

[54] **DOOR ASSEMBLY**

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49/388

[51] Int. Cl. **E05d 11/00**

[58] Field of Search **49/383, 384, 366, 388;**
16/111, 124

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[57]

ABSTRACT

An improved center-hung pivot door assembly comprises a door pivotally mounted within a door frame having a narrow jamb projection member attached to the pivot jamb of the door frame along substantially the entire length thereof and projecting outwardly from said pivot jamb into the door frame opening, an arcuate-shaped pivot stile mounted in closely spaced relation with said jamb projection, and resilient weather seal means attached either to said pivot stile or jamb projection and spanning the space between said pivot jamb and said pivot stile at least when the door is in a closed position. Preferably the surface of said jamb projection facing the pivot stile has a generally concave shape concentric with the arcuate-shaped pivot stile. The space between said projection and the pivot stile is always less than the thickness of human fingers, and the projection is sufficiently narrow so that such close spacing does not prevent mounting the door in or dismounting it from the pivot means while the projection remains attached to the pivot jamb.

4 Claims, 11 Drawing Figures

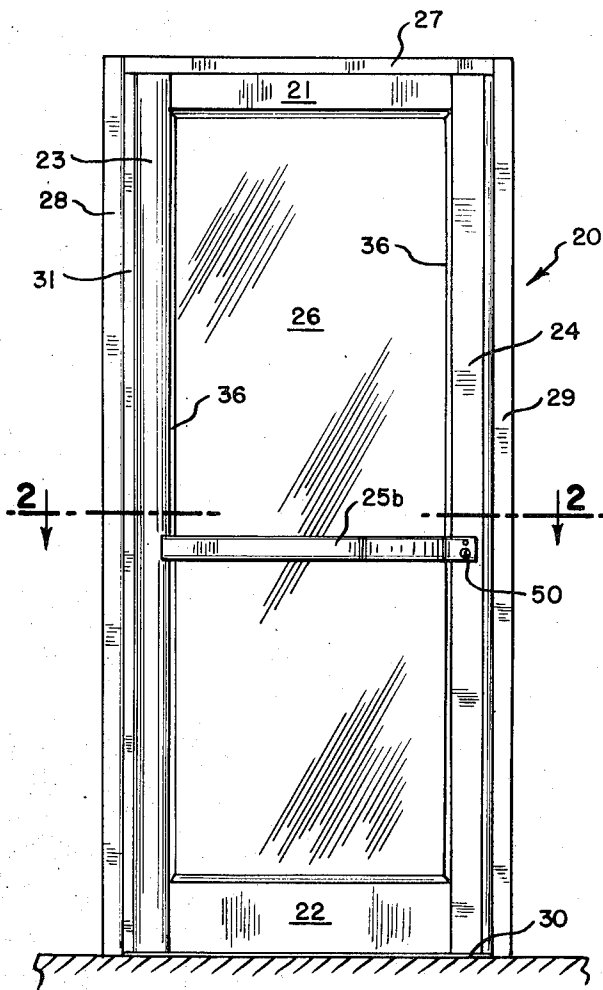


FIG. 1

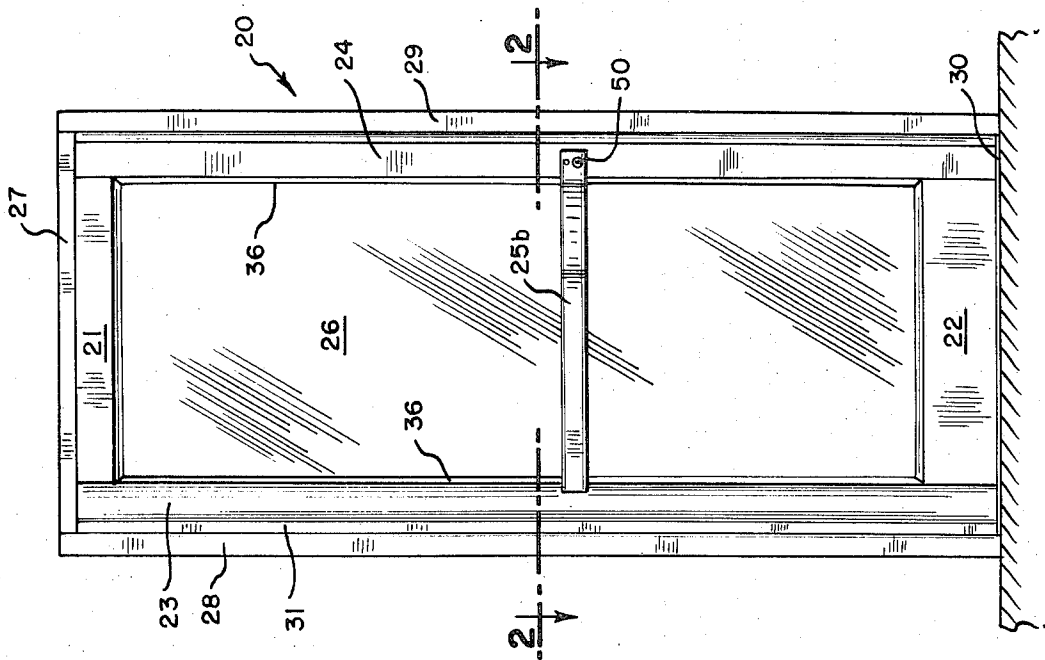


FIG. 2

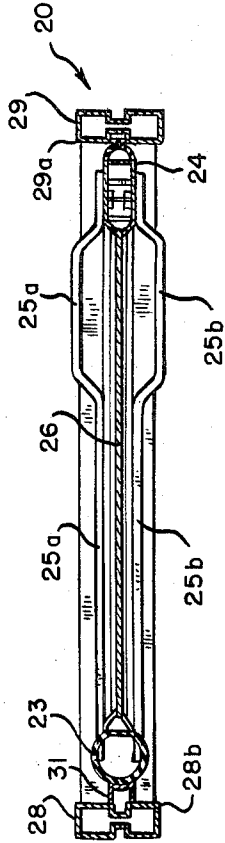


FIG. 3

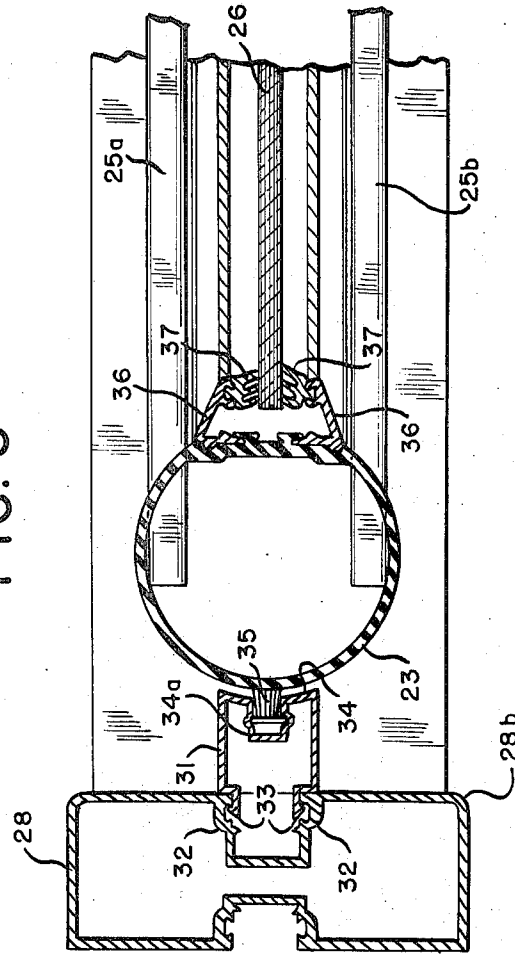


FIG. 4

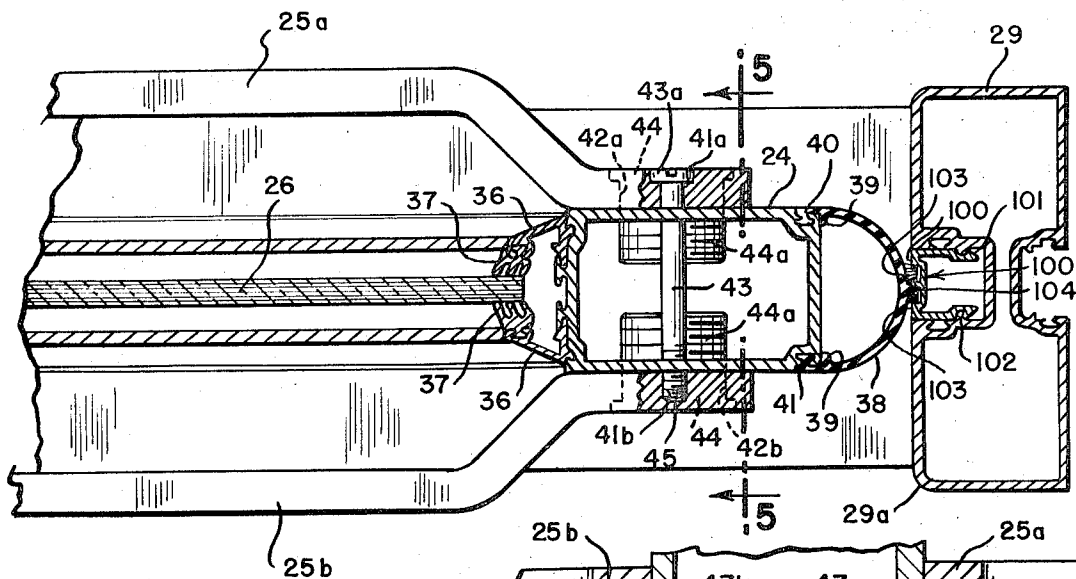


FIG. 5

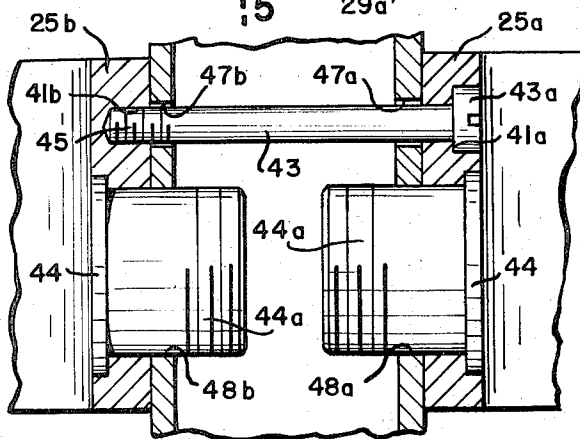
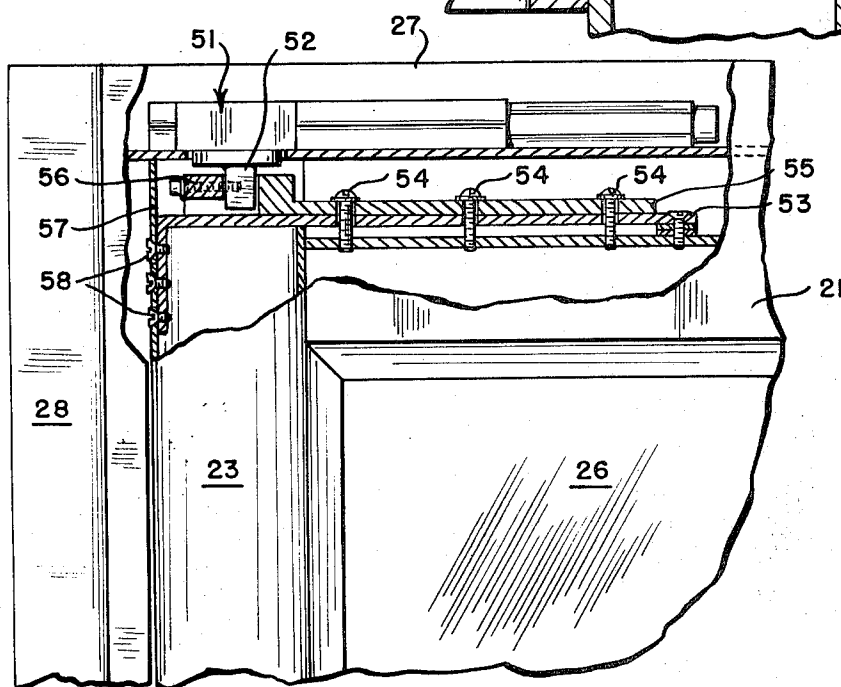


FIG. 6



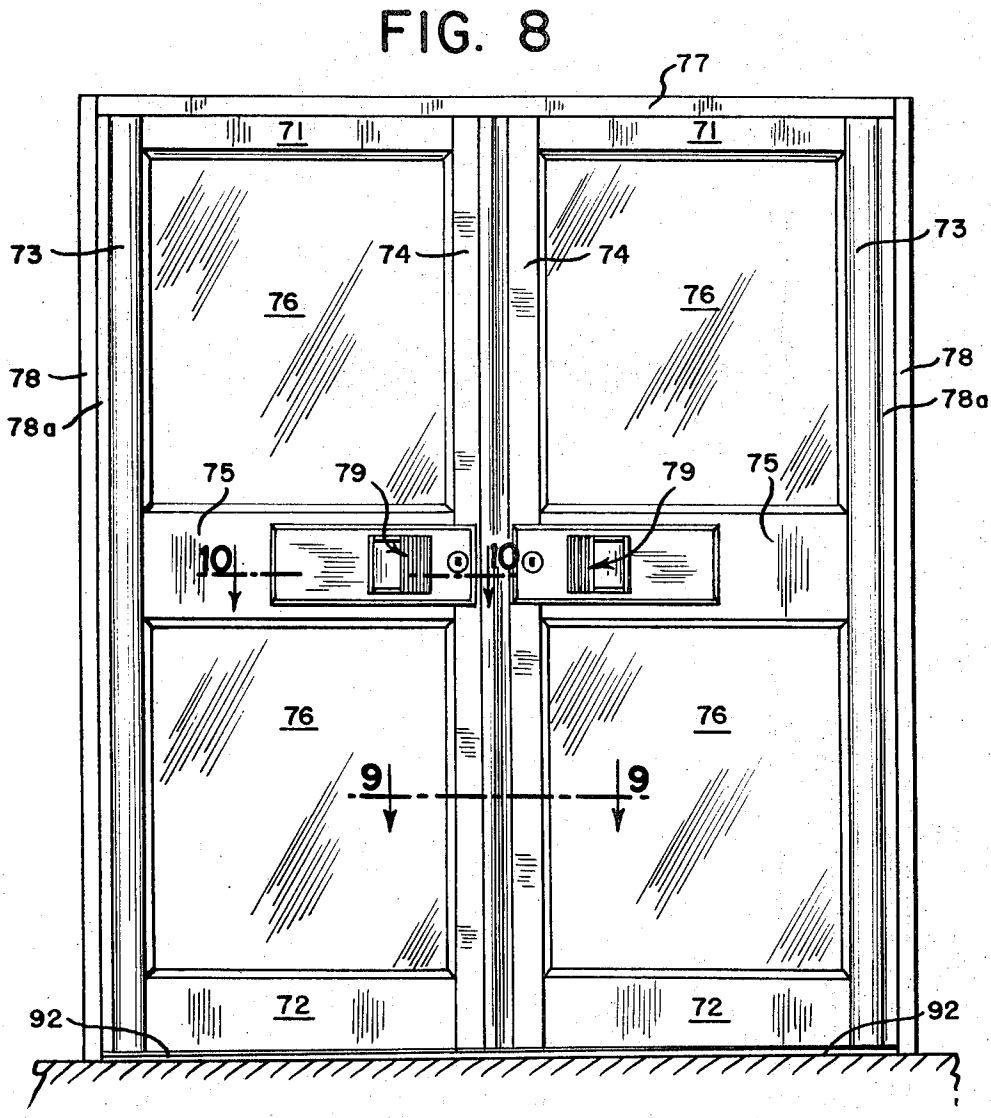
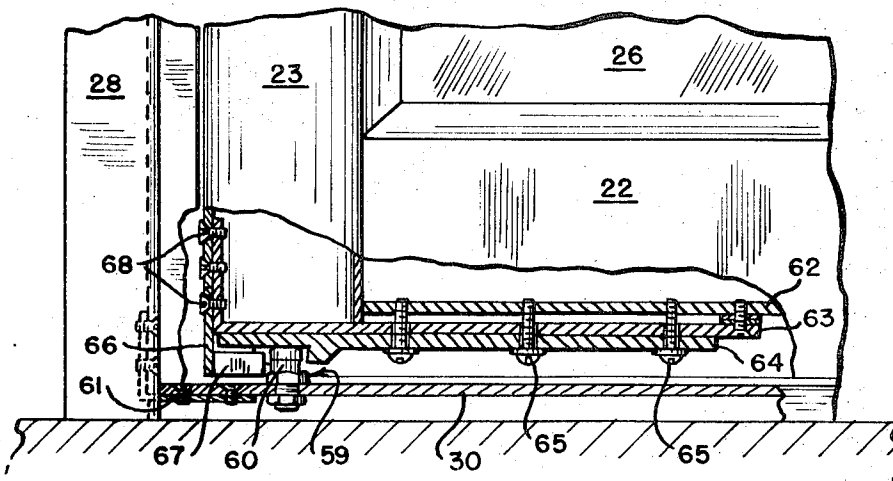


FIG. 9

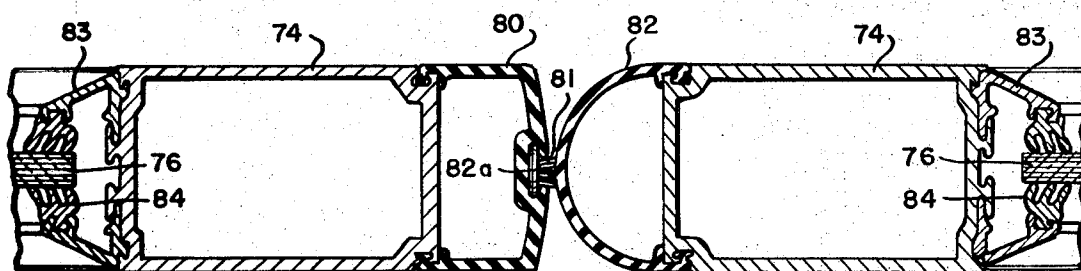


FIG. 10

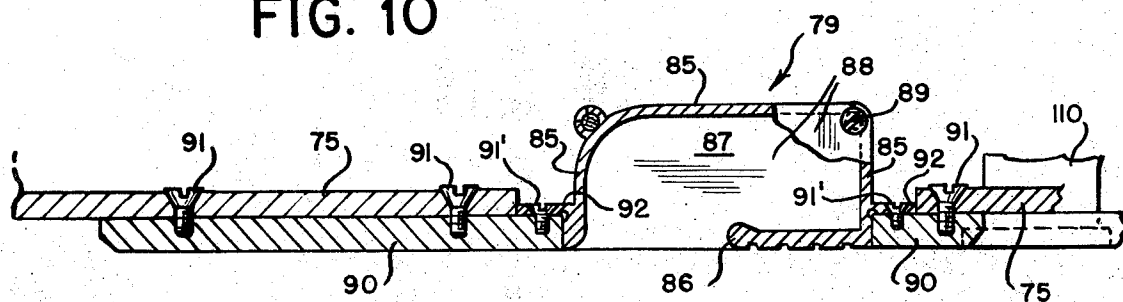
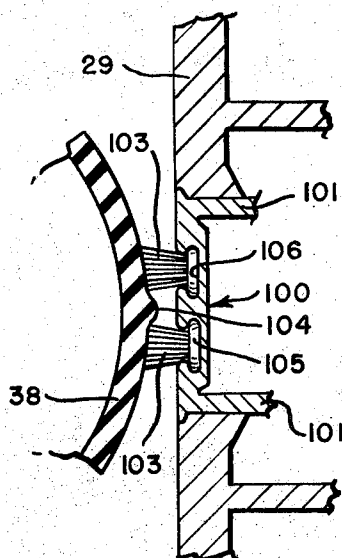


FIG. 11



DOOR ASSEMBLY

BACKGROUND OF THE INVENTION

Center-hung pivot door assemblies, whether utilizing one or more doors, have wide use, but are most commonly used in commercial structures. Such doors are usually made of a metal, such as aluminum, with glass panels, and are pivotally mounted in a metal frame comprising jambs, transom, and threshold affixed to the building structure. Such doors should meet several requirements: namely, they should present a pleasing aesthetic appearance, they should be made so as to resist the ability of people to make a forced entrance into the building when the door is locked, they should be weather resistant and they should be safe for use. In this last regard, the door should be such that human, and particularly children's, hands or feet do not get caught, of, if caught, are not seriously injured, between either jamb and the adjacent door stile, or between the lock stiles when two doors are hung in a single frame. Such safety factor is of major concern in commercial structures where large numbers of people are passing through the doors.

Attempts to harmonize these requirements and, in particular to provide adequate strength against forced entry together with weather resistance and safety to users, have not proven wholly satisfactory. Consequently, because of security needs and the desire to protect against weather, doors presently in use have more or less lacked a full measure of safety protection. Thus, for example, the use of resilient materials in the pivot and lock stile areas has been avoided since such material can usually be readily removed by those wishing to force entry through the door. Furthermore it has been difficult to provide weatherseals for doors when such resilient means are used, since frictional contact with a hard surface by such resilient means causes rapid wear of the resilient material.

SUMMARY OF THE INVENTION

An improved center-hung pivot door assembly has now been devised which substantially eliminates the hazard of damage to fingers being caught in the door, and which at the same time is weather-resistant and resistant to forced entry.

Briefly stated, the present invention relates to an improved center-hung pivot door assembly comprising at least one door pivotally mounted within a door frame opening on pivot means secured to the door frame. The door frame comprises parallel transom and threshold members, and parallel jambs of which at least one is a pivot jamb. The door itself includes parallel top and bottom rails and parallel pivot and lock stiles fixedly secured together. In such assembly the invention provides the improvement comprising a relatively narrow jamb projection member attached to the pivot jamb along substantially the entire length thereof and projecting outwardly from said pivot jamb into the door frame opening, an arcuate-shaped pivot stile mounted in closely spaced relation with said jamb projection, and resilient weather seal means spanning the space between said pivot jamb and said pivot stile at least when the door is in a closed position, the space between said projection member and said pivot stile always being less than the thickness of human fingers, and the projection being sufficiently narrow adjacent the pivot stile

so that such close spacing does not prevent mounting the door in or dismounting it from the pivot means while the projection remains attached to the pivot jamb.

Preferably the face of the jamb projection adjacent the arcuate pivot stile is substantially concave and concentric with the arcuate-shaped pivot stile.

The door further preferably includes resilient edge guard means substantially wider than the thickness of human fingers attached to the outer edge of the lock stile and extending substantially the entire length thereof. When two doors are mounted in the frame, only one need be provided with such resilient edge guard to insure that fingers cannot be caught and injured between the doors. Advantageously weather seal means contact the edge guard along substantially its entire length when the door is in the closed position.

The invention further provides improved push bars, or a center rail with a recessed pull, including means by which a lock cylinder is fully recessed so that its exposed face is flush with the surface of the push bar, or with a shield plate surrounding the recessed pull, thereby to reduce the possibility that the lock cylinder can be removed to force an entry.

These and other features of the invention are more specifically described below:

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is an elevation of a single door assembly of the present invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIGS. 3 and 4, taken together, represent an enlarged view of FIG. 2 with a portion of FIG. 4 broken away to show the means for attaching the push bars to the lock stile and for housing the lock cylinder as more fully described below;

FIG. 5 is an enlarged sectional view taken along line 5—5 of FIG. 4;

FIG. 6 is a partial cut-away view of the door showing the overhead closer assembly;

FIG. 7 is a partial cut-away view of the door showing the bottom pivot assembly;

FIG. 8 is a plan view of a modified double door assembly of the invention;

FIG. 9 is an enlarged sectional view taken along line 9—9 of FIG. 8;

FIG. 10 is an enlarged sectional view taken along line 1—10 of FIG. 8; and

FIG. 11 is an enlarged partial view of the interface of the resilient weather strips and lock stile edge guard of FIG. 4.

DETAILED DESCRIPTION

Referring to the drawings, FIG. 1 is an elevation of a single center-hung pivot door assembly 20 comprising a door having a parallel top rail 21 and bottom rail 22 fixedly secured to an arcuate-shaped (substantially cylindrical) pivot stile 23 and a lock stile 24. Attached to and spanning the substantially parallel stiles on opposite sides of the door are push bars 25a and 25b which will be described in greater detail below. A panel member or members, such as, for example, a transparent glass panel 26, is positioned in the space defined between the respective stiles and rails.

The door is pivotally mounted in a frame comprising a parallel door header or transom 27 and a threshold 30, and parallel pivot jamb 28 strike jamb 29. The means of mounting the doors on pivots and their location can be any of those conventionally used, but are preferably in compliance with manufacturers standards for overhead concealed closers (OHCC), floor checks (FC), and overhead surface mounted closers (OHSC). An OHCC mounting is shown by way of example in FIGS. 6 and 7.

It is an important feature of the invention that the pivot stile does not directly abut the pivot jamb 28. Rather, a narrow jamb projection member 31 extends out an appreciable distance from the pivot jamb into close-spaced relation with the arcuate pivot stile 23. The jamb projection 31 spaces the pivot stile far enough away from the jamb 28 (at least by a distance as great as the thickness of adult human fingers) so that roll action of the stile, when the door opens or closes, cannot pinch fingers inadvertently inserted between pivot jamb and pivot stile. Also, the space between the jamb projection 31 and the pivot stile 23 is too small for fingers to be inserted between them. Thus the stile and jamb relation is such as to make it exceedingly difficult if not impossible for fingers of even a small child to be caught between them and injured when the door is opened or closed.

Because the jamb projection 31 is narrow in thickness from front to back relative to the diameter of the pivot stile, and so does not extend around very much of the circumference of the stile, the door can be inserted into the frame or removed therefrom without interference with the jamb protection when the latter is mounted in place on the jamb. This dimensional relation between the jamb projection and the pivot stile also insures that fingers cannot be caught and pinched between them by roll action when the door is opened or closed.

FIG. 2 illustrates the arcuate nature of the substantially cylindrical pivot stile 23. It also shows how the edges 29a of the strike jamb 29 and 28b of the pivot jamb 28 facing the door frame opening are preferably rounded to further minimize any possibility of damage to the hands or other portions of the body caught between the door and the door frame.

FIGS. 3 and 4 taken together represent an enlarged view of the stiles of FIG. 2 to show the specific means for fastening the push bars 25a and b to the door and for housing the lock cylinders to prevent their removal by those seeking unauthorized entry into the building. In FIG. 3 the preferred configuration of the pivot jamb projection member 31 also is shown. This jamb projection, preferably made of metal, is mounted in grooves 32 and locked therein by means of tongues 33. The projection member 31 is mounted on the jamb 28 before the door is hung by inserting the tongues 33 into the grooves 32. This locks the jamb projection 31 to the jamb 28 and leaves no space therebetween for insertion of any tool to force the door.

The outer surface 34 of the jamb projection member 31 preferably has a generally arcuate concave shape which is substantially concentric with the arcuate shape of the rounded pivot stile 23. In addition, the surface 34 has a central recessed section 34a located therealong in which a weather strip 35 is mounted. An alternate embodiment, not shown, is to provide one or more weather strips on the pivot stile 23 instead of on the

jamb projection member. The resilient weather strip 35 spans the very narrow space between the pivot stile and the pivot jamb projection member and extends substantially along the entire length of the jamb projection 31 in order to give best protection against the weather. In addition, by being mounted as shown in FIG. 3, it acts to limit passage of air or water through the space during travel of the door from its fully closed to its fully open position.

The pivot stile 23 also has an opening therethrough at each side of the door to permit insertion therein of one end of the push bars 25. The push bars 25 are of a length and size and the openings therefor in the stile 23 are sized so that, when the push bars are secured to the lock stile 24, as hereinafter described, they will also be securely wedged in the openings of the pivot stile 23.

A glass panel 26 is mounted in the opening formed by the rails 21, 22 and stiles 23, 24 by means of conventional glass stops 36 ordinarily made of aluminum and resilient glazing strips 37 having fingers for sealing the glass against air or water leakage around its edges.

As noted above, the jamb projection 31 is limited to a maximum thickness which will permit mounting the door onto the pivot means attached to the transom and threshold as described below. This permits mounting and dismounting of the door without need to remove or disturb the projection 31. This, in turn, permits the locking of the jamb projection onto the jamb 28 to make the door assembly further resistant to tampering. It will be evident that, if the projection 31 is too thick (from front to back, or from inside to outside of the door), so that its concavely formed face 34 extends very far around the circumference of the cylindrical pivot stile 23, it becomes difficult or even impossible to mount or dismount the door from the pivot means, especially since the space between the face 34 of the jamb projection 31 and the cylindrical surface of the pivot stile 23 is kept appreciably less than the thickness of human fingers to prevent children or others from having their fingers caught therebetween. On the other hand the width of the jamb projection, from jamb 28 to pivot stile 23, must be substantially greater than the maximum thickness of human fingers, to prevent getting them caught by roll action between jamb and pivot stile when the door is opened or closed.

As shown in FIG. 4, the lock stile 24 has mounted on its outer end an arcuate, resilient edge guard means 38. The edge guard is of a width (from door stile to jamb) greater than the thickness of human fingers, so that even an adult hand can grasp the edge of the door when it is closed, and yet because of the resilience of the guard be unharmed by being pinched between door and jamb. The guard means 38 is locked onto the stile 24 by means of shoulders 39 which fit onto the end of the stile 24 and tongue means 40 which lock into retaining grooves 41 extending the length of the lock stile 24. This tongue-and-groove arrangement prevents pulling off of the guard means 38 since the guard means can only be placed onto or removed from the stile by being slid into the grooves from either the bottom or the top of the stile 24.

Locked into the strike jamb 29 is a weather strip assembly 100 the outer surface of which is substantially flush with the outer surface of the jamb 29. Arms 101 extending from the surface lock about lips 102 on the jamb 29. Projecting from the outer edge of the weather

strip assembly into the door frame opening, and best illustrated in FIG. 11, are resilient weather strips 103 which span the gap between the edge guard means 38 and the jamb 29. It is preferred to provide the edge guard means with a longitudinally extruding ridge 104 spaced approximately in the center thereof so that, when the door is in a closed position, the ridge will be spaced between the paired weather strips 103. This acts to further insure adequate weather resistance. Weather strip supports 105 are slidably mounted in weather strip recesses 106 in the weather strip assembly 100.

The resilient edge guard 38 and the substantial space which it fills between the lock stile 24 and the adjacent jamb 29 makes it impractical to provide door locking means extending from the stile to the jamb. Instead the door is locked by bolts extending longitudinally from the lock stile into the header 27 and threshold 30. Conventional mechanism for extruding and retracting such bolts, which may be operated by keys fitting lock cylinders 44, is housed in the lock stile. Such locking means make the door at least as secure as conventional doors against unauthorized entry.

Push bar 25a is attached to the inside of the door 20 and is provided with a screw opening 41a and a shouldered lock cylinder opening 42a; and push bar 25b, attached to the outside of the door, has a blind threaded recess 41b and shouldered lock cylinder opening 42b at its corresponding end. The threaded bolt 43, with its head portion 43a of a size such as to fit into shouldered opening 41a and a threaded portion 45, is used to tighten the push bars against the lock stile 24. The lock cylinders 44 have barrels 44a which are threaded into the lock mechanism inside the stile, and they have flanges which engage the shoulders of the recesses 42a and 42b. Thus they too help secure the push bars to the stile. This is all perhaps best illustrated in FIG. 5. Push bars 25a and 25b are inserted into the openings in pivot stile 23 and then placed with their openings 41a and b and 42a and b in registry with corresponding openings 47a and b and 48a and b in lock stile 24. The threaded bolt 43 is then inserted into recess 41a, the openings 47a and 47b in the lock stile 24, and its threaded end screwed into the mating threaded recess 41b of push bar 25b. Similarly the lock cylinder barrels 44 are screwed into place until they are properly positioned in the lock mechanism. The mounting bar 25a is on the interior of the door; thus there is no access to any screw, bolt, or other fastening device from the outside of the door. The outer face of the lock cylinder is substantially flush with the surface of the push bars, so that it is not possible for those seeking illegal passage through the door to get a tool on them to unscrew them from the lock mechanism.

FIG. 6 illustrates the overhead concealed closer (OHCC) 51 by which the door is hung in the door frame. Such closer is fixedly mounted in the usual manner to the transom 27 and comprises a spindle 52. An L-shaped clip 53 is used to attach the top rail 21 of the pivot stile 23. Fastened by means of screws 54 to the top rail of the door is top fork 55 having arms which fit about the spindle 52. Cap 56 is attached as by means of screws to the ends of the forked arms, thus forming an enclosure completely surrounding the spindle 52. A cover plate 57 is attached by means of screws 58 to the stile 23 to cover this opening in the door pivot stile.

FIG. 7 is a partial cut-away view illustrating the mounting of the door to the bottom pivot. There is

shown a standard center pivot base assembly 59 comprising a pivot base bearing 60 and a stile clip 61. The purpose of the clip 61 is to attach the pivot end of the threshold 30 to the jamb 28. To bottom web 62 of the rail 22 there is affixed an L-clip 63 which acts to fasten the rail 22 to the jamb 28. A bottom fork 64 is attached to the web 62 by means of screws 65 with the arms of the fork being spaced about the pivot base bearing 60. A cover plate 66 with retaining arm 67 is affixed to the stile 23 by means of screws 68.

FIGS. 8, 9 and 10 are directed to a modified double door embodiment of the invention, in which two center-hung pivot doors are mounted in a single door frame. Each of the doors comprises a top rail 71 parallel with a bottom rail 72 fixedly secured to an arcuate pivot stile 73 which is parallel to a lock stile 74. In this embodiment, the doors are provided with an intermediate rail 75 with glass panels 76 mounted in openings formed by the rails and stiles. The door frame comprises the usual door header or transom 77, threshold 92, and pivot jambs 78, with pivot jamb projection members 78a as described above. The intermediate rail is also provided with a recessed pull 79 which fits into an aperture in the rail 75 as described in greater detail later herein. The pivot stile and pivot jamb arrangement of this embodiment is the same as that described in connection with the embodiment depicted in FIGS. 1 through 7.

As to the meeting lock stiles, one is provided with a stile extension 80 (which may or may not be of resilient material) mounted on stile 74. The stile 74 of the other door is provided with an arcuate resilient guard 82 having a central longitudinal ridge 82a. The guard 82 is wider than the thickness of human fingers, so they cannot be hurt by pinching between the doors when the doors are closed. A resilient weather strip 81 is affixed at the outer edge of the stile extension. The weather strip is of a size sufficient to span the opening between the stile extension 80 and the resilient edge guard 82. The glass panels 76 are mounted in the openings utilizing the conventional glass stops 83 and resilient glazing strips 84.

The recessed pull 79 comprises side walls 85 and a rounded arm 86 which define an opening 87 into which the hand of a user can be placed to move the door. Top and bottom plates 88 are affixed by means of screws 89 to the pull 79 to close the top and bottom of chamber 87. A shield plate 90 is affixed by means of screws 91 to the intermediate rail 75 and by screws 91 to flanges 92 extending from opposite side walls of the pull. The shield 90 restrains movement of the pull 79 by virtue of being secured to flanges 92. Here again there are no fastening means or openings through the door, and the shield 90 houses the lock cylinders 110 with their outer faces flush with the shield to prevent removal thereof by those seeking illegal entry.

The mode of mounting of the door or doors onto the pivot assemblies is evident from the description that has been given above. The door, minus the cap 56, cover plate 57, cover plate 66, and retaining arm 67, is slid onto the pivot base bearing 60 and the spindle 52. The cap 56, retaining arm 67, and cover plates 57 and 66 are then attached to the door and the door is then ready for operation. Dismounting is accomplished by reversing the procedure.

While the preferred embodiments of the invention have been shown and described, it will be understood

that the invention may be embodied otherwise than as herein illustrated and described and that certain changes in the form and the arrangement of the parts and in the specific manner of practicing the invention may be made without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A center-hung pivot door assembly comprising at least one door pivotally mounted in a door frame opening on pivot means secured to said door frame, the frame comprising paralled header and threshold members and parallel jambs at least one of which is a pivot jamb, and the door including parallel top and bottom rails and parallel pivot and lock stiles fixedly secured together, a relatively narrow jamb projection member attached to said pivot jamb along substantially the entire length thereof and projecting outwardly from said pivot jamb into the door frame opening, the door pivot stile being arcuate-shaped and mounted in closely spaced relation with said jamb projection, the space between said projection member and pivot stile always being less than the thickness of human fingers, a pair of push bars spanning the door intermediate the top and bottom rails, said bars being disposed on opposite sides of the door in substantially the same horizontal plane, one of said bars having a recessed opening therein at an end thereof and the other having a female threaded recess at the corresponding end, and means for fastening the bars to the door stiles comprising an opening in each side of the arcuate-shaped pivot stile adapted to receive one end of said bars, a passage in the lock stile in communication with the recessed opening

in the one bar of the pair and the female threaded end of the other bar of the pair when said bars are brought into contact with the lock stile after their respective other ends have been inserted into said pivot stile openings, and a bolt of a length sufficient to extend through said passage and having one end threaded for locking engagement with said female threaded recess of one of said bars to fasten said bar to said lock stile and head means at the other end of a size to be received in said recess of the other of said bars and to clamp it against the lock stile.

2. The door assembly of claim 1 including an arcuate, resilient edge guard substantially wider than the thickness of human fingers attached to the outer edge of the lock stile and extending substantially the entire length thereof.

3. The door assembly of claim 2, including resilient weather seal means contacting said edge guard means along substantially its entire length when the door is in its closed position.

4. The door assembly of claim 1 wherein at least one of the push bars is formed with a shouldered opening overlying an internally threaded lock cylinder opening in the lock stile, and a lock cylinder having a flanged head and a male threaded barrel is threaded into said lock cylinder opening with its exterior face substantially flush with the outer surface of the push bar and with its flanged head engaging the shoulder of the opening in the push bar and thereby tending to hold the push bar against the lock stile of the door.

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