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2,038,035

DISAPPEARING DROP DOOR FOR REFRIGERATOR AND DISPLAY CABINETS, BINS, ETC

Filed Dec. 19, 1935

4 Sheets-Sheet 1

Fig. 1.

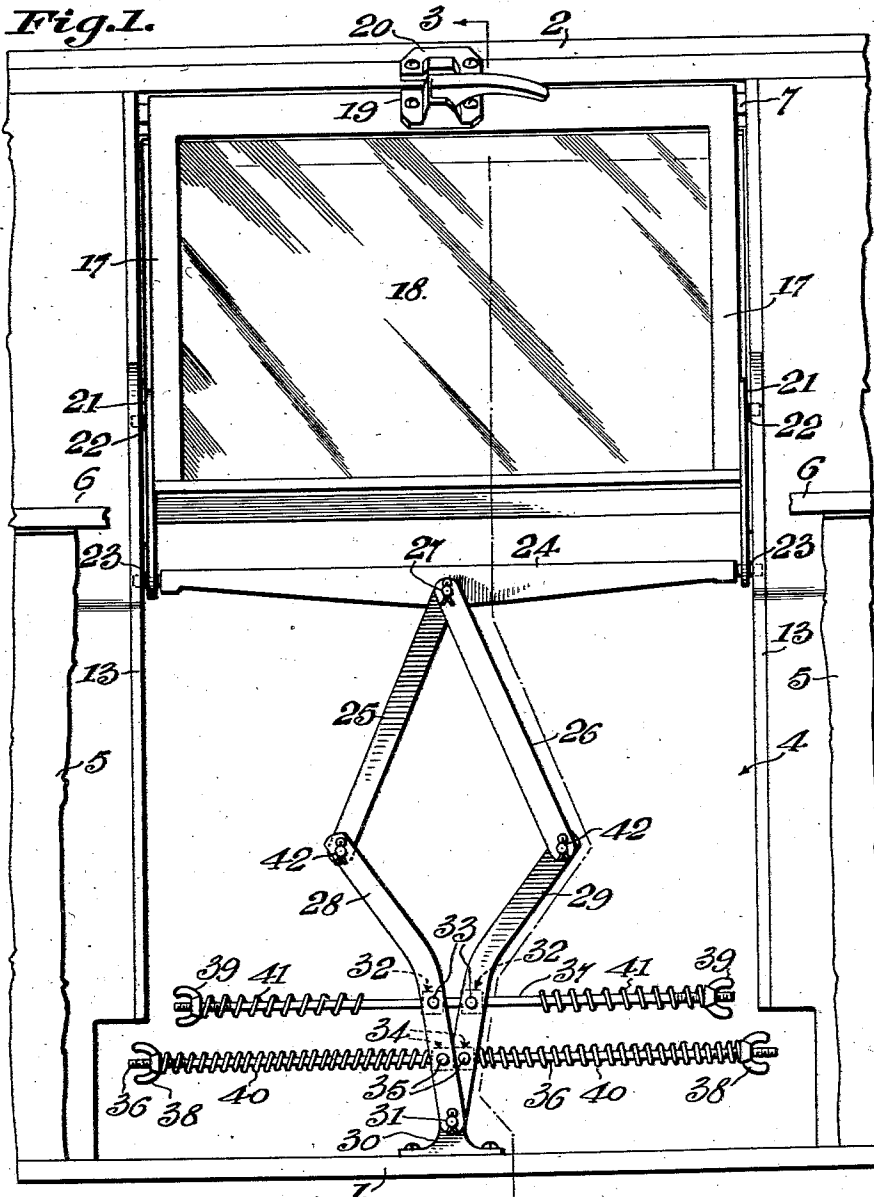
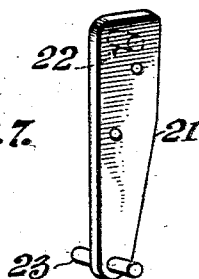


Fig. 7.



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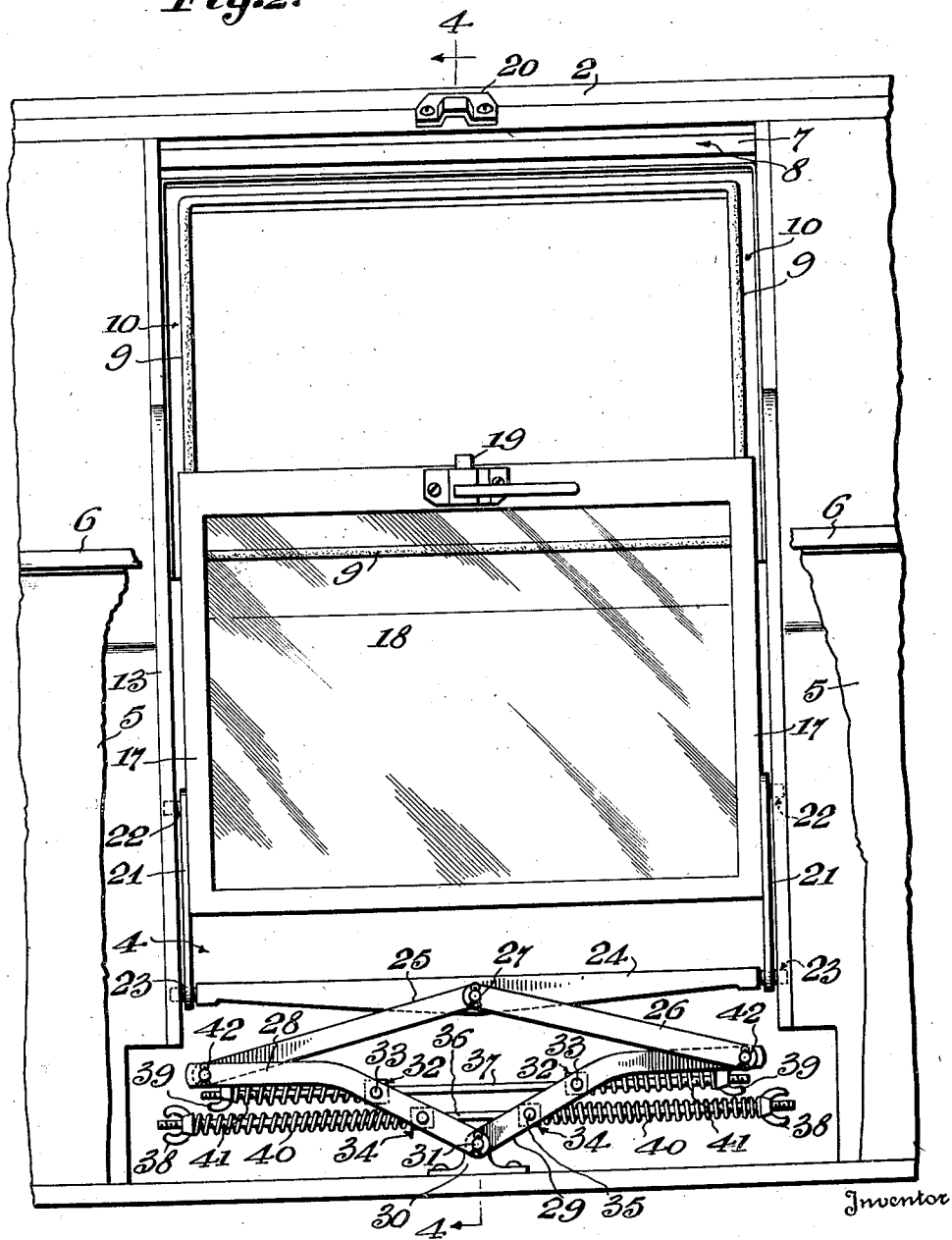
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Fig.2.



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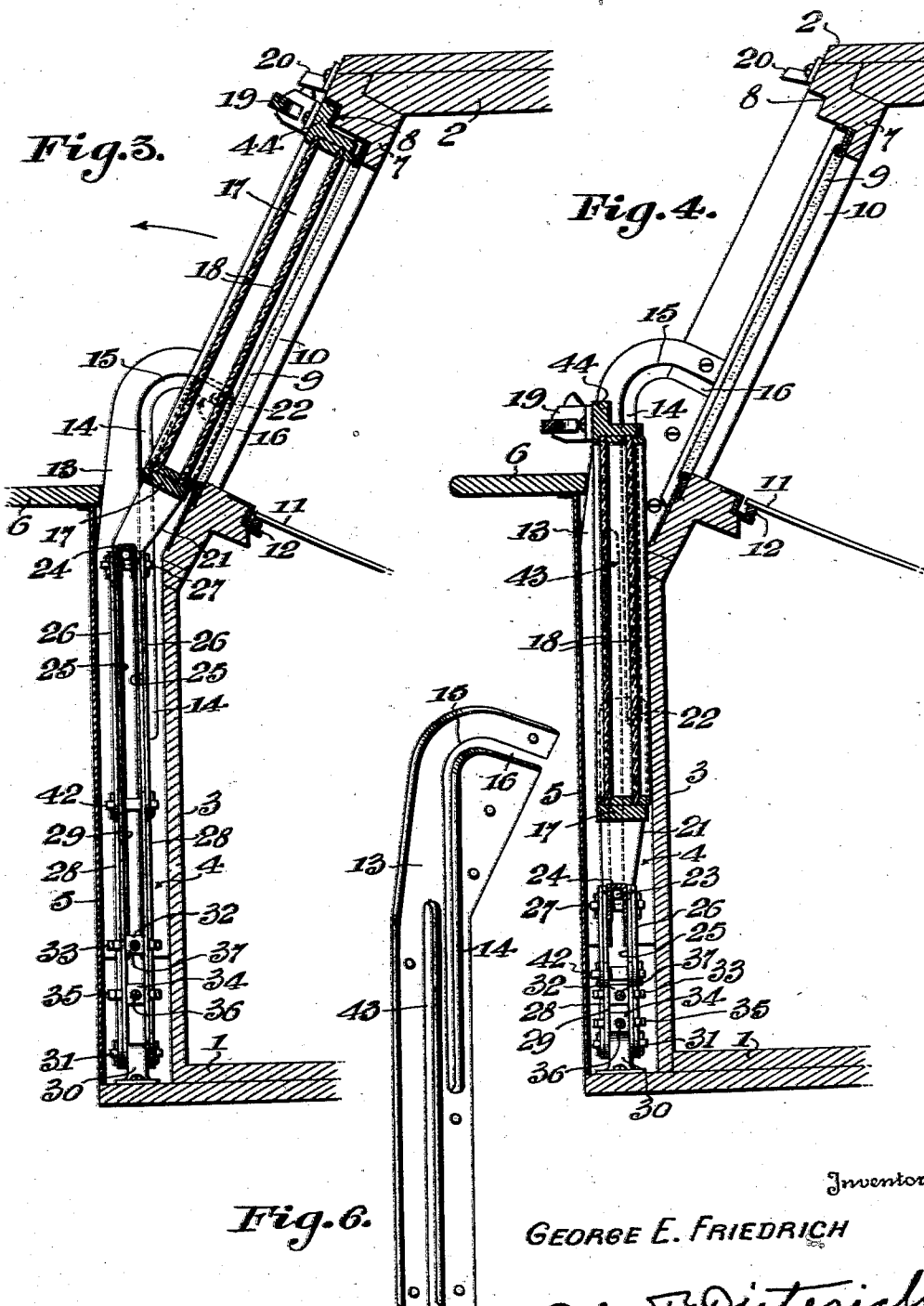
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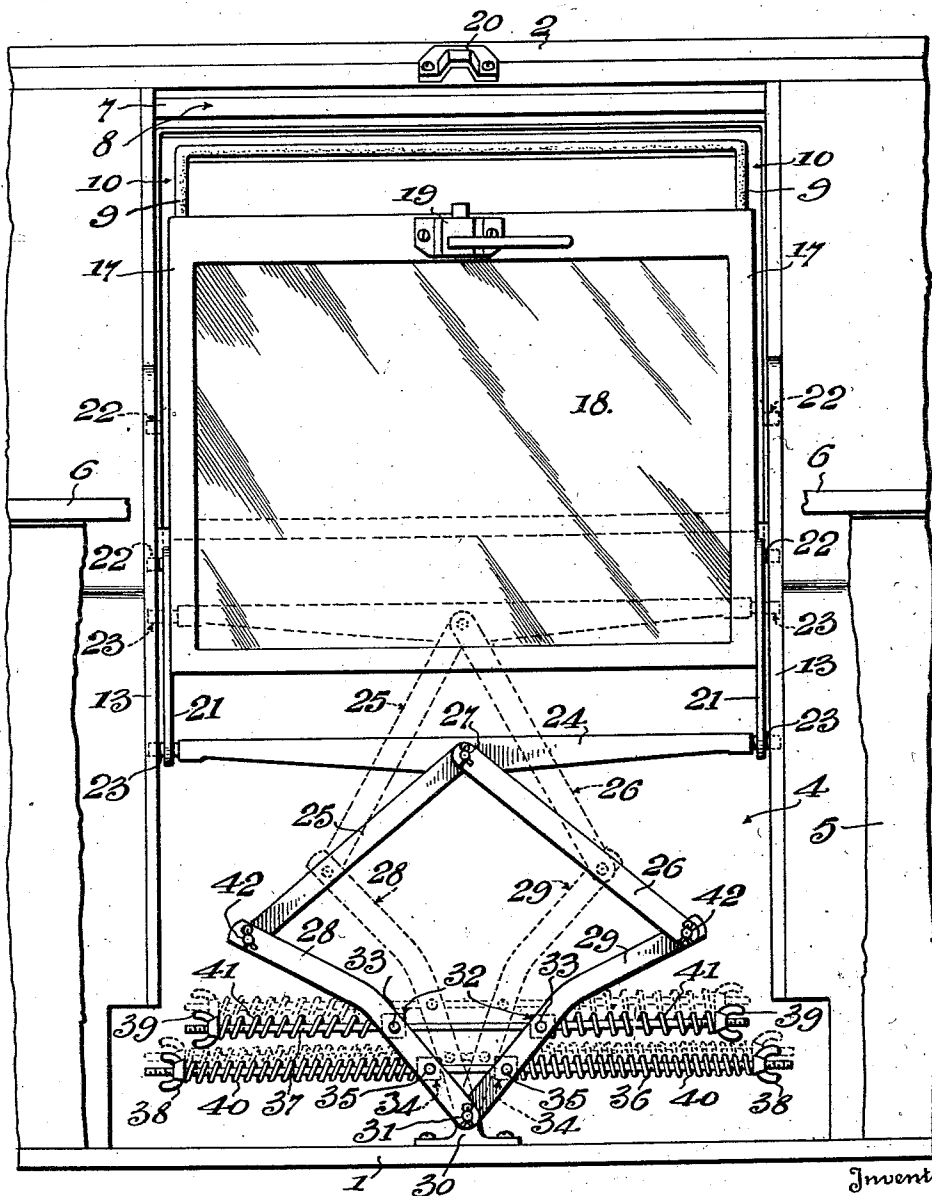
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Fig. 5.



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DISAPPEARING DROP DOOR FOR REFRIG-
ERATOR AND DISPLAY CABINETS, BINS,
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poration of Texas

Application December 19, 1935, Serial No. 55,253

7 Claims. (Cl. 312—192)

The present invention which has especially been devised for use on display cabinets and particularly refrigerated display cabinets has relation to the door or doors thereof.

6 The invention particularly has for its object to provide a simple, inexpensive, drop, disappearing door which is so counterbalanced as to require little manual effort to open it and little or no manual effort to close it.

10 Generically, the invention resides in providing the cabinet with a drop pocket at the back into which the door may be lowered and to provide side guideways for the door together with a bal-
15 ancing spring device located within the pocket and adjustably connected with the door in such fashion that, under one adjustment, when the door is in a vertical position its entire weight may be balanced so that the door will remain in its
20 lowermost position; will float between that position and a predetermined elevated position, and remain balanced above said predetermined position for a short distance and above the last men-
25 tioned short distance the weight of the door plus the upthrust of the balancing means will effect a closing movement of the door to its closed points; or when under another adjustment the door is
30 overbalanced so that it will be automatically raised and closed when released from any open (fully or partially) position, as may be desired by the user.

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

To the attainment of the aforesaid objects and ends, the invention still further resides in the novel details of construction, combination and arrangement of parts, all of which will be first fully described in the following detailed description, then be particularly pointed out in the ap-
35 pended claims, reference being had to the accompanying drawings, in which:—

40 Figure 1 is an elevation looking at the rear of the cabinet and shows the door closed (the cover plate being removed and parts broken away).

45 Figure 2 is a similar view with the door open.

Figure 3 is a detail cross section on the line 3—3 of Figure 1.

Figure 4 is a detail cross section on the line 4—4 of Figure 2.

50 Figure 5 is an elevation showing in full lines the door raised by the springs to a position where

the door remains in static balance (springs 41 having completed their lifting function); and in dotted lines showing the door lifted to the position where it begins to swing to close (pins 22 enter curves 15) through the swinging movement of the door on pins 23 as a pivot.

Figure 6 is a detail perspective view of one of the slotted door-guiding plates.

Figure 7 is a detail perspective view of the plate 21.

10 In the drawings, in which like numerals of reference indicate like parts in all the figures, 1 indicates the bottom of the cabinet, display case, or bin, 2 the top and 3 the rear wall thereof.

The rear wall is provided with a pocket or well 15 to receive the drop-door, there being an outer plate or cover 5 which may be removable for purposes of inspection and adjustment of the door mechanism.

A shelf 6 may be provided, if desired, on the 20 rear wall adjacent to the top of the pocket 4.

The door-way frame 7 is set at an inclination and has a recess 8 to receive the top edge or lip 44 of the door (see Fig. 3). A marginal gasket, preferably, of a resilient tubular structure 9 is 25 secured to the frame 7 on the door side of the opening 10.

The cabinet may be provided with the usual goods displaying shelf 11 located on suitable rests 30 12 indicated in Figs. 3 and 4.

At each side of the pocket 4 is secured, in any suitable way, a door-guiding slotted side plate 13 having a vertical slot 43 and a combined vertical, curved and inclined slot 14, 15, 16, the slot 43 terminating within the pocket 4 while the slot 35 14—15—16 extends above the pocket 4 (see Figures 3 and 4).

The door sash 17 may be provided with the usual transparency or transparencies 18, and latch 19, the latter cooperating with a keeper 20 on 40 the cabinet when the door is closed (Figure 3).

At each side the door carries a plate 21 having an upper guide pin 22 and a lower guide pin 23, the pins 22—23 being out of alignment with one another so that a pin 23 may work in a slot 43 45 while the other pin 22 works in the adjacent slot 14—15—16.

Extending between the plates 21—21 below the door and carrying the pins 23 in a cross-bar 24 preferably of U or channel section and having 50

midway its ends, a pivot pin 27 to which the adjacent ends of two pairs of links 25—25 and 26—26 are pivoted. The remote ends of each pair are pivoted respectively at 42 to the remote ends of two pairs of levers 28—28 and 29—29, the adjacent ends of which are pivoted at 31 to a bracket 30 on the bottom 1, within the pocket 4.

Between each pair of levers 28—28 and 29—29 is pivoted, at 33 and 35 respectively, swivel bearing blocks 32 and 34.

A rod 37 passes horizontally through bearing apertures in the blocks 32 and carries springs 41—41 which are held between the respective blocks 32 and the adjusting nuts 39 that are threaded on the ends of the rod 37. A rod 36 passes horizontally through bearing apertures in the blocks 34—34 and carries springs 40—40 which are held between the respective blocks 34 and adjusting nuts 38 that are threaded on the ends of the rod 36. The rod 36, blocks 34, springs 40 and adjusting nuts 38 constitute the lower or main door-counterbalancing and lifting spring-assembly while the rod 37, blocks 32, springs 41 and adjusting nuts 39 constitute the upper or auxiliary counterbalancing spring-assembly, which comes into action only after the door has been partly lowered, (see Figure 5 and compare Figure 1).

By adjusting the tension on the springs 40—41 to a predetermined degree the door can be made to remain poised at the bottom of the well or be in static balance in a partly lowered position (Figure 5) and may be moved by spring action from its lowest position to said partly lowered position by simply giving the door a slight upward start manually.

By increasing the tension of the spring 40 beyond that just specified, the door may be over-balanced, i. e., it will not remain down in the well but will be automatically lifted and closed upon releasing the door, after it has been lowered by hand against the spring tension.

Assuming the tension of the springs to be set as first above mentioned, when the door is to be opened the operator grasps the handle of the latch 19 and pulls the door in the direction of the arrow in Figure 3 to a vertical position, the weight of the door then becomes sufficient to cause it to drop to the position shown in Figure 5, the statically balanced partly dropped position.

From the position the operator pushes the door down to the bottom of the well where it will remain due to the critical angle of the lever system being there attained.

In order to close the door the operator lifts the door by the handle of the latch, the spring-lever-link system assisting, until the pins 22 engage the curved portion 15 of the slot 14—15—16 when the door drops over to the closed position, swinging on the pins 23 as a pivot.

If the spring-lever-link system be adjusted with greater tension than has just been assumed, the weight of the door may be over-balanced so that it must be held down in the well 4, and when released, will be automatically raised and swung over to the closed position.

From the foregoing description taken in connection with the accompanying drawings it is believed that the construction, combination, and arrangement of parts will be readily understood by those skilled in the art.

What I claim is:

1. A chambered body having an inclined doorway, and a well below the same, a drop-door for closing said doorway and arranged to be received

by said well when the door is opened, a lever-link-spring assembly located in said well and connecting said door with said body as a door counterbalance, door guides at the side of said well and means on said door and operatively engaging with said guides for effecting a swinging movement of the door from its closed-inclined position to a position aligning with said well and for holding said door parallel to the well while the door is within the well.

2. A chambered body having a well or pocket and an inclined doorway above the pocket, a drop-door for closing said doorway, slotted guides at the sides of said pocket, said door having two sets of pins cooperating with said guides, the guides having two sets of slots one for each set of pins, one set of slots having curved portions for effecting a swinging movement of the door on leaving and arriving at the closed position and a spring-balance mechanism in the pocket for cooperation with the door.

3. In cabinets, having an inclined doorway, a vertically disposed door receiving well or pocket below the doorway, a pair of guide plates at the sides of the well each plate including a first vertical groove and a second groove offset from the first vertical groove, the second groove including a lower vertical portion merging with an upper curved portion that in turn merges with a portion directed inwardly toward the doorway, said door having side plates extending into the well and carrying two sets of pins, one set for each set of grooves, one set of pins being located above the other set, the higher set of pins working in the second set of grooves and the lower set of pins operating in the first set of grooves and also serving as a pivot for the door to swing on in moving from its inclined position to a position paralleling the well and vice versa, a cross-bar joining the lower pins, and a counterbalancing spring mechanism connected to said cross-bar within the well for cooperating with the door.

4. In cabinets, having an inclined doorway, a vertically disposed door receiving well or pocket below the doorway, a pair of guide plates at the sides of the well, each plate including a first vertical groove and a second groove offset from the first vertical groove, the second groove including a lower vertical portion merging with an upper curved portion that in turn merges with a portion directed inwardly toward the doorway, said door having side plates extending into the well and carrying two sets of pins, one set for each set of grooves, one set of pins being located above the other set, the higher set of pins working in the second set of grooves and the lower set of pins operating in the first set of grooves and also serving as a pivot for the door to swing on in moving from its inclined position to a position paralleling the well and vice versa, a cross-bar joining the lower pins, divergent links pivoted at one end centrally to said cross-bar, divergent levers pivoted at one end to the cabinet, the other ends of the respective levers and links being pivoted together, and compression springs connected with said levers continuously tending to move the levers to lift the door.

5. In cabinets, having an inclined doorway, a vertically disposed door receiving well or pocket below the doorway, a pair of guide plates at the sides of the well, each plate including a first vertical groove and a second groove offset from the first vertical groove, the second groove including a lower vertical portion merging with an upper curved portion that in turn merges with

a portion directed inwardly toward the doorway, said door having side plates extending into the well and carrying two sets of pins, one set for each set of grooves, one set of pins being located above the other set, the higher set of pins working in the second set of grooves and the lower set of pins operating in the first set of grooves and also serving as a pivot for the door to swing on in moving from its inclined position to a position paralleling the well and vice versa, a cross-bar joining the lower pins, divergent links pivoted at one end to said cross-bar, divergent levers pivoted at one end to the cabinet, the other ends of the respective levers and links being pivoted together, and compression springs connected with said lever continuously tending to move the levers to lift the door and other compression springs operating only through a portion of the path of movement of the levers to augment the action of the first mentioned compression springs.

6. In cabinets, having an inclined doorway, a vertically disposed door receiving well or pocket below the doorway, a pair of guide plates at the sides of the well, each plate including a first vertical groove and a second groove offset from the first vertical groove, the second groove including a lower vertical portion merging with an upper curved portion that in turn merges with a portion directed inwardly toward the doorway, said door having side plates extending into the well and carrying two sets of pins, one set for each set of grooves, one set of pins being located above the other set, the higher set of pins working in the second set of grooves and the lower set of pins operating in the first set of grooves and also serving as a pivot for the door to swing on in moving from its inclined position to a position paralleling the well and vice versa, a cross-bar joining the lower pins, divergent links pivoted at one end to said cross-bar, divergent levers pivoted at one end to the cabinet, the other ends of

the respective levers and links being pivoted together, an upper and a lower set of swivel blocks pivoted to said levers, rods passing through the sets of swivel blocks, springs on each rod, and spring action adjusting nuts on each rod, said springs being located on said rods between each nut and swivel block of each rod.

7. In cabinets, having an inclined doorway, a vertically disposed door receiving well or pocket below the doorway, a pair of guide plates at the sides of the well, each plate including a first vertical groove and a second groove offset from the first vertical groove, the second groove including a lower vertical portion merging with an upper curved portion that in turn merges with a portion directed inwardly toward the doorway, said door having side plates extending into the well and carrying two sets of pins, one set for each set of grooves, one set of pins being located above the other set, the higher set of pins working in the second set of grooves and the lower set of pins operating in the first set of grooves and also serving as a pivot for the door to swing on in moving from its inclined position to a position paralleling the well and vice versa, a cross-bar joining the lower pins, divergent links pivoted at one end centrally to said cross-bar, divergent levers pivoted at one end to the cabinet, the other ends of the respective levers and links being pivoted together, an upper and a lower set of swivel blocks pivoted to said levers, rods passing through the sets of swivel blocks, springs on each rod, and spring action adjusting nuts on each rod, said springs being located on said rods between each nut and swivel block of each rod, the lower spring, rod and block assembly constituting the main door-counterbalancing and lifting device and the upper spring, rod and block assembly being auxiliary thereto for purposes described.

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