

July 27, 1943.

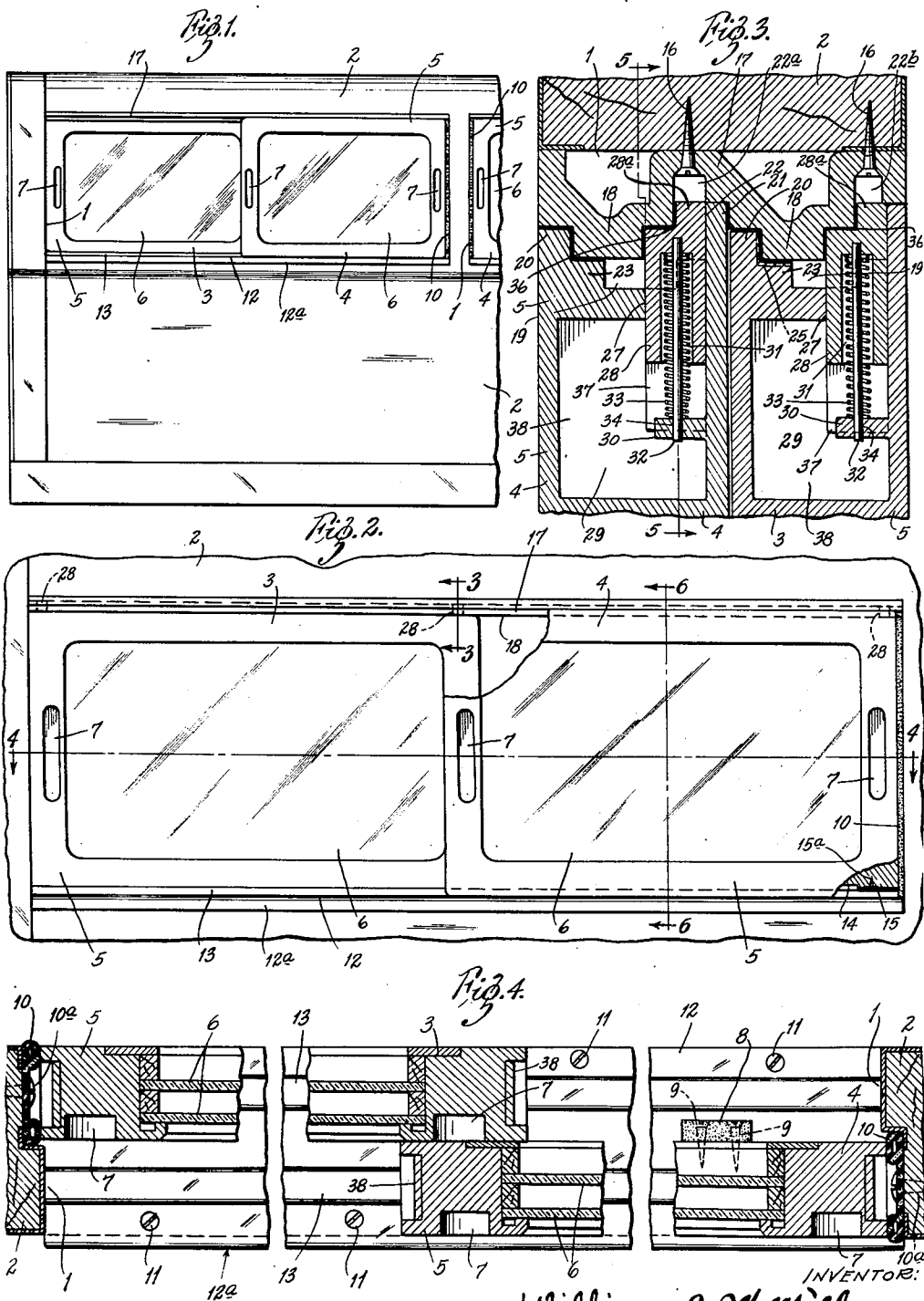
W. B. McMILLAN

2,325,263

SLIDING DOOR CONSTRUCTION FOR DISPLAY CABINETS

Filed Dec. 14, 1940

2 Sheets-Sheet 1



INVENTOR:
 William B. McMillan
 by Con. Han. S. Gandy
 HIS ATTORNEYS.

July 27, 1943.

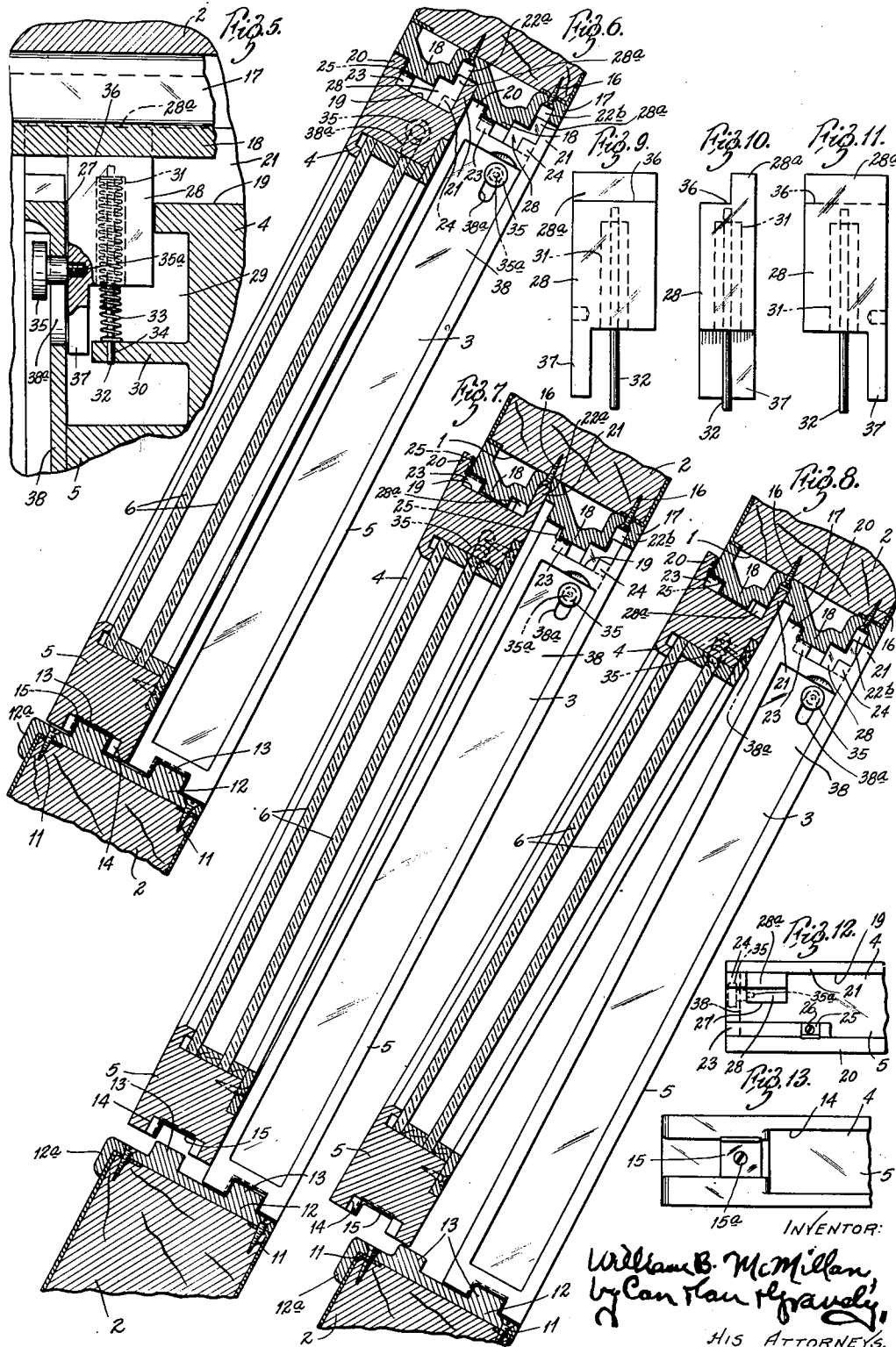
W. B. McMILLAN

2,325,263

SLIDING DOOR CONSTRUCTION FOR DISPLAY CABINETS

Filed Dec. 14, 1940

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,325,263

SLIDING DOOR CONSTRUCTION FOR
DISPLAY CABINETS

William B. McMillan, Clayton, Mo., assignor to
Hussman-Ligonier Company, St. Louis, Mo., a
corporation of Missouri

Application December 14, 1940, Serial No. 370,118

4 Claims. (Cl. 20—52.2)

This invention relates to display cabinets, and more particularly to sliding door or closure constructions for refrigerators of the show case type. The principal object of the present invention is to provide a simple and inexpensive sliding door construction for a show case refrigerator which will permit the doors to be easily operated and readily taken out in substantially any position of their sliding movement, which will reduce to a minimum leakage of air around the doors and which will provide a straight line movement of the doors and prevent rattling thereof. The invention consists in the sliding show case refrigerator door construction and in the parts and combinations and arrangements of parts herein-after described and claimed.

In the accompanying drawings which form part of this specification and wherein like symbols refer to like parts wherever they occur,

Fig. 1 is a rear elevation of a refrigerator show case provided with a sliding door construction embodying my invention,

Fig. 2 is an enlarged fragmentary rear elevation of said case in the region of the sliding doors,

Fig. 3 is an enlarged fragmentary vertical transverse section on the line 3—3 in Fig. 2,

Fig. 4 is a horizontal longitudinal section on the line 4—4 in Fig. 2,

Fig. 5 is a vertical longitudinal section on the line 5—5 in Fig. 3,

Fig. 6 is an enlarged vertical transverse section on the line 6—6 in Fig. 2,

Figs. 7 and 8 are views similar to Fig. 6, showing the manner in which the doors are removed,

Fig. 9 is a front view of one of the door retaining bolts,

Fig. 10 is a side view of said bolt,

Fig. 11 is a rear view of said bolt; and

Figs. 12 and 13 are top and bottom plan views of the respective upper and lower corner portions of one of the doors.

In the accompanying drawings, my sliding door construction is illustrated as a closure for a rectangular opening 1 in the inclined upper portion of the rear wall 2 of a refrigerator show case. Said closure construction comprises inner and outer pass-type doors 3 and 4, respectively, mounted for independent horizontal sliding movement in the opening 1 in the inclined upper portion 2 of the rear wall of the refrigerator show case, the adjacent vertical meeting rails of said doors overlapping in the fully closed position thereof.

Each of the doors preferably comprises a frame

5 of molded plastic or other material with two or more spaced parallel panes 6 therein. To facilitate opening and closing the doors, the frames 5 thereof have finger pockets or grooves 7 in the outer faces of their end rails. The outer door 4 has a stop block or bumper 8 secured by screws 9 to the inner face thereof to prevent the opened inner door 3 from being brought into complete register with said outer door and thus rendering both finger pockets of said inner door inaccessible. In closed position, the remote ends of the doors abut against rubber bumper strips or gaskets 10 secured to the end walls of the rectangular opening 1 by screws 10a, while the adjacent end or meeting rails of said door are disposed in lapped relation.

Secured to the bottom wall of the rectangular opening 1 by means of screws 11 is a sill strip 12 of molded plastic or other suitable material. This sill strip extends the full length of the opening 1 and has two spaced parallel upstanding guide rails or ribs 13 that extend longitudinally of said strip from end to end thereof and fit loosely in longitudinal grooves 14 in the bottoms of the respective doors to serve as guides therefor. The sill strip 12 also has a depending outer marginal flange 12a that overhangs the rear wall 2 of the refrigerator show case below the opening 1 therein. Secured by screws 15a in the angle formed by the bottom and outer side wall of the longitudinal groove 14 in the bottom of each door are two metal angle shaped wear or slide plates 15 located one near each end of said groove. One flange of each slide plate 15 seats on the top of a guide rib 13 and the other flange slidably engages the outer side face of said rib, thus limiting the area of surface contact between the door and sill members to the contacting portions of the slide plate and said guide rib.

Secured to the underside of the top wall of the opening 1 by means of screws 16 is a head strip 17 also of molded plastic or other suitable material. The head strip 17 extends the full length of the opening 1 and has two spaced parallel duplicate guide ribs or rails 18 on the underside thereof that extend longitudinally of said strip from end to end thereof and loosely engage longitudinal grooves 19 provided therefor in the upper edges of the respective doors. The groove 19 in the top of each sliding door is considerably wider and deeper than the rib 18 cooperating therewith and has a relatively shallow outer side wall 20 and a relatively deep inner side wall 21; and the underside of the head strip 16 has a lon-

itudinal groove 22 therein midway of the two guide ribs 18 thereon, the outer longitudinal portion 22a of said groove being deeper than the remaining portion thereof. In the operative position of each door, the shallow outer side wall 20 of the longitudinal groove 19 in the top edge thereof overlaps the outer side of the guide rib 18 therefor, while the deep inner side wall 21 of said groove extends into the shallow portion of the groove 22 in the head strip 16.

At each end of each door, a distance lug 23 is formed in the groove 19 thereof in the angle formed by the bottom of said groove and the outer side wall 20 thereof. In the operative position of each door, the lugs 23 are disposed beneath but clear of the underside of the guide rail 18 therefor. The top groove 19 of each door also has lugs 24 at the ends thereof in the angle formed by the bottom and inner side wall 21 of said groove, these lugs being of slightly less height than the distance lug 23. Located in the angle formed by the distance lug 23 of each door and the outer wall 20 of the groove 19 in the top thereof is a metal angle shaped wear or slide plate 25 having its bottom flange secured by means of a screw 26 flush with the top of said lug and its upstanding flange seated against the inner face of said wall and adapted to slidably engage the outer side face of the outermost guide rib. These metal angle plates serve as wear plates and reduce the area of sliding contact between the top of the door and the head rail to the portions of said plates that engage the outer side face of the outermost guide rib 18. Located in the underside of the head strip 16 between the inner side edge thereof and the inner side face of the innermost guide rib 18 is a longitudinal groove 22b. The longitudinal groove 22b is similar to and is located in the plane of the deep portion 22a of the groove 22 located between the two guide ribs 18.

Slidably mounted in a rectangular opening 27 that extends through the bottom of the longitudinal groove 19 in the top of each of the sliding doors 3 and 4 near each end thereof is a spring bolt or catch 28 in the form of a rectangular slide block of molded plastic or other suitable substance. The rectangular opening 27 has one corner located in the angle formed by the inner end of the lug 24 and the inner side wall 21 of the groove 19; that is, said opening has its rear edge disposed in flush alignment with the inner surface of said inner side wall and its outer side edge disposed in flush alignment with the inner end face of said lug. The opening 27 opens downwardly through the bottom of the groove 19 into an outwardly opening recess or pocket 29, which is formed in the outer edge of the adjacent end rail of the door frame and has a stop lug 30 therein that projects laterally from the wall at the rear side of said frame and terminates short of the front wall thereof. The bolt 28 has a central hole or bore 31 therein that extends upwardly from the lower end thereof and in which is fixed a centrally disposed guide rod 32 for a coil compression spring 33. The spring 33 is sleeved on the guide rod or stem 32 and has a loose fit in the bore 31 in which said stem is secured. The lower end of the bolt projecting spring 33 seats on the stop lug 30 in the recess 29; and the upper end of said spring seats against the upper or inner end of the downwardly opening blind bore 31 in the bolt which is projected upwardly by said spring. The guide rod 32 extends downwardly below the mouth of the bore 31 provided

therefor in the bolt 28 through an opening 34 in the stop lug 30.

The spring projected bolt 28 is retracted, that is pulled downwardly against the compression of its supporting spring 33 into abutting relation to the stop flange 30, by means of a knob or button 35 having a stem 35a that is threaded horizontally into the outer side edge of said bolt below the top wall of the recess 29. This knob is adapted to abut against the top wall of the recess 29 when said button is released and thus limit the upward sliding movement of said bolt. The slide bolt or block 28 is rabbeted, as at 36, along its front upper corner to provide a narrow upper end portion 28a at the back thereof; and the outer side edge of said bolt has a depending skirt or tail portion 37 that is slidable in a space provided therefor between a suitable closure plate 38 for the recess or pocket 29 in the end of the door frame and the opposing outer side edge of the stop lug 30 of said recess. As shown in the drawings, the knob 35 is located outside of the cover plate 38 and the stem of said knob extends through an opening 38a in said plate, which opening is elongated to permit the desired sliding movement of the spring projected bolt 28 that is depressed or retracted by a downward pull on said knob.

In the projected position of the retaining bolts 30 or plungers 28 for the outer door, the narrow upper end 28a of each bolt is flush with the top edge of the deep inner side wall 21 of the longitudinal groove 19 in the top of said door and extends into the groove 22 in the head rail 16 immediately beneath but clear of the deep portion 22a of said groove and in close proximity to the front side wall thereof, while the bottom of the rabbet 36 that forms said narrow upper end of said bolt is disposed below but clear of the bottom of said head strip between the groove 22 and the outermost guide rib 18 thereof, and the front face of said bolt below said rabbet is disposed adjacent to and slightly spaced from the inner side face of said rib. In the projected position of the retaining bolts 28 for the inner door 3, the narrow upper end 28a of each bolt is disposed flush with the top edge of the deep rear wall 21 of the groove 19 in the top of said door immediately below the groove 22b in the head strip 16 and opposite to but slightly clear of the extended inner or front side wall of said last mentioned groove; and the bottom of the rabbet 36 in the front upper corner of said bolt is disposed below but clear of the bottom of said head strip between the groove 22b and the innermost guide rib 18, while the front face of said bolt just below said rabbet is disposed opposite to but spaced slightly from said inner side face of said guide rib.

By the arrangement described, each door has a sliding rib and groove connection with the sill strip 12 and the head strip 16 and sliding contact between the door and said strips is limited to the area of the portions of the metal wear strips 15 and 25 in engagement with the guide ribs 13 and 18 of the respective sill and head strips due to the upward and inward inclination of the door and the clearance space provided between said door and said sill and head strips. The narrow upper portions 28a of the spring bolts 28 serve as filler or spacing elements to prevent excessive side play or rattle of the doors in the head strip, while the strips themselves prevent excessive up and down movement or play of the doors therebetween.

When it is desired to remove the doors from

the rectangular opening closed thereby, each door is partly opened so that access may be had to the knobs 35 at both ends of the door and these knobs are then pressed downwardly against the pressure of the bolt projecting springs 33 until the bolts 28 seat on the stop lugs 30 in the recesses 29. In this retracted position of the door retaining bolts the narrow upper ends 28a thereof are brought below the top of the deep inner side wall 21 of the groove 19 in the top of the door flush with the tops of the lugs 24 therein, that is below the level of the bottom portion of the head strip 16 between the outer guide rib 18 and the groove 22 when the outer door is to be removed, or below the level of the bottom of said strip between the inner guide rib and the groove 22b if the inner door is to be removed. The upper portion of the door is then pulled forward to bring the deep inner side wall 21 of the groove 19 in the top of the door in edgewise alinement with the deep portion 22a of the groove 22 in the underside of the head strip 17. The door is then forced upwardly until the stop lug 23 abuts against the underside of the head strip 17 outwardly of the adjacent guide rib 18, in which position the deep inner side wall 21 of the groove 19 is disposed within the deep portion 22a of the groove 22 if the outer door is being removed or within the groove 22b in said head strip if the inner door is being removed in the head strip. In this position of the door, the lower edge thereof is located above the plane of the top of the guide rib 13 of the sill strip 12, thereby permitting said edge to be pulled outwardly clear of the outer edge of said sill strip. The door is then removed by pulling the same downwardly to bring the highest portion thereof, that is the top edge of the high side wall 21 of the top groove 19 therein, below the plane of the guide ribs 18 of the head strip 16 and then withdrawing the upper portion of the door from said opening. As shown in Figs. 7 and 8 of the drawings, when the upper portion of a door is pulled forward and then forced upwardly into the grooves 22a or 22b of the head strip 17, the stop lugs 23 in the groove 19 abut against the underside of the guide rib 18 of the head strip 17 and space the upper edges of the side walls 20 and 21 of the groove 19, the tops of the lugs 24 and the upper ends of the retracted bolts 18 and the bottoms of the rabbets 36 clear of the underside of said strip; and these clearance spaces, together with the side clearance spaces between the relatively deep side walls 21 of the groove 19 and the grooves 22a or 22b and between the front faces of the lugs 24 and the front faces of the narrow upper ends of the retracted bolt and the inner faces of said guide ribs are sufficient to permit the upper portion of said door to be tilted in said head strip far enough to bring the lower portion of said door clear of the sill strip.

The hereinbefore described sliding door construction has several important advantages. It permits the doors to be quickly and easily mounted in and removed from the door opening in substantially any position of their sliding movement; it permits easy operation of the doors; and it also prevents binding of the doors without excessive side play thereof and reduces to a minimum leakage of air around the doors.

The invention is applicable to display cabinets having one or more sliding doors and is not limited to the precise shapes and arrangements of parts shown and described.

What I claim is:

1. A sliding door construction for a display cabinet comprising a wall having a door opening therein, a head strip secured in said opening along the upper edge thereof, a sill strip secured in said opening along the lower edge thereof, said door having longitudinal grooves along the upper and lower edges thereof, said sill strip having a guide rib along the top thereof cooperating with the groove along the lower edge of said door, said head strip having a guide rib along the underside thereof cooperating with the groove along the upper edge of said door, said last mentioned rib and groove having sufficient clearance therebetween to permit the upper edge of said door to be moved outwardly in said opening a limited distance and then upwardly to lift the groove in the lower edge of said door clear of the guide rib of said sill strip, and a downwardly retractable plunger mounted in said door and cooperating with said head strip to prevent such outward movement of said door in said opening, said plunger being disposed with its lower end portion in a recess provided therefor in one end of said door and with its upper portion disposed in the groove in the upper edge of said door, a cover plate for said recess, said recess having a lug projecting from one wall thereof for limiting the downward movement of said plunger, a spring interposed between said plunger and said lug for projecting said plunger upwardly, and a retracting knob for said plunger located exteriorly of said end of said door and having a stem portion extending through a slot provided therefor in said cover plate and secured to said plunger.

2. A sliding door construction for a display cabinet comprising a wall having a door opening therein, a head strip secured in said opening along the upper edge thereof, a sill strip secured in said opening along the lower edge thereof, a door mounted in said opening, said door having longitudinal grooves along the upper and lower edges thereof, said sill strip having a guide rib along the top thereof cooperating with the groove along the lower edge of said door, said head strip having a guide rib along the underside thereof cooperating with the groove along the upper edge of said door, said head strip having a groove of uniform width along the underside thereof inwardly of the guide rib thereon, sufficient side clearance being provided between the outer side wall of the head strip groove and the inner side wall of the upper groove of said door to permit the upper edge of said door to be pulled outwardly far enough to bring the inner side wall of the upper groove of said door in line with the groove in the underside of said head strip in substantially any position of the sliding movement of said door, in which position of the door the same may be raised and said inner side wall entered into the groove in said head strip far enough to raise the groove in the lower edge of said door clear of the guide rib on said sill strip, and a retractable plunger mounted in the groove in the upper edge of said door and cooperating with the groove in the underside of said head strip to prevent such outward movement of said upper edge of said door in any position of the sliding movement thereof, said plunger being retractable in substantially any position of the sliding movement of said door.

3. A sliding door construction for a display cabinet comprising a wall having a door opening therein, a head strip secured in said opening

along the upper edge thereof, a sill strip secured in said opening along the lower edge thereof, a door mounted in said opening between said head and sill strips, longitudinal sliding rib-and-groove connections between the lower edge of said door and said sill strip and between the upper edge of said door and said head strip, said last mentioned connection comprising a longitudinal rib on the underside of said head strip, a longitudinal groove of uniform width on the underside of said head strip inwardly of said rib having a relatively deep outer side portion and a relatively shallow inner side portion, and a longitudinal groove in the top of said door having a relatively low outer side wall overlapping the outer side of said rib and a relatively high inner side wall extending into the inner side portion of the head strip groove, and a downwardly retractible plunger mounted in the door groove and extending upwardly into said head strip groove between the outer side thereof and the inner wall of said door groove, thereby preventing outward movement of the top of said door relative to said head strip in any position of the sliding movement of said door, said retractible plunger being disengageable from said head strip groove in substantially any position of the sliding movement of said door, thereby permitting the top of said door to be moved outwardly in said opening and thence upwardly relatively to said head strip to disengage the sliding rib-and-groove connection between the lower edge of said door and said sill strip.

4. A sliding door construction for a display cabinet comprising a wall having a door opening therein, a head strip secured in said opening along the upper edge thereof, a sill strip secured in said opening along the lower edge thereof, a door mounted in said opening between said head and sill strips, longitudinal sliding rib-and-groove connections between the lower edge of

said door and said sill strip and between the upper edge of said door and said head strip, said last mentioned connection comprising a longitudinal rib on the underside of said head strip, a longitudinal groove of uniform width on the underside of said head strip inwardly of said rib having a relatively deep outer side portion, and a relatively shallow inner side portion, and a longitudinal groove in the top of said door having a relatively low outer side wall overlapping the outer side of said rib and a relatively high inner side wall extending into the inner side portion of the head strip groove, the door groove having distance lugs in the bottom thereof disposed in abutting relation to the underside of said rib, and a downwardly retractible spring-pressed slide block mounted in the door groove between and in abutting relation to the inner wall thereof and the inner side of said rib and having a horizontal shoulder in abutting relation to the underside of said head strip between said rib and said head strip groove and a narrow upper end portion extending upwardly into said head strip groove between and in abutting relation to said inner side wall of said door groove and the outer side of said head strip groove, whereby outward or upward movement of the top of said door relative to said head strip is prevented in any position of the sliding movement of said door, said block being retractible in substantially any position of the sliding movement of said door to disengage the narrow upper portion of said block from said head strip groove and to bring said horizontal shoulder of said block below the level of said head strip rib, thereby permitting the top of said door to be moved outwardly in said opening and thence upwardly relatively to said head strip to disengage the sliding rib-and-groove connection between the lower edge of said door and said sill strip.

WILLIAM B. McMILLAN.