SELF-CLOSING HINGED DOORS AND HINGES THEREFOR

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ABSTRACT OF THE DISCLOSURE

This construction permits mounting of upper and lower flange plates onto the door jamb; then mounting of all of other hardware or hinge assembly on the door; then setting the entire door and hinge assembly onto the door jamb and inserting top and bottom removable pivot pins. The door may be removed by first removing the pivot pins. As the door opens a spring is tensioned. When a dwell position is reached, the door is held open. As the door is gently pushed further toward opening position, a stop will limit the angle of opening the door. However, the door can be raised somewhat or pushed hard to open the door fully. By a simple gentle push of the door from the dwell position in a closing direction, the door will pass from the dwell position and close by itself under spring pressure. Means is provided to adjust tension of the spring pressure. In one modification the dwell position is omitted. In another modification, hardware is provided for two doors, one above the other including a common hinge means between the two doors. The door is a hollow shell with insulation therein. Similar aligned holes are formed in the top and bottom walls of the hollow door to receive the hardware so that the door can be reversed for use as a left or right door.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to doors for refrigerators, electronic housings, ovens, appliances, vending machines and many other types of cabinets which require a hinged door, and to pivot hinges for such doors.

Description of the prior art

Spring loaded self-closing doors are old. Devices to keep a door open, once the door is sprung to open position, is also known in the prior art.

SUMMARY OF THE INVENTION

An object of this invention is to provide a self-closing hinged door of the character described having hinge means at its upper end to support and to adjust the initial load of the self-closing spring for said door, and which is provided at its lower end with means to hinge the door and to support the weight of the door.

Another object of this invention is to provide a door of the character described in which the lower hinge has means to releasably retain the door in open dwell position at a predetermined angle, the retain means being so constructed that a gentle push on the door toward closing position will allow the door to move from dwell position and to close itself.

Yet another object of this invention is to provide a door of the character described in which the door moves down into latching open position and which yet allows the door to move up out of latching position, when the door is gently pushed toward closing position, to allow the self-closing spring means to close the door.

Still another object of this invention is to provide a door assembly and hardware for hinging the door to a door jamb, which is so constructed that to install the door it is possible to mount the upper and lower flange plates to the door jamb, to then mount other hardware to the door, and to then set the entire door assembly onto the door jamb, and insert removable top and bottom hinge pins.

Still a further object of this invention is to provide a construction of the character described having means to releasably cause the door to dwell when opened to a pre-determined angle, and stop means for stopping further opening movement of the door beyond the angle of the dwell position of the door. The construction is such that a hard push of the door in a further opening direction or slightly raising the door will permit the door to open fully. In connection with the present invention, spring tensioning means is provided to act on the door as the door is opened. The whole door drops into a dwell position when it is opened to said pre-determined angle. If the door is pushed open further, a stop will limit the angle of opening of the door. By a simple push of the door, the door will move beyond the dwell position toward closing.

A further object of this invention is to provide a highly improved hinged door which has a primary use with magnetic gasket closures which keeps the door closed within further manipulations or locks. In one modification of the improved construction, the dwell is omitted. The purpose of the dwell is to keep the door open for loading or unloading the refrigerator or container on which the door is mounted. Means is provided to adjust the tension of the door closing spring.

The door is a hollow shell with insulation therein. There is a mounting hole in the top edge portion of the door and there is a mounting hole in the bottom edge portion of the door. These holes are similar and aligned so that the door can be reversed for use as a left or right door and accept a spring cartridge assembly at the top and a hinge plate at the bottom. Other holes in the top and bottom edge portions of the door for attaching the spring cartridge and a hinge plate are also similar and aligned so that all the holes in the top and bottom of the door are the same to allow using the door as either a right or a left door. This makes for easy manufacture since both the right and left doors can be similarly drilled top and bottom. The interchangeability of the door for right and left use also applies to the hardware without the dwell.

Several different shapes and styles of top and lower brackets can be used in connection with the present invention.

It is still a further object of this invention to provide an assembly of the character described applicable to two doors hinged on a common axis, one above the other, including in the assembly, a hinge at the upper end of the upper door, at the lower end of the bottom door, and an intermediate hinge unit between the doors assembled with the lower end of the upper door and also with the upper end of the lower door.

A further object of this invention is to provide a strong, rugged and durable door of the character described and highly improved hardware therefor, which shall be relatively inexpensive to manufacture, easy to assemble and disassemble, and which shall yet be practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

This invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described and of which the scope of invention will be indicated in the following claims.
BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a refrigerator or container provided with a self-closing hinged door embodying the invention;

FIG. 2 is a perspective exploded view of the hinges for the door;

FIG. 3 is a vertical cross-sectional view through the door and hinges on the axis of the hinges and through the plane of the door;

FIG. 4 is a cross-sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken on line 5—5 of FIG. 3;

FIG. 6 is a cross-sectional view taken on line 6—6 of FIG. 3;

FIG. 7 is a transverse, vertical cross-sectional view through the lower end of the door and the adjacent hinge hardware of FIG. 3, with the door in latched dwell position, and taken on a plane offset from the axis of the hinge;

FIG. 8 is a perspective, exploded view of the hardware for the lower end of the door and illustrating a modification in which the door does not have means to latch it in open dwell position;

FIG. 9 is a cross-sectional view similar to the lower end of FIG. 3 but relating to the structure of FIG. 8.

FIG. 10 is a perspective view of a modified form of top hinge plate;

FIG. 11 is a perspective view of a refrigerator having upper and lower doors and illustrating a modified form of the invention.

FIG. 12 is a perspective, exploded view of hardware for the lower end of the lower door of the refrigerator of FIG. 11; and

FIG. 13 is a vertical cross-sectional view through hardware between the upper and lower doors of FIG. 11.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in detail to the drawing, 10 designates a refrigerator or other container or cabinet provided with a door 11. The refrigerator 10 has a font wall 12 provided with a door jamb 13 to which are attached upper and lower brackets 14 and 15, on which the door is mounted in the manner hereinafter appearing.

The upper brackets 14 are angle shaped, having a vertical flange 14a attached to the door jamb 13 by screws 16 (FIG. 4) or in any other suitable manner. The screws 16 pass through vertical aligned openings 17 in the flange 14a. Extending from the upper end of flange 14a, at right angles thereto, is a horizontal flange or arm 14b projecting away from the door jamb 13. The flange 14b is modified with a vertical threaded opening 18 offset sideways with respect to the openings 17. The axis of openings 18 is the axis of rotation of the door 11, as will appear hereinafter.

The door 11 may be hollow and has a vertical end edge wall 20 adjacent the door jamb, Extending from the wall 20 are parallel side walls 21 interconnected by a top edge wall 22 and a bottom edge wall 23. The top wall 22 of the door is formed adjacent wall 20 with the drilled opening 25 and with a pair of smaller openings 26 and 27. The axes of openings 25, 26, and 27 are longitudinally aligned. The bottom wall 23 is formed with openings 25a, 26a and 27a similar to and vertically aligned with the openings 25, 26, 27, respectively.

Screwed to the threaded opening 18 is an upper pivot pin 30. Said pin 30 has an upper hexagonal head 31 provided with a key or slot 32 to receive a screwdriver. Below the head 31 is an externally screwed-threshold portion 33 which may be screwed into opening 18. Extending below the threaded portion 33 is a vertical cylindrical pin portion 34 which project below the flange 14b.

Mounted on the upper end of the door is a spring housing 35. Said spring housing 35 comprises a top flange or arm 36 contacting the upper surface of door wall 22 and from which there extends downwardly through the opening 25, a cylindrical wall or tube 37. At the lower end of the tube 37 is an annular bottom wall 38 from which there extends upwardly, a short inner axial tube 39. The wall 38 is formed with a small vertical hole 40 for the purpose hereinafter appearing. The arm 36 is formed with countersunk openings 42, 43, spaced from the axis of tube 37 the same distances that the openings 26 and 27 respectively, are spaced from the wall opening 25. The outer diameter of the tube 37 is substantially similar to the diameter of the opening 25, and the openings 42 and 43 register with the openings 26 and 27, respectively. Screws 44 and 45 are screwed to a plate 46 placed against the underside of the door wall 22. Plate 46 has threaded openings 47, 48 coaxial with the openings 26, 27 respectively to receive the screws 44, 45, respectively. The plate 46 may have upstanding flanges surrounding openings 47, 48, and projecting upwardly through the openings 26 and 27 and into the openings 42, 43, respectively.

Mounted within the tube 37 is a pin assembly member 50. Said member 50 comprises an upper member 51 to which a pin 52 is fixed in a manner hereinafter appearing.

The upper member 51 has an axial through opening 53 rotatably receiving the pin 54. At the upper end of member 51 is an annular head 54 formed with a plurality of equiangularly spaced outwardly opening radial internally screw-threaded openings 55 communicating with the central opening 53. Below the head 54 is a cylindrical portion 56, journaled in the upper end of the tube 37. Said cylinder portion 56 is formed at its underside with a vertical opening 57 similar to and symmetrically disposed to the openings 40 in the wall 28.

The lower end of pin 52 is journaled in the tubular flange 39. Below the upper end of pin 52 is a fixed collar 58. Above the collar 58 is a ribbed portion 59 force fitted into the lower end of the opening 53 for fixing the pin 52 to the member 50.

The flange 14b of angle shaped bracket 14 is formed with a vertical opening 61 disposed between the opening 18 and flange 14a. Fixed within opening 61 and projecting below said flange 14b, is a stop pin 62. Screwed into one of the openings 55 is a horizontal pin 66 provided with a key or slot 67 to receive a screwdriver. The purpose of the pin 66 will be explained hereinafter.

Dispose of the pin 66 is a torsion spring 64 having a lower end 65 projecting through opening 40, and an upper end 66a projecting upwardly into opening 57. The pin 62 will engage the stop pin 66, which may be moved from one opening 55 to another. As the door is swung open the torsion spring 64 will be further tensioned. The adjustment of the pin 66 is for the purpose of changing the initial torsional tension of the spring 64 when the door is closed.

Attached to the lower end of the door is a hinges assembly 70 cooperating with the lower bracket 15 for lingly supporting the door on said bracket in the manner to be described hereinafter. Assembly 70 cooperates with the brackets 15 and parts, to be described, assembled therewith.

The bracket 15 comprises a vertical portion 15a vertically aligned with portion 14a of the bracket 14. Extending at right angles to portion 15a is a horizontal portion 15b parallel to and aligned with portion 14b of the bracket 14. Portion 15a has vertically aligned holes 71 which are aligned vertically with the openings 17 of the bracket wall 14a. The horizontal flange or portion 15b has at its outer end a rounded portion 72 which is fornted with a screw-threaded opening 74 coaxial with the openings 25, 25a in the brackets 15, 15b, respectively. The bracket 15 is attached to the door jamb 13 by means of screws 75 passing through openings 71 in flange 15c. Flange 15b is formed with a
through opening 76 offset from opening 74, for the purpose hereinafter appearing.

Screwed to the flange 15b is a pivot member 77 (FIGS. 3 and 5). Member 77 has a hexagonal head 78 at its lower end formed with a kerf or slot 79. Above the hexagonal head 78 is an externally screw-threaded portion 80 screwed into the opening 74. The upper end of the screw-threaded portion 80 is substantially at the level of the upper surface of the flange 15b. Extending upwardly from the screw-threaded portion 80 is a coxial pin 81 for the purpose hereinafter appearing. Flange 15b is formed with a permanent stop 116 which extends to the upper surface of said flange and projects out beyond the curved portion 72, and is located adjacent one side edge of said flange.

Mounted on the flange 15b is a stop plate 85. Said stop plate 85 is in the form of a stamping. Plate 85 comprises a top wall 86 formed with a downwardly extending internally screw-threaded hub 87 coaxial with the opening 76 of flange 15b of bracket 15. The outer end of wall 86 is rounded as at 88. Extending downwardly from the sides of wall 86 are vertical flanges 89 having lower edges contacting top surface of flange 15b. Extending through the openings 76 is a stop 90 having a head at its lower end contacting the underside of flange 15b. The upper end of the screw is screwed into the hub 87, as shown in FIG. 5. A flange 91b extends downwardly from the front curved end 88 of the wall 86. The top wall 86 of stamping 85 is formed with a depressed rib 92 inclined somewhat more than 90° degrees from the flange 85a. The depressed rib 92 crosses the axis of the opening 76. Said rib comprises a bottom web 93 and parallel side flanges 94 and an inner end flange 95 spaced from the hub 87. The bottom wall 93 and portions of the side flanges 94 are formed with a drilled opening 96 coaxial with opening 74 and through which the pin 81 projects upwardly above the stamping 85. The leading edge 93a of the stop lug 83 is disposed close to the outer side of the groove formed by the depressed rib 92. The upper surface 86 of the stamping 85 is at the level of the upper surface 83b of the stop lug 83. Side walls or flanges 94 are outwardly curved adjacent top surface 86 of the stamping. The upper end of leading surface 83a is very slightly spaced from the plane of the inner surface of the outer flange 94. Said surface 83a is in a vertical plane which intersects and rises above the curved upper end of said outer flange 94, for the purpose hereinafter appearing.

The assembly 70 comprises a member 100 as assembled with a stop plate 101. Plate 101 comprises a flat plate portion 102 formed with a pair of spaced openings 103 registering with the openings 26a, 27a in the bottom edge wall 23. Plate 101 at one end is formed with a downwardly extending flange 105 from which a central lug 106 projects downwardly. Lug 106 is disposed closer to the rear edge 102a of plate 102, than to the front edge 102b of said plate. Plate 101 is formed with an opening 107 coaxial with the opening 25a of the bottom wall 23. Force fitted into the opening 107 is the reduced lower end 108 of a sleeve 109. Sleeve 109 has an outer diameter such as to fit into the opening 25a. Said sleeve is formed with an annular inwardly extending annular flange 110 at its upper end providing a central opening 111. Within the sleeve 109 is a bearing bushing 112. The upper end of the pin 81 is journaled in the bushing 112. Plate 102 lies against the underside of the sleeve 109.

Attached to the underside of the plate 102 is the stamping 101. Said stamping 101 comprises a bottom wall 114 formed with an outer flange 114a, and with side flanges 114b and 114c, contacting the outer edge 102c and the rear and front edges 102a, 102b, respectively, of the plate 102. Extension 115 extends from edge of the wall 101 are spaced flange 115 and 115a disposed on opposite sides of the flange 105. Said bottom wall 114 is further more formed with a depressed rib 116 adjacent its inner end. The rib 116 is so located that when the door is opened about 90° the rib 116 will drop into the groove formed by the depressed rib 92. The rib 116 has a bottom web 117, side flanges 118 and inner end wall 119. The rib 116 is inclined to the side flanges 114b, 114c when the door is closed. The rib 116 is formed with a through opening 120 aligned with the central through opening in the bushing 112 and the pin 81 extends upwardly through said opening 120. The opening 120 is formed in the web 117 and cuts through the side walls 118 of rib 116.

The assembly 70 is attached to the bottom of the door by means of a pair of counter-sunk heads 123 at their lower end received in countersunk openings 24 in wall 114 and passing through the openings 103 in the plate 102 and through the openings 26a, 27a in the lower edge portion 23 of the door.

At the top of said lower edge portion 23 is a plate 127 formed with internally screw-threaded openings 128 to receive the upper ends of screws 122. The plate 127 may have hubs 129 received within the openings 26a, 27a. It will be noted that the lug 106 and the flange 105 projects downwardly into the rib 116 to close its outer end.

When the door is closed, the rib 116 crosses the groove formed by the rib 92 and rides on the wall 86 of the stamping 85. The door will swing open on the axially aligned pivot pins 81 and 34. When the door is opened through an angle of somewhat more than 90°, the rib 116 becomes aligned with the groove formed by the rib 92 and the door, as a whole, will drop as rib 116 drops into the groove for a dwell position of the door. The door can be closed by gently pushing it in a closing direction. The junctions between the side walls 94 and the top wall 86 of member 85 are curved and the junction between the web 117 and the side flange 118 are also curved, to facilitate the closing of the door when the door has been subjected to a gentle push in a closing direction. The spring 64 will close the door once the rib 116 is out of the groove formed by the rib 92. If the door is gently pushed in an opening direction from dwell position, rib 116 will rise in the groove but will engage the upper end edge of surface 83a to stop further opening movement of the door, so that the door can only open several thousand of an inch from dwell position before further opening of the door is halted. However, a hard push or lifting of the door enables the door to be opened up further or fully.

It will be noted that the door can be used for a left hand door or a right hand door because the openings 26a and 27a are similar and in vertical alignment, and also because the openings 26a, 27a are similar to and in alignment with the openings 26 and 27.

In FIGS. 8 and 9 there is shown a modified construction in which the dwell of the door in open position is not employed. The upper end of the door for the modification 10a of FIGS. 8 and 9 is the same as shown in FIGS. 1 to 7. The lower bracket 15 of FIG. 2 is employed in the modification 10a. However, the stamping 85 is omitted. The hinge pin 77 shown in FIG. 5 is also employed as shown in FIG. 8. The head 78 of the hinge pin 77 contacts the underside of flange 15b of bracket 15. The threaded portion 80 of the hinge pin 77 is screwed externally into the internally threaded opening 74 of the flange 15b, and the pin 81 projects upwardly above said flange. The opening 76 of the flange 15b is not used in the modification 10a. Said screw 101 is attached to the underside of the door 11, in the manner hereinafter appearing. The plate 130. The plate 130 is formed with a pair of counter-sunk openings 131 coaxial with the openings 26a, 27a of the bottom wall 23 of the door. Mounted on the upper side of porti 23 of the door 11 is a plate 127. Screws 132 have their heads within the counter-sunk openings 131, and their shanks are screwed to the internally threaded openings 128 in the plate 24. Plate 130 is formed with an opening 135 coaxial with the
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7 opening 25a in the bottom portion 23 of the door. Force fitted within said openings 135, 25a is the upper reduced end 137 of sleeve 138. Said sleeve 138 has a cylindrical portion 139 of increased diameter projecting below plate 138 and carries a bushing 140 in which the pin 91 is journalled. Force fitted onto the upper end of the reduced portion 137 of the sleeve 138 is a collar 142 which has a close fit within the opening 25a. The lower end of portion 139 of the sleeve 138 rests on the upper surface of the flange 15b.

In FIG. 10 there is shown a bracket 150 to replace the bracket 75. The bracket may have a vertical flange 151 formed with openings 152 for attaching said bracket to a surface of the door jamb. Extending from the upper end of the flange 151 is a horizontal flange 153. The flange 153 may be provided with a hinge pin 154 somewhat similar to the hinge pin 30 and is also provided with a stop pin 155 similar to the stop pin 62. The bracket 150 of FIG. 10 is different in shape from the bracket 15 but serves the same purpose.

In FIGS. 11, 12, 13 there is shown another modification of the invention. In FIG. 11 there is shown a refrigerator 160 or other cabinet having upper doors 161 and lower doors 162 adapted to be opened and closed. The attachment of the upper end of the upper door 161 to the door jamb may be the same as shown in the modification of FIGS. 1 to 7. Also the attachment of the lower end of lower door 162 to door jamb may be similar to the attachment of the lower end of the to the door jamb as in the modification of FIGS. 1 to 7. Between the doors 161, 162, there is located a bracket 150 provided with a stamping 85 as described hereinabove. Replacing hinge pin 77 of FIG. 5 is a hinge pin 163 having a polygonal wrench engaging head 164 similar to the head 78. Above the head 164 is an externally screw-threaded portion 165 similar to screw-threaded portion 80 and from which a pin 166 extends upwardly similarly to pin 81. Extending downwardly from the head 164 is a pin 167 similar to the pin 166 but projecting in an opposite direction. The pin 166 projects upwardly through the assembly 70 in the same manner as the pin 81 projects through the assembly 70. The pin 167 projects downwardly into the central opening 50 in member 51 similarly to the way the pin 34 of FIG. 3 pivots the upper end of the door 11. The doors 161 and 162 are similar to each other and each is similar to the door 11. They are hollow and the upper and lower walls thereof have similar openings for reception of tube or other means at 37 and the hubs of the attaching plates 46 and 127. Thus each door may be opened separately and each has a dwell to keep the door open to permit loading or unloading of the refrigerator or other containers to which the door is mounted, in the same manner as described for door 11.

It will be appreciated that the tension of the spring is not sufficient to cause the door to move out of dwell position by itself, but needs a gentle push to start the closing of the door.

It will thus be seen that there is provided an article in which several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth is to be interrupted as illustrative only.

1. In combination, a door, upper and lower brackets at the upper and lower ends, respectively, of said door, adapted to be attached to a door jamb for said door, means at the upper and lower ends of said door, respective pivot means for said door to said brackets on a common pivotal axis for movement from closed position to a predetermined angular open position at one level, spring means associated with said upper pivot means and lower upper bracket, and projecting into said door, to cause the door to self-close, and means to adjust the initial tension of said spring means when the door is closed, and means associated with the lower pivot means and lower lower bracket to cause the door to dwell in said predetermined angular open position.

2. The combination of claim 1, and means associated with said lower bracket and lower pivot means, to stop the door from being opened at said level, upon the door being pushed in further door opening direction, from dwell position.

3. The combination of claim 2, and means associated with said lower bracket and lower pivot means to lift said door to a higher level upon the door being pushed in further door opening direction to ride over said stop means so that said door may be moved to fully open position from said dwell position.

4. The combination of claim 1, said dwell causing means comprising means on the lower bracket providing a flat upper surface fromed with a depressed groove, and means on the associated lower pivot means providing a flat under-face from which a rib projects downwardly, crossing said groove at said common pivotal axis, and is closed stop means on said flat upper surface and adapted to droop into said groove when said rib becomes aligned with said groove as the door is opened to said predetermined angular dwell position and allowing said flat under-face to rest on said upper flat surface.

5. The combination of claim 1, said door having aligned openings of similar diameter at its upper and lower ends, respectively, said pivot means having aligned members at the upper and lower end of said door of similar diameter, respectively, to be received in said openings, whereby said door can be mounted on said brackets for pivot movement at its right side as well as on its left side.

6. The combination of claim 4, and stop means on said lower bracket to engage said rib means to prevent opening of the door beyond dwell position.

7. The combination of claim 1, a second door, means on the lower bracket to pivotally engage the upper end of the second door on said common axis, a third bracket at the lower end of said second door, means on the third bracket to pivotally mount the lower end of said second door on said common axis.

8. In combination, a door, upper and lower brackets at the upper and lower ends, respectively, of said door, adapted to be attached to a door jamb for said door, means at the upper and lower ends of said door, respective pivot means for said door, respectively, to pivot said door and said brackets on a common pivotal axis, spring means associated with one of said pivot means and projecting into said door, to cause the door to self-close, and means to adjust the initial tension of said spring means when the door is closed, a second door, said means on the lower bracket to pivotally engage the upper end of the second door on said common axis, a third bracket at the lower end of said second door, means on the third bracket to pivotally mount the lower end of said second door on said common axis, pivot means at the lower end of the second door to cause said second door to dwell in a predetermined angular open dwell position.

9. The combination of claim 1, means to pivot the upper end of said door to the upper bracket, comprising a pivot pin on said bracket extending downwardly, and means on the upper end of said said bracket receiving said pin.

10. The combination of claim 1, said means to pivot the upper end of said door to the upper bracket, comprising a pivot pin on said bracket extending downwardly, and means on the upper end of said said bracket receiving said pin.

11. The combination of claim 10, said receiving means comprising a plate fixed to the upper end of said door, a tube fixed relative to said plate, a member formed with a
hole journalling said pin and being journalled in said tube, and a pin fixed to said member and extending through said tube, and said spring means comprising a coil torsion spring attached at one end to said tube and at its other end to said member.

12. The combination of claim 11, said member being formed with a plurality of radial, angularly spaced openings, a stop pin selectively fixable in said radial, openings and radially extending therefrom, and a stop pin on said upper bracket in the path of said stop pin on said member.

13. In combination, a door, upper and lower brackets at the upper and lower ends, respectively, of said door, adapted to be attached to a door jamb for said door, means at the upper and lower ends of said door, respectively, to pivot said door to said brackets on a common pivotal axis, spring means associated with one of said pivot means and projecting into said door, to cause the door to self close, and means to adjust the initial tension of said spring means when the door is closed, and means associated with the other pivot means to cause the door to dwell in a predetermined angular open dwell position, said dwell causing means comprising a member fixed to one of said brackets and formed with a groove in its upper side, the associated pivot means comprising a pivot pin on said one of said brackets passing up through said groove, a plate fixed to the underside of said door and having a bearing receiving said pivot pin, and a member fixed to said plate and provided with a rib receivable in said groove and formed with a hole through which the pivot pin passes.

14. The combination of claim 13, and said one of said brackets having a stop lug adjacent said groove, said groove having vertical inner side surfaces which are outwardly curved at their upper ends, said rib having outer side surfaces which are curved at their lower ends, and said stop lug having a vertical end wall substantially parallel to one of said inner side surfaces of said groove and cutting across the curvature at the upper end of one of said side surfaces of said groove.

15. The combination of claim 3, said dwell causing means comprising means on the lower bracket providing a flat upper surface formed with a depressed groove, and means on the associated lower pivot means providing a flat underspace from which a rib projects downwardly, crossing said groove at said common pivotal axis, when the door is closed and supported on said flat upper surface and adapted to drop into said groove when said rib becomes aligned with said groove as the door is opened to said predetermined angular dwell position and allowing said lower flat surface to rest on said upper flat surface.

16. The combination of claim 15, and stop means on said lower bracket to engage said rib means to prevent opening of the door beyond dwell position.

References Cited

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor(s)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>996,413</td>
<td>6/1911</td>
<td>Katzenberger</td>
<td>49—386 X</td>
</tr>
<tr>
<td>1,105,852</td>
<td>8/1914</td>
<td>Sherwood</td>
<td>49—386 X</td>
</tr>
<tr>
<td>3,331,159</td>
<td>7/1967</td>
<td>Cooke et al.</td>
<td>49—386 X</td>
</tr>
<tr>
<td>3,398,487</td>
<td>8/1968</td>
<td>Matyas</td>
<td>49—239</td>
</tr>
</tbody>
</table>

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16—76, 139; 49—236