SELF-CLOSING BUTT HINGE

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ABSTRACT
The compactness of a self-closing butt hinge is increased by nesting the self-closing mechanism within openings formed in the mounting wings of the hinge so that the wings can be positioned in closely spaced face-to-face relation when the hinge is "closed". Also disclosed are novel means for automatically locating the hinge in a proper position relative to a mortise and for limiting opening of the hinge beyond a given position.

3 Claims, 11 Drawing Figures
SELF-CLOSING BUTT HINGE

BACKGROUND OF THE INVENTION

This invention relates to hinges and, while certain aspects of the invention are applicable to different types of hinges, the invention is particularly concerned with a so-called butt hinge whose mounting wings are pivotally interconnected by a hinge pin and are adapted to be positioned face-to-face in the "closed" position of the hinge.

The invention has even more specific reference to a self-closing butt hinge of the type in which one wing supports a self-closing mechanism having a spring-urged pressure member operable to bias the hinge to and hold the hinge releasably in its closed position. Hinges of this type find many different applications but are used quite frequently in conjunction with fine furniture, cabinets and the like and serve to connect a door to a frame and to hold the door in a closed position. When so used, it is customary to mount at least one of the hinge wings in a mortise in the door or the frame so that the two can be positioned closely together to avoid an unattractive intervening gap.

SUMMARY OF THE INVENTION

One of the important objects of the present invention is to provide a new and improved self-closing butt hinge whose mounting wings, when the hinge is closed, are capable of lying in more closely spaced face-to-face relationship than prior hinges of the same general type. As a result, less material need be mortised from the door or the frame and, in addition, the overall diameter of the hinge pin portion of the pin may be reduced to enhance the external appearance of the hinge.

A more detailed object is to accomplish the foregoing through the provision of an opening in the wing opposite the wing with the self-closing mechanism, the opening being positioned to receive and accommodate part of the self-closing mechanism when the hinge is closed and thus enable close face-to-face positioning of the wings by reducing the effect of the obstruction presented by the self-closing mechanism.

A further object of the invention is to locate one of the hinge wings, within the mortise in a novel manner to insure against dragging of the other wing against the ends of the mortise when the self-closing mechanism effects closing of the door.

Still another object is to provide a hinge with novel means for limiting swinging of the door beyond a given open position, such means being uniquely located to leave the normal pivotal bearing surfaces of the hinge intact and to avoid a reduction in the effective bearing area of the bearing surfaces.

The invention also resides in the use of part of the self-closing mechanism itself for limiting opening of the door beyond a given position.

These and other objects and advantages of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a new and improved hinge embodying the novel features of the present invention, the hinge being viewed from the front of a cabinet and the cabinet door being shown in a closed position.

FIG. 2 is a perspective view of the hinge as seen from the rear of the cabinet with the door in a partially open position.

FIG. 3 is a rear elevation of the hinge as viewed from the rear of the cabinet with the door in a closed position.

FIG. 4 is a fragmentary rear elevation of the hinge with the mounting wings shown "open" or spread apart and primarily showing the door mounting wing.

FIG. 5 is a fragmentary cross-section taken substantially along the line 5—5 of FIG. 4.

FIG. 6 is a rear elevation similar to FIG. 4 but primarily showing the frame mounting wing and showing the door mounting wing with certain parts removed.

FIGS. 7 and 8 are enlarged cross-sections taken substantially along the lines 7—7 and 8—8, respectively, of FIG. 3.

FIG. 9 is an exploded perspective view of the hinge.

FIG. 10 is an elevational view primarily illustrating the door wing of a second embodiment of a new and improved hinge incorporating the features of the invention. In this view, certain parts of the hinge are broken away and shown in section and the hinge is shown "closed."

FIG. 11 is a cross-section taken substantially along the line 11—11 of FIG. 10.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

For purposes of illustration, the invention is shown in the drawings as incorporated in a butt hinge 15 for interconnecting first and second members 16 and 17 for relative swinging. While the hinge may be mounted on various types of members, the first member 16 herein is shown as being a door which swings between open and closed positions on a second member 17 comprising the frame of a cabinet such as a record cabinet, credenza or like piece of fine furniture. In this particular instance, the door 16 and the frame 17 are formed with edge surfaces 19 and 20, respectively, extending generally perpendicular to outer face surfaces 21 and 22. When the door is closed, the outer face surfaces 21 and 22 are located in substantially the same plane while the two edge surfaces 19 and 20 are disposed in face-to-face relation with one another.

The hinge 15 comprises substantially flat door and frame mounting wings 23 and 24 which are pivotally interconnected by an upright hinge pin 25 (see FIG. 9). Specifically, the door wing 23 includes a pair of vertically spaced ears or curls 26 formed integrally with and projecting from one edge of the door wing and wrapped inwardly around the hinge pin. Disposed between the curls 26 and wrapped reversely around the pin is an ear or curl 27 which is formed integrally with the corresponding edge of the frame wing 24. As the door 16 is opened and closed, the lower end of the upper curl 26 and the upper end of the lower curl 26 ride against the opposing ends of the intermediate curl 27 and thus the
3,851,354

various ends define bearing surfaces which support the wings for relative swinging.

When the hinge 15 is installed, the door wing 23 is anchored adjacent the edge surface 19 of the door 16, the frame wing 24 is screwed to the edge surface 20 of the frame 17, and the hinge pin 25 with the attached curls 26 and 27 is positioned just outwardly of the face surfaces 21 and 22 and adjacent the joint between the door and the frame (see FIGS. 1 and 2). To enable the edge surfaces 19 and 20 to be positioned in abutting relationship and thus avoid an unsightly gap between the edge surfaces, a slot or mortise 30 (FIGS. 2 and 3) is formed through the edge surface of the door 16 and receives the door wing 23 so that the latter does not protrude beyond the plane of the edge surface 19. While a mortise also could be formed in the edge surface 20 of the frame 17 to receive the frame wing 24, the need for forming such a mortise is eliminated in this instance by cutting the door mortise 30 sufficiently deep that this mortise also encompasses the frame wing when the door 16 is in its closed position (see FIG. 3). In other words, the frame wing 24 is received within the outboard portion of the door mortise 30 in face-to-face relation with the door wing 23 when the door 16 is closed and thus it is not necessary to mortise the frame 17 in order to locate the frame wing out of the plane of the two abutting edge surfaces 19 and 20. As shown in FIG. 2, the mortise 30 in the door 16 is generally rectangular and includes an upright wall 31 to which the door wing 23 is screwed, the upper and lower edges of the wing being positioned closely adjacent the upper and lower ends 33 of the mortise.

The hinge 15 is of the self-closing type in that it includes a self-closing mechanism 35 (FIGS. 2, 5 and 9) for urging the door 16 to and holding the door releasably in its closed position. In this instance, the self-closing mechanism includes a pressure member 36 carried on one of the mounting wings 23, 24 and spring-gurged toward the hinge pin 25 to bias the door to its closed position. In accordance with one aspect of the present invention, the pressure member 36 is positioned to be received within openings 39 and 40 (FIGS. 4, 5 and 9) in the door and frame wings 23 and 24, respectively, and is adapted to nest compatibly with both wings when the door 16 is closed so as to enable positioning of the wings in closely spaced face-to-face relationship in spite of the presence of the pressure member between the wings. Because the unique nesting of the pressure member permits close face-to-face spacing of the wings, the hinge pin 25 and the various curls 26 and 27 may be made smaller in diameter so as to reduce the overall diameter of the pin portion of the hinge and thereby cause the external appearance of the pin portion to be slimmer and more attractive. Moreover, the amount of material needed to be removed from the door to form the mortise 30 is reduced since the closely spaced wings 23 and 24 can fit in a mortise of lesser depth than otherwise would be the case if the pressure member 36 were not nested compatibly with both wings.

In this particular instance, the pressure member 36 is carried on the door wing 23 and comprises a block-like plunger molded of plastic and fitted partially into the opening 39 in the door wing. The opening 39 is defined by a generally rectangular window or notch formed through the door wing midway between the upper and lower edges thereof and opening out of the hinged edge of the wing. As shown in FIGS. 3 and 7, the inboard side of the plunger 36 is generally flush with the inboard face of the wing and thus the plunger lies closely adjacent the vertical wall 31 of the mortise 30 when the hinge 15 is attached to the door 16.

To retain the plunger 36 within the opening 39, the upper and lower edges of the opening are turned outwardly and define generally horizontal guide ribs 43 (FIGS. 5 and 9) extending toward the hinge pin 25. Grooves 44 formed in the upper and lower ends of the plunger are fitted slidably over the ribs and thus the latter guide the plunger for sliding toward and away from the pin. The plunger is biased toward the pin by two coil springs 45 telescoped into holes 46 in the plunger and compressed between the bottoms of the holes and a wall 47 struck outwardly from the door wing 23 adjacent the closed end of the opening 39.

When the door 16 is closed, the free end or nose of the plunger 36 is partially received within a slot 50 formed in the inner side of the curb 27 midway between the upper and lower ends thereof and, in this position of the door, the nose bears against one edge of the slot (i.e., one edge of the curb) (see FIG. 7). As a result, the plunger urges the door to and holds the door in its closed position. When the door is opened, the plunger rides past the slot edge and onto the arcuate surface of the curb 27 so as to direct the spring force radially through the hinge pin 25 and allow the door to remain in the open position. As the door swings to a nearly closed position, the major portion of the nose of the plunger moves into the slot 50 and again bears against the slot edge to snap the door to its closed position and to hold the door releasably in such position.

In carrying out the invention, the opening 40 in the frame wing 24 is located so as to receive the outboard side of the plunger 36 and the outer end portion of the wall 47 when the door 16 is closed (see FIGS. 3 and 7). As shown in FIGS. 6 and 9, the opening 40 is also defined by a generally rectangular notch which is formed through the frame wing 24 and which opens out of the hinged edge thereof adjacent the slot 50 in the curb 27. The opening 40 is located midway between the upper and lower edges of the frame wing and thus is aligned vertically with the plunger 36. Accordingly, as the door 16 is closed, the outboard side of the plunger and the outer end of the wall 47 move into the opening as shown in FIG. 7 and thus the plunger becomes compatibly nested between the door and frame wings rather than engaging the outboard face of the frame wing and preventing that wing from being positioned close to the door wing. The two wings thus may be located in closely spaced face-to-face relationship to enable a reduction in the depth of the mortise 30 and in the overall diameter of the hinge pin portion of the hinge. Advantageously, means are provided for automatically spacing the upper and lower edges of the door and frame wings 23 and 24 from the upper and lower ends 33 of the mortise 30 so that, when the door 16 is closed, the ends of the mortise will not drag across the edges of the frame wing and interfere with the self-closing action of the hinge 15. Herein, these means comprise short tabs 55 (FIGS. 2, 4 and 6) which project vertically from the upper and lower edges of the door and frame wings directly adjacent the curls 26 and the hinge pin 25. The tabs are only about 1/32" in height and about 1/16" in length.
When the door wing 23 is installed within the mortise 30 and attached to the vertical wall 31 thereof, the tabs 55 on the door wing engage the upper and lower ends 33 of the mortise as shown in FIG. 2 and automatically establish vertical gaps between such ends and the upper and lower edges of the door wing. As a result, the upper and lower edges of the frame wing 24 are also positioned in vertically spaced relationship with the ends 33 of the mortise 30. Accordingly, when the door 16 is swung closed and the mortise 30 encompasses the frame wing 23, the ends of the mortise clear the upper and lower edges of the frame wing 24 rather than dragging and rubbing across such edges and restricting self-closing of the door. Thus, the tabs 55 on the door wing 23 insure against improper location of the wings within the mortise 30 during installation of the hinge.

The tabs 55 formed on the frame wing 24 serve as spacers in the event the frame 17 is mortised rather than the door 16. Even though the ends 33 of the door mortise 30 drag across the frame wing tabs 55 during closing of the door 16, the effect of such dragging is nominal because of the comparatively short length of the tabs and because the tabs are located closely adjacent the hinge pin 25.

In accordance with another aspect of the invention, swinging of the door 16 beyond a given open position is prevented by pairs of coacting stops 60 and 61 which are spaced vertically from the ends or bearing surfaces of the curls 26 and 27 so that such surfaces may be left intact and need not be reduced in effective area as otherwise is the case when swing-limiting stops are formed at the bearing surfaces themselves. In the embodiment of the hinge shown in FIGS. 1 to 9, the stops 60 are defined by the closed ends of a pair of vertically spaced slots 63 (FIGS. 1 and 6) which are formed in and extend partially around the curl 27 between the upper and lower ends thereof, the slots 63 leading from one edge of the vertical slot 50. The stops 61 are formed by two outwardly projecting prongs which are fitted into the slots 63 and which advantageously constitute integral extensions of the ribs 43 for guiding the plunger 36.

During normal opening and closing of the door 16, the prongs 61 simply ride back and forth within the slots 63. If the door is swung open to a given limit position as shown in phantom in FIG. 8, the prongs 61 engage the closed ends 60 of the slots 63 and prevent any further opening of the door so that the latter will not bang against the cabinet. Because the prongs 61 and the slots 63 are spaced vertically from the bearing surfaces of the curls 26 and 27, these surfaces are kept smooth and unbroken to minimize wear and resistance to damage.

A modified hinge 15' incorporating the features of the invention is shown in FIGS. 10 and 11 in which parts corresponding to those of the first embodiment are indicated by the same but primed reference numerals. In this instance, swing-limiting stops are defined by a pair of lugs 70 formed integrally with and projecting outwardly from the outer side of the frame wing curl 27' and spaced vertically from the upper and lower ends of the curl. Two coacting stops are defined by small tabs 71 which are bent outwardly from the hinged edge of the door wing 23' just above and below the guide ribs 43'. When the door is swung open to a given limit position as shown in phantom in FIG. 11, the tabs 71 engage the lugs 70 and prevent further opening of the door. As in the case of the first embodiment, the stops defined by the lugs 70 and the tabs 71 do not reduce the effective area of the bearing surfaces at the ends of the curls 26' and 27'. In addition, the spacing between the hinge axis and the lugs 70 is greater than the spacing between the hinge axis and the closed ends 60 of the slots 63 and thus the force exerted on the tabs 71 is somewhat less than that applied to the prongs 61 when a given opening force is exerted on the door.

I claim as my invention:

1. A butt hinge comprising a hinge pin, first and second substantially flat mounting wings each having an ear received on said pin, said first wing being swingable about the axis of said pin and relative to said second wing from a predetermined position in which said wings are disposed in face-to-face relationship to another position in which the wings are disposed out of face-to-face relationship, a pressure member mounted on one of said wings and located in the gap between the opposing faces of said wings when said first wing is in said predetermined position, a spring mounted on said one wing and urging said pressure member edgewise of said one wing and toward said pin to bias said first wing to said predetermined position, and an opening formed in the other one of said wings and located to receive at least part of said pressure member when said first wing is in said predetermined position whereby said wings are positioned closely together when disposed in face-to-face relationship.

2. A butt hinge for connecting a door for swinging between open and closed positions relative to a frame, said door and frame each having an outer face surface and a generally perpendicular edge surface, said face surfaces being disposed in generally the same plane and said edge surfaces facing one another when said door is in said closed position, said hinge comprising substantially flat door and frame wings mountable on the edge surfaces of said door and frame, respectively, and each having an ear, a hinge pin interconnecting said ears to mount said wings for relative swinging and adapted to be located outwardly of said face surfaces, said wings being disposed in face-to-face relationship when said door is in said closed position and being disposed out of face-to-face relationship when said door is in said open position, a pressure member mounted slidably on one of said wings and having one side facing the respective edge surface, said pressure member being located in the gap between the opposing faces of said wings when the latter are in face-to-face relationship, a spring supported on said one wing and urging said pressure member to slide edgewise of said one wing and toward said pin to bias said door to said closed position, and an opening formed in the other of said wings and locate to receive the opposite side of said pressure member when said door is in said closed position whereby said wings are located in closely spaced face-to-face relationship when said door is in said closed position.

3. A butt hinge as defined in claim 2 further including an opening formed in said one wing for receiving said one side of said pressure member whereby the latter is nested within said two openings when said door is in said closed position.