

SPECIFICATION

SHEET GLASS ATTACHING CONSTRUCTION AND GLASS WINDOW

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TECHNICAL FIELD

The present invention relates to a sheet glass attaching construction for attaching a sheet glass to a fixed member having a concave groove capable of receiving a peripheral edge of the sheet glass.

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BACKGROUND ART

Conventionally, in a sheet glass attaching construction of this kind, as shown in Fig. 2, a sheet glass 2 is simply fitted into a fixed member 1A having a concave groove capable of receiving a peripheral edge of the sheet glass 2. And, after charging a filling material 7 such as of ceramic fiber into the concave groove 3a, a gap between the concave groove 3a and the peripheral edge is sealed with a sealant 6 or the like.

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However, with the above-described sheet glass attaching construction, in case a window glass is formed using this construction, the construction allows simple and easy installment by simply installing the fixed member, the sheet glass, the filling material and the sealant one after another. However, when the construction is subjected to a stress which pulls the sheet glass out of the concave groove, the sheet glass tends to be removed from the concave groove relatively easily. Normally, because of the rigidity of the sheet glass, such stress will not be applied to the concave groove of the sheet glass attaching construction. However, in the case of occurrence of a fire for instance, the sheet glass will be softened and readily deformed and the sheet glass may be bent due to its self-weight. In such case, a pulling tension will be applied from the sheet glass to the concave

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groove. As a result, there is sometimes developed such stress as above to pull the sheet glass out of the groove.

5 In the occurrence of a fire, if such situation develops, the bending deformation or the like will cause the sheet glass to come off the fixed member, thus establishing communication between two spaces which were partitioned from each other by the sheet glass, so that the fire will spread to the adjacent space, causing a problem in the disaster prevention.

10 Incidentally, in order to solve such problem relating to the disaster prevention, an attempt has been made to prevent fire spreading by means of e.g. heat tempering. However, glasses having low softening points, such as soda-lime glass, have tended to receive low evaluation as a fire retarding door due to the above-described problem especially.

15 In view of the above-described drawbacks present in the prior art, an object of the present invention is to provide a sheet glass attaching construction which effectively restricts falling of the sheet glass off the fixed member even when the sheet glass becomes softened due to heat such as of a fire, and also to provide a glass window having a high fire retarding performance.

20 DISCLOSURE OF THE INVENTION

In order to achieve the above object, according to the characterizing features of a sheet glass attaching construction of the present invention, in a sheet glass attaching construction including a fixed member having a
25 concave groove capable of receiving a peripheral edge of the sheet glass;

a pair of engaging portions are provided in the fixed member and the peripheral edge of the sheet glass respectively, the engaging portions coming into engagement with each other when the sheet glass is fitted into the concave groove, thereby to prevent the sheet glass from coming off the
30 concave groove.

With the above sheet glass attaching construction, even if a stress is developed to urge the sheet glass to come off the concave groove, the pair of engaging portions effectively resist this stress and prevents the sheet glass from coming off the concave groove. Therefore, even if the sheet glass becomes softened due to occurrence of a fire and deformed because of its self-weight, unless the stress applied to the sheet glass attaching construction due to the deformation exceeds the engagement force between the engaging portions, the force will not be sufficient to pull the sheet glass out of the concave groove. As a result, it is possible to reliably prevent the sheet glass from coming off the concave groove, thus prevent spread of the fire.

Further, at a side edge portion of the concave groove along a longitudinal direction thereof, there may be provided a projecting portion which projects in a direction to approach the sheet glass to be fitted into the concave groove, thus retaining the sheet glass fitted into the concave groove; and a fire-resistant adhesive having adhesiveness for glass may be charged within the concave groove.

As the fire-resistant adhesive having glass adhesive property referred to herein, so-called ceramic adhesive agents may be employed. For instance, an agent having a following composition given in the unit of wt.% may be employed; namely,

	sodium silicate ($\text{Na}_2\text{O} \cdot n\text{SiO}_2 \cdot x\text{H}_2\text{O}$)	about 15%
	silica (SiO_2)	about 50%
	alumina (Al_2O_3)	about 35%
25	alkali (R_2O : R is an alkaline metal)	< 2%

Incidentally, the fixed member may comprise a sheet glass holding member for securing the sheet glass to a window-glass fixing frame.

In the above, as the pair of engaging portions described above, it is conceivable to effect treatment on both an end portion of the sheet glass and the concave groove to provide them with the engaging portions. In

particular, it is preferred that at a side edge portion of the concave groove along a longitudinal direction thereof, there be provided a projecting portion which projects in a direction to approach the sheet glass to be fitted into the concave groove, thus retaining the sheet glass fitted into the concave groove; and a fire-resistant adhesive having adhesiveness for glass be charged within the concave groove. With this, when the sheet glass is to be installed, the installment may be readily carried out by applying the fire-resistant adhesive to the fixed member and then fitting the sheet glass into the concave groove. Moreover, after the installment, the fire-resistant adhesive will be integrated with the glass. So that, when the sheet glass is urged to come off the concave groove, it engages with the projecting portion within the concave groove, whereby the projecting portion and the fire-resistant adhesive act as the pair of engaging portions. Therefore, a sheet glass attaching construction achieving the above-described function may be readily obtained advantageously.

Incidentally, in the above, the fire-resistant adhesive will be integrated with the end portion of the sheet glass upon installment of the sheet glass. Further, in the event of a fire, when the sheet glass is urged to come off the concave groove, it will engage with the projecting portion, thus preventing the sheet glass from coming off. In this respect, supposing a situation when even the end portion of the sheet glass begins to soften, the sheet glass and the fire-resistant adhesive will be even more integrated with each other, thus preventing the fluidized sheet glass from coming off the concave groove.

Further, a glass window according to the present invention for achieving the above-noted object is characterized in that the above-described sheet glass attaching construction is employed at least at an upper end portion of the glass window.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a vertical sectional view of a window glass relating to one embodiment of the present invention, and

Fig. 2 is a vertical sectional view of a conventional sheet glass attaching construction.

BEST MODE OF EMBODYING THE INVENTION

Next, an embodiment of the present invention will be described in details with reference to Fig. 1, by way of an example where a sheet glass is attached to a window frame for forming a window glass.

The window frame 1 is made of steel and comprises, as shown in Fig. 1, an assembly of channel-shaped sheet glass holder members 3 constituting respectively the upper, lower, left and right side portions. In this respect, the window frame 1 is not limited to the one made of steel, but may be formed of other materials such as an aluminum alloy or the like. Further, the sheet glass holder members 3 will be attached respectively as being bound and fixed between a bead 4 bolt-fixed to the window frame 1 and the window frame 1.

The sheet glass holding member 3 is provided as an integral member having a concave groove 3a capable of receiving a peripheral edge of the sheet glass 2, and at a peripheral edge portion of this concave groove 3a, there is provided projecting portions 3b each of which projects in a direction to approach the sheet glass 2 to be fitted within the concave groove 3a. Preferably, as shown in Fig. 1, the leading ends of the projecting portions 3b are bent toward the peripheral edge of the sheet glass along the inserting direction of the sheet glass 2 into the concave groove 3a. More preferably, the projecting portions 3b are bent in not a curved form but a straight form to come into abutment against the opposed faces of the sheet glass. With this, when a fire-resistant adhesive 5 is charged to adhere to

both the sheet glass 2 and the sheet glass holder member 3 and then the sheet glass 2 is fitted therein, the fire-resistant adhesive 5 and the projecting portions 3b provide a pair of engaging portions for strictly preventing the sheet glass 2 from coming off the concave groove 3a.

5 Further, in the vicinity of the contacting portion between the outer side of the concave groove 3a of the sheet glass holder member 3 and the sheet glass 2, there is charged a sealant 6 of silicone rubber or the like for sealing.

As the fire-resistant adhesive having glass adhesive property referred to herein, so-called ceramic adhesive agents may be employed.

10 For instance, an agent having a following composition expressed in the unit of wt.% may be employed; namely,

sodium silicate	$(\text{Na}_2\text{O} \cdot n\text{SiO}_2 \cdot x\text{H}_2\text{O})$	about 15%
silica	(SiO_2)	about 50%
alumina	(Al_2O_3)	about 35%
15 alkali	$(\text{R}_2\text{O}: \text{R is an alkaline metal})$	< 2%

As the sheet glass, there is employed, for instance, a sheet glass having any one of compositions Nos. 1-9 shown in Table 1. The numerical values relating the respective compositions are given in the unit of wt.%.

For providing the above-described sheet glass attaching
20 construction, first, of the sheet glass holder members 3, into at least one of them constituting the upper side of the window glass, the ceramic adhesive 5 is charged. Under this condition, the glass and the holder member are assembled together by fitting a peripheral edge of the sheet glass 2 into the concave groove 3a. As for the other sides too, if the sheet glass holder
25 members 3 are assembled one after another in the same manner as above, the same sheet glass attaching constructions may be provided.

[other embodiments]

30 In the foregoing embodiment, the sheet glass attaching

construction is provided by using the sheet glass holder member 3 for attaching the sheet glass 2. Instead, the sheet glass 2 may be directly installed to the window frame (window glass fixing frame) 1.

5 Further, the pair of engaging portions for preventing the sheet glass 2 from coming off the concave groove 3a may be provided alternatively by forming, in the peripheral edge of the sheet glass 2, a hooking portion engageable with the projecting portions 3b. Hence, the means for providing the engaging portions may vary in many ways. However, with the above-described embodiment, there is no risk of the hooking portion, due
10 to is fire resistance, becoming deformed by heat in the event of fire, and this construction allows easy installment. In these respects, there may be provided a sheet glass attaching construction which is simple and reliable also.

Table 1

	1	2	3	4	5	6	7	8	9
SiO ₂	62.0	61.0	65.0	64.9	62.4	60.2	60.0	57.0	72.1
Al ₂ O ₃	4.8	3.0	1.2	1.3	1.2	3.8	0.3	0.6	1.5
MgO	3.5	3.5	4.6	3.7	4.6	3.0	3.5	2.0	4.1
CaO	7.0	7.0	9.0	7.5	9.0	6.0	7.4	11.0	8.2
SrO	3.0	6.0	6.0	6.0	6.0	5.0	1.8	4.5	0.0
BaO	7.0	6.0	5.0	5.0	5.0	8.0	12.0	9.4	0.0
ZnO	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Li ₂ O	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Na ₂ O	3.6	3.0	2.8	1.7	2.8	2.0	1.8	3.8	13.0
K ₂ O	7.5	9.0	6.2	9.5	6.8	8.0	12.0	9.8	1.0
ZrO ₂	0.5	1.5	0.0	0.3	2.0	2.8	0.5	1.1	0.0
SnO ₂	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
TiO ₂	0.3	0.0	0.0	0.0	0.0	0.6	0.5	0.5	0.0
Fe ₂ O ₃	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1
SO ₃	0.2	0.0	0.1	0.1	0.2	0.1	0.2	0.2	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
R ₂ O (Na ₂ O + K ₂ O)	11.1	12.0	9.0	11.2	9.6	10.0	13.8	13.6	14.0
MgO + CaO	10.5	10.5	13.6	11.2	13.6	9.0	10.9	13.0	12.3
SrO + BaO	10.0	12.0	11.0	11.0	11.0	13.0	13.8	13.9	0.0
RO (MgO + CaO + SrO + BaO)	20.5	22.5	24.6	22.2	24.6	22.0	24.7	26.9	12.3
melting temperature (°C)	1542	1528	1520	1535	1497	1525	1523	1511	1462
working temperature(°C)	1139	1119	1125	1127	1096	1120	1130	1098	1039
devitrification temperature (°C)	1115	1105	1100	1080	1092	1090	1119	1082	991
softening point (°C)	824	809	820	820	812	808	830	788	738
distortion point(°C)	571	563	575	578	596	558	590	545	509
coefficient of thermal expansion $\times 10^{-7}/(K)$	86	89	79	84	81	85	86	92	86
water resistance (%)	0.3	0.3	0.4	0.5	0.5	0.3	1.1	0.8	0.4
devitrification adjacent brick	△	○	○	○	○	○	○	△	○



WHAT IS CLAIMED IS:

1. A sheet glass attaching construction including a fixed member having a concave groove capable of receiving a peripheral edge of the sheet glass;

wherein a pair of engaging portions are provided in the fixed member and the peripheral edge of the sheet glass respectively, the engaging portions coming into engagement with each other when the sheet glass is fitted into the concave groove, thereby to prevent the sheet glass from coming off the concave groove.

2. A sheet glass attaching construction including a fixed member having a concave groove capable of receiving a peripheral edge of the sheet glass;

wherein at a side edge portion of the concave groove along a longitudinal direction thereof, there is provided a projecting portion which projects in a direction to approach the sheet glass to be fitted into the concave groove, thus retaining the sheet glass fitted into the concave groove; and a fire-resistant adhesive having adhesiveness for glass is charged within the concave groove.

3. The sheet glass attaching construction according to claim 1 or 2, wherein the fixed member comprises a sheet glass holding member for securing the sheet glass to a window-glass fixing frame.

4. The sheet glass attaching construction according to claim 2, wherein a leading end of the projecting portion is bend toward the peripheral edge of the sheet glass along an inserting direction of the sheet glass into the concave groove.



5. The sheet glass attaching construction according to claim 2, wherein the fire-resistant adhesive comprises a ceramic adhesive.

5 6. A glass window wherein at least an upper end portion thereof is formed by attaching a sheet glass to a fixed member by means of the sheet glass attaching construction according to any one of claims 1-5.