July 21, 1936. S. BOHN ET AL 2,047,937

REFRIGERATOR DISPLAY CASE

Filed July 2, 1935 3 Sheets-Sheet 1

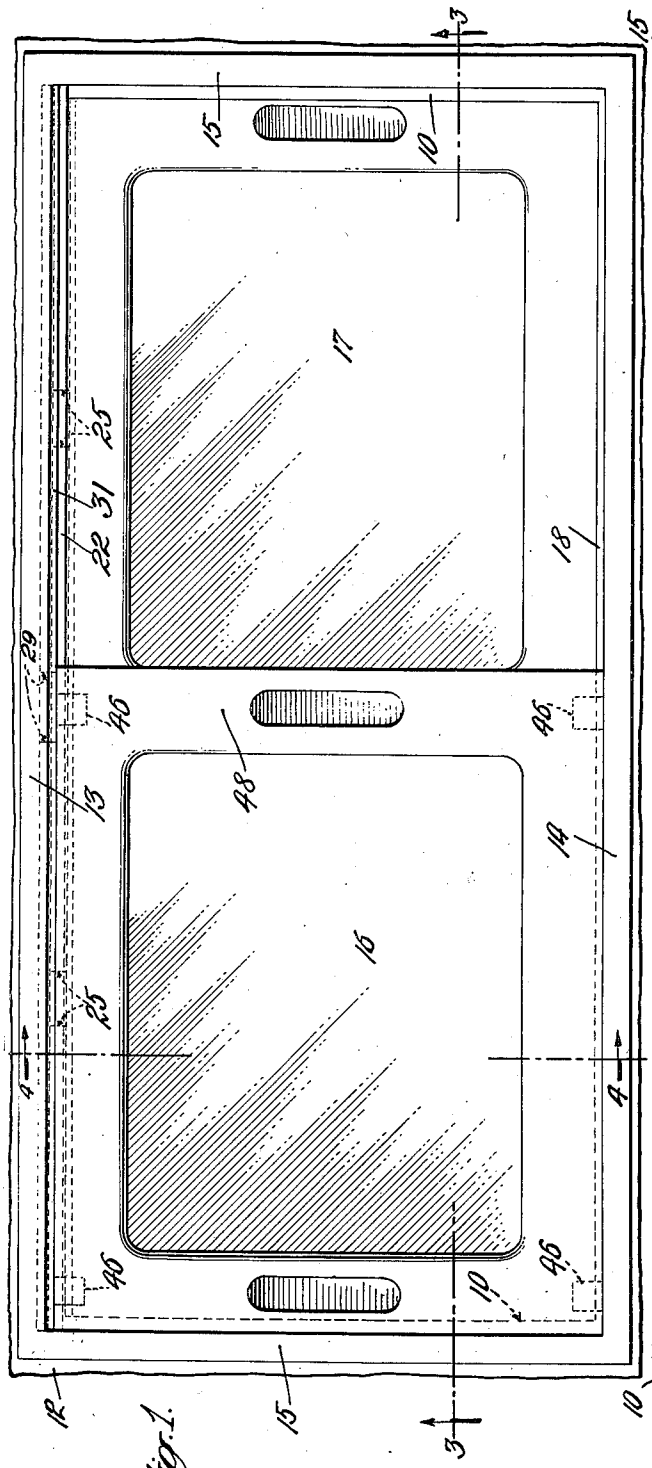


Fig. 1.

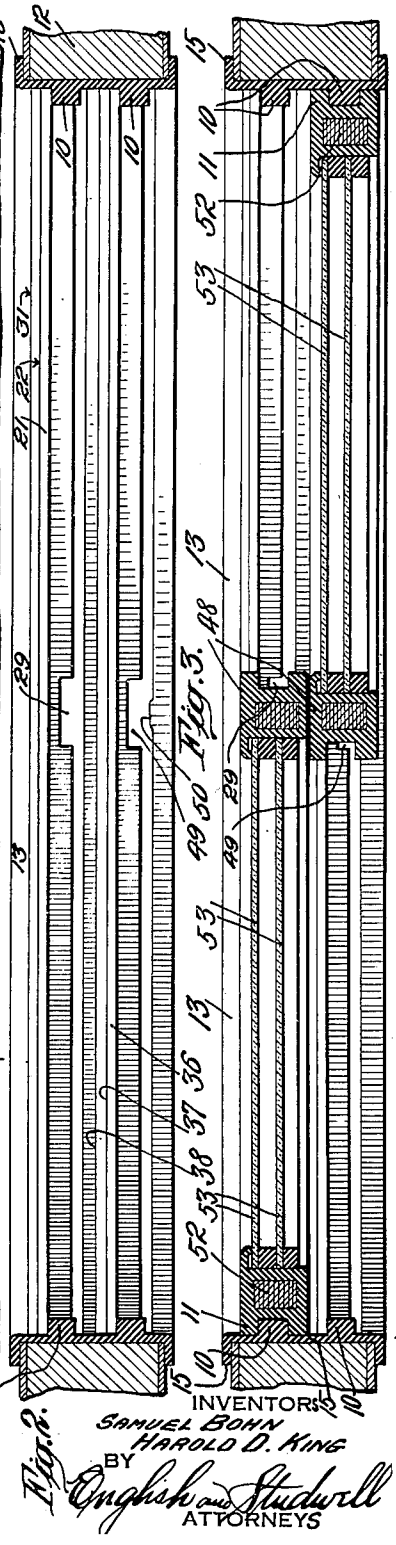


Fig. 2.

Fig. 3.

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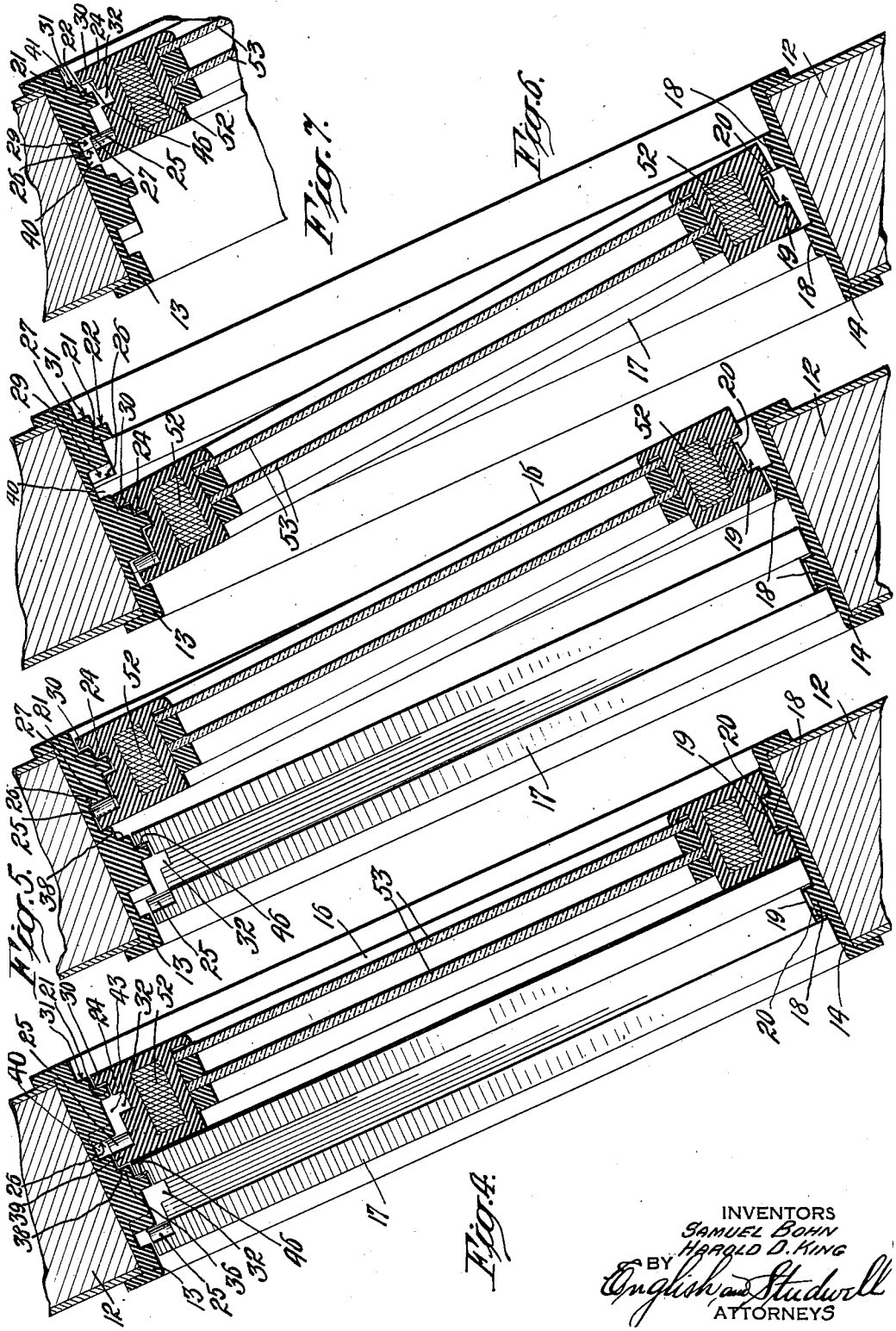


Fig. 4.

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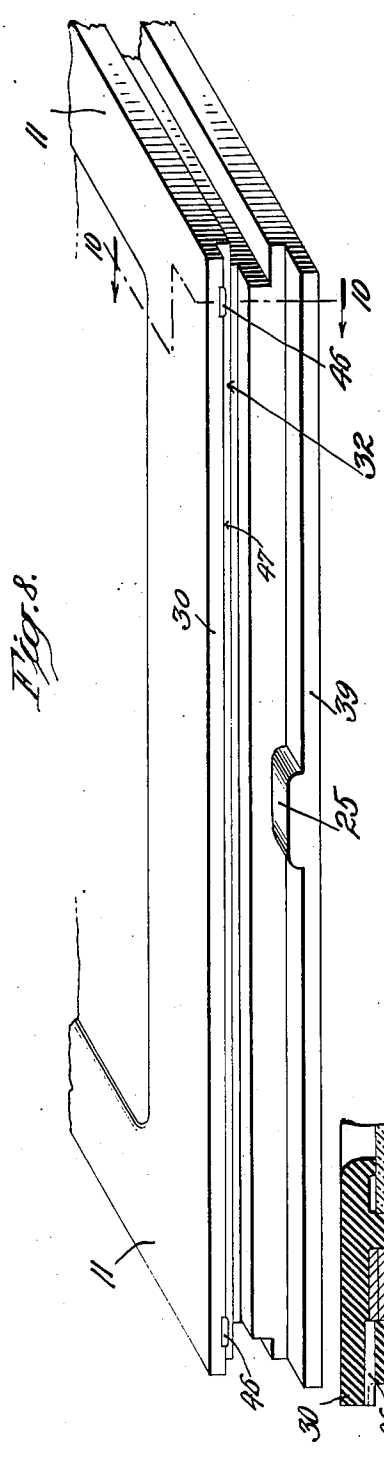


Fig. 8.

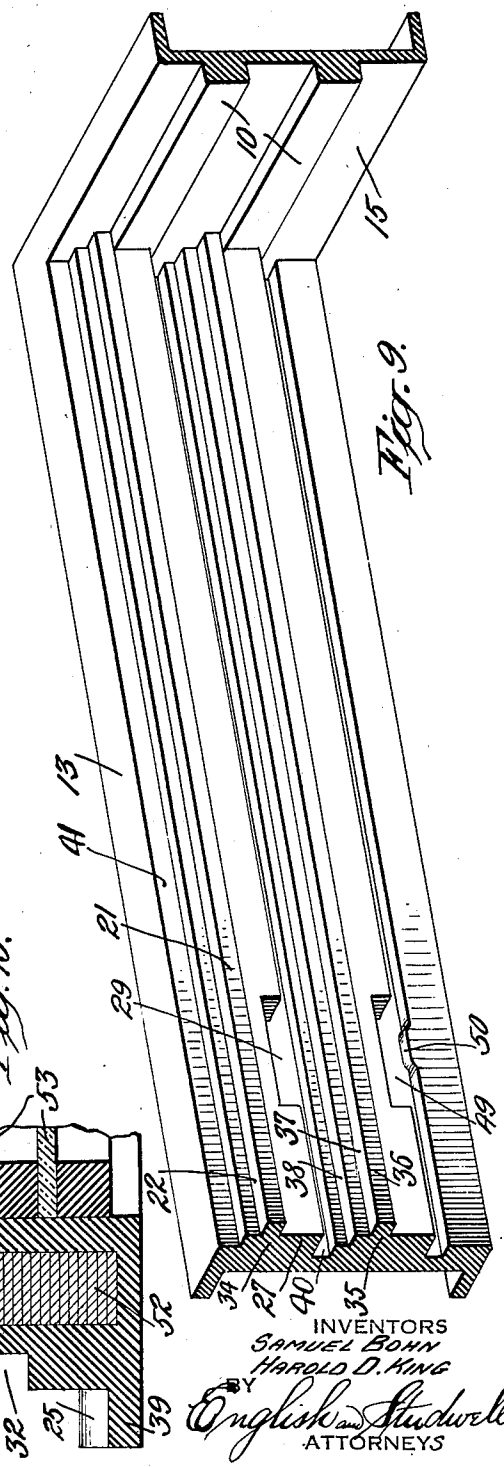


Fig. 9.

Fig. 10.

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REFRIGERATOR DISPLAY CASE

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Application July 2, 1935, Serial No. 29,454

8 Claims. (Cl. 312—138)

The invention relates to an improvement in sliding doors for display cases and cabinets and more especially to an improvement in sliding doors particularly adapted for refrigerator display cases or cabinets.

In the usual form of refrigerator display case access is had to the interior of the case through a rectangular opening in the rear side of the case provided with a pair of sliding doors, which when they are in closed condition overlap each other at their inner ends. Efforts have heretofore been made to construct these sliding doors and the cooperating parts of the sills of the casing in such a way as to prevent ingress of the room air into the case and egress of cold air from the case. These prior efforts have not, however, been entirely satisfactory. It is moreover, occasionally necessary to remove the doors from the case. For this purpose means have been provided so that when the doors are in a certain position they may be lifted within the sill opening to clear the lower part of the doors from the bottom rail on which they slide so that the lower edges of the doors may be swung outwardly to clear the bottom rail, thereby permitting the doors to be moved downwardly out of contact with the upper rails.

In order that the doors, as heretofore constructed, may be moved upwardly to clear the bottom rail, it is obvious that the upper rails and the corresponding grooves in the upper part of the doors must be of greater depth than the lower rails and grooves in order that the doors may be lifted high enough to clear the bottom rails. Hence when the doors are in operative position in the cases the upper edges of the doors are separated a considerable distance from the lower surfaces of the upper sills with the result that there is considerable leakage at this point. Moreover, the fact that the doors can be removed from the cases by only an upward movement of the doors when they are in a certain position in the case and then by an inward or outward movement of the lower part of the door sometimes results in the doors being accidentally displaced. To keep the doors as heretofore constructed in position except when they are at the point at which they can be removed, either the door or the sill is provided with a block or boss and the other member is provided with a recess. As a result of this construction that part of the door distant from the block is capable of considerable vertical movement, thereby permitting a wobbling movement of the door when it is slid to open and closed positions, and also resulting in leakage longitudinally past this portion of the door.

One object of the present invention is to produce a refrigerator display case and sliding door construction in which the joints between the sliding doors and the sills of the case are substantially leak proof, the only space between the working parts being such as is absolutely necessary for a sliding joint, whereby a minimum of leakage takes place to and from the interior of the case. To this end the upper part of the door and the upper sill are so constructed that the door is incapable of vertical movement, except for clearance to permit sliding movements of the door. To remove the doors in the present construction it is first necessary to swing the upper part of the doors outwardly at a certain point and then move the doors upwardly so as to clear the lower rail. By means of this arrangement no accidental displacement of the doors from the case can take place. Other objects of the invention are the novel cooperating elements or parts which constitute the improved refrigerator display case and sliding door construction, which will be fully described hereinafter and particularly pointed out in the appended claims.

In the accompanying drawings illustrating the preferred form of the invention, Fig. 1 is a front elevation of the rear side of a display case showing two sliding doors with their cooperating sills, the rest of the display case being broken away; Fig. 2 is a longitudinal section of the parts shown in Fig. 1, looking toward the top end with the sliding doors removed; Fig. 3 is a longitudinal section taken on the line 3—3 of Fig. 1, looking in the direction of the arrows; Figs. 4, 5 and 6 are transverse sections taken on the line 4—4 of Fig. 1; Fig. 7 is a fragmentary cross section of the upper portion of the door. Fig. 4 shows the doors in normal operative position. Fig. 7 illustrates the first step in removing a door from the case. Fig. 5 shows the position of the top door during the second step of removing it from the case, and Fig. 6 shows the position of the inner door during the second step of removing it from the case. Fig. 8 is an isometric view of the top portion of a door, showing particularly the construction of the top edge thereof; Fig. 9 is an isometric view of the lower side of the top sill of the case with a portion of one of the end sills; and Fig. 10 is a section taken along the line 10—10 of Fig. 8.

The improved refrigerator display case and sliding door construction as illustrated in the drawings comprises the usual form of display case, the portions of which around the doors are

indicated at 12 and may be composed of any suitable material. The rear side of the case has a rectangular opening provided on its inner edges with an upper sill 13, a lower sill 14 and end casements or sills 15. These sills are preferably composed of hard rubber, but may be composed of any suitable material. The sliding doors comprise a top or outer door 16 and a bottom or inner door 17. It will be noted by reference to Figs. 4, 5 and 6, that the upper and lower sills 13 and 14 are offset from each other, whereby the doors 16 and 17 occupy a slanting position, as is usual in these constructions.

The lower sill 14 is provided with two longitudinally extending tongues or tracks 18 adapted to receive the grooves 19 cut in the lower edges of the doors. To eliminate friction the grooves 19 are provided with roller bearings 20 which ride on the top edges of the tracks 18. The outer edges of the sides or sashes 11 of the doors are grooved to fit over the tongues 10 located on the inner sides of the side sills 15 when either side edge of the doors is moved into contact with the side sills 15. The sliding door and sill structure thus far described is substantially as is usual in this art. The construction of the doors is as usual, the sashes may have a laminated wood or other form of interior 52 and are provided with the double panels of glass 53.

The elements which constitute the improved sliding door and sill construction comprise the following:—The upper sill 13 is provided with a longitudinally-extending rail or track 21 step-shaped in cross section and having a bearing or sliding surface 22. The front edge of the upper part of each door is provided with a correspondingly-formed rail or slide portion 24 in reversed position, so as to cooperate with and slide on the rail 21, as illustrated in Fig. 4, which shows the doors in normal operative or sliding position. To prevent the upper part of the doors from swinging outwardly during their sliding movements the rear edge of the upper part of each door is provided with a boss or block 25, the front surface of which is adapted to cooperate with the rear surface 26 of a guard part 27 integral with the upper sill. The part 27 of the upper sill is located to the rear of the rail 21 and prevents outward movement of the upper part of the door, except when the latter is in a certain position. To permit the upper part of the door to swing outwardly when it is to be removed from the case the rear edge of the guard 27 is provided with a recess 29 with which the boss 25 is adapted to register when the door is in a certain position.

The first step of removing the door from the refrigerator case, when the boss 25 is opposite the recess 29, is to pull the upper part of the door forwardly until the boss 25 is fully received in the recess 29. This movement separates the slide portion 24 of the upper part of the door from the rail 21, as shown in Fig. 7. The door is then moved upwardly, as shown in Figs. 5 and 6, until the flange 30 of the slide portion 24 of the door overlaps the surface 31 of the rail 21, and the rail 21 is received in the groove 32 in the upper edge of the door. The recess 29 is of such depth as to permit the boss 25 to be moved up into it during the upward movement of the door.

The overlapping and cooperating track and slide or bearing parts of the upper sill and the upper part of the door are of such depth that when the door is moved upwardly, as just described, the groove in the lower edge of the door is freed from the tongue or track 18. The door is now in condition for removal from the case by swinging the lower part of the door outwardly to clear the lower sill, whereupon the upper part of the door may be freed from the upper sill by a downward movement. It will be understood that there is enough clearance in the cooperating parts of the upper sill and the upper part of the door to permit the swinging of the lower part of the door outwardly to clear the lower sill.

If only a single door were employed it would not be necessary to provide the upper sill and the upper part of the door with any other elements than those described above, but since it is the universal practice to have at least a pair of sliding doors, the present invention provides further elements for preventing leakage into and from the case. By referring to the left-hand portion of Fig. 9, wherein the rail on the upper sill for the upper part of the outer door is indicated generally at 34, it will be noted that the rail for the upper part of the inner door, designated generally at 35, is identical in construction with the rail for the outer door. The rail proper 36 for the inner door corresponds to the rail 21 for the outer door, the surface 37 of the inner rail corresponding to the surface 22 of the outer track, and the surface 38 of the inner rail corresponding to the surface 31 of the outer rail. When the doors are in operative position they are separated only by a space large enough to permit them to slide by each other without friction, as indicated in Fig. 4. To prevent as much as possible leakage at the point or track 36, the upper rear edge of the inner door is provided with an upwardly-extending flange 39 which overlaps the surface 38 of the inner track but does not contact therewith. It is on the inner face of the flange 39 that the boss or block 25 is mounted. It will be noted that the flange 39 extends upwardly beyond the upper edge of the flange 30 of the track or slide portion 24 of the outer door, and when the door is moved upwardly during the removal thereof from the case the flange 39 is received in a recess 40 in the upper sill which is deeper than the recess formed by the surface 31 and the surface 41 of the front portion of the sill. It will be obvious that this flange 39 by overlapping the surface 38 of the inner track when the doors are in operative position prevents ingress of air into the space 43 (Fig. 4) between the outer track and the upper end of the outer door when they are in operative relation.

The construction of the upper end of the inner door is exactly the same as that of the upper end of the outer door, even as the construction of the inner rail of the upper sill is identical with that of the outer rail of the upper sill, so that both doors can be interchangeable if necessary. Accordingly, it will not be necessary to describe in detail the construction of the upper part of the inner door and the construction of the inner rail.

Inasmuch as the sill and the sash portions of the doors are preferably composed of hard rubber and two hard rubber surfaces in sliding contact with each other gradually produce a black dust, which may find its way into the interior of the case, the present construction eliminates this possibility by providing the inner surfaces of the slide portion 24 of the upper part of the door and the inner side of the slot 19 in the lower edges of the doors with bearings. These bearings are clearly indicated at 46 in Figs. 8 and 10. They are preferably composed of stainless steel or other similar material. The bearings 46, as

shown in Fig 8, project slightly below the inner surface 47 of the part 30 of the upper edge of the door so that there is no contact between the inner surface 47 of the part 30 and the surface 22 of the rail.

In order to seal the joint between the inner sashes 48 of the doors when they are in closed position, as shown in Fig. 1, the inner rail portion of the upper sill is provided under the recess 49 therein (corresponding to the recess 29 with a boss 50 onto which the bearing 46 of the inner sash of the inner door rides when it is in closed position, so as to push the sash 48 of the inner door up into engagement with the sash 48 of the outer door.

It will conduce to a clearer understanding of the operation of inserting the doors in the frame defined by the sills and removing them therefrom to recapitulate it briefly. Assuming that the doors are to be inserted in operative position in the sills, and having regard only to the outer door (since the identical operation is performed with the inner door), the first step is to insert the upper end of the door into interacting relationship with the corresponding parts of the outer rail of the upper sill, as shown in Fig. 5, but with the lower part of the door clearing the lower sill. The second step is to swing the lower part of the door inwardly until the groove 19 in the lower sash of the door is in alinement with the tongue or track 18 of the lower sill. The third step is to move the door downwardly until the tongue or track 18 is fully received in the groove 19. The upper part of the door will then have the relationship to the outer rail of the upper sill shown in Fig. 7. The fourth and last step of the act of inserting the door into the opening defined by the sills is to swing the upper end of the door inwardly until the outer flange 30 of the slide portion of the upper part of the door contacts with the bearing surface 22 of the outer rail of the upper sill. The door is now free to be slid in either direction. The operation of removing the door from the frame defined by the sills is of course the reverse of inserting it therein. The first step, after the boss 25 has been brought into alinement with the recess 29, is to swing the upper part of the door outwardly into the position shown in Fig. 7. The second step is to lift the door upwardly until the parts of the upper end of the door assume the position relatively to the parts of the outer rail of the upper sill shown in Fig. 5. The third step is to swing the lower part of the door outwardly until it is free of the lower sill, and the fourth step is to move the door downwardly thereby completely removing it from the case.

Having thus described the invention, what we claim as new is:—

1. In a display case of the character described including lower, upper and side sills defining a rectangular opening, a longitudinal track on the upper side of the lower sill, and a longitudinal rail on the lower side of the upper sill, a door adapted to slide longitudinally in the space defined by the sills, said door having on its lower side a groove adapted to receive loosely the track on the lower sill, the upper part of the door having a slide portion adapted to contact with and slide on the rail on the upper sill, the upper sill being provided with a longitudinally-extending guard, a boss mounted on the rear side of the upper part of the door adapted to move parallelly with said guard so as to prevent the upper part of the door from being moved outwardly unless the door is in a certain position, said guard having on its rear side a recess with which the boss on the door may be brought in alinement to permit the upper part of the door to be swung outwardly, said cooperating elements on the upper sill and the upper part of the door being of such depth as to permit the door when the boss is in the recess to be moved upwardly to raise the lower part of the door out of engagement with the track, whereby the lower part of the door may be swung outwardly to clear the track on the lower sill so that the door may then be moved downwardly to disengage it from the upper sill.

2. In a display case of the character described including lower and upper parallelly-arranged sills, a longitudinal track on the upper side of the lower sill and a longitudinal rail on the lower side of the upper sill, a door adapted to slide longitudinally on the track and the rail, the lower part of said door having a sliding engagement with the track on the lower sill, the upper part of the door having a slide portion adapted to contact with and slide on the rail on the upper sill, said rail on the upper sill and the slide portion on the upper part of the door being arranged when the door is in operative position to prevent the door from moving upwardly far enough to disengage the lower part of the door from the track on the lower sill, the upper sill being provided with a longitudinally-extending guard located rearwardly of the rail thereon and having a recess in its rear side, a boss mounted on the rear side of the upper part of the door adapted to move parallelly with said guard on the rear side thereof so as to prevent the upper part of the door from being moved outwardly unless the boss is in register with the recess, said cooperating elements on the upper part of the door and the upper sill being of such depth that when the boss is in alinement with the recess and the upper part of the door is moved outwardly the door may then be moved upwardly to free the lower part thereof from engagement with the track on the lower sill.

3. In a display case of the character described including lower and upper sills, a longitudinal track on the upper side of the lower sill and a longitudinal rail on the lower side of the upper sill, a door, the lower part of said door being adapted to cooperate with and slide on the track, the upper part of the door having a slide portion adapted to cooperate with and slide on the rail on the upper sill, said rail being stepped, and said slide portion of the upper part of the door being stepped in reverse position adapted to cooperate with the step of the rail, said rail having on its rear side a longitudinally-extending guard in the rear face of which is a recess, and a boss located on the rear edge of the upper part of the door adapted to cooperate with the guard to prevent the upper part of the door from being moved outwardly unless the boss is in alinement with the recess, said cooperating members on the upper sill and on the upper part of the door being of such depth that when the upper part of the door has been moved outwardly the door may then be lifted to disengage the lower part thereof from the track on the lower sill so that the door may be removed from the case.

4. In a display case of the character described including a lower sill having a longitudinal track on its upper side, an upper sill having a rail on its lower side composed of two steps, a door, the lower side of the door being adapted to slide longitudinally on the track on the lower sill, the upper part of the door having a two step slide portion in

the reverse position of the two steps of the rail on the upper sill, said rail and said slide portion on the door having two cooperating sliding surfaces when the door is in normal position, said rail and said slide portion on the door preventing upward movement of the door when the latter is in operative position, means on the door and on the upper sill including a boss and recess to prevent outward movement of the upper part of the door except when the boss and recess are in alinement, the outward movement of the upper part of the door when the boss and recess are in alinement serving to disengage the rail and the slide portion of the door so that the door may be moved upwardly thereby bringing into loose engagement other portions of the steps of the rail and the steps of the slide portion of the door whereby the lower part of the door may be swung outwardly to disengage it from the track on the lower sill.

5. A display case comprising a sill structure having upper, lower and side walls defining a rectangular opening, two parallel tracks arranged along the upper side of the lower sill, an inner and an outer door having grooves adapted to loosely embrace said tracks to permit sliding movement thereon, two parallel rails extending longitudinally on the lower side of the upper sill, said rails being step-shaped in cross section, the forward edges of the top part of each door being provided with a step-shaped slide portion for engagement with said rails, the rear side of the upper edge of each door having a flange projecting upwardly beyond the step-shaped slide portions, a boss located on the front side of each flange, a longitudinally-extending guard located on the rear of each step-shaped rail adapted to be engaged by the front side of a boss to prevent outward movement of the upper part of the doors, said guards each having a recess which when it alines with its boss permits the upper part of the door to be swung forwardly, said upper sill having grooves adapted to receive the flanges to permit the doors to be lifted vertically to free the groove at the lower parts thereof from the tracks on the lower sill whereby the lower part of the doors may be swung outwardly and the doors disengaged from the upper sills by a downward movement.

6. A display case having a door opening including upper, lower and side sills, and doors having a slidable interlocking mounting in the upper and lower sills, the slidable interlocking mounting being constructed and arranged whereby the doors may be first slid longitudinally to a predetermined position, then swung outwardly at their upper ends and then moved upwardly to separate the lower interlocking connection to permit the lower ends to be moved outwardly of the door opening for subsequent complete removal of the door from the opening in a downward and outward direction of movement.

7. A display case having a door opening including upper, lower and side sills, and doors having a slidable interlocking mounting in the upper and lower sills, the slidable interlocking connection being constructed and arranged to prevent upward movement of the doors in the opening during normal sliding movements of the doors, and cooperating means carried by the upper sill and upper edges of the doors whereby at a predetermined point the doors may be partially moved outwardly at their upper ends and then moved upwardly to disengage the lower interlocking connection for the subsequent complete removal of the doors from the opening.

8. A display case having a door opening including upper, lower and side sills, and doors having a slidable interlocking mounting in the upper and lower sills and being constructed and arranged to prevent upward movement of the doors in the opening, and cooperating lugs and recesses on the upper sill and upper edges of the doors adapted to be alined by sliding movements of the doors whereby the upper ends of the doors may be first moved outwardly and then moved upwardly to disengage the lower interlocking connection for subsequent complete removal of the doors from the opening.

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