

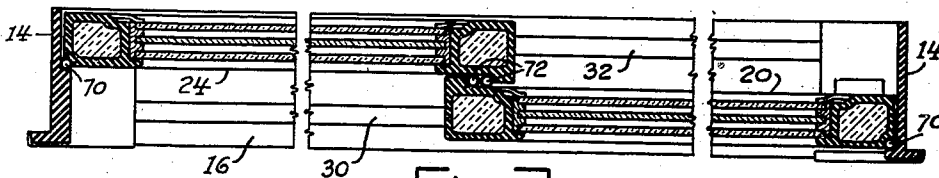
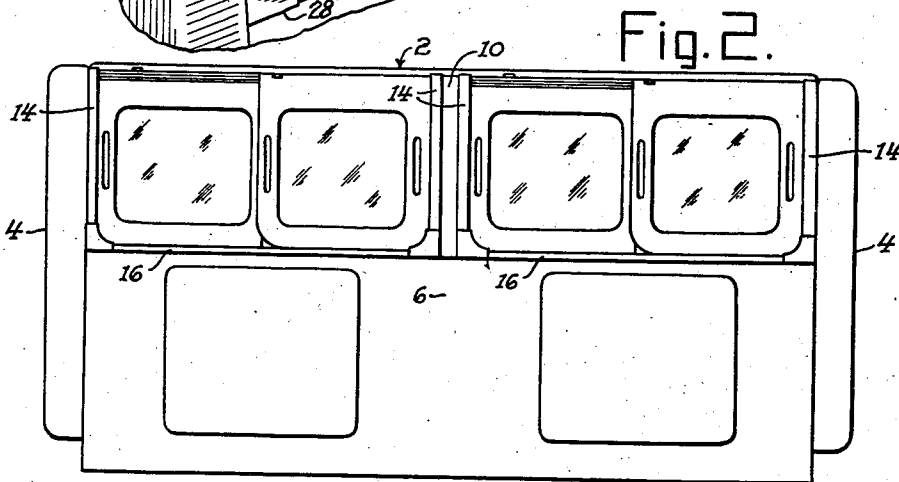
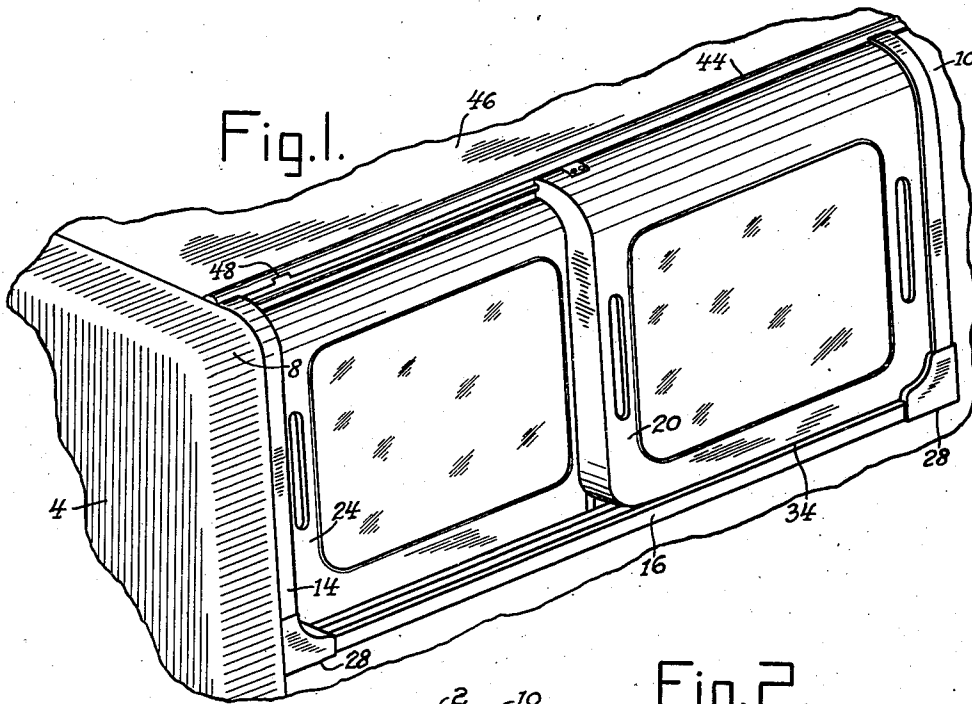
April 23, 1940.

C. F. HOFFMAN
REFRIGERATED DISPLAY CASE

2,198,436

Filed Dec. 18, 1937

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

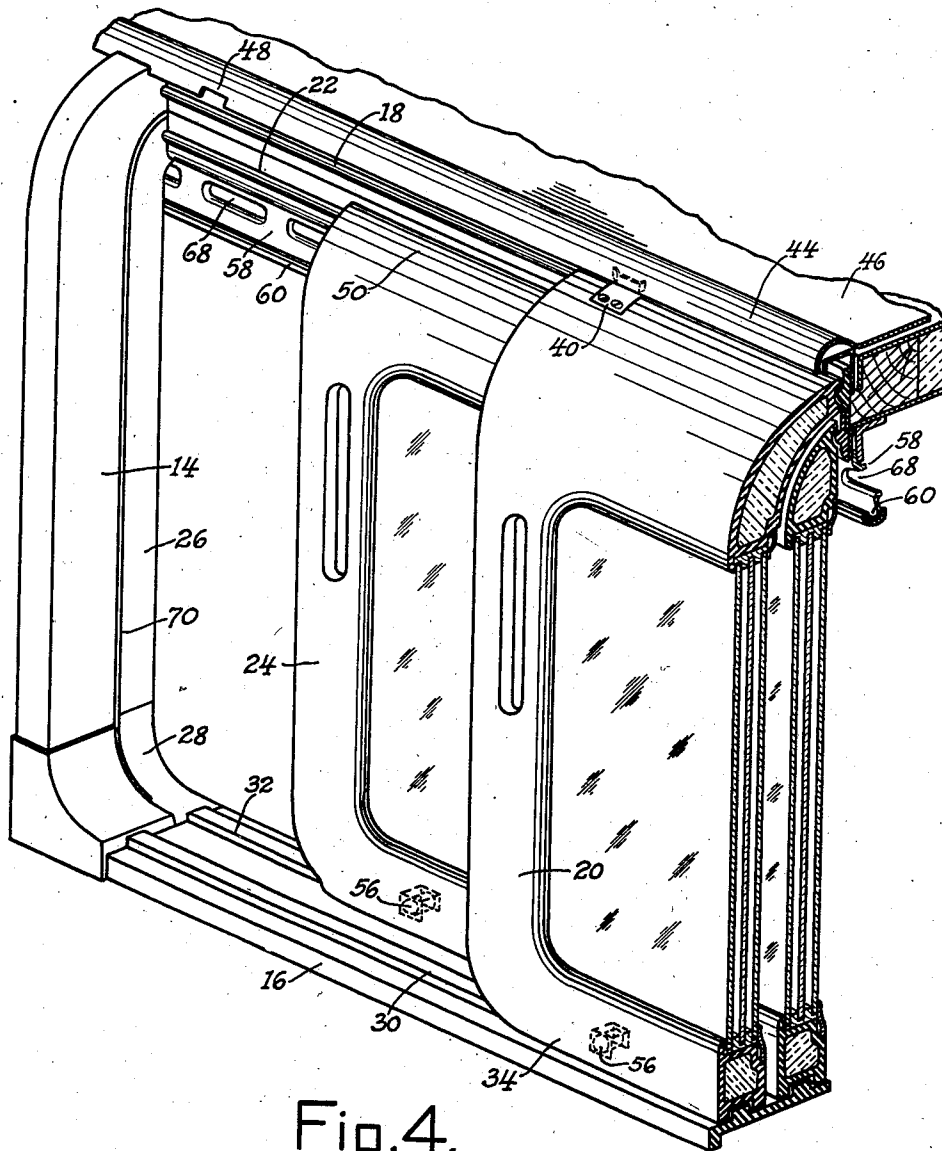


Fig. 4.

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3 Sheets-Sheet 3

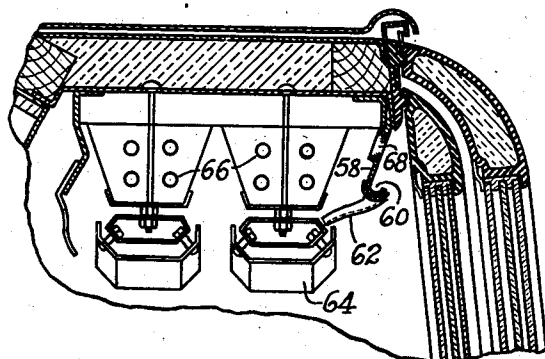


Fig. 5.

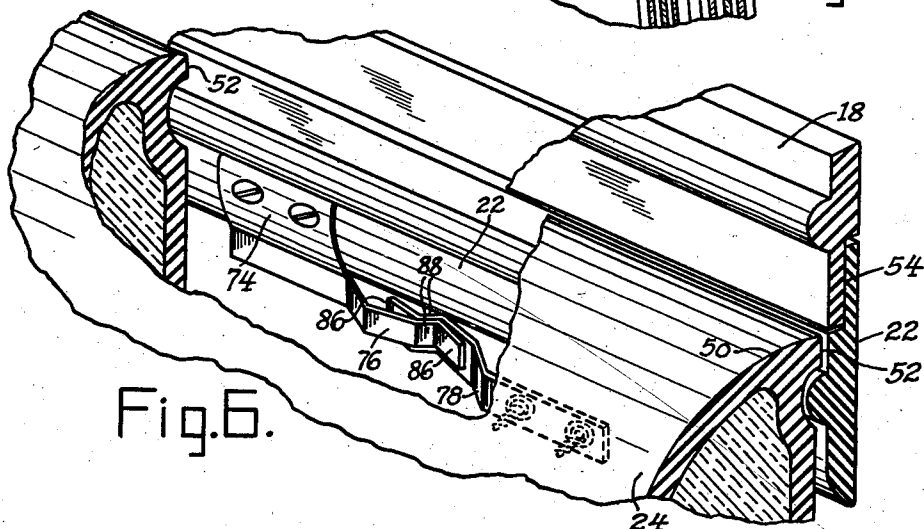


Fig. 6.

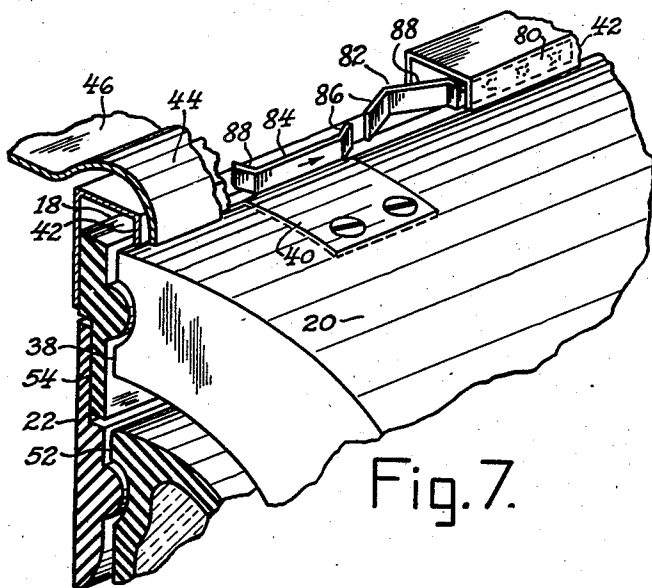


Fig. 7.

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2,198,436

REFRIGERATED DISPLAY CASE

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8 Claims. (Cl. 312—138)

This invention relates to display cases and doors therefor and particularly to constructions adapted for use in refrigerated display cases to provide ready access to the interior of the case and to seal the space about and between the doors and the door frame so that refrigeration losses due to air leakage about the doors are decreased.

Refrigerated display cases and similar constructions are ordinarily provided with a transparent panel in the front of the case through which the articles in the case may be viewed, and with sliding doors at the rear of the case to provide access to the interior thereof. In such construction it is desirable to place the articles on display as near the front of the case as possible so that they will attract the attention of patrons. However, it then is difficult for the clerk to reach the articles through the rear door opening. This is particularly true when, as is usual, the top of the case is sufficiently low to be useful as a display counter. In such cases the upper edge of the door frame strikes the clerk's shoulder as he reaches into the case so that he has to lean far over or stoop down in order to arrange or remove the articles in the front of the case.

While this objection can be overcome to some extent by forming the rear of the case on an incline of, say 45°, much of the storage space is then sacrificed and the refrigerating coils, usually located in the top of the case, must be moved forward so that they obstruct the view from the front of the case. Moreover much of the attractive appearance and outline of the case is lost when the rear thereof is inclined materially.

Most refrigerated cases having sliding doors also are inefficient and tend to become wet and unsanitary due to the leakage of air about the doors and between the doors and the frame. This leakage may result from failure of the doors to fit properly due to faulty construction or warping of the doors or tracks or because the doors stick as a result of swelling or because they are jarred open on closing other doors of the case. In any event the refrigeration losses resulting increase the cost of operation of the case and tend to aggravate the condensation of moisture or sweating about the doors.

In accordance with my invention these objections to constructions of the prior art are overcome and a display case provided which provides more convenient access to the interior thereof than has been possible heretofore. The invention also includes means providing more effective

sealing of the space about and between the doors of the case than in prior constructions whereby refrigeration losses are reduced, the life of the case is increased and sweating about the doors is eliminated.

Although the advantages of my invention may be attained in various ways I prefer to form the top of the case with the rear edge thereof located forward of adjacent portions at the ends of the case so that a recess is provided for receiving the upper portions of the doors, and to form the doors of the case with the upper portions located within the recess thus provided so that on sliding the doors sideways only that portion of the door frame within the recessed edge of the top of the case is presented toward the clerk and he can reach well into the case without striking his shoulder against the door frame. The recessed edge of the case and the door are also formed with sealing or engaging surfaces against which the top of the door rests but which have little if any guiding action so that the door does not tend to stick or bind as it moves along the track at its lower edge by which it is supported. The present invention further includes sealing means about the doors together with means for retaining the doors in their closed positions and in contact with the sealing means therefor. Air leakage and refrigeration losses about the door are thus reduced or eliminated. Furthermore the present invention includes novel means for reducing heat transfer and condensation of moisture on the surfaces about the door when the door is opened together with means for preventing such moisture as does condense from dripping down onto the articles or surfaces beneath the same.

In order to illustrate my invention and bring out these and other advantages and features thereof more clearly a typical form of refrigerated display case embodying my invention is illustrated in the accompanying figures of the drawings.

In the drawings:

Fig. 1 is a perspective of a portion of a refrigerated display case embodying my invention.

Fig. 2 is a rear view of a display case embodying the features illustrated in Fig. 1.

Fig. 3 is a horizontal sectional view through the doors of the display case shown in Figs. 1 and 2.

Fig. 4 is a view partly in perspective and partly in section showing one end of the display case of Fig. 1 with the doors thereof opened to illustrate details of the construction thereof.

Fig. 5 is a vertical sectional view of the upper portion of the display case illustrated in Fig. 1.

Fig. 6 is a perspective of the upper portion of the inner door and frame with parts broken away to illustrate a detail of the construction, and

Fig. 7 is a view similar to Fig. 6 showing the outer door to illustrate a detail of the construction.

In that form of my invention illustrated in the figures of the drawings a refrigerated display case is provided with a top 2, end members 4 and a lower portion 6 defining a rear door opening communicating with the interior of the case. The rear edge of the top 2 is located forward of the adjacent upper rear corners 8 of the end members 4 so that a recess is formed at the rear of the upper portion of the case above the portion 6 and between the end members 4. When the case has two pairs of doors in the rear thereof as shown in Fig. 2, the center member 10 between the pairs of doors has the same functions as an end member and is herein referred to as an "end member".

A door frame extends about the edges of this recess and is formed with an upper portion 12 extending along the rear edge of the top 2, end portions 14 extending downward along the inner surface of the end members 4 adjacent the rear edges thereof and a sill or lower portion 16 extending along the upper edge of the lower portion 6 of the case.

The upper portion 12 of the door frame presents a rearwardly facing surface which is nearly vertical in a direction transverse to the length thereof and which is provided with an upper rail 18 engageable by an outer door 20 and a lower rail 22 engageable by an inner door 24. The end portions 14 of the frame are shown as curved forward at their upper extremities toward the rearwardly facing surface of the upper portion 12 of the frame and as presenting jamb surfaces 26 extending downward nearly vertically and merging into curved corner portions 28 as shown and described more fully in my copending application Serial No. 180,568, filed December 18, 1937. The sill or lower portion 16 of the door frame is provided with a surface which is nearly horizontal and along which extend an outer track 30 for guiding the outer door 20 and an inner track 32 for guiding the inner door 24 as these doors are moved toward and away from the jamb surfaces 26 at the ends of the frame in opening and closing the doors.

The outer door 20 is formed with a recessed track engaging lower edge 34 and extends upward therefrom with the rear face thereof nearly vertical and substantially parallel with a surface defined by the rear edges of the end members 4 of the case. The upper edge of the door is curved forward and is substantially flush with the top of the case. The inner face 38 of the upper edge of the door is formed to engage the upper rail 18 on the upper portion 12 of the door frame and is prevented from moving outward away from the case by an upwardly extending tongue 40 which is carried by the door and projects behind a downwardly turned flange 42 extending the length of the rear edge of the top of the case. The flange 42 is covered by a bead 44 at the rear edge of a porcelain cover plate 46 on the top of the case and both the flange 42 and bead 44 are cut away at 48 to permit removal of the outer door for cleaning of the door and track.

The inner door 24 is supported on the inner track 32 and extends upward adjacent the inner

surface of the outer door so as to be slidable relative thereto. The upper edge 50 of the inner door is curved on its outer surface to correspond to the curved inner surface of the outer door and is formed on its inner face 52 with a groove for engaging the lower rail 22 on the portion 12 of the door frame. The inner door is normally prevented from removal by engagement with the outer door but upon removal of the latter the inner door can be lifted freely from the inner track for cleaning the door and track.

In order to facilitate assembly and accurate positioning of the rails 18 and 22 of the upper portion 12 of the door frame, the rails are formed separately and provided with interfitting edges indicated at 54 whereby they may be individually positioned to insure proper engagement thereof by the doors and proper sealing of the space between the upper edges of the doors and the frame.

Each of the doors is provided with rollers 56 for engaging the track along which it is movable. The lower tracks thus carry the weight of the doors and guide them in their movement whereas the upper tracks need only serve to provide a labyrinth seal or other contact sufficient to prevent leakage of air between the door and frame. Little if any guiding of the door is effected by the upper rail so that sticking of the doors does not occur even when the frame is distorted by unlevel positioning of the case or injury thereto during shipping or handling thereof.

The construction shown and described is characterized by the positioning of the upper portion 12 of the frame adjacent the rear edge of the top of the case and in the recess at the rear of the case whereby on sliding either door sideways to provide access to the interior of the case the clerk can reach far into the case without being restricted by the upper edge of the door frame. Moreover, this advantage is attained without reducing the capacity of the case and without sacrifice to the attractive appearance of the case.

In all refrigerated display cases there is a tendency for moisture to condense on the surfaces about the door when the door is opened due to the relatively low temperatures maintained within the case. However, I have found that the condensation of moisture on the door frame and doors can be materially reduced by forming these parts of a material, such as hard rubber, which has low heat conductivity. This construction is particularly advantageous when, as in the form of my invention shown and described herein, the upper portion of the door frame presents a surface which is nearly vertical or inclined at a steep angle so that moisture condensing thereon tends to run downward toward the lower edge of the frame. If the frame were formed of metal or other material of high heat conductivity the resulting condensation when the door was opened would cause moisture to drip almost continually from the door frame onto articles within the case and below the lower edge of the frame.

While the condensation of moisture on the frame and doors is reduced by forming these parts of hard rubber I prefer, as a further precaution, to provide the upper portion of the frame with a member 58 extending downward therefrom within the case and having an upturned lower edge 60 forming a gutter which collects any moisture that may run down over the upper portion 12 of the frame. The gutter is inclined toward the end of the case and is connected by a trough 62 or the like to the drain

into the drip pans 64 located beneath the cooling coils 66 by which the case is refrigerated. The member 56 may be formed with spaced openings 68 therein to allow warm air within the case to flow upward therethrough to the cooling coils when the doors of the case are closed.

In order further to avoid sweating of the case due to leakage of air about and between the doors sealing strips 70 are located on the jamb surfaces 26 at the ends of the door frame in position to be engaged by the doors when they are moved to their closed positions. As shown in Fig. 3 the outer door 20 and the inner door 24 are also provided with sealing strips 72 extending vertically along the edges thereof which are adjacent when the doors are closed and on the inner and outer surfaces thereof respectively. Thus the vertical edges of the doors are sealed whereas the upper and lower edges thereof are sealed by the engagement of the doors with the rails 18 and 22 on the upper portion 12 of the frame and the tracks 30 and 32 on the lower portion of the frame.

I prefer also to provide each of the doors with means which serve to retain them in closed position and prevent them from being jarred open by slamming of another door on the case. The means employed for this purpose are shown in Figs. 6 and 7 and serve also to urge the doors toward the sealing means and toward the rails on the upper portion of the frame so that the sealing means are compressed and an adequate, substantially air tight seal is provided. The construction shown in Fig. 6 is applied to the inner door whereas that of Fig. 7 is applied to the outer door.

The retaining means of Fig. 6 is in the form of a spring latch having a portion 74 thereof secured to the lower rail 22 of the upper portion of the door frame and having a tongue 76 located below the rail and in position to be engaged by a complementary spring member 78 secured to the inner door 24 adjacent the upper edge of the inner face 52 thereof. The retaining means of Fig. 7 includes a member 80 secured to the inner surface of the downwardly directed flange 42 at the top of the case and formed with a spring tongue 82 positioned to engage a member 84 carried by the outer door 20 and located on the inner face 38 thereof near the top of the door.

The latch members for both doors are formed as shown with free ends 86 which are inclined to allow the parts to more readily pass each other on closing the doors and with oppositely inclined engaging surfaces 88 so positioned to urge the doors toward the sealing strips engaged thereby. This not only serves to insure proper sealing of the spaces between the doors and frame but also serves to prevent the doors from being jarred open by slamming of another door on the case. Moreover, the spring members are arranged adjacent the upper edges of the doors and in such positions as to urge said edges against the upper portion of the door frame to further improve sealing thereof.

The latch means shown and described are of particular advantage as used in combination with the novel form of seal at the upper edge of the doors of the construction shown and described above for the reason that the doors are not otherwise guided or restricted at their upper edge and might therefore tend to spring away from the upper portion of the frame if such retaining means were not employed. However, this feature of my invention is also applicable to

constructions wherein doors of conventional type are employed and when so applied serves to prevent jarring open of the doors on closing or opening other doors of the case.

While I have herein shown and described a typical form of display case embodying my invention it will be evident that the form and arrangement of the elements thereof are capable of various modifications and changes particularly when adapting the features of my invention to other types and styles of display cases. Therefore it should be understood that the form of my invention shown in the drawings and described herein is intended to be illustrative of my invention and is not intended to limit the scope thereof.

I claim:

1. In a structure having a door opening therein and a door frame in said opening, upper rails and lower tracks on the frame, and doors arranged in overlapping relation on said frame and slidably movable longitudinally of said rails and tracks relative to said frame, the lower edges of said doors and said tracks having complementary surfaces lying substantially in one plane and the upper edges of said doors and said rails having complementary surfaces lying in a plane substantially normal to the plane in which the complementary surfaces on the lower edges of said doors and said tracks are located.

2. A structure having a door opening therein in combination with a door frame in said opening, door supporting tracks on the lower portion of said frame, door engaging rails on the upper portion of said frame and sliding doors arranged in overlapping relation on said frame and slidably movable longitudinally of said rails and tracks relative to said frame to provide access to the interior of said structure, said door supporting tracks lying in a plane which is substantially horizontal and the door engaging rails presenting a sealing surface engageable by the doors and lying in a plane which is substantially vertical.

3. In a structure having a door opening therein and a door frame in said opening, upper rails and lower tracks on the frame and doors arranged in overlapping relation on said frame and slidably movable longitudinally of said rails and tracks relative to said frame, the lower edges of said doors and the lower tracks having complementary surfaces lying substantially in one plane and the upper edges of said doors and said upper rails having complementary surfaces lying in a plane substantially normal to the plane in which the adjacent surfaces on the lower edges of said door and said tracks are located and means on one of said doors and on said frame for limiting movement of said doors outwardly from said frame.

4. A display case having a top, end members located adjacent the ends of said top and projecting rearwardly beyond the rear edge of said top, a door frame having an upper portion extending along the rear edge of said top presenting a rearwardly facing surface which is nearly vertical in a direction transverse to the length thereof and which is provided with upper and lower rails, said door frame having a lower portion presenting a surface which is substantially horizontal and provided with parallel inner and outer door supporting tracks and doors slidably movable on said tracks in overlapping relation each presenting a rear face which is nearly vertical and which curves forward at the upper edge thereof toward the upper portion of said door

frame, the door which is movable on said inner track having means on the inner face thereof for engaging the lower rail on the upper portion of said door frame and the door which is movable on said outer track having means on the inner face thereof for engaging the upper rail on the upper portion of said door frame.

5 5. A display case having a top, end members located adjacent the ends of said top and projecting rearwardly beyond the rear edge of said top, a door frame having an upper portion extending along the rear edge of said top presenting a rearwardly facing surface which is nearly vertical in a direction transverse to the length thereof and which is provided with upper and lower rails, said door frame having a lower portion presenting a surface which is substantially horizontal and provided with parallel inner and outer door supporting tracks and doors slidably movable on said tracks in overlapping relation each presenting a rear face which is nearly vertical and which curves forward at the upper edge thereof toward the upper portion of said door frame, the door which is movable on said inner track having means on the inner face thereof for engaging the lower rail on the upper portion of said door frame and the door which is movable on said outer track having means on the inner face thereof for engaging the upper rail on the upper portion of said door frame, cooperating means on said doors and frame for sealing the space between said doors and between the doors and frame and means on said frame and doors for retaining said cooperating means in their sealing relation when said doors are in their closed positions.

6. A display case having a top, end members located adjacent the ends of said top and projecting rearwardly beyond the rear edge of said top, a door frame having an upper portion extending along the rear edge of said top presenting a rearwardly facing surface which is nearly vertical in a direction transverse to the length thereof and which is provided with upper and lower rails, said door frame having a lower portion presenting a surface which is substantially horizontal and provided with parallel inner and outer door supporting tracks and doors slidably movable on said tracks in overlapping relation each presenting a rear face which is nearly vertical and which curves forward at the upper

edge thereof toward the upper portion of said door frame, the door which is movable on said inner track having means on the inner face thereof for engaging the lower rail on the upper portion of said door frame and the door which is movable on said outer track having means on the inner face thereof for engaging the upper rail on the upper portion of said door frame and moisture collecting means extending along the lower edge of the upper portion of said door frame for preventing moisture condensing on said frame from dripping into said case.

7. A case having sliding doors for providing access to the interior thereof, a rail extending along the upper edge of said case for guiding said doors, said rail presenting a surface disposed substantially vertically whereby liquids or condensate collecting thereon tend to flow downward toward the lower edge of said rail and means extending along the lower edge of said rail for conducting liquids or condensate away from said rails.

8. A display case having a top, end members located adjacent the ends of said top and projecting rearwardly beyond the rear edge of said top to define a recess in the upper rear portion of the case and between said end members, a door frame in said recess having an upper portion extending along the rear edge of said top presenting a rearwardly facing surface which is nearly vertical in a direction transverse to the length thereof, end portions extending downward adjacent the rear edges of said end members and a lower portion presenting a surface which is substantially horizontal, and doors slidably and horizontally movable in said recess between said end members and into and out of engagement with the ends of said frame, said doors being arranged in overlapping relation and each of said doors presenting a rear face which is nearly vertical and which curves forward at the upper edge thereof toward the upper portion of said door frame, said doors having means on the inner faces thereof for engaging the upper portion of said door frame and means on the lower portion of said doors which engage the lower portion of said door frame and cooperating means on said doors and frame for sealing the space between said doors and between the doors and the frame.

CYRUS F. HOFFMAN.