Nov. 9, 1926. **1,606,027**

G. J. GRUENDLER

REFRIGERATOR

Filed Oct. 3, 1925 3 Sheets-Sheet 1

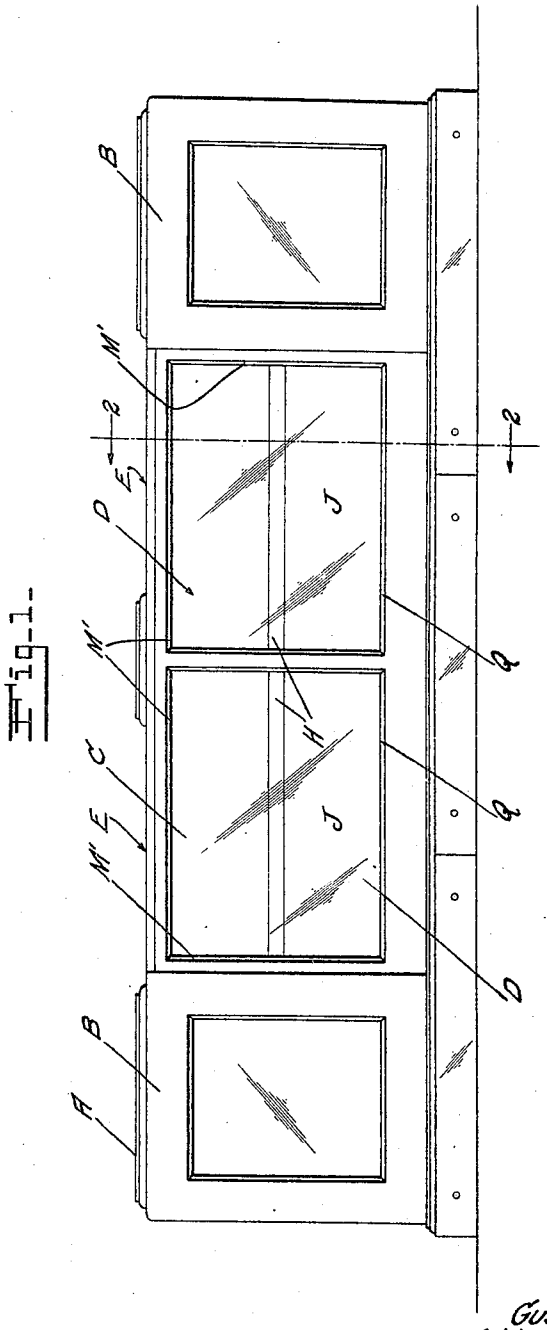


Fig-1-

Inventor:
Gustav J. Gruendler
By J. Henry Kinealy
His Attorney.

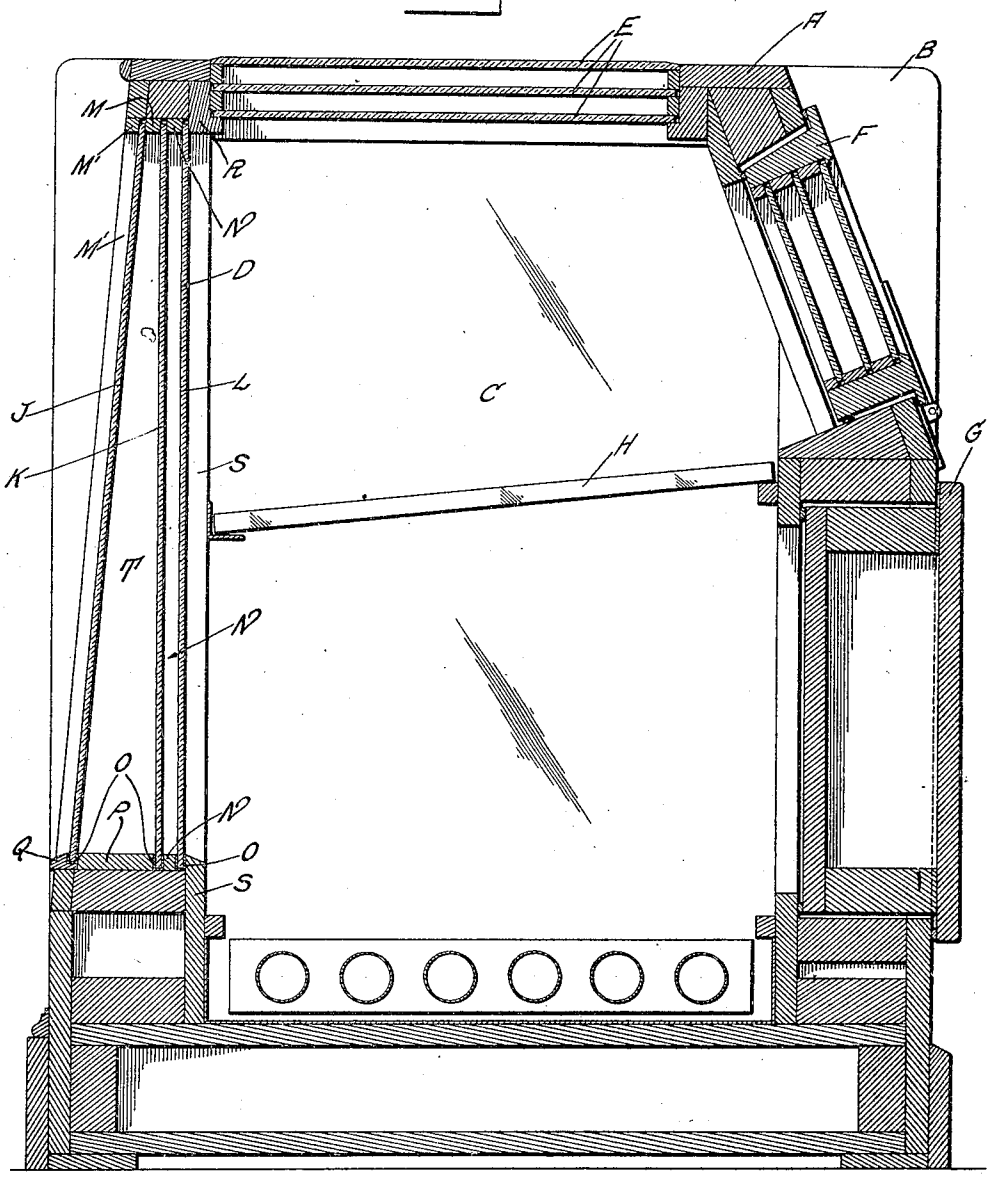
Nov. 9, 1926. 1,606,027

G. J. GRUENDLER

REFRIGERATOR

Filed Oct. 3, 1925 3 Sheets-Sheet 2

Fig. 2.



Inventor:
Gustav J. Gruendler;
By Henry Kinealy.
His Attorney.

Nov. 9, 1926. 1,606,027

G. J. GRUENDLER

REFRIGERATOR

Filed Oct. 3, 1925 3 Sheets-Sheet 3

Fig-4-

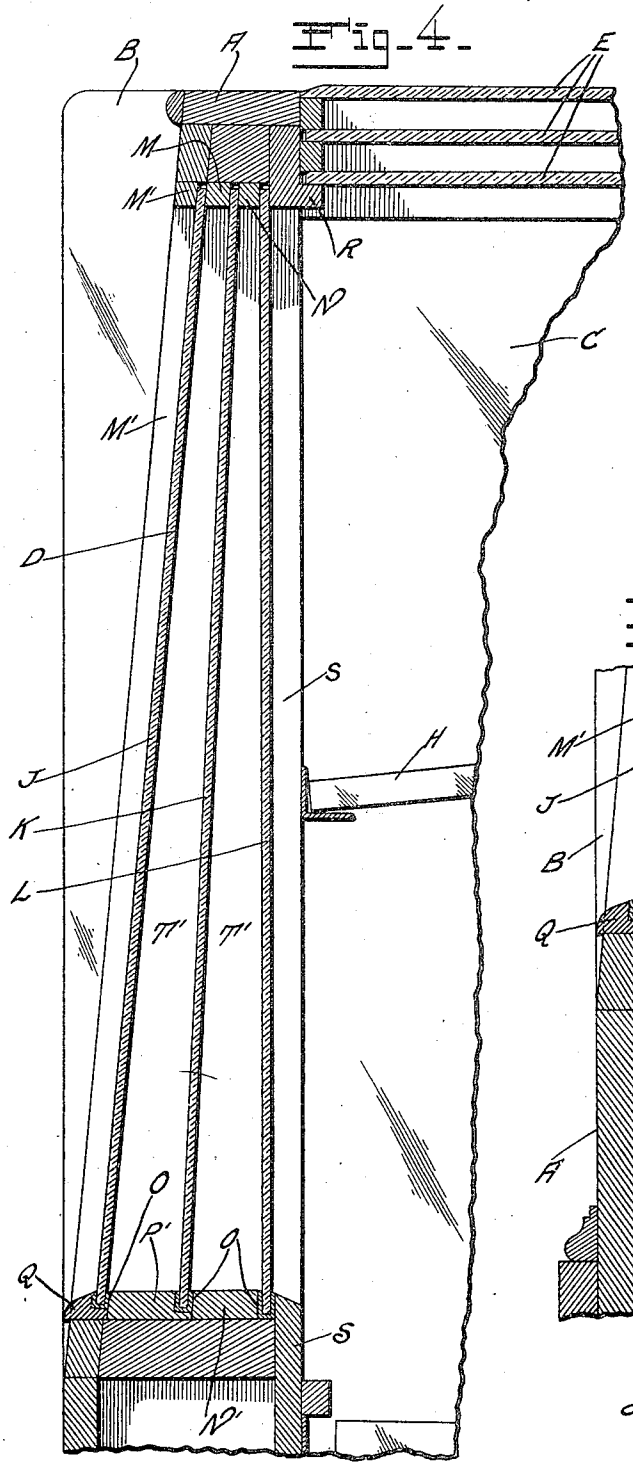
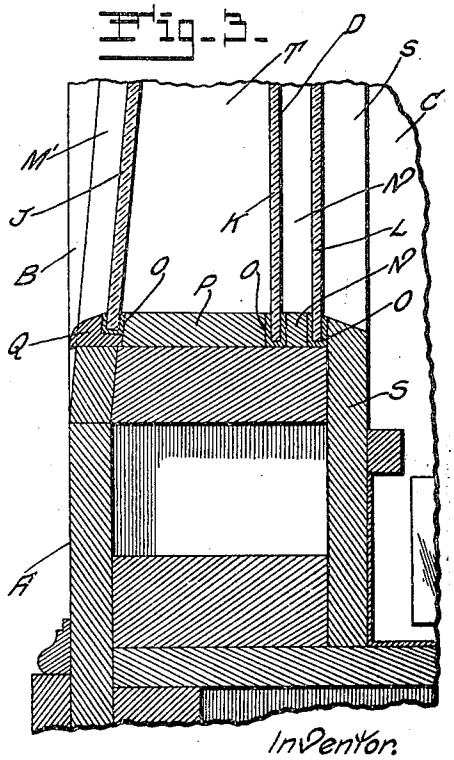


Fig-3-



Inventor:
Gustav J. Gruendler,
By Henry Kinnedy
His Attorney.

Patented Nov. 9, 1926. 1,606,027

UNITED STATES PATENT OFFICE.

GUSTAV J. GRUENDLER, OF CLAYTON, MISSOURI.

REFRIGERATOR.

Application filed October 3, 1925. Serial No. 60,289.

My invention relates to refrigerators and more particularly to show-case refrigerators having an elongated storage compartment with transparent panels in the walls thereof.

Heretofore these transparent panels in show-case refrigerators comprised a plurality of plates of glass usually arranged to form a plurality of air spaces therebetween so as to better insulate the refrigerator whereby only a comparatively small amount of heat leaks through into the interior of the refrigerator. However, the use of a plurality of plates of glass in the panels was objectionable since each of the plates reflected light and the outward reflections from the inner plates of glass were again reflected inwardly by the inner sides of the outer plates. The plurality of reflections made it difficult to see through the transparent panels into the interior of the storage compartment of the refrigerator wherein articles were displayed. This difficulty of vision is greater in the front panel of the refrigerator as the image of the customer is reflected therein and it is usually through the front panel that the customer attempts to examine the goods on display.

The objects of my invention are to provide in the front wall of a refrigerator a transparent panel which will allow a clear view of the contents of the storage compartment of the refrigerator and which will more effectually prevent the escape of cold air from the interior of the refrigerator and prevent the entrance of warm air therein to.

My invention is fully shown in the accompanying drawings wherein similar letters are used to designate similar parts: Fig. 1 is a front view of a refrigerator embodying my invention; Fig. 2 is a section along the lines 2—2 in Fig. 1; Fig. 3 is a detail view showing means for maintaining the lower ends of the glass plates in fixed relation; and Fig. 4 shows a modified form of my invention.

Referring to the figures in the embodiment of my invention shown therein the refrigerator A has an ice compartment B arranged at either end thereof and has the storage compartment C arranged centrally longitudinally thereof as shown in Fig. 1. The front wall of the storage compartment of the refrigerator is almost entirely formed by the transparent panels D and the upper wall of the storage compartment is formed by the transparent panels E, as shown in Fig. 2. The rear wall of the storage compartment has the upper doors F and the lower doors G mounted to normally close openings through which articles are placed in the storage compartment or withdrawn therefrom. Substantially midway the top and bottom of the storage compartment is the shelf H upon which provisions are placed and which, preferably, has its rear end elevated as shown, so that a better view may be had from the front of the refrigerator of the articles arranged on this shelf.

The transparent panels D each include an outer glass plate J, a middle plate K and the inner plate L positioned to form two air spaces therebetween, as shown. The inner plate is, preferably, arranged substantially vertical and in the embodiment of my invention shown in Figs. 1 to 3, inclusive, the middle plate K is also arranged substantially vertical and, in turn, substantially parallel to the inner plate L. The outer plate J is inclined to the vertical and converges upwardly towards the vertical plates K and L, as shown in Fig. 2. To facilitate manufacture and to lower the cost thereof I prefer that the plates J, K and L be of the same dimensions.

The means for maintaining the glass plates J, K and L in fixed spaced relation is as follows:—The marginal surface of the inner side of the inner plate L bears at the bottom and at the sides against the framing S and at the top bears against the L-shaped bar R. The bottom extension of the bar R carries the lower glass of the transparent panel E at the top of the storage compartment, as shown in Fig. 2. The middle plate K is spaced from the inner plate L by the strips N. The outer plate J is spaced at the bottom from the middle plate K by the comparatively wide strip P and at the top by the comparatively narrow strip M the outer edge of which is slightly beveled so as to bear against the marginal edge of the top of the plate J which is inclined, as hereinbefore described. At each of their sides the plates K and J are maintained in spaced relation by a strip T which has its inner edge substantially vertical so as to bear against the outer side of the plate K and which has the outer edge thereof cut at an angle to conform to the angle at which the plate J is arranged so that this outer edge will bear against the inner side of the

plate J. Around the outer side of the plate J at the top and at the sides are arranged the strips M′ and at the lower side thereof is placed the strip Q which has formed on its inner edge, preferably integral therewith, a shoe adapted to be positioned under the lower edge of the plate J to support the plate in fixed position. As the outer plate J is arranged at an angle to the vertical the lower edge thereof will be at an angle to the horizontal and the engaging surface of the shoe on the strip Q is arranged at substantially the same angle to the horizontal whereby it will engage the entire surface of the lower edge of the plate and thereby prevent any strain being put upon one corner of this lower edge. Packing O of rubber or any other suitable material is, preferably, placed at the lower edges of the plates J, K and L so that leakage of air at the bottom of the panel is effectually prevented. Also, the packing will fill any irregularities in the plates or spacing strips and will provide even bearing surfaces when the strips are put in place so the pressure of the strips will be distributed and no undue strain will be put at any one point on the glass plates. The arrangement of the spacing strips N, P and Q at the bottom of the plates is shown in detail in Fig. 3.

In the modified form of my invention shown in Fig. 4 each of the plates J, K and L is arranged at a different angle than the other plates. The inner plate L is arranged substantially vertical, the middle plate K is arranged to incline slightly to the vertical and the outer plate J is arranged at a greater inclination to the vertical than the middle plate K. The plates L and K are separated at their lower sides by the spacing strip N′ and the plates K and J are separated at their lower sides by a spacing strip P′ which, in this embodiment of my invention, has at its inner edge a shoe adapted to engage the lower edge of the plate K. At their sides the plates are separated by the strips T′ which are similar to the strips T in the other form of my invention shown in Fig. 2 and which have their edges arranged at an angle to engage the sides of the plates, as shown in Fig. 4.

Since, as stated above, I prefer to have all of the plates of the same size, in this modified form of my invention the lower plate K will have to be slightly raised and, therefore, the shoe on the strip P′ is of a thickness to slightly raise the lower edge of the plate K. The shoe on the strip Q is slightly thicker than that on the strip P′ so as to raise the lower edge of the plate J higher than the lower edge of the plate K as the inclination of the plate J is greater than that of the plate K.

It may be readily seen that the transparent panels in the front wall of the storage compartment of a refrigerator embodying my invention will allow a clear view of the interior of the storage compartment. The arrangement of the front and rear glass plates at different angles will obviate reflections therebetween since the plates being disposed in different planes have different angles of reflection. Also, the transparent panels more effectually prevent the escape of cold air from the storage compartment and the entrance of warm air thereinto because of the comparatively wide space separating the inner and outer plates of glass at their lower edges. Further, since the space between the plates is less at the top than at the bottom any warm air passing into the space between the glass plates and rising therein will be contracted in volume between the upwardly converging plates and this contraction will have a cooling effect upon the air. Furthermore, as stated above, when the lower edges of the inclined plates are supported and maintained in fixed position by the means described no undue strain will be put on the glass at any one point and breakage will be prevented to a large extent.

I do not propose to limit my invention to the exact details of construction shown in the drawings since the shape and size of the various parts may be varied within wide limits without deviating from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent, is:—

1. A refrigerator having a storage compartment therein with a transparent panel arranged in the front wall thereof, said transparent panel including a plurality of glass plates arranged to converge upwardly and spaced apart to form a plurality of air spaces, and means for maintaining said plates in fixed position.

2. A refrigerator having a storage compartment therein with a transparent panel arranged in the front wall thereof, said transparent panel including a glass plate arranged in a substantially vertical plane and another glass plate arranged at an inclination to the vertical, and means for maintaining said plates in fixed position.

3. A refrigerator having a storage compartment therein with a transparent panel arranged in the front wall thereof, said transparent panel including a plurality of glass plates, the innermost of said plates being substantially vertical and the outermost of said plates being inclined to the vertical, and means for maintaining said plates in fixed position.

4. A refrigerator having a storage compartment therein with a transparent panel arranged in the front wall thereof, said transparent panel including a plurality of upwardly converging glass plates the innermost of which is substantially vertical, and means for maintaining said plates in fixed

position, said means including spacing strips arranged at the bottom of said panel to maintain said plates in fixed spaced relation and a shoe arranged and adapted to support said plate which is inclined to the vertical.

5. A refrigerator having a storage compartment therein with a transparent panel arranged in the front wall thereof, said transparent panel including a plurality of upwardly converging glass plates, and means including spacing strips arranged at the bottom of said panel to maintain said plates in fixed spaced relation, a shoe having an inclined upper surface arranged and adapted to support one of said plates, and packing arranged between said plates and said spacing strips.

6. A refrigerator having a storage compartment therein with a transparent panel arranged in the front wall thereof, said transparent panel including a plurality of glass plates, the innermost of said plates being substantially vertical and the outermost of said plates being inclined to the vertical, and means for maintaining said plates in fixed position, said means including a plurality of spacing strips arranged to maintain said plates in fixed spaced relation and one of said strips having formed along one edge thereof a shoe adapted to engage the lower edge of said inclined plate and the engaging surface of said shoe being formed at the same angle as said lower edge of said plate.

In witness whereof I have signed my name to this specification.

GUSTAV J. GRUENDLER.