

- [54] **GLAZING STRIP**
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Related U.S. Application Data

- [63] Continuation of Ser. No. 831,407, June 9, 1969, abandoned.

[30] Foreign Application Priority Data

June 11, 1968 Great Britain27661/68

- [52] U.S. Cl..... 52/232, 52/616, 52/627, 52/727, 161/205, 161/403
 [51] Int. Cl..... E04c 2/04, E06b 1/08
 [58] Field of Search..... 52/232, 172, 616, 52/627, 727; 117/126 AB, 136; 161/205, 403

[56] References Cited

UNITED STATES PATENTS

- | | | | |
|-----------|---------|----------------|--------|
| 2,341,906 | 2/1944 | Cowbourne..... | 52/210 |
| 621,542 | 3/1899 | Sheppard..... | 52/398 |
| 1,739,754 | 12/1929 | Foster..... | 52/368 |

- | | | | |
|-----------|---------|---------------------|----------|
| 2,910,739 | 11/1959 | Snitker..... | 52/232 X |
| 3,167,823 | 2/1965 | Palfey..... | 52/398 X |
| 3,404,499 | 10/1968 | Lewis..... | 52/616 X |
| 3,426,491 | 2/1969 | Gaeth et al. | 52/232 X |
| 3,543,460 | 12/1970 | Stastny et al. | 52/232 |

FOREIGN PATENTS OR APPLICATIONS

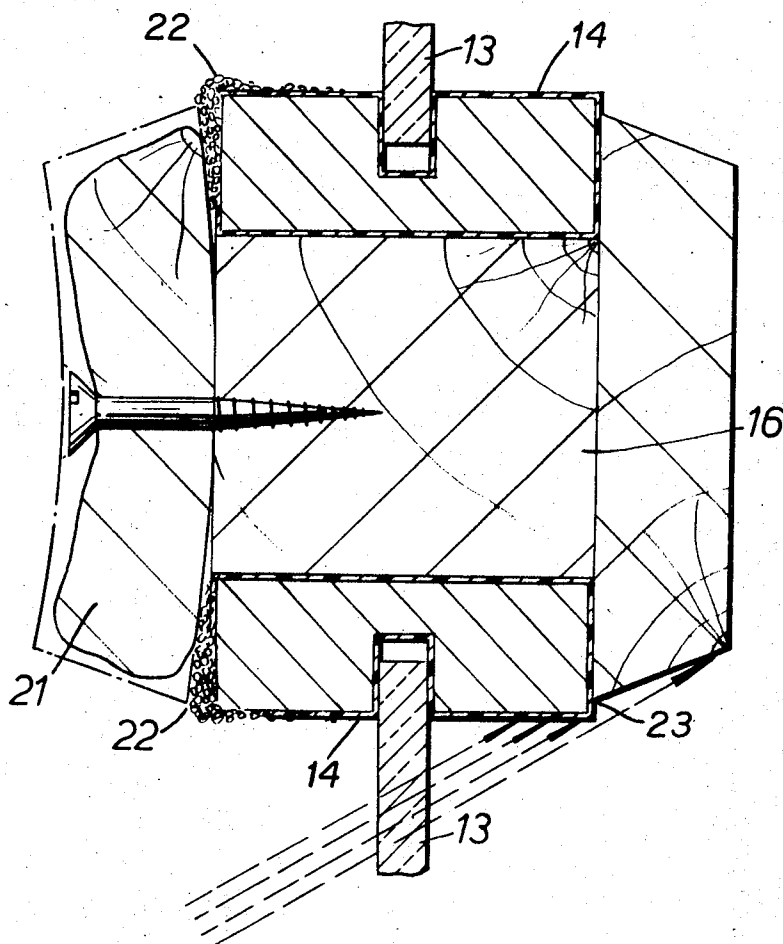
- | | | | |
|-----------|---------|--------------------|---------|
| 569,891 | 2/1959 | Canada..... | 161/403 |
| 1,280,800 | 11/1961 | France..... | 52/656 |
| 805,954 | 12/1958 | Great Britain..... | 52/498 |
| 168,225 | 8/1959 | Sweden..... | 52/616 |

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[57] ABSTRACT

This invention is a grooved glazing strip of non-combustible, poor heat-conducting material for enabling a glazed timber panel to have good resistance against fire spreading from one side to the other. The glazing strip can prevent heat being convected through the panel and may have a coating which expands when heated to seal any gaps which appear following distortion or burning of the timber.

10 Claims, 13 Drawing Figures



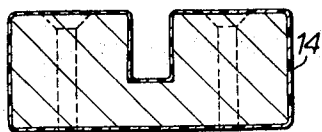


FIG. 1A

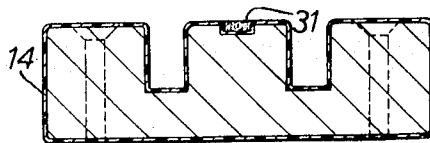


FIG. 1B

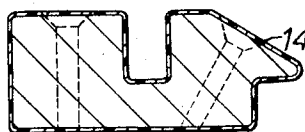


FIG. 1C

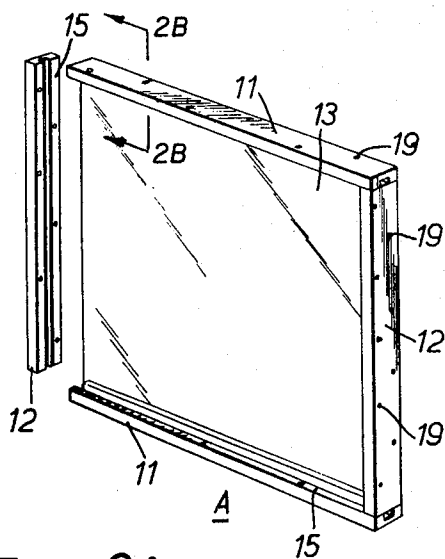


FIG. 2A

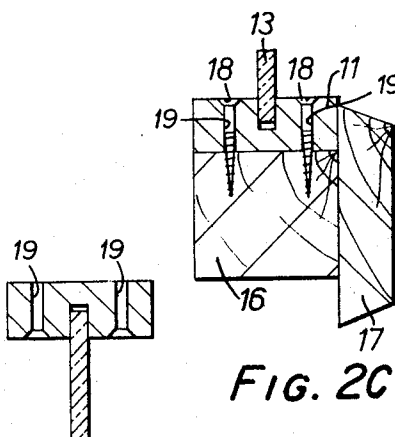


FIG. 2B

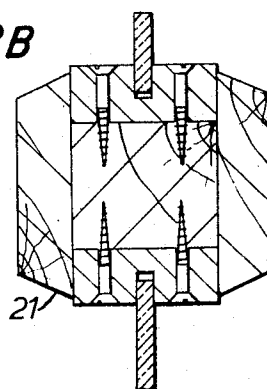


FIG. 2D

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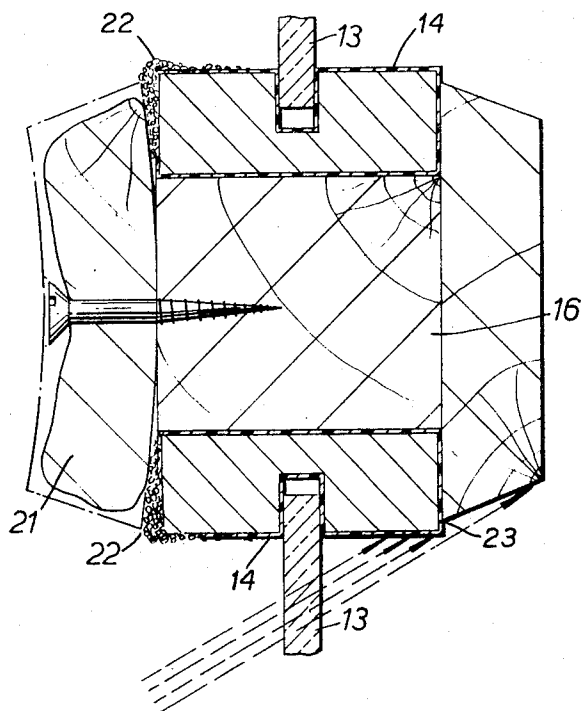


FIG. 3A

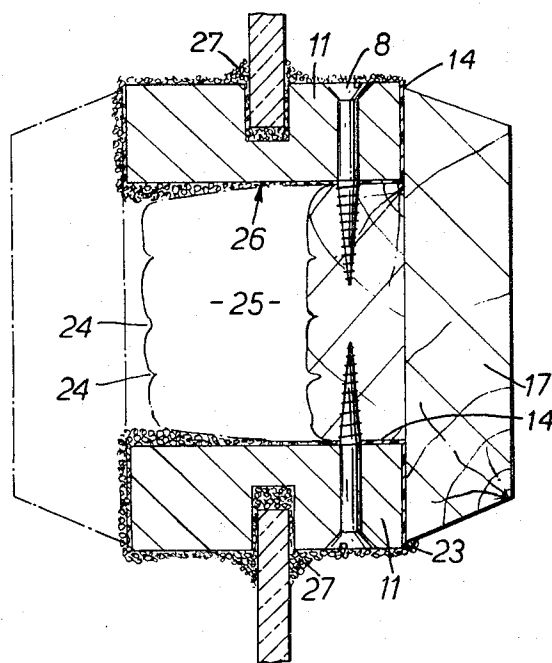


FIG. 3B

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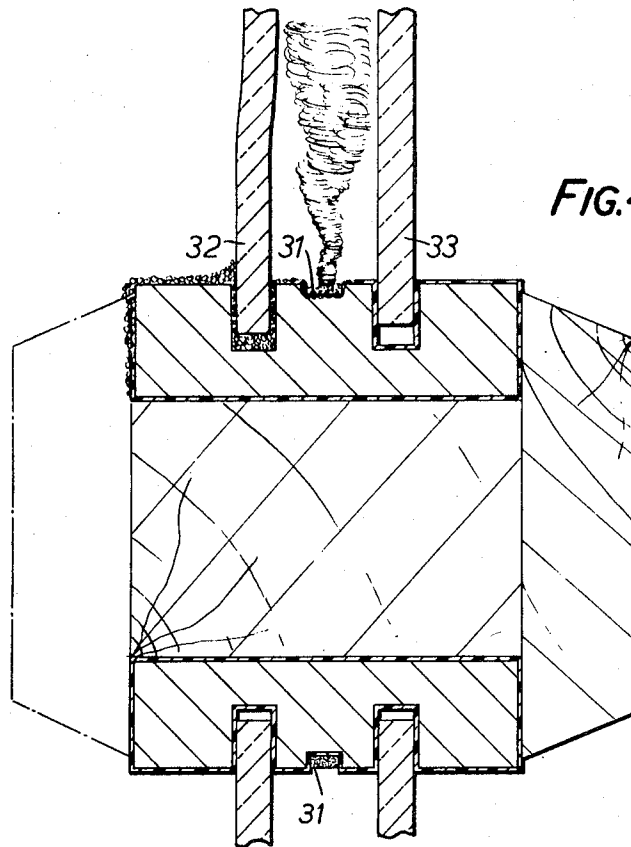


FIG. 4

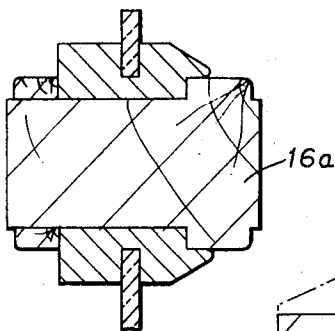


FIG. 5A

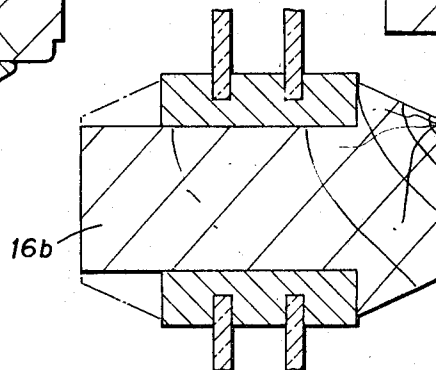


FIG. 5B

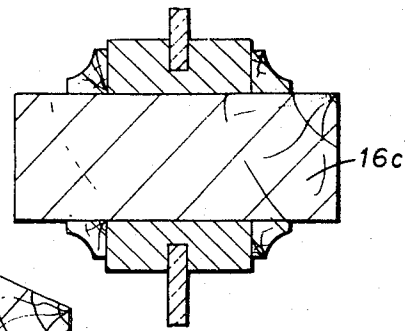


FIG. 5C

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GLAZING STRIP

This is a continuation of application Ser. No. 831,407 filed June 9, 1969 and now abandoned.

This invention relates to a glazing strip for fixing fire resistant glass into timber or other frames which can be charred or otherwise depleted by fire and an object is to provide a strip which enables a timber-framed window, glazed screen or glass door for example, to have good overall resistance against the spread of fire from one side to the other.

Timber is a desirable structural material because it can give a naturally decorative effect quite economically and it is clearly advantageous if a method can be found of using timber while providing means for rendering a glazed panel much more resistant to fire spreading than would normally be the case with such a material.

According to the present invention glazing strip is formed of a non-combustible and poor heat conducting material with a groove for the accommodation of a sheet of glass. The material conveniently carries on external surfaces a coating which swells when heated. The coating could be on all surfaces of the section of the strip, but is preferably at least on the internal surfaces of the groove.

If a fire starts on one side of a glazed panel embodying glazing strips according to the invention the heat will cause the material to swell so that it will fill cracks as they occur due to deformation of the glass or the timber or other framework to prevent flue effects and restrict the transfer of heat to the other side of the panel, and also to maintain the glass firmly held in the groove even if the groove deforms.

Preferably the material is one which is also deformable at ambient temperatures so that when the glass is inserted in the groove a good snug fit can be ensured by reason of the deformable material between the groove and the glass.

One form of glazing strip has double grooves for double glazing, and then it is possible to include between the grooves means which will generate smoke when heated so that when a fire starts on one side of the panel even if one glass cracks the heat will cause smoke to be generated between the sheets of glass and this will restrict radiation of heat to the other side.

The face of the strip opposite the grooved face could be plane, or stepped, for easy insertion in the reveals of a timber frame.

Preferably a panel is assembled with a sheet of glass in a local frame built up from the glazing strip and with clearance between the edges of the glass and the bottom of the grooves in the strip. The local frame consisting of the glass in the glazing strip can then be inserted in the timber framework of a door, window or other panel.

The cross section of a local frame is preferably rectangular so that where the strips meet at corners a tight butt joint can easily be made.

Preferably holes for fixing screws are provided in the strip on both sides of the groove or grooves, so that the strips can be retained in good wood at one side even if the wood has been charred away at the other side of the panel.

The invention may be carried into practice in various ways and certain embodiments will now be described

by way of example with reference to the accompanying drawings in which:

FIGS. 1A, 1B, and 1C are cross-sectional views of three samples of strip embodying the invention;

FIG. 2A shows details of a typical frame;

FIG. 2B is a sectional view taken along line 2B—2B of FIG. 2A;

FIG. 2C is a sectional view showing a strip of the frame which mounts a glass panel to a timber frame;

FIG. 2D is a sectional view showing frame strips which mount glass panels to a timber frame;

FIGS. 3A and 3B show progressive effects of the frame in FIG. 2 due to a fire starting on one side of the panel;

FIG. 4 is a view similar to FIG. 3 but with a double glazing arrangement; and

FIGS. 5A, 5B and 5C are cross-sectional views of three alternative methods of mounting the local frame.

The way in which the strip is used is now described in relation to a particular application involving wired plate glass, a timber frame and a strip made of fibre-reinforced gypsum or asbestos with a single groove and dipped in intumescent emulsion paint. The section may be any of those shown in FIGS. 1A, 1B and 1C, and it may be in one piece as shown or may be built up from two or three pieces secured together.

Two strips 11 are cut with square ends and a length corresponding to that of the top or bottom edge of the glass (when fixed) plus twice the overall depth of a bead.

Two other strips 12 are cut with 'square' ends and a length corresponding with that of a vertical edge of the glass when fixed, less about 16 m/m.

The strips are fitted onto the edges of the glass 13 as shown in FIG. 2A, so that (a) the strips abut tightly at the corners and (b) there is a gap of about 3 m/m between the edges of the glass and the back-faces of the grooves 15, in the case of the vertical strips, and of about 6 m/m in case of the top horizontal strip 'W'.

It will be appreciated that the intumescent plastic coating 14 will ensure (a) that there is a tight but compliant fit between the edges of the glass and the side faces of the grooves so that

i. the strips will stay in position when the glass is fixed into the frame,

ii. the possible passage for the flow of combustible gas, between the faces of the strip and the edges of the glass, is sealed, and

iii. thermal expansion of the glass will not break this seal or cause excessive stresses in the glass or frame because there is a gap between the glass and the back face of the channel around three edges of the glass, and (b) that where the butt joints occur one of the abutting faces will be coated with intumescent material.

The glass together with the strips which have been applied to its edges is then inserted into the reveals of the timber frame 16 to stop against a timber cover trim 17, with splayed edges, provided on the far side.

The glazing strips are secured to the frame on both sides of the glass by means of screws 18 in holes 19 in the strip as shown in FIG. 2C.

A timber trim 21 shown in FIG. 2D, with splayed edges, is then secured to the front faces of the timber frame to cover most of the exposed side face of the glazing strip or, in the case of a mullion or transom member of the frame, to cover the exposed side faces of glazing strip applied to adjacent sheets of glass.

The way in which the strip performs its function in fire conditions is now described with reference to FIGS. 3A and 3B in relation to two adjacent sheets of glass fixed as above with particular reference to the behaviour of a mullion 16 between them.

In the first few minutes of a fire (or fire resistance test) the wired glass 13 will expand particularly on the side exposed to the fire and it will crack, but the cracks are likely to be fewer because the glazing strips 11 are designed to accommodate thermal expansion.

In the next few minutes the timber cover strip 21 nearest the fire is likely to flame and will then char at a steady rate and its edges will tend to curl away from the abutting faces of the glazing strips, as shown in FIG. 3A, but this will expose the intumescent plastic coating on these faces to high temperature so that it expands and temporarily seals the gaps at 22 which would otherwise cause acceleration of the depletion of the timber cover strip and frame.

The fire, unless it is accomplished by dense smoke, will emit radiant heat of increasing intensity. A high proportion of this will pass through the glass and would be liable to ignite combustible material in close proximity to the glass on the other side, thus rendering the resistance of the screen, to the passage of fire, ineffective. If the glass were placed directly into a rebate of a timber frame or fixed with timber glazing beads this would happen at a comparatively early stage in a fire, the timber in the critical position being heated by conduction via the glass in addition to radiant heat through it. It will be appreciated that the special glazing strip not only provides a barrier to such conduction but in conjunction with a splayed timber trim 17 slightly retracted at 23 from the area of the glazing strip it masks to a considerable extent the timber on the side of the glass away from the fire, from the effects of radiant heat.

In the course of the fire the cover strip 21 nearest the fire will be burnt away and the timber frame itself will begin to char on that side and the timber will tend to shrink and open up gaps 24 between it and the back faces of the glazing strip. Again the intumescent coating will tend to block the fissures and prevent local flue effects from accelerating the rate of depletion of the timber and prevent the passage of combustible gas through to the other side.

In due course the 'front' of char 25 within the timber frame will leave the screws on the side nearest the fire without a secure hold in the timber frame and will in due course penetrate beyond the plane of the glass. However the screws 18 on the side of the glass away from the fire will still be in sound timber and, by means of the bridge 26 between the two sides of the glazing strip continue to hold it and the glass in position.

After a considerable period of fire exposure, the wired glass will begin to become molten, deform and sag. The method of holding the glass tightly at the edges by means of the glazing strip, in the grooves of which the intumescent material will have expanded as at 27, exerting pressure to grip the semi-molten state to stay in position for a long time.

The glazing strip shown in FIG. 1B previously described as having grooves to accommodate two sheets of glass, with a shallow channel 31 between them containing a smoke producing chemical, will in general perform in the way described above, but being of greater overall width it will fit larger timber sections which could suffer depletion for a longer period.

In addition the double-glazing (consisting of two sheets of wired glass spaced apart) will perform advantageously in relation to fire in the following manner, illustrated in FIG. 4.

5 The sheet 32 nearest the fire will crack at an early stage, but cracking of the second sheet 33 is likely to be delayed for a considerable period.

As the radiant heat from the fire increased, the chemicals deposited in the shallow channel 31, emit dense smoke into the cavity between the sheets which considerably reduce the transmission of radiant heat through the double glazing.

The time at which the sheet 33 furthest from the fire reaches a semi-molten state and finally pulls away from the glazing strip is considerably delayed.

10 FIGS. 5A, 5B and 5C each show different types of timber frames 16a, 16b and 16c to which a single or double window frame is mounted.

The practical uses of glazed constructions incorporating fire resistant glazing strips as described in this application include the following:

the provision of fire resistant glazed doors in buildings, ships and similar structures — in such a case, there may be a flexible seal around the edges of the doors;

the provision of glazed screens for the purpose of containing a fire within a limited compartment of a building, ship or similar structure;

the provision of smoke and fire check doors and screens in the circulation spaces of ships, hotels, theatres, schools and other buildings a structure of a similar nature — particularly when aesthetic and functional characteristics are desired;

the provision of elements to enclose and protect routes for escape from buildings and the circulation spaces of ships;

the provision of glazed parts of external walls to buildings with fire resistance both to internal and external fires, in order to increase the time it would take for a fire to burst through the external wall of that compartment, and penetrate the external wall of a neighbouring one.

In general terms, the advantages claimed for the fire resistant glazing strips described, when incorporated in constructions referred to, are that naturally decorative structural materials such as timber can economically be used in comparatively slender sections to provide barriers to the spread and effects of fire for long periods of time in situations where it is desirable to have through visibility. In particular the strip designed to accommodate a form of double glazing is claimed to provide a barrier to radiant heat of unusual effectiveness as far as glazed constructions are concerned.

Some alternative mullion or transom profiles incorporating the glazing strips are shown in FIG. 5.

What is claimed is:

1. A window frame construction having elongated glazing strips and timber frame members, said glazing strips being formed of non-combustible poor heat-conducting, and thermally stable, material supported by said frame members and having an elongated groove accommodating a sheet of glass, said glazing strips being secured to said timber frame members on both sides of said sheet of glass by means of threaded fasteners, and said glazing strips having a surface coating of intumescent plastic material which, when heated, swells and fills any gaps which may develop between

said glazing strips and said timber strips and between said glazing strips and said glass.

2. The construction, as claimed in claim 1, in which each said strip is of integral construction.

3. The construction, as claimed in claim 1, in which the coating is deformable at ambient temperatures.

4. The construction, as claimed in claim 1, wherein each glazing has double grooves for double glazing.

5. The construction, as claimed in claim 2, wherein means on each said strip for generating smoke when heated is provided between said double grooves.

6. The construction, as claimed in claim 1, wherein each of said strips is comprised of reinforced gypsum.

7. The construction, as claimed in claim 1, wherein each said strip is comprised of asbestos.

8. The construction, as claimed in claim 1, in which said non-combustible and poor heat-conducting material is rigid.

9. The construction, as claimed in claim 1, in which said coating is provided along the surfaces of said groove.

10. The construction, as claimed in claim 1, in which said coating is provided on all the outer surfaces of said glazing strips.

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