problem.

Summary of The Invention

The primary object of this invention is to provide a fireprotection door assembly comprising fireprotection material filled in the door assembly.

The secondary object of this invention is to provide a fireprotection door assembly comprising a fire-protecting strip attached between the door plate and the door frame so as to block smoke and flame of fire to flow through the gap between the door and the doorframe.

In accordance with the present invention, a fireprotection door assembly comprises a first door skin, a second door skin, a top stud, a bottom stud, a left stud, a right stud, a reinforcement member and a plurality of fire-protecting strip. The door

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REPLACED

skins and are made of the material selected from sheet molding compound of glass fiber, wood, and steel. The rear surface of the door skins should be rough surface for increasing the adherence ability. The top stud, the bottom stud, the left stud and the right stud are made of the material selected from PVC foam profile, wood, steel and injected plastics. When assembled, the studs are mounted to the edge of the first door skin by the adhesive, and the reinforcement member is disposed at the lock and handle position to enhance the mechanical strength around the lock and handle position. Two ends of the left stud and the right stud have recessions to receive the end of the top stud and the bottom stud while assembling to form a cabin therebetween. The bottom stud is then drilled with a hole (not shown) through which the fire-protection material is filled into the cabin. The fireprotection material further comprises a hardening agent such that the fireprotection material will be solidified in the cabin between the door skins to block the fire flame.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Brief Description of the Drawings

The present invention will now be described in detail with reference to the accompanying drawings wherein;

Fig. 1 is a front view of a fire-protection door in accordance with a first embodiment of the present invention;

Fig. 2 is a sectional view, along line 2-2, of the fire-protection door in accordance with the first embodiment of the present invention;

Fig. 3 is a sectional view, along line 3-3, of the fire-protection door in accordance with the first embodiment of the present invention;

Fig. 4 is a front view of a fire-protection door in accordance with a second embodiment of the present invention;

Fig. 5 is a sectional view, along line 5-5, of the fire-protection door in accordance with the second embodiment of the present invention;

Fig. 6 is a sectional view, along line 6-6, of the fire-protection door in accordance with the second embodiment of the present invention;

Fig. 7 is an exploded perspective view of a fire-protection door in accordance with the first embodiment of the present invention; and

Fig. 8 is an exploded perspective view of a fire-protection door in accordance with the second embodiment of the present invention.

Detailed Description of the Invention

Referring to Figs. 1 through 3, a fireprotection door assembly in accordance with the first embodiment of the present invention comprises a first door skin 11, a second door skin 12, a top stud 13, a bottom stud 14, a left stud 15, a right stud 16, a reinforcement member 17 and a plurality of fire-protecting strip 18. The thickness of the first door skin 11 and the second door skin 12 is about 1 to 4 mm and the four edges of each door skin are smooth surfaces for tightly adhered to the top stud 13, the bottom stud 14, the left stud 15, and the right stud 16. The door skins 11 and 12 are made of the material selected from sheet molding compound of glass fiber, wood, and steel. The front surface of the door skins 11, 12 can be smooth surface or with wood pattern and the rear surface of the door skins 11 and 12 should be rough surface for increasing the adherence ability. The top stud 13, the bottom stud 14, the left stud 15 and the right stud 16 are made of the material selected from PVC foam profile, wood, steel and injected plastics.

When assembled, the studs 13, 14, 15, 16 are mounted to the edge of the first door skin 11 by the adhesive, and the reinforcement member 17 is disposed at the lock and handle position to enhance the mechanical strength around the lock and handle position. Two ends of the left stud 15 and the right stud 16 have recessions to receive the end of the top stud 13 and the bottom stud 14 while assembling to form a cabin therebetween. The bottom stud 14 is then drilled with a hole (not shown) through which the fire-protection material 20 is filled into the cabin. The fireprotection material 20 further comprises a hardening agent such that the fireprotection material 20 will be solidified in the cabin between the door skins 11 and 12 to block the fire flame. When on fire, the door skins 11, 12 will be burn away, however, the

fireprotection material 20, including phenol and formaldehyde, will not burn up and thus forms a block wall for the fire. In order to increase the adhesion of the fireprotection material 20 to the door skins, the fireprotection material 20 further comprises agglutinating agent to prevent it from stripping from the door skins 11, 12.

The fireprotection material 20 mainly comprises phenol and formaldehyde which are mixed to form phenol-formaldehyde resin. The fire-protection material 20 further comprises hardening agent, such as acid, vesicant, such as dichloromethane or pentane, and agglutinating agent, such as polyvinyl acetate or magma. The proportion of compound in the fire-protection material 20 is as follow:

Compound 1: 35%~45% by weight of phenol;

Compound 2: 35%~45% by weight of formaldehyde;

Hardening agent: 10%~30% by weight of acid;

Vesicant: 0.01%~2% by weight of dichloromethane or pentane; and

Agglutinating agent: 1%~5% by weight of polyvinyl acetate or magma.

Referring to Fig. 7, in order to block smoke and flame of the fire to flow through a gap between the door and the doorframe (not shown), the top stud 13, the bottom stud 14 and the left stud 15 have a groove therein so as to receive the fire-protecting strip 18. The fire-protecting strip 18 seals the gap between the door and the doorframe while closing the door.

Referring to Figs. 4 through 6, a fire-protection door in accordance with the second embodiment of the present invention comprises a first door skin 21, a second door skin 22, a top stud 23, a bottom stud 14, a left stud 24, a right stud 25, a reinforcement member 17 and a plurality of fire-protecting strip 18. The left edge and right edge of the door skins 21, 22 are provided with a rib 26 and a groove 27 respectively, and the top edge of the door skins 21, 22 are provided with another rib 28 and groove 29 respectively. The top stud 23, the bottom stud 14, the left stud 24 and the right stud 25 together define a cabin between the edge of the first door skin 21 and the second door skin 22. The thickness of the first door skin 21 and the second door skin 22 is about 1 to 4 mm and the four edges of each door skin are smooth surfaces

for tightly adhered to the top stud 23, the bottom stud 14, the left stud 24, and the right stud 25. The door skins 21 and 22 are made of the material selected from sheet molding compound of glass fiber, wood, and steel. The front surface of the door skins 21, 22 can be smooth surface or with wood pattern and the rear surface of the door skins 21 and 22 should be rough surface for increasing the adherence ability. The top stud 23, the bottom stud 14, the left stud 24 and the right stud 25 are made of the material selected from PVC foam profile, wood, steel and injected plastics.

When assembled, the studs 23, 14, 24, 25 are mounted to the edge of the first door skin 21 by the adhesive, and the reinforcement member 17 is disposed at the lock and handle position to enhance the mechanical strength around the lock and handle position. The ribs 26, 28 are respectively attached to the grooves 27, 29 with the adhesive. The bottom stud 14 is then drilled with a hole (not shown) through which the fire-protection material 20 is filled into the cabin. The fireprotection material 20 further comprises a hardening agent such that the fireprotection material 20 will be solidified in the cabin between the door skins 21 and 22 to block the fire flame. When on fire, the door skins 21, 22 will be burn away, however, the fireprotection material 20, including phenol and formaldehyde, will not burn up and thus forms a block wall for the fire. In order to increase the adhesion of the fireprotection material 20 to the door skins, the fireprotection material 20 further comprises agglutinating agent to prevent it from stripping from the door skins 21, 22.

The fireprotection material 20 mainly comprises phenol and formaldehyde which are mixed to form phenol-formaldehyde resin. The fire-protection material 20 further comprises hardening agent, such as acid, vesicant, such as dichloromethane or pentane, and agglutinating agent, such as polyvinyl acetate or magma. The proportion of compound in the fire-protection material 20 is as follow:

Compound 1: 35%~45% by weight of phenol;

Compound 2: 35%~45% by weight of formaldehyde;

Hardening agent: 10%~30% by weight of acid;

Vesicant: 0.01%~2% by weight of dichloromethane or pentane; and

Agglutinating agent: 1%~5% by weight of polyvinyl acetate or magma.

As shown in Fig. 8, in order to block smoke and flame of the fire to flow through a gap between the door and the doorframe (not shown), the top stud 23, the bottom stud 14 and the left stud 24 further provides a groove (not labeled) so as to receive the fire-protecting strip 18. The fire-protecting strip 18 seals the gap between the door and the doorframe while closing the door.

Although the invention has been described in detail with reference to its presently preferred embodiment, it will be understood by one of ordinary skill in the art that various modifications can be made without departing from the spirit and the scope of the invention, as set forth in the appended claims.

What is claimed is:

1. A fireprotection door assembly comprising:
 two door skins having a lock and handle portion;
 a top stud, a bottom stud, a left stud, and a right stud disposed between the two door skins and defining a cabin therebetween
 a reinforcement member disposed between the two door skins around the lock and handle portion to enhance the strength thereof, and
 a fireprotection material filled in the cabin between the door skins, the top stud, the bottom stud, the left stud, and the right stud.
2. The fireprotection door as defined in Claim 1, wherein the fireprotection material comprising 35%~45% by weight of phenol, 35%~45% by weight of formaldehyde, 10%~30% by weight of acid, 0.01%~2% by weight of dichloromethane or pentane, and 1%~5% by weight of polyvinyl acetate or magma.
3. The fireprotection door as defined in Claim 1, wherein the surfaces of the two door skins facing the studs are rough surfaces.
4. The fireprotection door as defined in Claim 1, wherein the stud made of PVC, wood, steel, and plastic.
5. The fireprotection door as defined in Claim 1, wherein the top stud, the bottom stud and the left stud have a recess for receiving a fire-protecting strip therein.
6. A fireprotection door assembly comprising:
 two door skins having a lock and handle portion, each door skin having a top edge, a right edge, a left edge and a bottom edge, one of the door skin having a rib on the top edge, the right edge, and the left edge and the other door skin having a groove on the top edge, the right edge, and the left edge for receiving the rib of the corresponding edges;
 a top stud, a bottom stud, a left stud, and a right stud disposed between the two door skins and defining a cabin therebetween



a reinforcement member disposed between the two door skins around the lock and handle portion to enhance the strength thereof; and

a fireprotection material filled in the cabin between the door skins, the top stud, the bottom stud, the left stud, and the right stud.

7. The fireprotection door as defined in Claim 6, wherein the fireprotection material comprising 35%~45% by weight of phenol, 35%~45% by weight of formaldehyde, 10%~30% by weight of acid, 0.01%~2% by weight of dichloromethane or pentane, and 1%~5% by weight of polyvinyl acetate or magma.
8. The fireprotection door as defined in Claim 6, wherein the surfaces of the two door skins facing the studs are rough surfaces.
9. The fireprotection door as defined in Claim 6, wherein the stud made of PVC, wood, steel, and plastic.
10. The fireprotection door as defined in Claim 6, wherein the top stud, the bottom stud and the left stud have a recess for receiving a fire-protecting strip therein.

