

May 23, 1967

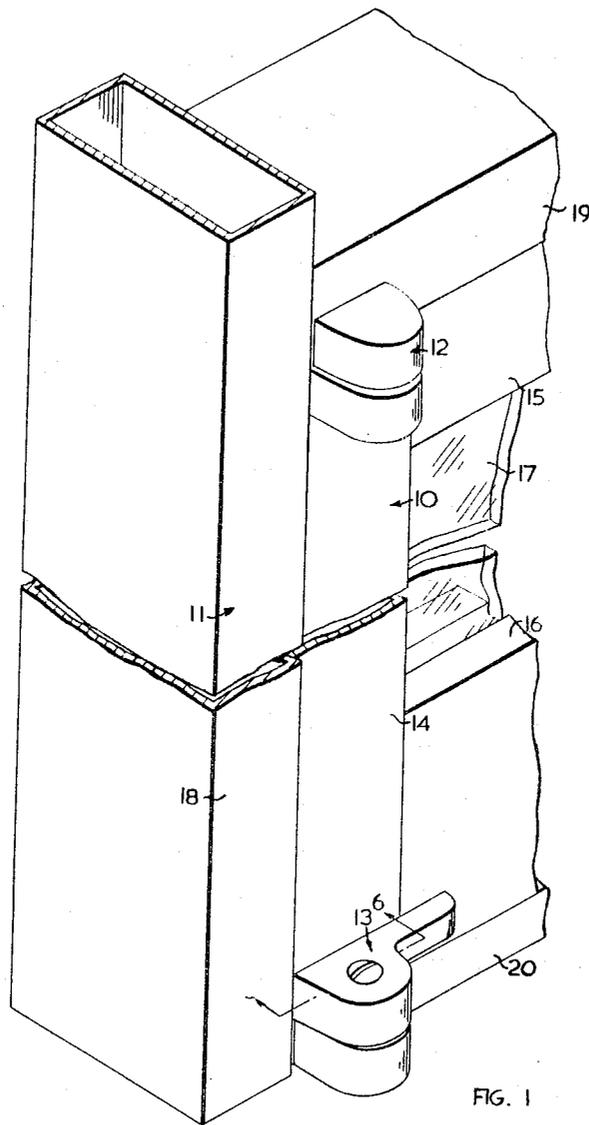
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3,320,699

DOOR PIVOTS

Filed Dec. 21, 1964

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

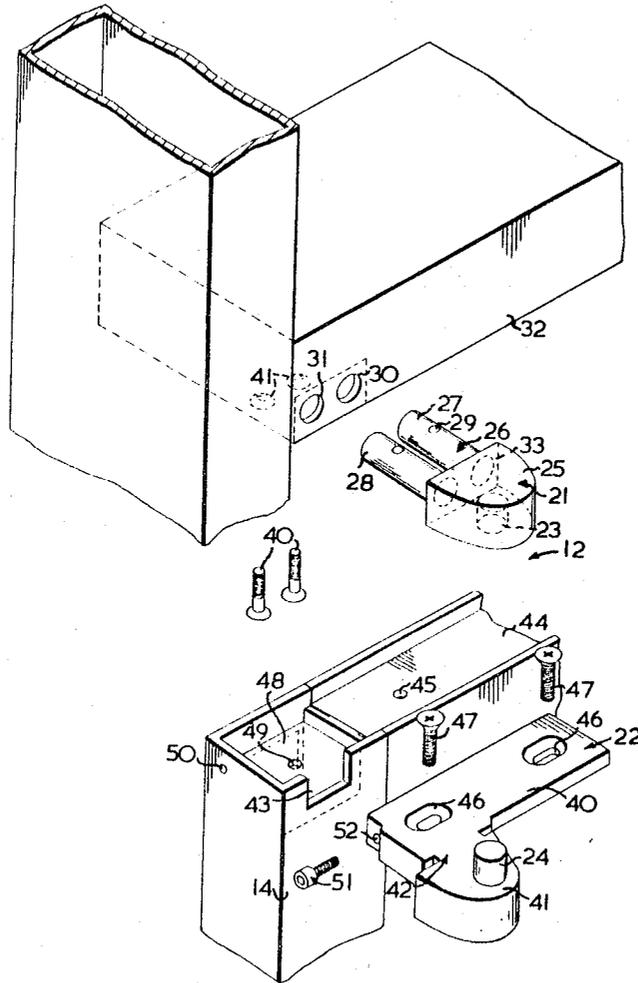


FIG. 2

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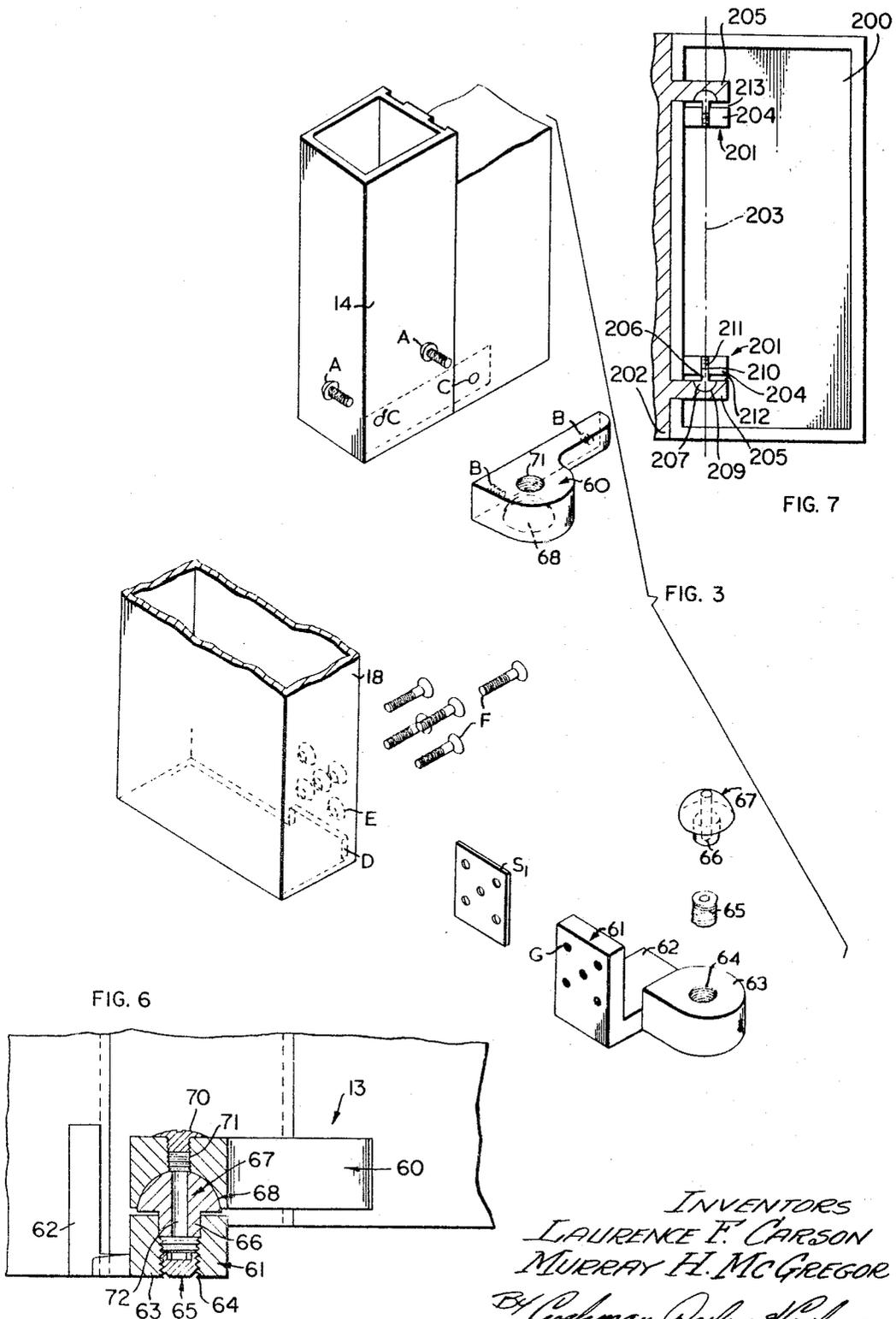
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DOOR PIVOTS

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4 Sheets-Sheet 3



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FIG. 5

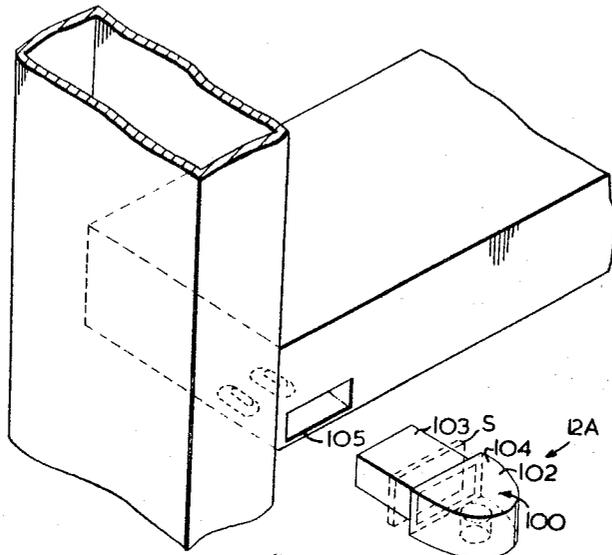
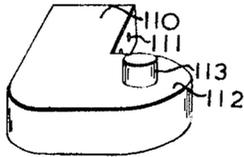
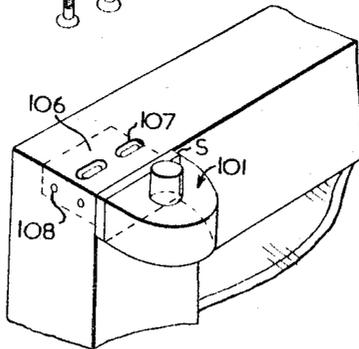


FIG. 4



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DOOR PIVOTS

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7 Claims. (Cl. 49—388)

This invention relates to hinges. Although the instant hinge has utility in joining together any relatively movable rigid members, the disclosure herein will be limited to hinges for securing doors to hollow metallic grid frame type of wall structures, more commonly referred to as curtain wall structures.

In curtain wall construction, it is desirable to secure a door with relative precision within an opening provided therefor. To accomplish this, the hinges used must be easily secured to the fixed and movable parts, i.e., respectively the frame and door and such hinges must be firmly and positively secured in position. It is also desirable that a limited amount of adjustment can be made and that removal of the door cannot be made from exteriorly of the building.

There are numerous hinges available, however, in most instances they are complicated, costly members, relatively difficult to secure accurately in position. The prior art hinges also normally require substantial modification to the respective door frame and door structures.

It is an object of the present invention to provide a hinge relatively rugged, but simple in construction.

A further object is to provide a hinge wherein at least one part thereof (normally the part secured to the structure in situ) can be accurately positioned and positively secured in place.

A still further object is to provide a hinge substantially tamper-proof, preventing removal of the same from exteriorly of the building structure.

Accordingly, one aspect of the present invention provides a hinge plate mounting means, comprising a pin projecting from said plate and adapted to project into an aperture in a rigid member and be detachably secured to the latter.

In a further aspect there is provided a hinge having a pair of hinge plates pivotably movable relative to one another about a common axis and a bearing member interposed therebetween said bearing member having surface in contact with one plate and stem projecting therefrom to abut a member adjustably secured to the other plate.

A still further aspect of the invention consists of a door mounted to a frame by the aforementioned hinge means.

The invention is illustrated by way of example, in the accompanying drawings, wherein:

FIGURE 1 is a broken elevational view illustrating a portion of a frame and a door pivotally secured thereto;

FIGURE 2 is an exploded detailed view of the upper hinge;

FIGURE 3 is an exploded detailed view of the lower hinge;

FIGURE 4 is an exploded view illustrating a modified hinge plate, the various parts being in a disassembled position;

FIGURE 5 is an oblique view of a further modified hinge plate;

FIGURE 6 is a cross-sectional view along section 6—6 of FIGURE 1; and

FIGURE 7 is a vertical elevation of a modified door mounting means.

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Referring now to the drawings, shown in FIGURE 1 is a portion of a door 10 pivotally mounted to a rigid frame 11 by respective upper and lower pivots or hinges 12 and 13. The door 10 consists of a stile 14, respective upper and lower rails 15 and 16 and a central panel 17, the latter of which may be glass, metal or the like. The stile 14 may be tapered if desired or it may be of any suitable configuration. It is preferable that the front face, against which the pivots abut, as will be seen hereinafter, be flat although this need not be so.

The door frame 11 defines an opening into which the door fits and such frame consists of a vertical member 18, a horizontal transom member 19 and a threshold 20. The members 18 and 19 are portions of members which together with similar members define a grid type frame work in a curtain wall structure. However, as previously mentioned this could be any structure for example an ordinary wall structure, a refrigerator cabinet and door or any other structure having an opening with a closure therefor pivotally secured to the structure.

Referring now to FIGURE 2, the upper hinge or pivot 12 consists of a first hinge plate 21 and a second hinge plate 22 adapted to be pivotally joined together by a pin 24. In the instant case the pin is secured to the plate 22 and projects into a recess in the plate 21. The pin, if desired, may be replaced by a ball adapted to fit into suitable recesses in respective plates 21 and 22 or it may be substantially mushroom-shaped having a hemispherical crown and a stem projecting therefrom. The plates 21 and 22 are secured respectively to the door frame and the door.

The hinge plate 21, consists of a first portion 25 (in which the recess 23 is located) and which, when secured in position, projects from the door frame and a second portion 26 which projects into the frame. The portion 26 consists of a pair of axially parallel, spaced pins 27 and 28 each having therein at least one threaded aperture 29. The axis of the aperture is substantially normal to the axis of the pins and parallel to the axis of the recess 23. The pins 27 and 28, when the hinge is assembled, project through respective apertures 30 and 31 in the front wall 32 of the box-like horizontal transom member 19. The pins 27 and 28 have a diameter less than the thickness of the hinge plate portion 25 and thereby the latter portion provides a shoulder 33 adapted to abut against the front face 32 of the horizontal transom member. Shims may be used between the shoulder 33 and the face 32 if necessary to precisely locate the axis of the recess 23, i.e., the axis of the pivot of the door. The hinge plate is secured in position by screws 40 which project through apertures 41 in the lower wall of the box-like member and are threaded into the apertures 29.

It is evident from the above described structure that the hinge plate 21 cannot be removed unless the door is in an open position and is thus substantially tamper-proof. The hinge plate is also securely and readily positioned accurately. The drilling of apertures 30, 31 and 41 may, if desired, be part of the field installation job. The lack of structural modification for use of the instant hinges also facilitates conversion of existing structures to the use of the instant hinges.

The hinge plate 22, shown in FIGURE 2 detached from the door 10, consists of a flat plate portion 40 which bears against the upper edge of the door. A portion 41 formed integrally with the plate portion 40, projects therefrom and forwardly of the front face of the door, at the juncture of the two portions there being a necked down portion 42 adapted to fit into a notch 43 formed in the front upper edge of the door stile. The pin 24 is secured to the plate portion 41 in any convenient manner as for example by being welded thereto, or a separate pin in interference fit in a recess or the like.

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The pin 24 may, if desired, be replaced by a ball which fits into suitable recesses in adjacent faces of respective hinge plate portions 25 and 41. The plate portion 40 is disposed below the upper edge of the door and is confined between the walls of the members which form the front and rear faces of the door. These walls are joined by a web 44 having therein threaded apertures 45. The hinge plate portion 40 has one or more elongated slots 46 through which screws 47 pass to secure the hinge plate to the door. The stile also is closed by a web 48 having therein a threaded aperture 49, for the same purpose as apertures 45.

Adjacent the upper edge of the stile 14 there is an aperture 50 providing access of an Allen wrench to a screw 51 which threads into an aperture 52 in an edge of the hinge plate portion 40. The head of the screw is of larger diameter than the aperture 50 and abuts against the stile and thus provides means for adjustably positioning the plate 22 relative to the door.

Referring now to FIGURE 3 the lower hinge 13 consists of the upper and lower hinge plates 60 and 61 adapted to be secured respectively to the front face of the door and the lower end of the door vertical frame member. The plate 61 includes an L-shaped portion 62, having one leg thereof which fits into the interior of the box-like stile for securement thereto by screws and one leg which projects therefrom into the door opening. The projecting leg includes a further portion 63 formed integral therewith and which projects forwardly of the door face. This portion together with the associate leg of portion 62 bears upon the floor structure and supports the entire door assembly. The portion 63 of the plate has a threaded aperture 64 into which a stud 65 is threaded to provide a seat for a shaft 66 of a member 67. The member 67 includes a dome shaped upper part which fits into a recess 68 in the lower face of the plate 60 and thereby pivotally interconnects the hinge plates 60 and 61.

The bottom pivot 13 effects vertical adjustment of the door by virtue of the stem of member 67 resting upon the upper edge of the movable threaded stud 65 (see FIG. 6). In order to facilitate adjustment, the stem 66 of member 67, includes an axial bore 72 through which an Allen wrench may be inserted. In order to gain entry to such bore, the pivot member 60 is provided with a threaded aperture 71 which is normally closed by a screw member 70. After assembly of the door, vertical adjustment may be effected by the proper directional rotation of the stud 65.

The door bottom pivot portion 60 is secured to the door by a pair of screws A inserted through apertures C in the door stile 14. These screws are not visible from the exterior and are threaded into apertures B in the pivot member 60. The other part or member 61 of the lower pivot is inserted through a notch D in the door frame 18 such that the L portion of the member projects upwardly into the hollow portion of the frame. This upwardly projecting L portion has a plurality of threaded apertures G into which screws F are threaded through apertures E in the frame. Horizontal adjustment of the pivot may be effected by use of shims S1 or the like.

In the alternative embodiment illustrated in FIGURE 4, the upper hinge 12A consists of a pair of hinge plates 100 and 101 each of which consists of integrally formed first and second portions 102 and 103. The portion 103 is a rectangular in cross-section shank of smaller dimension than the first portion 102 thereby providing a shoulder 104 at the juncture of the two portions. The shank portion 102 of the respective hinge plates fits into a similarly shaped aperture in the door frame and door. In each instance the respective transom wall and door edge are untouched, i.e., parts 105 and 106 and these edges may thus be apertured to receive screws for securely fastening the hinge plates. A pair of such apertures (elongated) and screws 107 are shown in the upper edge of the door. Additional screws 108 may also be used in the door which

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would provide means of adjusting the hinge longitudinally of the door. In such a case the aperture in the door into which the shank fits would be larger than the shank but such difference in size would remain hidden due to the shoulder 104. If desired shims S may be used as a filler between the plate shoulder and frame or door.

A similar hinge to that just described could also be used at the lower edge of the door. A modification, however, would be required to the lower hinge plate such that it may be secured to the stile. One such modified hinge plate is shown in FIGURE 5 and consists of an L-shaped member having a leg portion 110 adapted to project into the stile and be secured thereto by screws threaded into apertures 111 and a leg portion 112 which carries pivot pin 113. As in the previous instance, this plate is adapted to rest upon the floor structure and support the entire door assembly.

A still further modification is illustrated in FIG. 7, wherein a door 200 is pivotally mounted by a pair of hinge assemblies 201 to a wall 202. The door is mounted adjacent an opening to selectively open and close the latter by pivotal movement about a vertical axis 203.

Each of the hinge assemblies 201 includes a pair of hinge plates 204 and 205 having a bearing member 206 interposed therebetween. The bearing member is substantially mushroom-shaped having an interconnected hemispherical crown portion 207 and stem portion 208. The crown and stem portion project respectively into appropriately shaped apertures 209 and 210 disposed in hinge plates 205 and 204.

The aperture 210 is threaded throughout a major portion of its length to receive a threaded stud 211 which bears against the end of the step of the bearing member.

The bearing member stem and the threaded stud of each assembly have the axis thereof coaxial with the pivot axis 203. The stud in one assembly is disposed such as to exert a force on its associated bearing member in a direction opposite to that of the stud in the other assembly on its associated bearing member.

In this figure, the plate 205 of each hinge assembly is secured to the frame 202 while the plates 204 are secured to the door. It is obvious that this arrangement could be reversed as could also the relative vertical position of the associated hinge plates in each assembly be interchanged.

In initial installation the distance between the plates is preferably such as to provide selected gaps 212 and 213 between adjacent hinge plates. Vertical adjustment of the door may thus be effected by the proper directional rotation of the threaded studs 211.

We claim:

1. A frame comprising a rigid vertical member, and an upper and lower pair of vertically spaced horizontal members and an assembly pivotally secured to said frame by at least an upper and lower pair of hinges where said frame and assembly in one position have one face thereof in a common plane, said upper hinge comprising a first and second hinge plate secured respectively to the upper horizontal member and said assembly, the first hinge plate comprising a first portion abutting said one face and projecting therefrom, said first hinge plate including a second portion comprising spaced parallel pins lying in a substantially horizontal plane and projecting into correspondingly spaced apertures in said upper horizontal member, and screw means disposed between opposed faces of said assembly and projecting through a wall of said upper horizontal member into engagement with each of said spaced pins thereby to secure said plate to the assembly and prevent access to said means when said members have their said one face in a common plane, and bearing means interposed between the projecting portion of said first plate and said second plate for pivotally interconnecting said plates.

2. In a wall having an opening therein defined by a door frame including an upper horizontal member and a

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pair of horizontally spaced vertical frame members, and a door including pivot mounting means pivotally securing said door to said frame adjacent one of the latter's vertical members to pivot about a vertical axis, pivot means comprising an upper and lower pivot assembly each having a first and second hinge plate secured respectively to said frame and door; the first hinge plate of the upper hinge assembly comprising a pair of parallel pin members defining a plane which is disposed normal to said vertical axis and projecting outwardly from a main body portion through a pair of apertures in the horizontal member of said frame and detachably secured thereto, the second hinge plate of the upper pivot assembly comprising a first portion secured to the edge of the door adjacent said horizontal member and horizontally adjustable with respect thereto, and a second portion, said second portion and said main body portion pivotally securing together said first and second hinge plate, said lower pivot assembly comprising a first and second hinge plate secured respectively to said door and frame, and a vertically adjustable bearing member interposed between said plates; said first plate of the lower hinge assembly being disposed vertically above said second plate and resting upon said bearing member thereby providing means for adjustment of said door.

3. A pivotally mounted door as defined in claim 2 wherein said vertically adjustable bearing member is substantially mushroom-shaped, including a crown and stem and having the crown thereof projecting into a recess in the lower face of said first hinge plate, said stem projecting into a threaded aperture in said second plate and abutting a stud threaded into said aperture.

4. A device as claimed in claim 3 including an axial aperture through said crown and stem providing access to said threaded stud to permit adjustment of the latter.

5. A hinge comprising a first and second pair of hinge plates pivotally movable about a common axis and a bearing member interposed therebetween, said bearing member being substantially mushroom-shaped having a substantially hemispherical crown and a stem portion projecting respectively into adjacent recesses in said first and second hinge plates with said recesses shaped to accommodate and conform to the shape of the crown and stem portion respectively associated therewith, said stem abutting a stud threaded into said recess in said second plate, said stud and stem being substantially in alignment

on said common axis whereby rotation of said stud effects adjustment of said hinge.

6. A hinge as defined in claim 5 including an access aperture extending through said first plate and bearing member to said threaded stud, said aperture being substantially co-axial with said common axis.

7. In a wall having an opening therein defined by a door frame including an upper horizontal member and a pair of horizontally spaced vertical frame members, and a door pivotally secured to said frame, hinge means for pivotally mounting said door comprising an upper and lower pivot assembly each having a first and second hinge plate secured respectively to said frame and door; the first hinge plate of the upper hinge assembly being secured to the horizontal member of said frame and the second hinge plate of the upper pivot assembly being secured to the edge of the door adjacent said horizontal member and horizontally adjustable with respect thereto, said first and second plates being pivotally interconnected, said lower pivot assembly comprising a first and second hinge plate secured respectively to said door and frame and a vertically adjustable bearing member interposed between said plates, the bearing member being substantially mushroom-shaped having a crown and stem portion projecting respectively into adjacent recesses in said first and second hinge plates, said stem bearing against an adjustable abutment comprising a stud threaded into said second plate, said stud and stem being substantially in alignment on said common axis and thereby providing means to effect adjustment of said hinge; said first plate of the lower hinge assembly being disposed vertically above said second plate and resting upon said bearing member thereby providing means for adjustment of said door.

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