Oct. 23, 1962 N. SCHOOLER 3,059,270

GRAVITY DOOR HINGE SET

Filed July 19, 1961 2 Sheets-Sheet 1

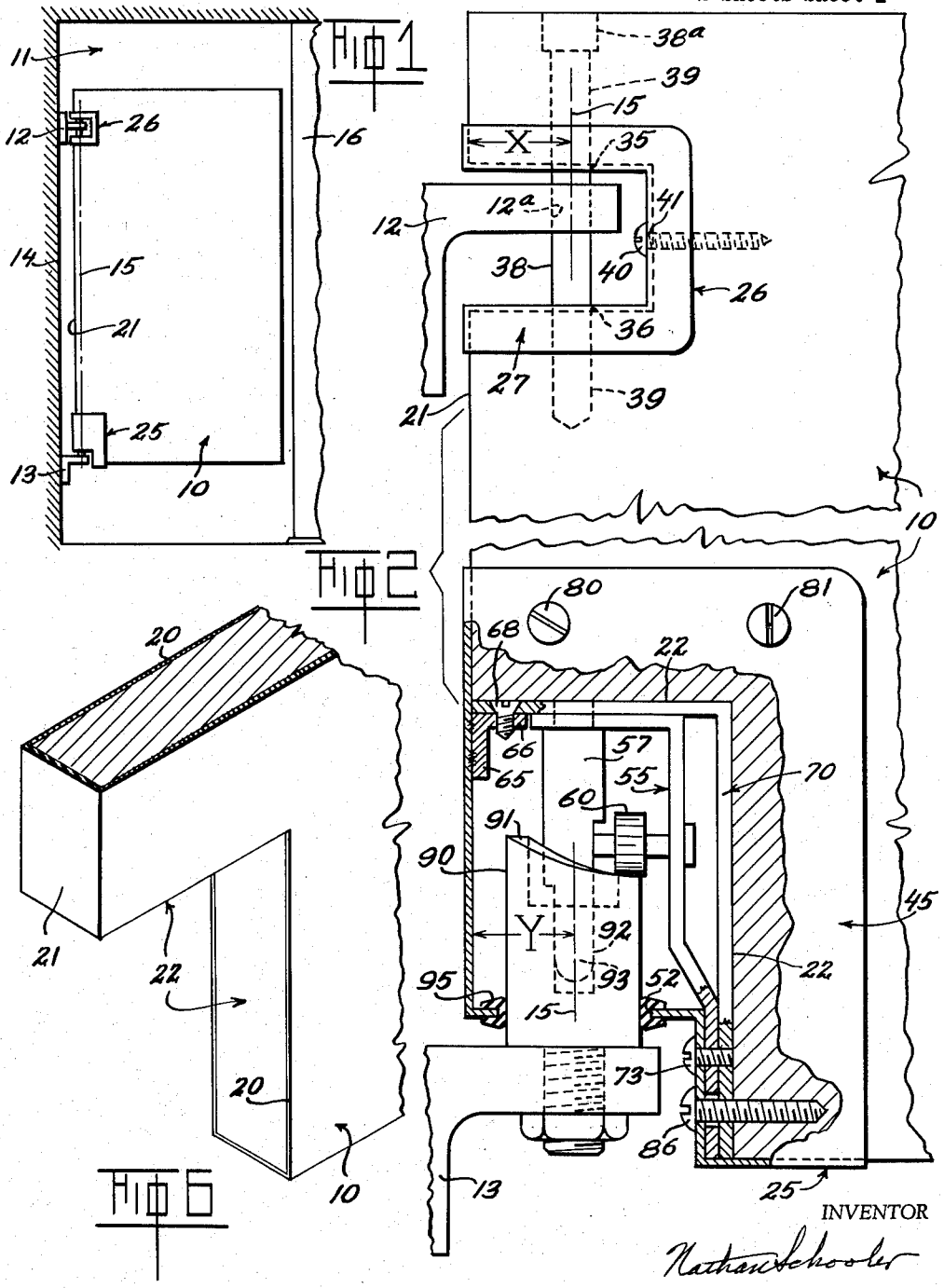


FIG 1

FIG 2

FIG 6

INVENTOR

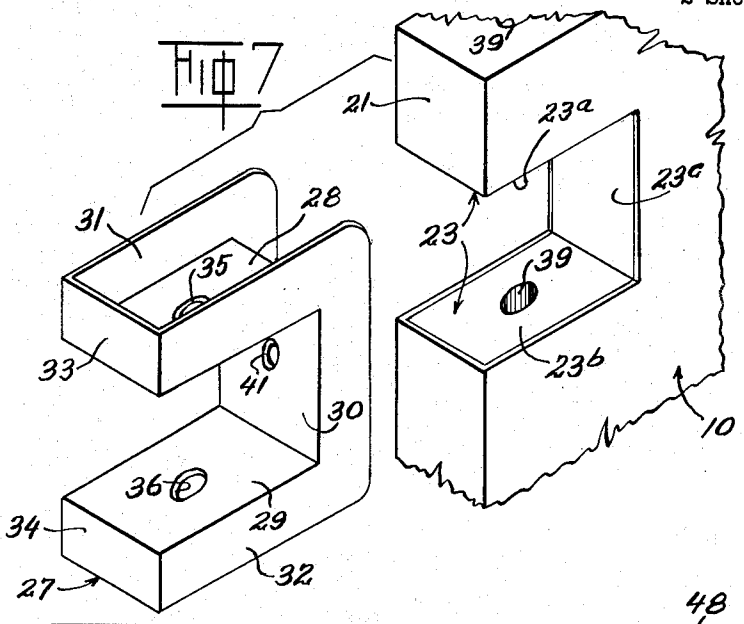
Nathan Schooler

Oct. 23, 1962 N. SCHOOLER 3,059,270

GRAVITY DOOR HINGE SET

Filed July 19, 1961 2 Sheets-Sheet 2

FIG 7



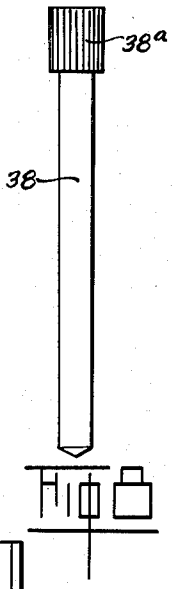


FIG 6

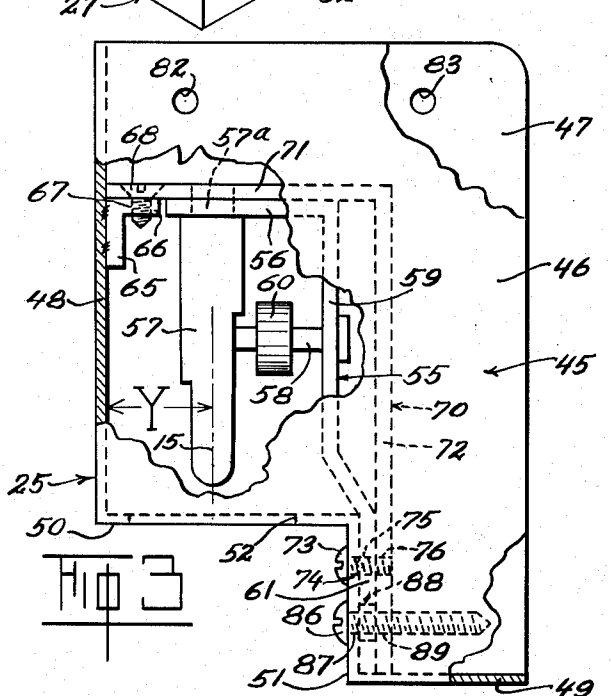


FIG 3

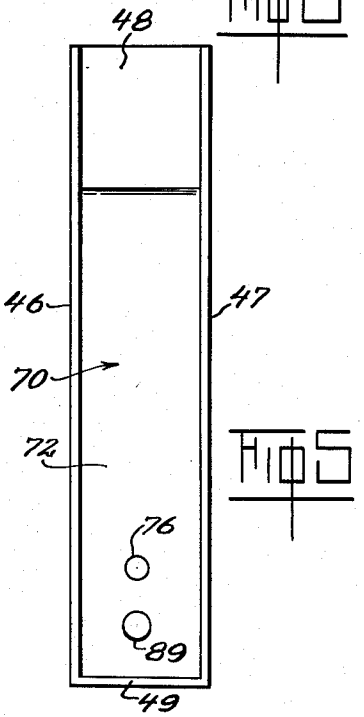


FIG 5

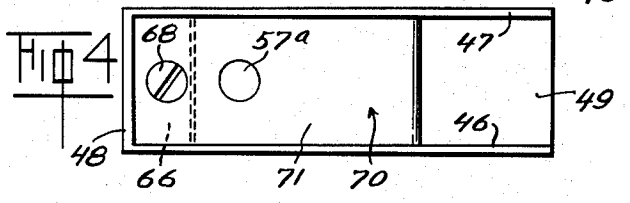


FIG 4

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GRAVITY DOOR HINGE SET

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11 Claims. (Cl. 16—154)

This invention relates to a hinge construction particularly applicable to swinging doors of the type employed in lavatories and more particularly to a door of wood construction provided on its exterior surfaces with a bonded plastic coating. In doors of this type it is desirable to reduce to a minimum the manipulative and operational steps that are both time consuming and expensive in attaching the hinge parts to the door aside from the fact that the door may be subjected to possible damage of the plastic coating thereon.

This invention therefore, more specifically, relates to a hinge set comprising an upper housing and associated hinge pin unit and a lower self-contained housing and gravity hinge unit of the concealed gravity type that will function to cause a swinging lavatory door to remain in a pre-determined position.

It is accordingly an object of this invention to provide a self-contained unit-handled gravity door hinge and housing that may be readily affixed as a unit to a lower cut-out portion provided in the door with a minimum of effort and skill and which is simple in construction, durable and dependable in operation; which will obviate undue operational working on, handling and manipulating of the door in mounting the same thereon and which can be quickly and readily removed to effect replacement of parts.

A further object of this invention is to provide an upper housing and associated hinge pin unit adapted to fit within a cut-out portion provided in the door and shaped to receive a hinge bracket, the housing having preformed openings therein for accurate positioning and reception of the hinge pin which is to extend through the hinge bracket, the housing further having wall flanges for completely concealing the edges of the cut-out portion and employing but a single hidden fastener for securing the same to the door.

A still further object of this invention is to correlate the upper housing and associated hinge pin and the lower self-contained unit-handled gravity door hinge and housing such that when each is mounted on the door at its respective cut-out portion, the hinge pin axis of both will always be in vertical axial alignment.

Further objects and advantages and a better understanding of the invention will appear from the following detailed description when taken in connection with the accompanying drawings wherein:

FIG. 1 is a front elevational view of a swinging lavatory door of a lavatory compartment showing the upper hinge pin and housing unit and the lower self-contained gravity hinge and housing unit mounting the door on fixed hinge brackets.

FIG. 2 is a front elevational view showing both the upper and lower hinge units in greater detail and partly in section with fragmentary portions of the door to illustrate the relationship of the lower self-contained gravity hinge unit to the door and to the upper hinge housing and associated hinge pin.

FIG. 3 is an elevational view of the lower self-contained gravity hinge unit and housing with part of the housing side wall broken away to show details of the hinge structure.

FIG. 4 is a plan view of the gravity hinge unit of FIG. 3.

FIG. 5 is an end view of the forward open end of the hinge unit of FIG. 3.

FIG. 6 is a detail perspective view of the lower corner of the door with the cut-out for receiving the gravity hinge unit of FIG. 3.

FIG. 7 is a detail perspective view of the upper hinge pin housing in separated relation to the cut-out in the door for receiving the same.

FIG. 8 is an elevational view of the upper hinge pin for use with the upper hinge pin housing.

Referring to the drawings, the door **10** is shown as a closure for a lavatory compartment **11**, see FIG. 1, and is mounted on upper and lower brackets **12, 13** secured to wall **14** for swinging movement about a vertical hinge axis **15**. It is to be understood that for adjacent lavatory compartments the door **10** is similarly mounted on brackets **12, 13** which are affixed to a pilaster or post **16** as is conventional.

The door **10** is of the swinging type and is of wood construction, the exterior surfaces of which are provided with a plastic coating **20** bonded thereto such as "Formica" or other suitable plastic. A "Formica" covered door possesses many advantages such as lightness, color variation, simplicity of manufacture, less maintenance as the color or design of the "Formica" coating will not peel or fade, and less cost than conventional fabricated metal doors. The hinge construction as will hereinafter be described is particularly designed for a door of this type.

The hinge side **21** of the door **10** is provided with a lower rectangular cut-out portion **22**, see FIG. 6, at the lower corner of the door, and adjacent its upper corner with an upper rectangular cut-out portion **23**, see FIG. 7, for reception respectively of a lower gravity hinge unit **25** and an upper hinge unit **26**, see FIG. 1.

The upper hinge unit **26**, see FIG. 7, comprises a one-piece metal housing **27** having an upper horizontal wall **28**, a lower horizontal wall **29**, and a vertical wall **30**, the walls each having a width corresponding to the thickness of the door and a length corresponding respectively to the walls **23***a*, **23***b* and **23***c* of the cut-out portion **23** so as to snugly seat thereagainst. Extending from the walls **28, 29** and **30** at each side thereof are parallel side walls or flanges **31** and **32** joined by end walls or flanges **33** and **34**. It is thus seen that the housing **27** is of a uniform channel-shaped cross section throughout and when seated in the cut-out portion **23** of the door that the side flanges **31** and **32** will engage the sides of the door with the end flanges **33, 34** engaging the edge of the door whereby the housing **27** will completely conceal the edges of the cut-out portion **23**. Provided in the walls **28, 29** are vertically aligned openings **35, 36** located centrally between side flanges **31, 32** through which a hinge pin **38** is adapted to be inserted. Extending vertically and downwardly through the upper corner of the door and through the lower cut-out wall **23***b* into the door is a bore **39** for the hinge pin **38**. The hinge pin **38** is of a length sufficient to span the cut-out portion **23** with its lower end extending into the lower end of the bore **39**. The upper end of the hinge pin **38** is provided with a serrated head **38***a*.

Referring to FIG. 2, the upper hinge housing **26** is shown in assembled relation to the door **10** and is secured thereto by a screw **40** extending through opening **41**, see FIG. 7, provided in the vertical wall **30** of the housing. In the assembled relation of the housing **26** with the door, the openings **35, 36** in the horizontal walls **28, 29** of the housing **26** will lie in registry with the bore **39**. The complete hinge connection at the upper end of the door is effected by positioning the upper hinge housing **26** with the upper bracket **12** projecting into the housing and inserting the hinge pin downwardly into the bore **39**, through opening **35**, bore **12***a* in the bracket, opening **36** and into

lower bore 39. Tapping the serrated head 38*a* of the hinge pin into the bore 39 so that it will lie flush with the top edge of the door will insure a positive non-rotational holding engagement of the pin in the door so that on swinging movement of the door the pin 38 will freely turn in the bore 12*a* of the bracket 12.

The lower hinge unit 25 is shown in FIG. 3, and in assembled relation with the door in FIG. 2, and comprises a one-piece metal housing 45 having parallel side walls 46, 47, a vertical end wall 48 and a bottom end wall 49. At the lower left hand corner of the housing 45, viewing FIG. 3, the same is formed with a right angular notch defined by a horizontal ledge wall 50 and vertical support wall 51. The spacing between side walls 46, 47 corresponds to the thickness of the door 10 so that said side walls will contact the sides of the door when the housing 45 is positioned thereon as will be hereinafter described. Provided in ledge wall 50 is an enlarged opening 52.

Located within the housing 45 is a gravity door hinge assembly of conventional construction comprising a support bracket 55 having affixed to the horizontal arm 56 thereof, the upper end 57*a* of a vertical hinge pin 57 disposed centrally between the housing side walls 46, 47 and to which is secured one end of a shaft 58, the other end of the shaft being fixed to a vertical arm 59 of the bracket 55. Mounted on the shaft 58 is a cam roller 60 which rotates thereon in a fixed vertical plane. The lower end portion 61 of the vertical arm 59 is offset and is adapted to seat against the vertical support wall 51. Preferably both arms 56, 59 of the support bracket 55 are of uniform width and of a width corresponding to the spacing of the housing side walls 46, 47.

Secured by welding or otherwise to the inside surface of the housing end wall 48 is a bracket 65 provided with a horizontal flat attaching portion 66, the bracket 65 being so positioned that the horizontal arm 56 of support bracket 55 will lie coextensive with the attaching portion 66. The bracket 65 is of such a width as to completely span the space between the housing side walls 46, 47. Provided in the attaching portion 66 is a central threaded opening 67.

A right angular retaining bracket 70 is disposed in juxtaposition to the support bracket 55, and is of uniform width corresponding to the spacing between the housing side walls 46, 47. The bracket 70 is shaped and dimensioned to provide a horizontal leg 71 and a vertical leg 72. The terminal free end of leg 71 is arranged to seat on the attaching portion 66 of bracket 65 and is secured thereto by a flat-headed screw 68 engageable with threaded opening 67. The horizontal leg 71 may also serve as an additional support and connection for the upper end 57*a* of hinge pin 57. The lower end portion of vertical leg 72 seats against the offset end portion 61 of support bracket 55 with the terminal ends of both end portions bearing against the bottom end wall 49 of the housing 45. A screw fastener 73 inserted through opening 74 in the housing vertical support wall 51, and in threaded engagement with threaded openings 75, 76 provided respectively in said end portions securely holds the lower end of support bracket 55 and retaining bracket 70 to the housing 45. It is thus seen that the housing 45 and its associated hinge parts when assembled as hereinabove described is self-contained and handled as a unit for application to a door.

The cut-out portion 22 at the lower corner of the door is dimensioned to be complemental to the dimensions of the retaining bracket 70 and to wholly engage the same when the lower self-contained gravity hinge unit 25 is positioned on the door as is clearly shown in FIG. 2. When so applied to the cut-out portion 22 of the door the housing 45 is secured in place by screws 80, 81, see FIG. 2, inserted through openings 82, 83, see FIG. 3, provided at the upper end portion of the housing side walls 46, 47, there being two such openings in each side wall. An additional screw 86, see FIG. 2, extends through an opening 87 in vertical support wall 51, opening 88 in offset lower end 61 of support bracket 55 and opening 89 in lower end of vertical leg 72. Preferably the opening 89 is threaded to receive screw 86 to retain the screw in place against loss when the self-contained hinge unit 25 is packaged or otherwise handled prior to placing the same on the door. The screws 80, 81 and 86, see FIG. 2, will securely hold the hinge unit 25 in fixed relation to the door as is readily apparent.

The lower self-contained gravity hinge unit 25 and the upper hinge unit 26 constitute a "matched set" by virtue of the fact that when each is positioned and secured on the door 10, the axis of the hinge pins 57 and 38 will be in vertical axial alignment. In other words, in the manufacture of the hinge units, the axis of hinge pin 38 of upper hinge unit 26, see FIG. 2, is located at distance "X" from the inside surface of end walls 33, 34 of housing 27 which distance "X" is made equal to distance "Y" of axis of hinge pin 57 of lower hinge unit, see FIG. 3, from the inside surface of end wall 48 of housing 45. As the aforesaid end walls of both housings must abut the edge 21 of the door, the vertical axial alignment of both hinge pins is thus assured.

In the mounting of the door 10, the upper hinge unit 26 is assembled with bracket 12 in the manner as described hereinabove. With regard to the lower self-contained gravity hinge unit 25, the bracket 13 has affixed thereto a sleeve 90 provided with an upper cam surface 91 and an axial bore 92 which is adapted to telescopically receive in rotative bearing relation the lower end 93 of hinge pin 57. The bracket 13 and sleeve 90 are assembled with the lower hinge unit by insertion of the sleeve through opening 52 in ledge wall 50 so that hinge pin end 93 will fit within bore 92 and the cam roller 60 will seat on cam surface 91. With the upper and lower hinge parts thus assembled the brackets 12 and 13 are each secured to wall 14 or pilaster 16 in the conventional manner and the door is thus mounted in position. As normally the opening 52 is made oversize with regard to sleeve 90, the edge of opening 52 may be fitted with a ring seal 95 of any suitable elastic material such as "neoprene," rubber, etc., which seal will function to prevent the entrance of dust, water and vermin into the space within housing 45.

The gravity hinge unit may be adjusted so that the door will be able to return to a predetermined position of rest which may be either an open or closed one or a partly open position. This is accomplished by proper positioning of the cam sleeve 90 on the bracket 13. In the position of the hinge parts shown in FIG. 2 the predetermined position of rest is a closed one for the door 10.

Although a specific embodiment of the invention has been disclosed in the accompanying drawings and described in detail in the foregoing specification, it is to be understood that the invention is capable of embodying a wide variety of modifications in detail structure without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. A self-contained gravity hinge unit for attachment to a swinging door comprising a one-piece housing defining a vertical end wall and spaced parallel side walls, a bottom wall joined to said end and side walls including a notched portion adjacent the vertical end wall defining a horizontal ledge wall and a vertical support wall, a bracket secured to the vertical end wall intermediate the ends thereof, an attaching portion on said bracket normal to said vertical end wall, an angular support member providing a horizontal support arm and a vertical support arm, the horizontal support arm lying coplanar with the attaching portion of the bracket and in juxtaposition thereto, the lower end of the vertical support arm seated against the vertical support wall of said notched portion, a hinge pin and roller assembly carried by said support member with the hinge pin axis parallel to and located a predetermined distance from said vertical end wall, a retaining bracket providing

a right angularly related horizontal leg and vertical leg, the terminal end of the horizontal leg seated on the attaching portion of said wall bracket and the lower end of the vertical leg engaging the lower end of said vertical support arm, a removable fastener securing the terminal end of the horizontal leg to said attaching portion, and removable fastening means simultaneously securing the lower end of said vertical support arm and the lower end of said vertical leg to the vertical support wall of said housing whereby to retain the gravity hinge pin and roller in said fixed predetermined relationship with reference to said housing and to permit handling of the housing and its associated parts as a self-contained unit.

2. The hinge unit of claim 1, wherein each of said housing side walls is provided with at least one fastener receiving opening for reception of a fastener to secure the upper part of the housing to said door, said removable fastening means comprising an elongated screw extending beyond said vertical leg serving further to secure the lower portion of the housing to said door.

3. The hinge unit of claim 2, wherein the hinge pin has its upper end fixed to said horizontal support arm and projects therethrough for anchoring engagement with the horizontal leg of said retaining bracket.

4. The hinge unit of claim 3, wherein said roller assembly includes a shaft which extends normal from said hinge pin and parallel to said horizontal support arm having one end secured to said hinge pin and the other end secured to said vertical support arm, and a cam roller rotatively mounted on said shaft.

5. The hinge unit of claim 4, wherein an opening is provided in said horizontal ledge wall adapted to receive a cam sleeve for coaction with said cam roller and hinge pin.

6. The hinge unit of claim 5, wherein a ring seal is fitted to the peripheral edge of said opening for contacting engagement with said cam sleeve.

7. A unit handled hinge structure of the gravity hinge type for a swinging door comprising a housing structure open at its top and at one side thereof to receive an angular cut-out corner of the door, said housing having a vertical wall, side walls and horizontal parallel offset bottom wall portions joined by a vertical support wall defining a notch, a pre-assembled gravity hinge pin and roller assembly including a support bracket, a retaining bracket of angular formation, means connecting said hinge pin and roller assembly to one end of said retaining bracket, means removably securing said one end of said retaining bracket to an upper portion of said vertical wall, common means removably securing the other end of said retaining bracket and support bracket to said vertical support wall, and an opening for the reception of a cam sleeve provided in the upper of said parallel bottom wall portions.

8. The unit handled hinge structure of claim 7, including a hinge bracket for fixed attachment to a support, and a cam sleeve adjustably secured to said hinge bracket and extending through said opening into said housing for operative coaction with the hinge pin and roller respectively of said hinge pin and roller assembly.

9. The unit handled hinge structure of claim 7, said angular retaining bracket and said angular cut-out corner of said door being complementally formed whereby said retaining bracket is adapted to seat on said angular cut-out corner to place the housing structure in a fixed predetermined position on said door, said common means comprising a pair of spaced fastener elements, extending through said vertical support wall, support bracket and retaining bracket, at least one of said fastener elements extending beyond the retaining bracket and adapted to secure the lower portion of the housing structure to said door.

10. The unit handled hinge structure of claim 7, wherein the side walls of the housing structure are so spaced and dimensioned as to be adapted to engage the sides of the door adjacent the cut-out corner, with the upper portion of the vertical wall adapted to abut the edge of the door and the retaining bracket is adapted to seat in said cut-out corner, whereby to place the housing structure in a fixed predetermined position on said door, and at least one fastener receiving opening in each side wall for the reception of a fastener to secure the housing structure to the door.

11. A housing unit to contain a gravity hinge assembly and adapted for attachment to a cut-out corner of a swinging door comprising a vertical end wall, a continuous bottom wall joined at one end to the lower end of said vertical end wall including a notched portion adjacent the vertical end wall defining a horizontal ledge wall and a vertical support wall, parallel opposed side walls joined to the vertical sides of said vertical end wall and to the sides of said continuous bottom wall, said housing unit being open at its top and the side thereof opposite said vertical end wall, a retaining bracket of angular formation within said housing unit arranged with one part thereof in opposed relation to said horizontal ledge wall and with another part thereof in opposed juxtaposed relation to said vertical support wall to define an enclosed space to contain said hinge assembly, means securing said parts of said retaining bracket respectively to said vertical end wall and to said vertical support wall, said retaining bracket serving as an anchor for at least one element of said hinge assembly, said horizontal ledge wall having an opening dimensioned to receive another element of said hinge assembly, at least one fastener receiving opening provided in each of said side walls and said vertical support wall, said retaining bracket being so related to the housing unit and to the cut-out corner of the door as to provide a positive seating engagement thereof with said cut-out corner when said housing unit is applied to said door whereby to place the housing unit in a fixed predetermined position on said door.

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