May 10, 1960 E. H. McLAUGHLIN 2,936,050

HARDWARE ATTACHING MEANS

Filed May 18, 1953 2 Sheets-Sheet 1

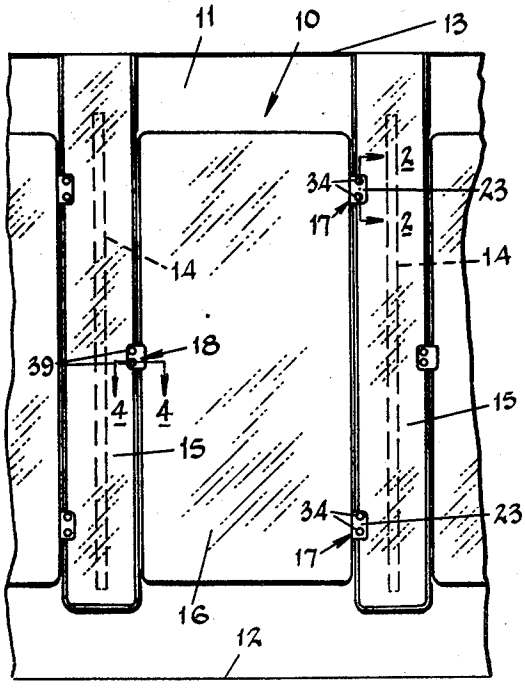


Fig. 1

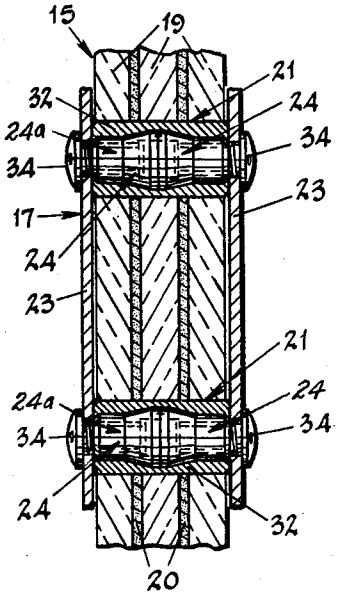


Fig. 2

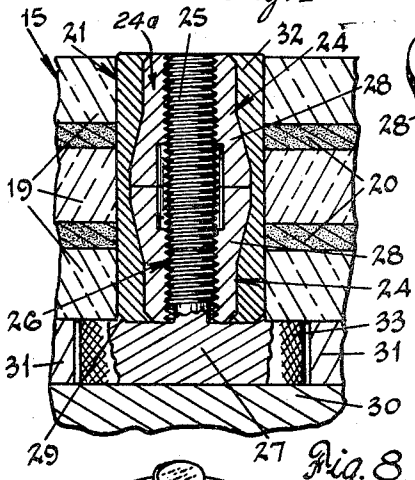


Fig. 8

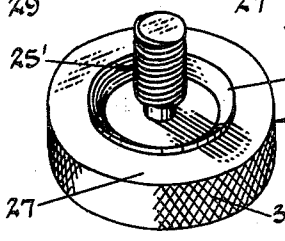


Fig. 6

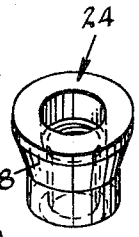


Fig. 5

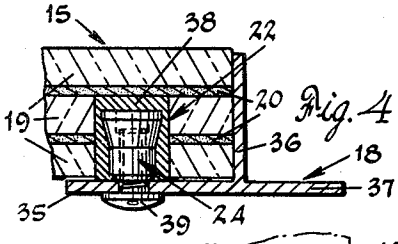


Fig. 4

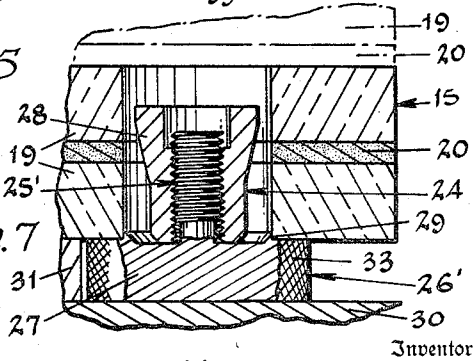


Fig. 7

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HARDWARE ATTACHING MEANS

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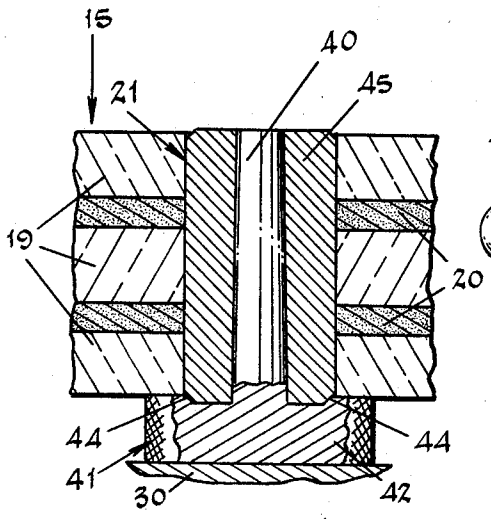


Fig. 10

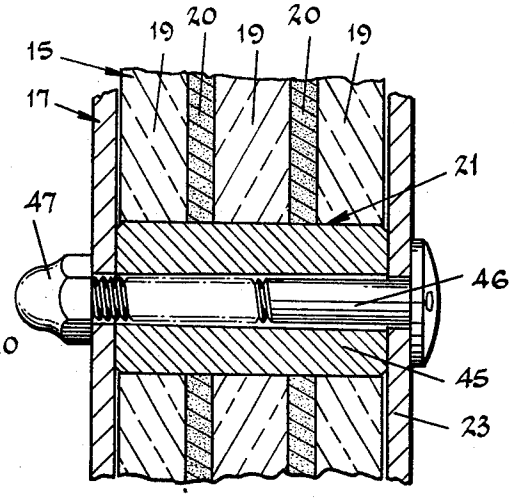


Fig. 3

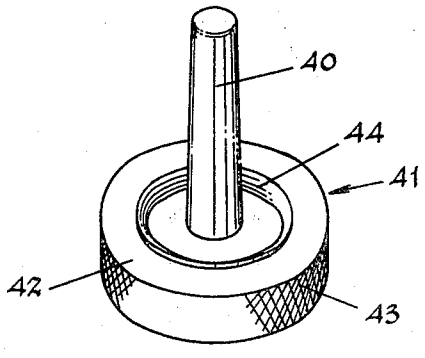


Fig. 9

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HARDWARE ATTACHING MEANS

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Application May 18, 1953, Serial No. 355,567

1 Claim. (Cl. 189—36)

This invention relates broadly to panel construction, and more particularly to novel means for attaching articles of hardware to glass panels for use as toilet stall partitions and the like.

It is conventional practice to construct partitions, doors, and facing members for toilet stall enclosures of laminated panels of opaque structural glass or like material. Problems are encountered, however, in attaching articles of hardware, such as hinge members and door stops, to the laminated glass panels, that is, due to the brittle nature of the glass panels, the articles of hardware may not be screwed, bolted or nailed thereto, as in the case of wood and metal panels.

It is, therefore, a primary object of this invention to provide novel means for attaching articles of hardware to glass panel constructions wherein undue stresses will not be placed upon said panel construction.

It is another object of this invention to provide hardware attaching means of the type described whereby said hardware may be secured to the panel construction in slightly spaced relation thereto.

Still another object of this invention is to provide hardware attaching means of the type described in which the panel construction is provided with a permanently disposed metallic socket member for receiving a complementary portion of said hardware.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

In the accompanying drawings, wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is a front elevational view of a typical toilet stall;

Fig. 2 is a vertical sectional view, taken along the broken line 2—2 of Fig. 1, of a door hinge attached to a facing member panel construction in accordance with one form of this invention;

Fig. 3 is an enlarged vertical sectional view taken along the same line and showing the door hinge attached to the panel construction in accordance with another form of this invention;

Fig. 4 is a horizontal sectional view, taken along the broken line 4—4 of Fig. 1, of a door stop attached to an opposite facing member panel construction in accordance with still another form of this invention;

Fig. 5 is a perspective view of a bushing used as a socket member in the construction of the forms of hardware attaching means shown in Figs. 2 and 4;

Fig. 6 is a perspective view of a headed bolt used in assembling said bushing with respect to the panel construction;

Fig. 7 is a detailed sectional view of the facing member panel construction shown in Fig. 4, illustrating a step in the assembly therewith of the above-described bushing;

Fig. 8 is a detailed sectional view of the facing member panel construction shown in Fig. 2, illustrating another step in the assembly therewith of said bushing;

Fig. 9 is a perspective view of a headed bolt used in the construction of the form of the hardware attaching means shown in Fig. 3; and

Fig. 10 is a sectional view of the facing member panel construction shown in Fig. 3, illustrating a step in the construction of the hardware attaching means therefor.

Referring now more particularly to the drawings, there is shown in Fig. 1 a typical toilet stall **10** situated adjacent a wall **11**, above a floor **12**, and below a curtain wall **13**. This stall **10** is enclosed by partitions **14**, facing members or stiles **15**, and a swinging door **16**. The door **16** is mounted for swinging movement from the rightmost facing member by hinges **17**, and a door stop **18** is attached to the leftmost facing member for limiting the swinging of the door **16** outwardly of the stall.

Each of the facing members, partitions, and doors may comprise, as shown herein, a panel construction made up of three sheets **19** of opaque structural glass which are laminated together by a suitable mastic **20**. However, this construction, although conventional, is not meant to be a limitation on the scope of this invention. To the contrary, each of the aforementioned members may be made of a single sheet of glass or, if desired, a pair of laminated sheets.

In any case, however, the panel construction making up the facing members or stiles **15** is provided with through openings **21** (Figs. 2 and 3) or recessed openings **22** (Fig. 4) for receiving the novel attaching means of this invention. If the panel constructions are formed of laminated glass sheets **19**, as shown herein, matching holes are drilled through said sheets prior to the lamination thereof. In the case of the panel construction of Fig. 4, in which recessed openings **22** are formed therein, holes are drilled in only two of the sheets.

Dealing first with the hardware attaching means for the door hinges **17**, the legs of a stirrup **23** of said hinge grip opposite sides of the facing member **15**, as shown in Figs. 2 and 3. Each of the legs is provided with oppositely disposed openings which are adapted to be substantially aligned with the spaced openings **21** in said facing members. Suitable hinging means (not shown) are disposed at the other ends of the hinges **17** for attachment to the door **16**, but, for the purposes of illustration, only the details of the hinge attachment to the facing member **15** are shown herein.

In assembling one form of the hinge attaching means of this invention in the opening **21** through the facing member **15**, a pair of opposed bushings **24** forming a socket member **24***a*, Figs. 2 and 8 are threaded onto the elongated stem **25** of a threaded bolt **26** and positioned within said opening, as shown in Fig. 8, while an enlarged head **27** on said bolt is held flush with the adjacent surface of said facing member surrounding said opening. The stem **25** of the bolt as well as the length of the pair of bushings **24** are slightly longer than the depth of the opening **21** through the facing member **15** such that, when said bushings and bolt are positioned as shown, the upper ends thereof which are opposite from the bolt head **27** project slightly above the upper surface of said facing member.

As shown in detail in Fig. 5, one end of the bushing **24** is enlarged as at **28**, for a purpose to be explained hereinafter. A substantial length of the inner diameter of the bushing is threaded for engagement with the threaded stem **25** of the bolt as well as to provide threaded sockets within the opening **21**. Also, as best shown in Fig. 6, the enlarged head **27** on the bolt **26** is provided with a circular concentrically arranged rim **29** having an outer diameter corresponding to that of the

opening 21. Thus, when said head is held flush with the facing member 15, as previously described and with the rim 29 inside the opening 21, as shown in Fig. 8, the bushings 24 received on the stem 25 of the bolt are centrally positioned in alignment with the opening 21. As well, the portion of the head 27 within the rim 29 and surrounding the stem 25 is recessed to a depth slightly below the portion of said head outside of and surrounding said rim. In this manner, when the bolt 26 and bushings 24 are properly positioned within the opening 21, as shown in Fig. 8, the lower end of the lowermost bushing as well as the portion of the stem 25 adjacent the head 27 will project slightly below the under surface of the facing member 15. The amount of this projection, as well as that of the upper ends of the stem and uppermost bushing above the upper surface of said facing member is preferably about 0.005 to 0.010 inch.

While the bushings and bolt are so held and positioned with respect to the facing member 15, the entire assembly is placed face down on a plane support 30, as shown in Fig. 8, and suitable spacers 31 are disposed between said support and the facing member adjacent the head 27 so as to maintain said assembly in a substantially stable position. While the assembly is in this stable position, a filler material may be placed within the annular space in the opening 21 surrounding the bushings 24. For this purpose, I have found it desirable to use as a filler material a product known as "Cerrobase" composed of approximately 45% lead and 55% bismuth. This material has a melting point of approximately 255° F. and may be readily poured into the annular space about the bushings 24 at a temperature of about 485° F. It has been found especially well-suited to applications of this type as it "sets up" or hardens rather quickly.

Although the filler material will set up rather quickly, it will still completely fill the annular space surrounding the bushings 24 in the opening 21. In this manner, when said material hardens within said space, it forms an "anchor" 32 for permanently holding the bushings 24 in place. Portions of the anchor adjacent the bolt head 27 will project slightly below the lower surface of facing member 15 so as to surrround the similarly projecting portions of the lowermost bushing 24. As well, prior to hardening, the upper surface of the filler material may be planed off even with the upwardly projecting portions of the uppermost bushing 24. It will also be understood that the adjacent enlarged portions 28 of the bushings form additional anchoring means for retaining said bushings within the hardened filler material 32.

When the facing member 15, with its hardware attaching means now formed in the openings 21, is lifted from the support 30, the bolt 26 may be removed from the bushings 24 by means of the knurled surface 33 on the bolt head 27. With the bolt removed, the bushings form a socket within the facing member 15 having oppositely facing threaded openings which are adapted to receive bolts 34 (Fig. 2) for attaching thereto the stirrup 23 of the door hinge 17, or other article of hardware. Since the oppositely facing openings of said socket member project a slight distance beyond the adjacent outer surfaces of the facing member 15, the legs of said stirrup will be held slightly spaced from said surfaces, thus lessening the possibilities of undue pressure being applied thereto.

Dealing now with another form of this invention in which a door stop 18 is attached to the opposite facing member 15, it can be seen from Fig. 4 that the door stop is of an angular construction, one flange 35 of which is adapted to be secured to a hardware attaching means in said facing member. For this purpose, the flange 35 is provided with an opening which is adapted to be disposed in substantial alignment with the recessed opening 22 in the facing member 15 when the leg 36 of said stop is in operative flush engagement with the edge of said member, as shown. An oppositely disposed flange 37 of the stop is adapted to engage the door 16 in its closed position. Inasmuch as this type of hardware article is only attached to one side of the facing member 15, the openings 22 for receiving the bushings 24 do not extend all the way through said member. Thus, holes may be drilled in only two of the glass sheets 19 and the smooth and uninterrupted finish of the opposite surface of the facing member is preserved.

This particular embodiment of the novel hardware attaching means of the present invention involves a slightly different assembly procedure. That is, only the two glass sheets 19 which have been drilled are laminated together prior to the positioning of the hardware attaching means in the opening 22 formed by the holes in said sheets. When, however, these two drilled sheets have been laminated together, a bolt 26' (Fig. 6) having a single bushing 24 threaded over a short stem 25' thereof is positioned within the recessed opening 22, similarly to the manner in which the bolt 26 and bushings 24 of the earlier described embodiment were positioned within the through opening 21. That is, the single bushing 24 on the short stem 25' is centrally aligned within said opening by means of the rim 29 as the bolt head 27 is held flush against the facing member 15, as shown in Fig. 7. Also, the portion of the head 27 of the bolt 26' within the rim 29 is recessed to a depth slightly below that of the portion of said head surrounding the rim.

In this case, however, it will be noted that the stem 25' of the bolt 26' is considerably shorter than the stem 25 of bolt 26 and terminates short of the end of the bushing 24. As well, only a single bushing 24 is used with the enlarged portion 28 thereof disposed inwardly of the opening 22. It will be further noted in this respect that, despite the differences in construction between the bolts 26 and 26', the bushings 24 may be used interchangeably with either of the disclosed embodiments of this invention. Of course, if desired, the bushing means forming the socket in the hardware attaching means of Fig. 2 may comprise a single integral bushing, rather than a pair of the interchangeable bushings 24.

When the bushing 24 and bolt 26' have been so positioned with respect to the opening 22, the two sheets 19 of the facing member 15 and said assembled bushing and bolt are placed face down on the support 30, similarly to the manner in which the facing member and hinge member attaching means of Fig. 8 were placed on a similar support. As shown in Fig. 7, a spacer 31 may be used adjacent the enlarged head 27 of the bolt for stabilizing the facing member in its supported position.

At this time, "Cerrobase" or other suitable filler material may be poured into the annular space within the recessed opening 22 surrounding the bushing 24 as well as above the enlarged portion 28 of said bushing to at least approximately the level of the top of the uppermost glass sheet 19. When the filler material has hardened to form an anchor 38 and while the facing member 15 is still resting upon the support 30, the top sheet of glass 19 (shown in phantom in Fig. 7) is laminated to the middle sheet by means of the mastic 20.

Thus, the facing member 15 is completely formed with its hardware attaching means and may be lifted from the support 30. The bolt 26' is then removed from the bushing 24 to form a relatively short threaded socket in the facing member, which socket is adapted to receive a threaded bolt 39 for securing the door stop 18 to the hardware attaching means formed in said facing member, as shown in Fig. 3. Also, similarly to the stirrup 23 of the door hinge attaching means of Fig. 2, the flange 35 of the stop 18 is held in slightly spaced relation to the adjacent surface of the facing member 15 (as shown in Fig. 4) by means of the projecting opening of the socket.

In Fig. 3, the door hinge 17 is shown as attached to the facing member 15 by still another form of this invention in which the bushings used in connection with the previously described forms are dispensed with and

a stem 40 of a headed bolt 41 (Fig. 9) acts as the socket-forming member.

Referring specifically to Figs. 9 and 10, it can be seen that the bolt 41 includes, similarly to the bolts 26 and 26', an enlarged head 42 having a knurled outer periphery 43 and a concentrically arranged rim 44 for centrally aligning the stem 40 within the opening 21 through the facing member 15. As well, the portion of said bolt head 42 within the rim 44 and surrounding the base of the stem 40 is recessed to a depth about 0.005 to 0.010 inch below the level of the portion of said head surrounding the rim.

The stem 40 is very slightly tapered toward its upper end, for a purpose to be explained hereinafter, and is of a length slightly greater than the depth of the opening 21 such that the upper end of said stem will project slightly above the upper surface of the facing member 15 when the bolt 41 is held in its centrally aligned position within said opening. The assembled facing member and bolt may be placed upon the support 30 and "Cerrobase" or other suitable material may be poured into the annular spacing surrounding the stem 40 within the opening 21. As in the case of the other forms of this invention, the filler material will entirely fill said space so that the portion thereof disposed above the recessed portion of the bolt head 42 within the rim 44 will project outwardly about 0.005 to 0.010 inch beyond the lower surface of the facing member 15. As well, prior to hardening, the filler material may be leveled off adjacent the upper end of the stem 40 to a plane approximately aligned therewith so as to form a similarly projecting portion about said upper end of the stem.

Due to the slight taper of its stem 40, the bolt 41 may be removed with minor effort from the bushing 45 formed by the hardened filler material within the opening 21. That is, upon a slightly forced turning of the bolt head 42, the stem 40 will be freed from the bushing 45 and may thus be pulled therefrom.

The stirrup 23 of the hinge 17 may at this time be properly positioned over the edge of the facing member 15 with the legs of said stirrup held in slightly spaced relation to the surface of said facing member by means of the projecting openings at opposite ends of the socket formed in the bushing 45. The legs of the stirrup are secured to this form of the novel attaching means by bolts 46 received through said socket and held by nuts 47. Of course, the threaded bolts 46 are received in slightly spaced relation to the socket formed in the bushing 45.

It will be obvious that this type of attaching means, in which the filler material itself forms the socket for securing the hardware thereto, may be also used in connection with the door stop 18. In such a case, of course, the stem of the bolt 41 used in forming the bushing 45 within a recessed opening 22 would be shorter. Also, if desired, the door stop 18 could be secured to the socket formed in the bushing 45 by means of a self-threading screw (not shown), rather than by the bolt 46 and nut 47.

It is to be understood that the forms of the invention disclosed herein are to be taken as the preferred embodiments thereof, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the following claim.

I claim:

A panel construction comprising, in combination, a glass panel having an opening extending entirely therethrough from one face of said panel to the other face of said panel, a socket member extending through said panel substantially aligned with said opening, each of the end surfaces of said socket member projecting outwardly beyond the surfaces of the adjacent panel faces, said socket member having a diameter always less than the diameter of the opening so as to define a clearance space between the socket member and the panel surfaces exposed by the opening, a low melting metallic member permanently disposed within the clearance space and completely filling the clearance space, the portions of the metallic member surrounding said socket member adjacent both opposite panel faces extending slightly outwardly from said panel and beyond said panel faces to be in the same relative plane as the corresponding end surfaces of said socket member, retaining means forming an integral part of said socket member to fixedly anchor said socket member within the metallic member, said retaining means including an outwardly flaring taper intermediate the ends of said socket member and completely around the periphery of said socket member, an article of hardware and means on said socket member attaching said article of hardware thereto whereby said article of hardware is maintained in spaced relation to the faces of the panel and out of bearing engagement therewith by the outwardly extending portions of said socket member and said metallic member.

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