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Horvay et al.

[11] **3,863,391**

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[54] **REVERSIBLY MOUNTED CABINET DOOR**

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[73] Assignee: **General Electric Company**, Louisville, Ky.

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[52] **U.S. Cl.** **49/382**, 16/147, 16/176, 49/193, 49/460

[51] **Int. Cl.** **E05d 7/02**

[58] **Field of Search** 49/193, 382, 388, 460, 49/402; 16/147, 170, 176

[56] **References Cited**

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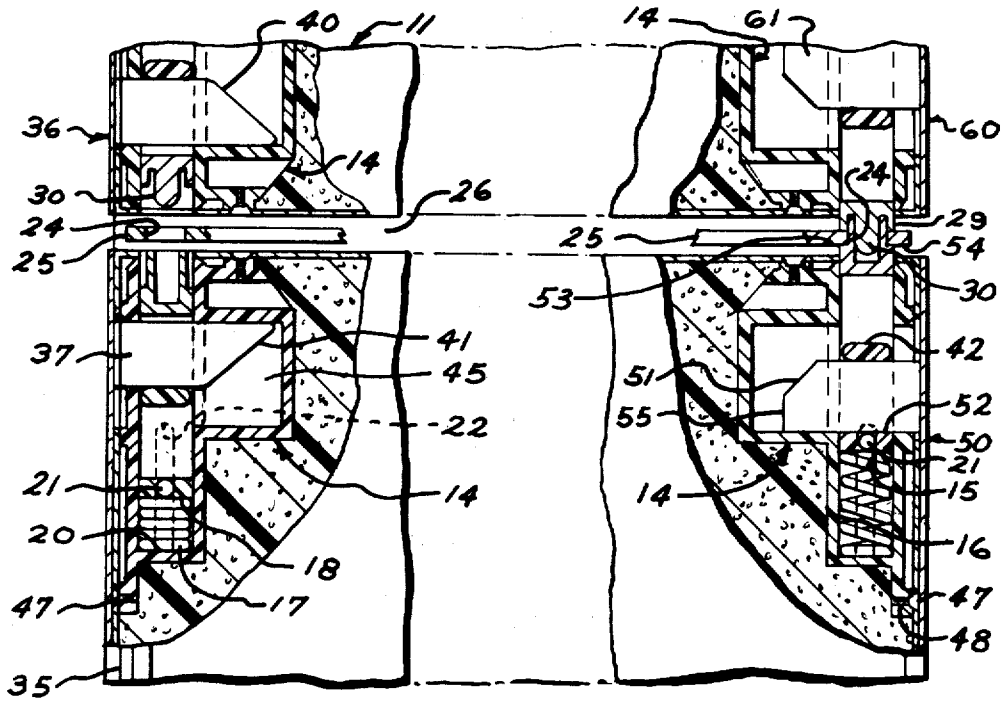
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Primary Examiner—Kenneth Downey

[57] **ABSTRACT**

A door for a cabinet such as a domestic refrigerator cabinet, for example, has hinge pins at its upper and lower ends on each side thereof spring biased to extend beyond the peripheral edges of the door for disposition in hinge plates mounted on the cabinet adjacent the upper and lower ends of each side of the door. A handle adapted to be mounted on one side of the door includes cam actuators which cooperate with the upper and lower hinge pins on the side on which the handle is mounted to retract these hinge pins from support in the hinge plates so that the door is hinged to the cabinet on the opposite side of the door from the handle. The door preferably has a trim cover on the opposite side to that having the handle including means for locking the hinge pins in their extended positions to which they are urged.

3 Claims, 4 Drawing Figures



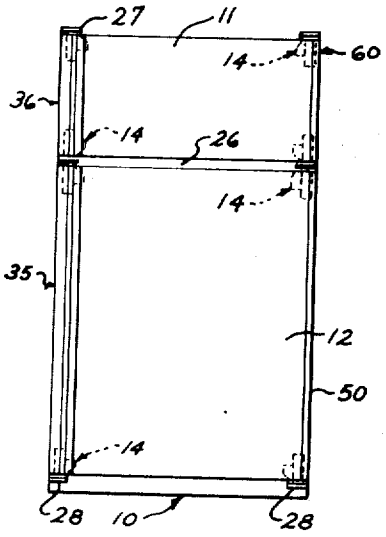


FIG. 1

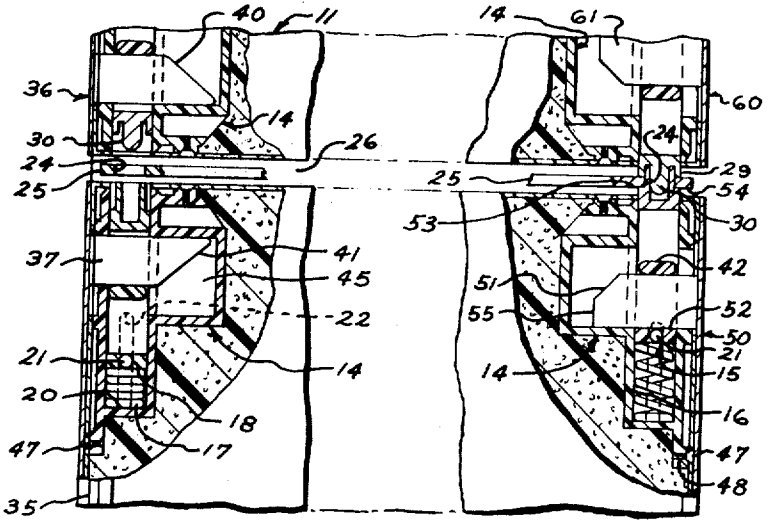
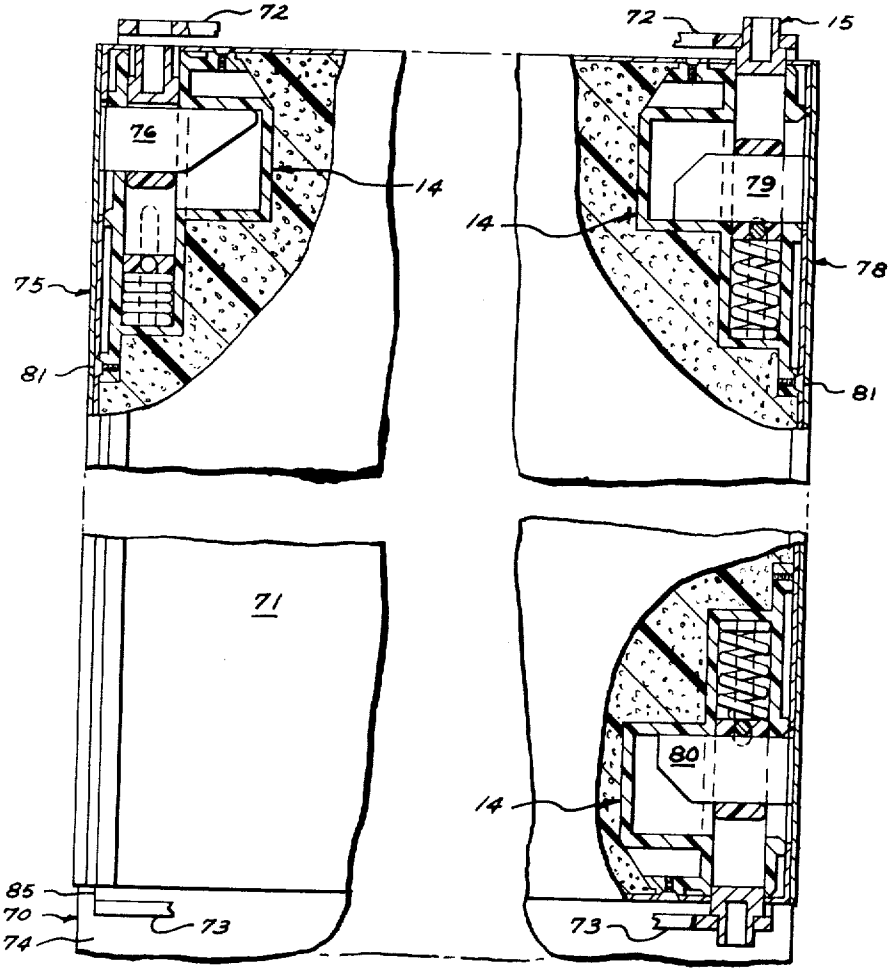


FIG. 2

FIG. 3



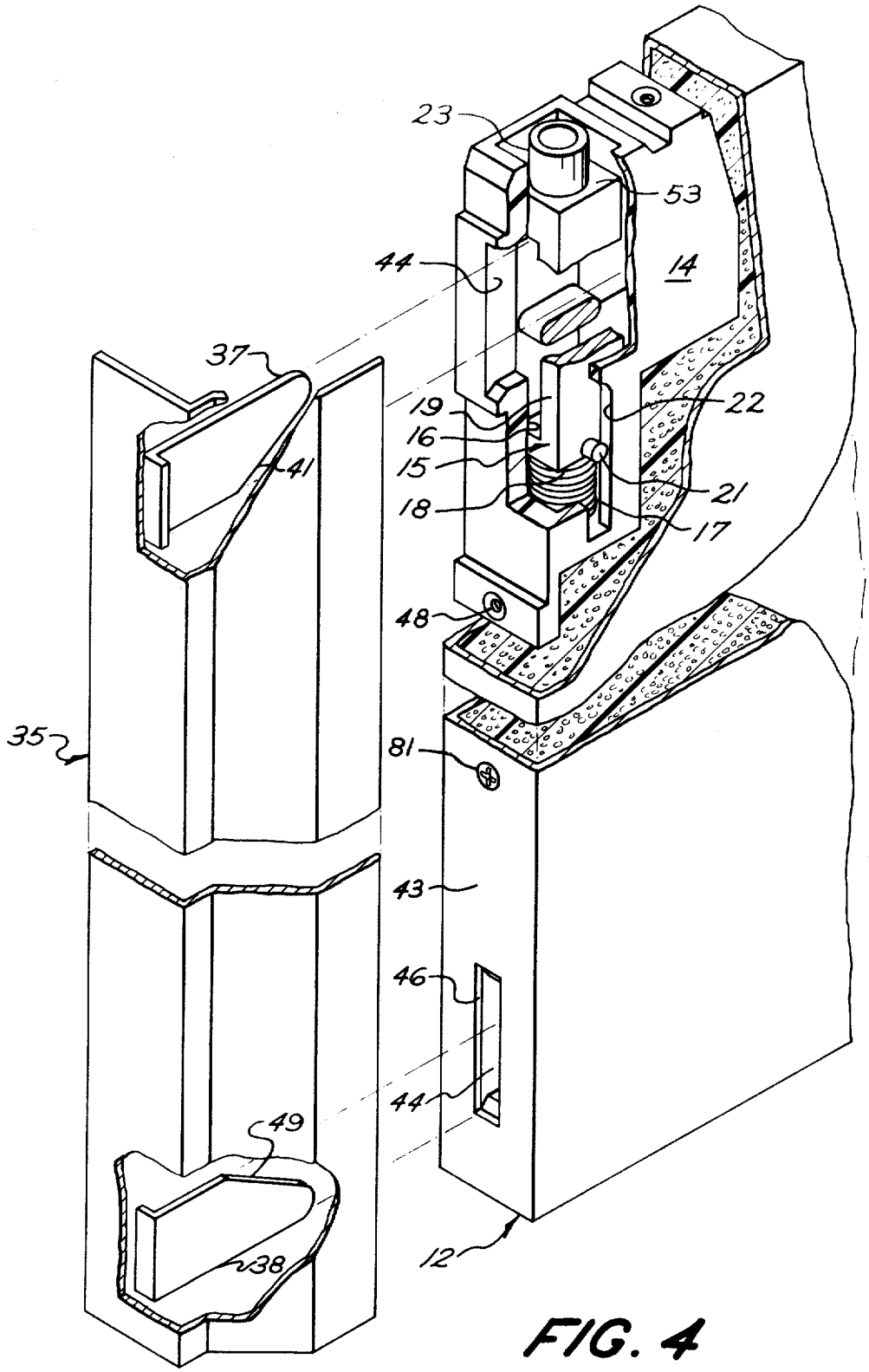


FIG. 4

REVERSIBLY MOUNTED CABINET DOOR

BACKGROUND OF THE INVENTION

In a cabinet such as a domestic refrigerator cabinet, for example, it is desired to be able to mount the door so that it can swing in either direction. A dealer can then sell a single domestic refrigerator for use either as a right-hand or left-hand door and does not have to stock separate right-hand and left-hand door cabinets.

Furthermore, when the owner of a domestic refrigerator cabinet moves, for example, the possibility exists that the design of the kitchen in the new home will be such that the door of the refrigerator cabinet should swing from the opposite side to that which it swung in the prior home for easy accessibility. Thus, it is desirable that the hinge mounting of the door of a domestic refrigerator be easily switched.

It has previously been suggested, as for example in U.S. Pat. No. 3,378,954-Sandin, to reversibly mount a door for a cabinet such as a domestic refrigerator so that it can be hinged on either side of the cabinet. In the Sandin patent, the hinge pins are manually movable from within the door to a position in which each is supported by a hinge plate carried by the cabinet.

However, with the hinge structure of the Sandin patent, the possibility exists that all of the hinge pins accidentally could be retracted into the door whereby the door would no longer be supported on the cabinet. This possibility exists particularly when the hinge mounting of the door is being changed by the owner at some period of time after having purchased the refrigerator.

The present invention satisfactorily solves this problem by providing an arrangement for mounting a door on a cabinet so that, during change-over, the door can be always hinged to at least one side of the cabinet. Thus, even if the owner decides to change the hinge mounting of the door so that it swings from the opposite side of the cabinet, the arrangement of the present invention enables the owner to make the reversal while the door is hinged to the cabinet on at least one side.

The arrangement of the present invention preferably also incorporates cam actuators for retracting the hinge pins on the side of the door that is not to be hinged, which are integral with the door handle. Thus, when the door handle is mounted on the door, this automatically insures that the correct set of hinge pins is retracted.

SUMMARY OF THE INVENTION

An object of this invention is to provide an improved reversibly-mounted cabinet door.

Another object of this invention is to provide a reversibly-mounted cabinet door capable of being hinged on either side without the use of any special tools.

Still another object of this invention is to provide a reversibly-mounted cabinet door in which changing of the side on which the door handle is disposed automatically inactivates the hinge support to the cabinet on that side.

In accordance with the illustrated embodiment of the invention, there is provided an arrangement for reversibly mounting a door on a cabinet. The arrangement has a first pair of hinge pins supported adjacent the upper and lower ends of the door on one side thereof and a second pair of hinge pins supported adjacent the upper and lower ends of the door on the other side thereof. Each of the hinge pins is continuously biased to extend beyond the peripheral edge of the door by means cooperating with each of the hinge pins so that the hinge pins are disposed within support means mounted on each side of the cabinet at the upper and lower ends thereof to provide hinge mountings for the door. A handle structure adapted to be mounted on one or the other side of the door has means thereon to retract the hinge pins on that side of the door from the support means.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a front elevational view of a refrigerator cabinet having upper and lower reversibly-mounted doors in accordance with the hinge arrangement of the present invention.

FIG. 2 is a fragmentary sectional view, partly in elevation, showing the hinge arrangement for the lower end of the upper door and the upper end of the lower door of the cabinet of FIG. 1 with the doors hinged on the right side.

FIG. 3 is a fragmentary sectional view, partly in elevation, of a door for a single-door cabinet and having the arrangement of the present invention.

FIG. 4 is an enlarged perspective view of a portion of the hinge arrangement of the present invention as used with the lower door of the cabinet of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and particularly FIG. 1, there is shown a domestic refrigerator cabinet 10 having an upper door 11 and a lower door 12. Each of the upper door 11 and the lower door 12 can be hingedly mounted on either side of the cabinet 10.

The lower door 12 has a pair of hinge bodies 14 disposed in its upper end adjacent the corners thereof and a similar pair of the hinge bodies 14 disposed in its lower end adjacent the lower corners. Each of the hinge bodies 14 is supported within the lower door 12.

The door 11 similarly has a pair of the hinge bodies 14 disposed at its upper end and a similar pair of the hinge bodies 14 disposed at its lower end.

Each of the hinge bodies 14 has a hinge pin 15 (see FIGS. 2 and 4) slidably supported therein within a longitudinal recess 16 and continuously urged outwardly of the hinge body 14 to an extended position by a spring 17, which also is disposed within the recess 16. The spring 17 acts against lower surface 18 of a square shaped portion 19 (see FIG. 4) of the hinge pin 15 and against a surface 20 (see FIG. 2), which forms the bottom of the recess 16, of the hinge body 14.

The hinge body 14 has a keeper 21 (see FIGS. 2 and 4) secured thereto and disposed within a slot 22 in a wall of the hinge body 14. Accordingly, the outward movement of the hinge pin 14 by the spring 17 is limited by the keeper 21 engaging the upper end of the slot 22.

As shown in FIG. 4, the substantially squareshaped portion 19 of the hinge pin 15 also slides within the longitudinal recess 16 in the hinge body 14. The upper end of the square-shaped portion 19 has a hollow cylindrical portion 23, which protrudes outwardly beyond the periphery of the door 11 or 12 in which it is mounted.

The cylindrical portion 23 of the hinge pin 15 is disposed within a round opening 24 in a hinge plate 25 as

shown in FIG. 2. A pair of the hinge plates 25 is disposed between the lower end of the upper door 11 and the upper end of the lower door 12 and supported on a portion of front wall 26 of the refrigerator cabinet 10 between the doors 11 and 12.

The cabinet 10 also has a pair of hinge plates 27 (see FIG. 1) disposed on its top wall with each having a round opening for receiving one of the hinge pins 15 slidably disposed in the hinge bodies 14 at the upper end of the upper door 11 for support. The cabinet 10 further includes a pair of hinge plates 28 supported on the front wall 26 of the cabinet 10 adjacent its lower end with each having a round opening to receive one of the hinge pins 15 in the hinge bodies 14 at the lower end of the lower door 12 for support.

As shown in FIG. 2, the hinge plates 25 not only receive the cylindrical portions 23 of the hinge pins 15 at the upper end of the lower door 12 but also receive cylindrical portions 29 of the hinge pins 15 at the lower end of the upper door 11. The portion 29 of each of the hinge pins 15 at the lower end of the upper door 11 is formed with a reduced projection 30 for disposition within the hollow cylindrical portion 23 of the hinge pin 14 at the upper end of the lower door 12 as shown for the right hinge in FIG. 2. Thus, it should be understood that each of the hinge pins 15 at the lower end of the upper door 11 has the cylindrical portion 29 rather than the cylindrical portion 23.

The lower door 12 has a handle 35 for mounting on the side of the lower door 12 opposite to the side about which the lower door 12 is to pivot. Similarly, the upper door 11 has a handle 36 on the side opposite to the side about which the upper door 11 is to pivot.

As shown in FIG. 4, the handle 35 for the door 12 has a cam actuator 37 at its upper end and a similar cam actuator 38 at its lower end. The handle 36 has a cam actuator (not shown) at its upper end and a cam actuator 40 (see FIG. 2) at its lower end with the cam actuators on the handle 36 having the same shape as the cam actuators 37 and 38 on the handle 35.

The cam actuator 32 includes an inclined surface 41, which functions as a wedge or cam when the handle 35 is mounted on the lower door 12. As the handle 35 is moved inwardly, the surface 41 engages an intermediate cross-piece or partition 42 of the hinge pin 15 to retract the hinge pin 15 within the door 12 against the force of the spring 17. The full retraction of the hinge pin 15 within the hinge body 14 is shown in FIG. 2 for the upper hinge pin 15 at the upper end of the lower door 12.

The cam actuator 37 is inserted into the hinge body 14 through an opening in side wall 43 (see FIG. 4) of the lower door 12 and an opening 44 in the hinge body 14. The opening 44 communicates with the longitudinal recess 16 in the hinge body 14 and extends into a rear passage or receptacle 45 (see FIG. 2). The cam actuator 38 on the lower end of the handle 35 is inserted simultaneously into the hinge body 14 at the lower end of the lower door 12 through an opening 46 in the side wall 43 of the lower door 12 and the opening 44 in the hinge body 14.

The handle 35 is secured in this position to the lower door 12 by screws 47 (see FIG. 2) extending into threaded holes 48 (see FIG. 4) in the hinge body 14. Of course, the handle 35 is also similarly secured to the hinge body 14 in the lower end of the lower door 12.

Because the lower hinge pins 15 move in the opposite direction to the upper hinge pins 15 during both extension and retraction thereof, the cam actuator 38 at the lower end of the handle 35 has its inclined surface 49 (see FIG. 4) disposed to move the lower hinge pin 15 upwardly to retract the hinge pin 15 within the lower door 12.

A similar arrangement exists with the hinge pins 15 on the upper door 11 and the cam actuators (one shown at 40) on the upper door handle 36. Thus, when the cam actuators (one shown at 40) on the upper door handle 36 are inserted into the upper door 11, the hinge pins 15 of the upper door 11 are no longer supported in the hinge plates 25 and 27 on the side of the door 11 having the handle 36.

Since both of the side walls or edges of the lower door 12 have openings therein to receive the cam actuators 37 and 38 of the handle 35, these openings not covered by the handle should be closed to provide an attractive appearance. Accordingly, a trim cover 50 is disposed on the opposite side wall of the lower door 12 from that having the handle 35. The cover 50 also has a pair of retaining or locking elements (one shown at 51 in FIG. 2) which are secured to the cover 50 in longitudinally spaced relation to each other so that each of the retaining elements (one shown at 51) can only fit between a surface 52 of the hinge pin 15 and the partition 42 of the hinge pin 15. This relation for the upper right hinge pin 15 on the lower door 12 is shown in FIG. 2.

When the hinge pin 15 is supported on the hinge plate 25, the square-shaped portion 19 of the hinge pin 15 has its upper surface 53 bearing against lower surface 54 of the hinge plate 25. Therefore, when the retaining element 51 is inserted within the opening in the side wall of the lower door 12 and the opening 44 in the hinge body 14, it merely slides between the partition 42 of the hinge pin 15 and the surface 52 of the hinge pin 15 to lock or maintain the pin in the extended position. An inclined surface 55 of the retaining element 51 aids in guiding the retaining element 51 into the hinge body 14.

The other retaining element on the cover 50 cooperates with the lower hinge body 14 in the lower right corner of the lower door 12 to lock the lower right hinge pin 15 in its hinge or extended position, that is, the position in which the hinge pin 15 is disposed in the hinge plate 28.

After the trim cover 50 has been mounted on the lower door 12 so that the retaining elements (one shown at 51) are in the fully inserted position as shown for the retaining element 51 in FIG. 2, the cover 50 is secured to the lower door 12 by being connected to the upper and lower hinge bodies 14 by screws 47 cooperating with the threaded holes 48 in the hinge bodies 14.

In a similar manner, the upper door 11 has openings in its side wall on the side opposite that to which the handle 36 is mounted. Accordingly, a trim cover 60 (see FIG. 1) is mounted on the upper wall 11 on the side door opposite that having the handle 36 secured thereto. The cover 60 has retaining elements (one shown at 61 in FIG. 2) which, like the retaining element 51 on the cover 50, cooperate with the hinge pins 15 in the hinge bodies 14 at the upper and lower edges of the right side of the upper door 11. The retaining elements (one shown at 61) of the cover 60 lock the hinge

pins 15 on this side of the upper door 11 within the upper hinge plate 27 and the lower hinge plate 25.

If it is desired that the handle 35 be mounted on the right hand side of the lower door 12 so that the lower door 12 is hinged on its left side, the handle 35 is removed from the left side of the lower door 12 and the cover 50 is removed from the right side of the lower door 12. Then, before the handle 35 is mounted on the right side of the lower door 12 and the trim cover 50 is mounted on the left side of the lower door 12, the handle 35 and the cover 50 are inverted. As a result, the cam actuator 38 of the handle 35 is in a position to be inserted in the upper hinge body 14 on the right side of the lower door 12 while the cam actuator 37 of the handle 35 is in a position to be inserted in the lower hinge body 14 on the right side of the lower door 12. With the cover 50 inverted, the retaining element 51 is inserted in the lower hinge body 14 on the left side of the door 12 while the other retaining element of the cover 50 is inserted in the upper hinge body 14 on the left side of the lower door 12. This change in positions of the handle 35 and the cover 50 results in locking the hinge pins 15 on the left side of the lower door 12 in their extended positions while retracting the hinge pins 15 on the right-hand side of the lower door 12 within the perpiheral edges of the lower door 12 so that the lower door 12 pivots about the hinge pins 15 on the left side of the lower door 12.

A similar procedure is followed for reversing the upper door 11. That is, the handle 36 and the cover 60 are inverted and transposed to the opposite sides of the upper door 11.

Referring to FIG. 3, there is shown a refrigerator cabinet 70 having a single door 71, which has the hinge bodies 14 in both of its upper corners and both of its lower corners. The cabinet 70 has upper hinge plates 72 mounted thereon at the top and lower hinge plates 73 disposed on its front wall 74 near the bottom of the cabinet 70.

The door 71 has a handle 75, which is like the handle 36, mounted on the left-hand side of the door 71 so that the door 71 pivots about the hinge pins 15 on the right-hand side thereof. The handle 75 has a pair of cam actuators (one shown at 76), which are like the cam actuators 37 and 38 on the handle 35 of the lower door 12 of the cabinet 10.

The opposite side of the door 71 has a trim cover 78, which is similar to the trim cover 50 for the lower door 12 of the cabinet 10. The cover 78 has a pair of retaining elements 79 and 80 to lock the hinge pins 15 at the upper and lower ends of the right-hand side of the door 71 in the position shown in FIG. 3. Each of the handle 75 and the cover 78 is secured by screws 81 to the hinge bodies 14.

When the door 71 is to be hinged on its left side, the positions of the handle 75 and the trim cover 78 are reversed. They also are inverted in the same manner as the handle 35 and the trim cover 50.

An advantage of this invention is that the door can be always hinged on the cabinet during reversal.

A further and important advantage of the present invention is the construction and operation of the retaining element 51 to lock the associated hinge pins 15 in an extended position to thereby prevent scrubbing of the bottom edge of a door against the supporting hinge plate on the opposite or handle edge of the door. In the absence of the locking member 51, the weight of the door would compress the spring 17 in the lower hinge body and the door would rest on the hinge plates. As shown for example in FIG. 2, the locking action of the element 80 raises the door relative to the hinge plate 73 to provide a clearance space indicated by numeral 85 between the opposite lower corner of the door and the adjacent hinge plate 73.

For purposes of exemplification, particular embodiments of the invention have been shown and described according to the best present understanding thereof. However, it will be apparent that changes and modifications in the arrangement and construction of the parts thereof may be resorted to without departing from the spirit and scope of the invention.

We claim:

1. An arrangement for reversibly mounting a door on a cabinet including:

a first pair of hinge pins supported adjacent the upper and lower ends of the door adjacent one side thereof;

a second pair of hinge pins supported adjacent the upper and lower ends of the door adjacent the other side thereof;

means cooperating with each of said hinge pins to continuously bias each of said hinge pins to a position extending beyond the peripheral edge of the door;

first support means on the cabinet to receive in supporting engagement each of said hinge pins adjacent the upper end of the door when each of said hinge pins is in an extended position;

second support means on the cabinet to receive in supporting engagement each of said hinge pins adjacent the lower end of the door when each of said hinge pins is in an extended position;

removably disposed means mounted on one of the sides of the door to retract each of the hinge pins on the one side of the door from said first and second support means when said removably disposed means is disposed on the door so that said retracted hinge pins are retracted from supporting engagement with said first and second support means, said removably disposed means comprising a single longitudinal member having first and second means for cooperation with each of said hinge pins on the one of the sides of the door and said single longitudinal member of said removably disposed means being secured to the door to serve as the handle for the door; and

removable means on the other side of the door from the side having said removably disposed means for locking each of said hinge pins on the other side of the door in its extended position and supporting the bottom edge of the door in spaced relationship to the adjacent hinge plates.

2. An arrangement for reversibly mounting a door on a cabinet including:

a first pair of hinge pins supported adjacent the upper and lower ends of the door adjacent one side thereof;

a second pair of hinge pins supported adjacent the upper and lower ends of the door adjacent the other side thereof;

means cooperating with each of said hinge pins to continuously bias each of said hinge pins to a position extending beyond the peripheral edge of the door;

first support means on the cabinet to receive in supporting engagement each of said hinge pins adjacent the upper end of the door when each of said hinge pins is in an extended position;

second support means on the cabinet to receive in supporting engagement each of said hinge pins adjacent the lower end of the door when each of said hinge pins is in an extended position; and

removably disposed means mounted on one of the sides of the door to retract each of the hinge pins on the one side of the door from said first and second support means when said removably disposed means is disposed on the door so that said retracted hinge pins are retracted from supporting engagement with said first and second support means, said removably disposed means comprising a single longitudinal member having first and second means for cooperation with each of said hinge pins on the one of the sides of the door, said single longitudinal member being secured to the door to serve as the handle for the door, each of said cooperating means being a continuous urging means, and each of said first and second means on said single longitudinal member being a cam actuator adapted to extend into a slot in an unexposed portion of said hinge pin to move said hinge pin against the force of said continuous urging means.

3. The arrangement according to claim 2 including removable means on the other side of the door from the side having said removably disposed means for locking each of said hinge pins on the other side of the door in its extended position when said removable means is mounted on the other side of the door.

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