

[54] **AUTOMATIC DOOR CLOSURE FOR STORAGE CABINETS**

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[22] Filed: **Aug. 14, 1974**

[21] Appl. No.: **497,140**

[52] **U.S. Cl.** 312/324; 16/51; 312/319

[51] **Int. Cl.²** **A47B 88/00**

[58] **Field of Search** 16/51, 66; 49/366, 367; 312/219, 274, 275, 319, 324

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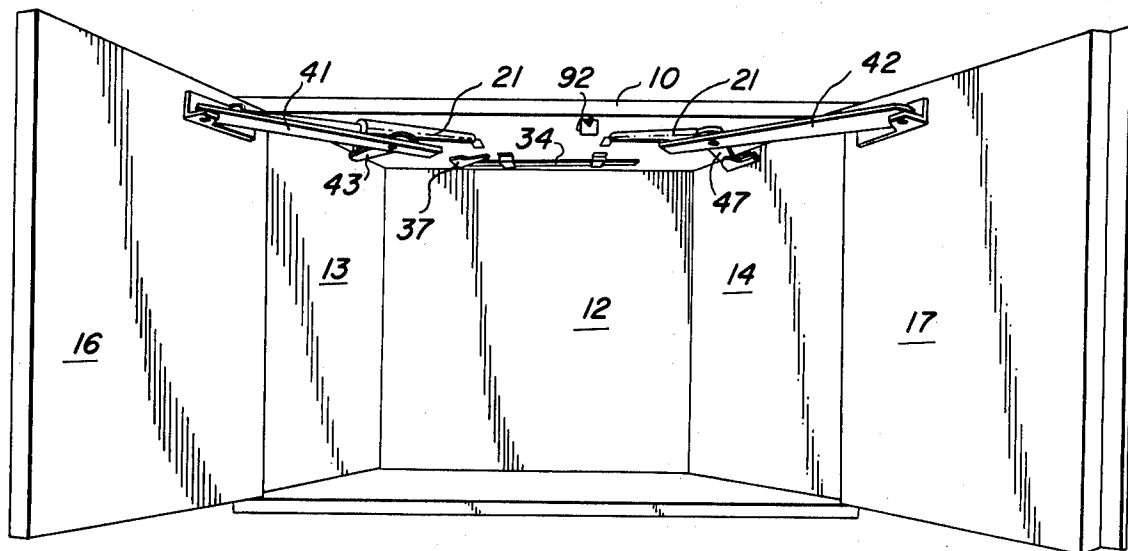
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[57] ABSTRACT

A door closure mechanism for a storage cabinet including a hydraulic check and a spring arranged so that the spring is at minimum efficiency and the check is at maximum efficiency for closing the doors slowly when the doors are in a fully open position and operative to apply a greater closing force to more rapidly close the doors as they approach the closed position. A lock-out linkage arrangement is provided for assuring a selective door closing sequence.

7 Claims, 10 Drawing Figures



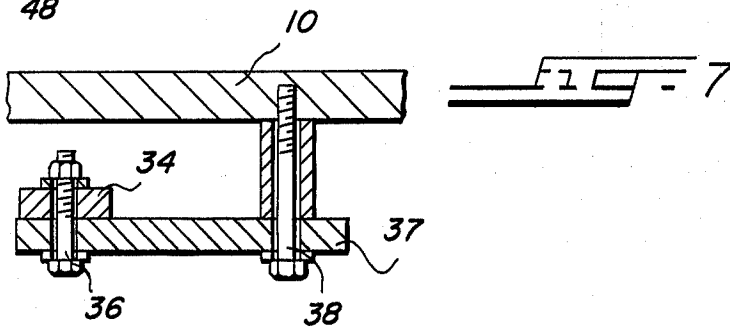
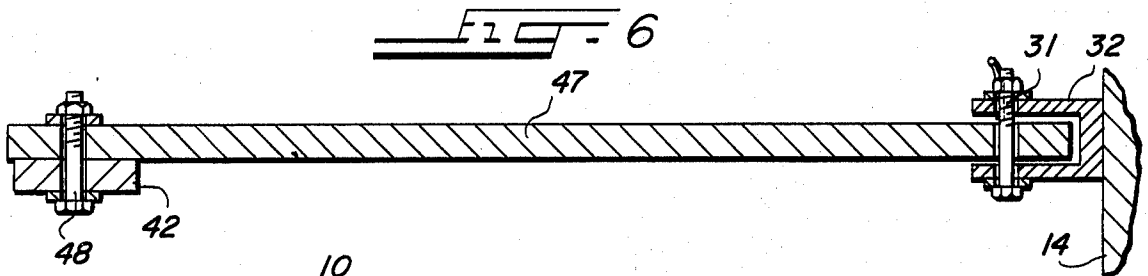
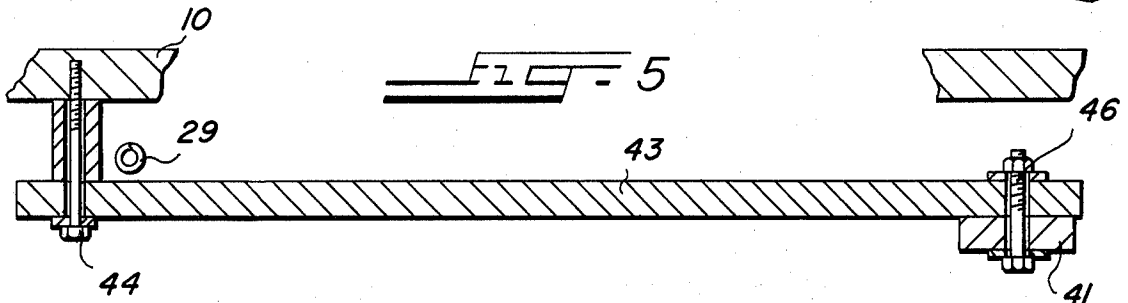
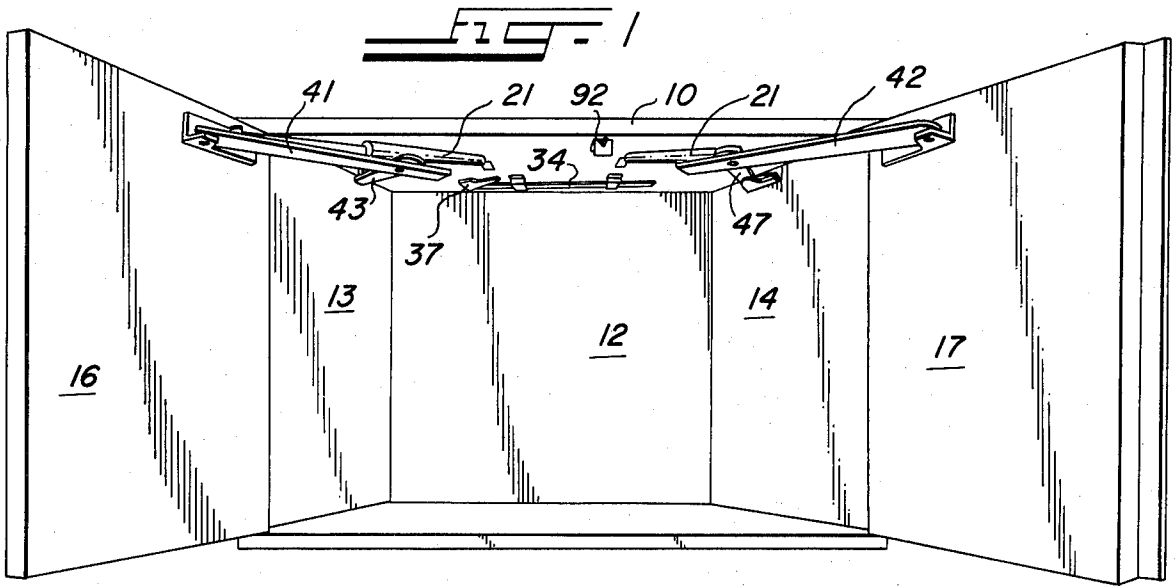


FIG. 2

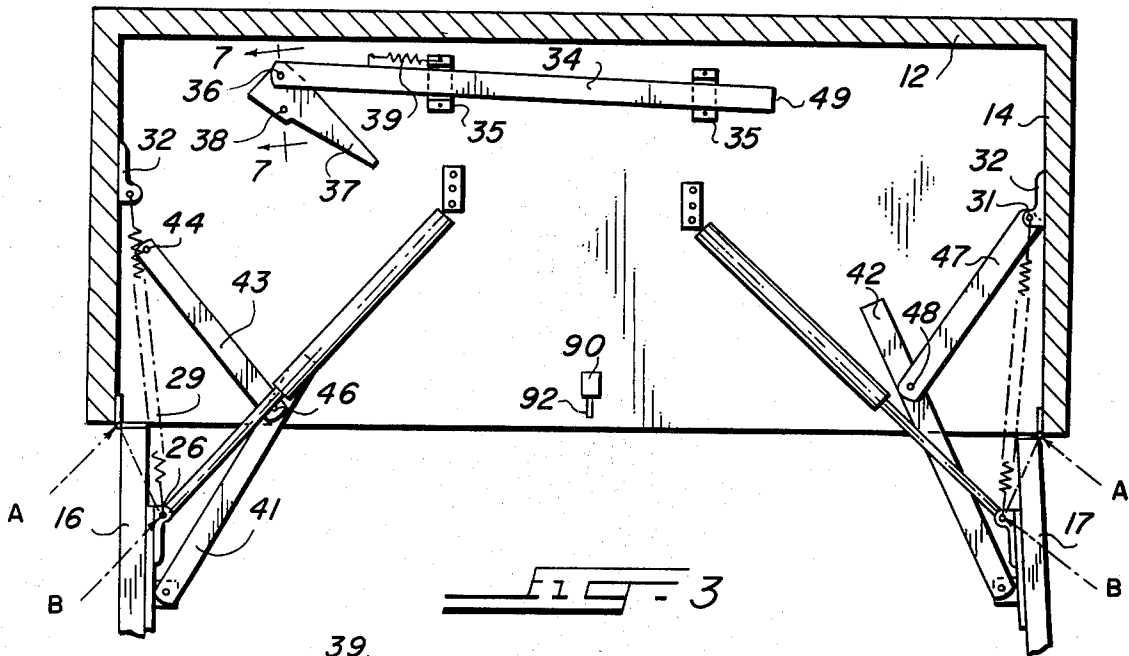


FIG. 3

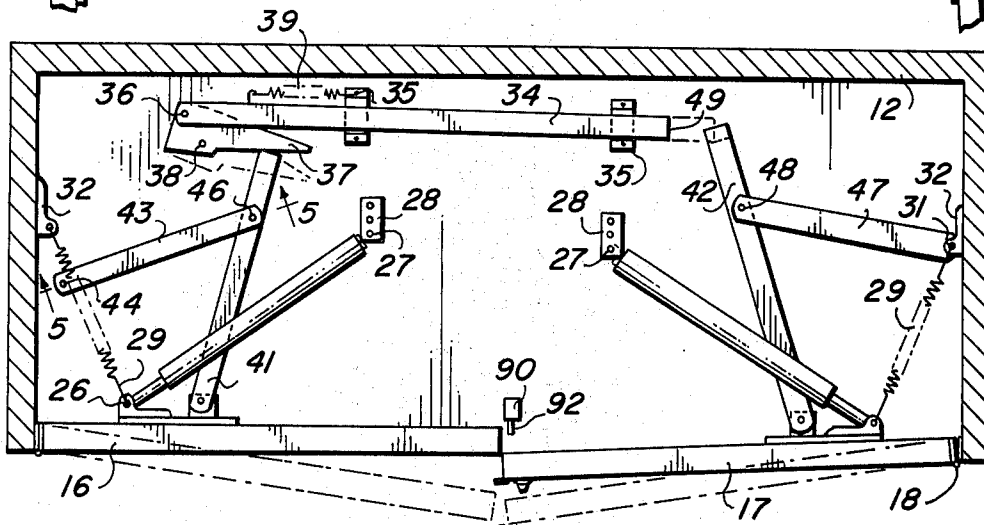
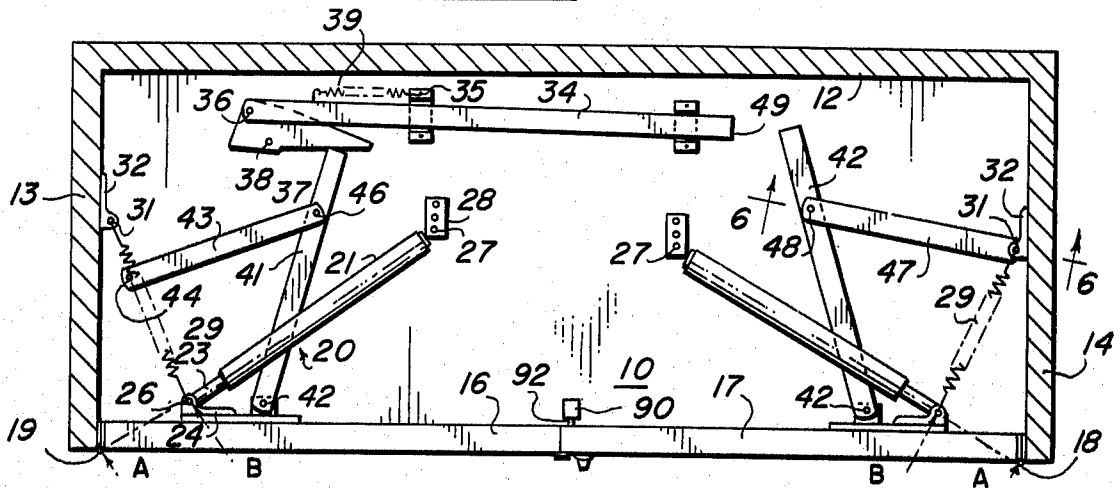


FIG. 4



AUTOMATIC DOOR CLOSURE FOR STORAGE CABINETS

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to door closing mechanisms and more particularly to a door closing mechanism for a flammable storage cabinet.

Flammable storage cabinets are desirably constructed such that the doors automatically close after opening in order to assure that the flammables remaining within the cabinet are not exposed. The automatic door closing mechanism includes means retaining the cabinet doors open a sufficient time to permit removal of the stored flammables from the cabinet.

By the present invention there is provided a door closing mechanism including means for permitting opening of each of a right and left hand doors to substantially about 90° to an open position and means operative to slowly close the doors sequentially upon release at the fully open position. This rate of closing is adjustable to permit the removal of the desired quantity of flammables so that the initial closure period is slow during withdrawal of the product but once the doors close approximately halfway, the further closing of the doors is properly sequential and substantially rapid.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a cabinet (shelves and springs not shown) and showing the doors in open position;

FIG. 2 is a top plan view of the linkage and door arrangement in open position;

FIG. 3 is a view similar to FIG. 2 but with the doors substantially closed;

FIG. 4 is a view similar to FIG. 3 but showing the doors fully closed;

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

FIG. 6 is a cross-sectional view taken on the lines 6—6 of FIG. 4;

FIG. 7 is a cross-sectional view taken on the lines 7—7 of FIG. 2;

FIG. 8 is a vertical cross-sectional view through the door latching mechanism showing the doors in closed position;

FIG. 9 is a view similar to FIG. 8 but showing the doors approaching closure; and

FIG. 10 is a cross-sectional view taken on the lines 10—10 of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the door closing arrangement is shown embodied in a storage cabinet having a back wall 12 and a left side wall 13 and right side wall 14, a bottom not shown, and a top wall 10. A right hand door 16 is hingedly connected by means of a hinge 18 to the right side wall 14 and a left hand door 17 is hingedly connected by means of a hinge 19 to the left side wall 13. The construction of the left and right hand doors along their free edges in the embodiment shown is such that the left hand door 17 should be completely closed before the right hand door 16 closes thereon.

The door closing mechanism is mounted on the interior of the top wall 10 and side walls 13 and 14. The

right and left hand doors closing mechanism are substantially identical such that only the left hand door need be described in detail and comparable parts carry the same number on both doors. The closing mechanism includes a hydraulic check 20 of substantially conventional construction including a hydraulic filled piston housing 21 having a variable orifice in the piston controlled by rotating the piston rod. A piston rod 23 is reciprocally mounted in the piston housing. The piston 23 is pivotally connected at its free end to a bracket 24 by a pivot pin 26 mounted on the inner side of the door 16. The housing 21 at its opposite end is pivotally connected to a pivot pin 27 carried by a plate 28 fastened to top wall 10 of the cabinet. The pivot pins 26 and 27 lie along a center line which is substantially in alignment with the hinge pivot 19 when the doors are in closed position.

Connected to the pivot pin 26 is one end of a spring 29 of which the opposite end is connected to a pin 31 mounted on a bracket 32 fixed to the side wall 13. The spring 29 is located so that it lies substantially normal to the moment of force indicated by the lines A - B in the closed position of the doors as shown in FIG. 1.

In this position, the force of the spring 29 is most efficient in applying a closing force and the hydraulic check 21 is least effective in counteracting the spring force. When the door is in the open position as shown in FIG. 2, the spring 29 is in its maximum extended or stretched position but it is approaching parallelism with the moment force (A - B) while the hydraulic check 21 is nearly in quadrature with the moment of force and thus most effective in counteracting the spring force. The spring 29 is thus at its minimum efficiency so that when the door is released, the component of force applied on the hydraulic check 19 is of a low magnitude such that the door closes slowly. This rate of closing may also be varied by adjusting the piston orifice to control the pressure force on the piston rod 23.

As the doors close, say about 30°, the component of force exerted by spring 29 on the hydraulic check 20 increases so that the door closes more rapidly. The rate of closing gradually increases to that the door closes at its maximum speed when it approaches the closed position. Preferably the rate of closing is such that the doors remain open a sufficient width to permit removal of cans containing inflammables from the cabinet for a period of 2 to 3 minutes. Should this time be inadequate, only a slight manual opening force need be applied to the doors to reopen the same to the fully opened position.

To assure that the left hand door 16 closes prior to the right hand door 17 in the embodiment shown, there is provided a lock-out linkage. The lock-out or closing sequence linkage includes a slide bar 34 loosely accommodated in guides 35 and 35' for sliding movement generally parallel to the rear wall 12. The end 34' of the bar 34 has pivotally attached thereto by means of a pin 36 an actuating crank 37. The actuating crank 37 is pivotally mounted on the inner wall of the top of the cabinet by means of a pin 38. A spring 39 is connected to bracket 35 and at its other end adjacent the end 36 of the bar 34 to pin 39'. In this manner the free force end 49 of the slide bar 34 is urged to the right as viewed in FIG. 2. Pivotally connected at one end to the left door 16 by pivot 41' is an actuating arm 41 and a similar but longer actuating arm 42 is pivotally connected at one end 42' to the right hand door 17. A left radius

arm 43 is pivotally connected at one end by means of a pivot pin 44 to the cabinet top wall 10 and at its other end by means of a pivot pin 46 to the left door actuating arm 41 adjacent but below the free end thereof. Similarly a right radius arm 47 is pivotally connected at one end to the cabinet by means of the pin 31 of bracket 32 on the right side wall 14 and to the right door actuating arm 42 by means of a pin 48.

As both the doors 16 and 17 close the free end of the right actuating arm 48 abuts the right or free end 49 of the slide bar 34. In this manner the slide bar 34 is operative to prevent full closing of the right door. As the left door 16 fully closes the free end of the actuating bar 41 strikes the crank arm 37 whereupon shifting the same towards the wall 12 and shifting the slide bar 34 to the left as shown in the drawing thus freeing the free end of arm 42 whereupon the right door 17 is free to close. Thus the right door 17 is prevented from closing until the arm 41 rotates the crank 37 to permit movement of the right actuating arm 42 and thereby control the sequence of the door closing.

The doors 16 and 17 are constructed with double walls 52-54 anchored together at the upper and lower edges as at 56-58, respectively. The right hand door 16 is provided with a handle 60 secured to the face of door 16 as shown. Interiorly of the double walls 52-54 angle irons 62-64 have one leg welded adjacent the bottom and top, respectively, of the door 16, as shown in FIGS. 8 and 9.

As also shown therein, the top and bottom walls 66-68, respectively, of the rear wall 54 are provided with openings 70-72, respectively. Also, the free leg of the angle irons 62-64 are each provided with openings 74-76, respectively. Openings 70, 72 and 74 are substantially equal in size. The opening 76 is longer to provide a clearance that will let bar 82 be displaced from an aligned position with opening 70.

Attached to the shaft 78 of the rotary handle is a plate 80 to which a pair of latch arms or bars 82-84, respectively, are pivotally secured as shown. The bar 82 is pivotally secured at one end to the upper end of plate 80 while the upper end of the lower bar 84 is pivotally secured at the lower end of plate 80. The free end of bar 84 extends into the openings 72 and 74 in the angle iron 62 and horizontal member 66. The free end 86 of bar 82 extends through openings 70 in member 68 and through a slot 76 in angle iron 64 when the door is closed.

One end of spring 88 is secured to the free end of the angle iron 64 and depends therefrom and the opposite end is secured to the latch bar 82 so as to urge the latch bar 82 upwardly and rearwardly towards the rear wall 54 of the door.

A bracket 90 depends from the forward end of the top wall 10 and is positioned substantially medially of the walls 13-14, but slightly offset to the right as shown in the drawings. A rod or pin 92 is secured at one end to the lower end of the bracket 90 and extends forwardly at right angles thereto but not beyond the door openings.

The upper end of the back wall 54 is provided with an opening 94 aligned with the rod 92 whereby the rod readily extends therethrough and presses against the upper end of latch bar 82 when the door is in closed position.

When the handle 60 is rotated, the free ends of bars 82-84 will be withdrawn from the openings 70-72 and

the distal ends away from the depending upper front wall 96 of the top wall 10 and the upstanding wall 98 of the bottom wall 100. Upon withdrawal of bar 82 from the opening 70, the spring 88 will urge the free end of bar 86 under the inner face of horizontal wall 68 and be retained there while the door 16 is in opened position.

When the left door 16 closes, and door 17 has been closed, as hereinbefore described, the pin or rod 92 will be projected through aperture 94 and abut the bar 82 and push it towards the front wall 52 until the free end 86 of the bar is aligned with the slot 70 when the spring will urge the free end of the bar 86 through aperture 70 and upwardly behind the wall 96 while the free end of bar 84 will simultaneously move behind the lower wall 98. Of course, the handle 60 will return to its initial locked position.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

What is claimed is:

1. A door closing mechanism for a storage cabinet, having a top and back walls and side walls, a pair of doors hingedly connected along opposite edges of said side walls, said closing mechanism for each of said doors comprising a hydraulic check including a piston housing and a piston means reciprocable therein, a check spring, pivot means connecting said piston means and one end of said check spring at a common location on said door, means connecting the other end of said check spring to the side wall of said cabinet, and pivot means connecting said housing to said cabinet top wall, so that the moment of force extending between the door hinge and said pivot means is at substantially right angles to the force applied by said spring in the closed position of said doors, and so that said spring and said hydraulic check are substantially in quadrature position in said closed door position.
2. The invention as defined in claim 1 wherein the direction of the force of said spring and said pivot means is approaching parallelism in the open position of said doors.
3. The invention as defined in claim 2 wherein said hydraulic check includes means for adjusting the resistance to movement of said piston in said casing.
4. In a cabinet having top, side, back and end walls, a sequence closing linkage arrangement for use with a pair of doors hingedly connected along opposite edges to the side walls, said linkage arrangement comprising a slide bar, means for mounting said bar for sliding movement along a path substantially parallel to the doors in the closed position thereof, first actuating means pivotally secured to one of said doors engageable with one end of said slide bar to prevent closure of said door and second actuating means on the other of said doors engageable with the opposite end of said slide bar means for moving said end of said slide bar means out of the path of said first actuating means so that said other of said doors closes prior to said one door means.
5. The invention as defined in claim 4 wherein said slide means includes a crank and an arm pivotally connected at one end to said crank, and said second actuating means is engageable to partially rotate said crank whereby said other end of said actuating means is

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moved out of the path of movement of said bar means.

6. The invention as defined in claim 5 wherein each of said first and second actuating means is connected intermediate its ends by a radius bar connected at one end to a frame member on which said doors are mounted.

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7. The device according to claim 4 wherein latching means are provided on said other door to automatically lock said doors to said cabinet upon closure of said other door.

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