

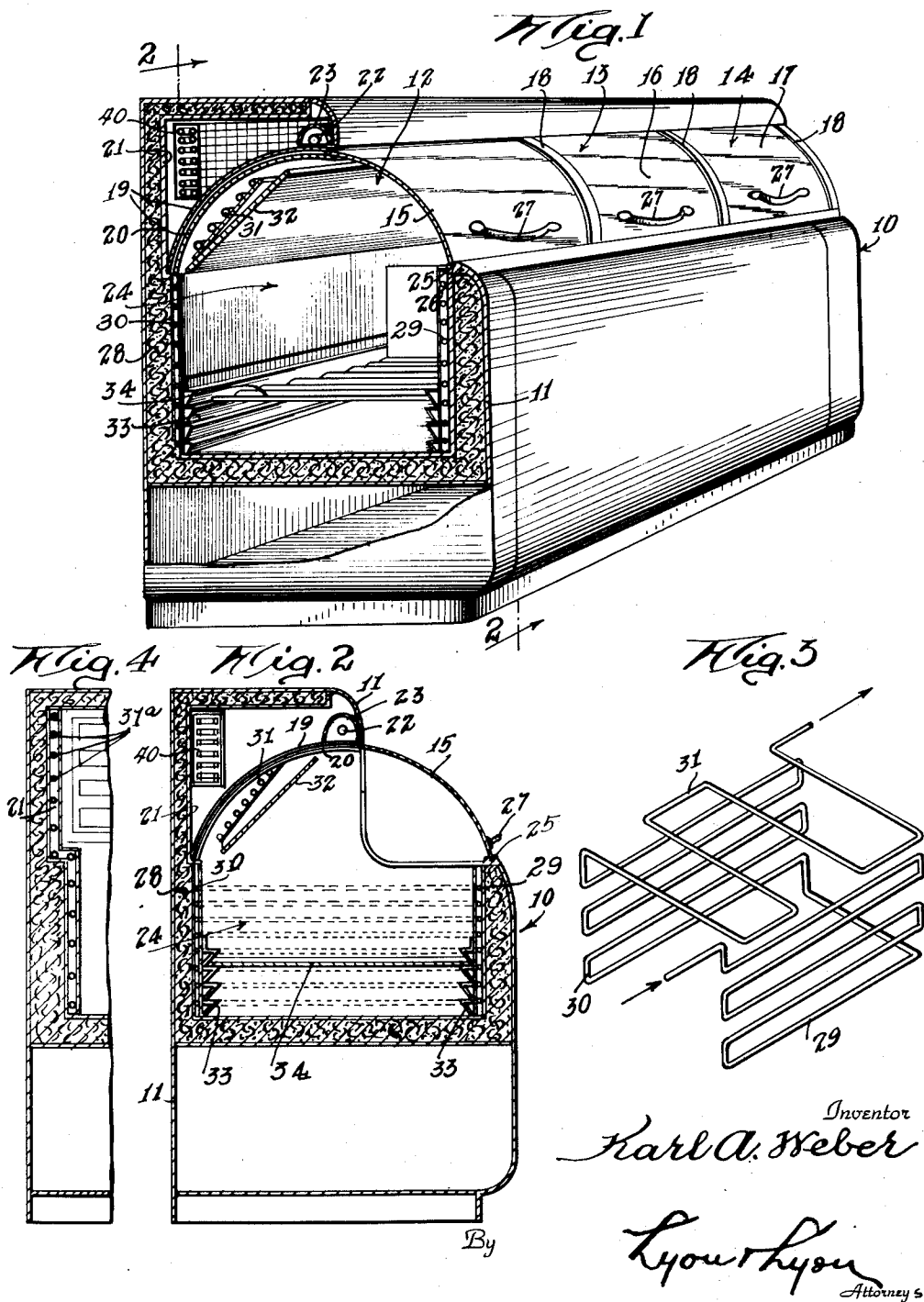
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REFRIGERATED STRUCTURE WITH CURVED DOOR

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REFRIGERATED STRUCTURE WITH CURVED DOOR

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The present invention relates to refrigerated structures and in particular to closure means therefor.

In grocery stores, markets and the like where frozen or refrigerated articles are sold, it is desirable that these articles be readily accessible, particularly to customers in the self-service type of store, without much effort on their part. Usually such articles are placed in a refrigerated cabinet which may be opened by customers, but oftentimes customers fail to close such cabinets and as a consequence there is a loss of refrigeration, loss in freshness of the refrigerated articles and increased likelihood of spoilage of the articles.

It is therefore an object of the present invention to provide an improved refrigerated structure.

Another object of the present invention is to provide an improved refrigerated structure having a door which is semiautomatically returned to its closed position.

Yet another object of the present invention is to provide an improved novel transparent door in a refrigerator which cooperates with illuminating means thereon so as to make the illumination in the structure substantially independent of the position of the door.

In the drawings:

Figure 1 is a view in perspective and partly in section of a refrigerated structure embodying the present invention.

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1.

Figure 3 is a diagrammatic representation of the refrigerant pipes in the structure of Figure 1 and the arrows shown therein represent the flow of refrigerant fluid.

Figure 4 shows a modified structure of the refrigerant pipes or coils positioned differently from their disposition in Figures 1 and 2.

The refrigerated structure having the general reference numeral 10 formed by an outside encircling wall or shell member 11 is preferably of sheet metal material, and is provided with a series of openings 12, 13 and 14, which are normally closed by the quarter-circular closure means 15, 16 and 17, respectively.

Each of such closure means 15, 16 and 17 is mounted for sliding guiding movement in spaced guideways 18 on the structure 10, such spaced guideways 18 being formed by two spaced sheet metal members 19 and 20, which are fastened by conventional means at their upper ends to the structure outside frame member 11, and at

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the lower end to the interior sheet metal wall 21.

It is noted in Figure 1 that the guideways 18 and closure member 15 are approximately quarter-circular and that they cooperate to provide approximately a semicircular figure. It is noted further that the guideways 18 are of limited thickness so as to engage only the opposite sliding edges of the particular closure member 15, 16 or 17, as the case may be. In such case the guideways 18 produce substantially no interference to the transmission of light from the longitudinally extending illuminating means 22.

The illuminating means 22 may comprise a conventional fluorescent tube or conventional high vacuum showcase bulb supported, together with the cooperating light shade 23, and mounted on the structure 10 so as to illuminate the interior 24 of the structure.

Each one of the closure members 15, 16 and 17 is preferably transparent, being formed of glass of multiple layers so as to not only allow vision into the interior 24 when, for example, closure member or door 15 is closed, but also to not interfere with the transmission of light from the illuminating means 22 to the interior 24 when the door 15 is moved upwardly into its retracted open position in the guideways 18.

One particular feature of the present invention is that the door 15 is easily moved from its closed to its opened position and vice versa, and is mounted at the top of the refrigerated structure so as to minimize the loss of refrigeration when the door 15 is opened; that is, there is a tendency for the cool air to remain at the bottom of the interior 24 when the door 15 is opened. Inasmuch as the door 15 is held by gravity forces acting thereon in the groove 25 in the upper front edge 26 of the cabinet, a fairly good heat seal is thus provided. Furthermore, the door 15 is easily moved to its open position wherein gravity forces acting on elemental parts of the door 15 are counterbalanced due to the fact that substantially equal areas of the door 15 are on opposite sides of the highest point of guideways 18 due to their particular curvature and association with door 15.

It is noted further that the door 15 is moved semiautomatically to its closed position due to gravity forces acting thereon as it is moved a small distance from its open position, thereby assuring closure of the structure 10 and a good heat seal at the groove or channel 25.

It is noted further that the door 15 is quarter-

circular with its concave side facing downwardly and so arranged with respect to the guideways 18 that the door may be swung in a path about an axis passing substantially through the center of curvature of the substantially quarter-circular door.

It is noted further that the guideways 18 from their uppermost points to their rearwardmost points form a continuation of the arc formed by the quarter-circular door 15 when it is in closed position, the door being so arranged on the structure that its curved surface faces concavely downwardly, and the guideways being curved concavely downwardly also within the region specified to allow the door to be maintained in either its open or closed position by gravity forces acting thereon.

It is clear that movement of the door 15 downwardly in the direction of its closed position is limited due to engagement of the door 15 itself in the groove 25, while movement of the door in its upper direction is limited by engagement of the door handle 27 with the outside shell member 11, or preferably a stop (not shown) may be mounted in the guideways 18 for engagement with the upper leading edge of the door member 15 in Figure 1.

The interior sheet metal wall 21 is spaced from the exterior shell 11 along substantially its entire length by the interposed insulating material 28, while the interior 24 of the cabinet bounded by the interior wall 21, door 15 and a small area of shell member 11 is subjected to a cold produced by refrigerant fluid circulating through the serially connected series of refrigerant pipes 29, 30 and 31 shown diagrammatically in Figure 3.

In Figure 2 it is noted that the series of pipes 31 are spaced from the interior wall 21 while in the modification in Figure 4 the corresponding series of pipes 31^a is mounted practically in abutment with the interior wall 21. Inasmuch as the series of pipes 31 in Figure 2 is spaced from the wall 21, it is desirable to mount a plate 32 in front of the series of pipes 31 to not only improve the appearance of the interior of the cabinet, but also to avoid direct manual contact with the refrigerant pipes 31.

A shelf structure 33, 34, of conventional type, may be mounted in the interior 24 of the refrigerant structure.

In the structure shown in Figures 1 and 2 a refrigerant coil 40 may be disposed, if desired, between, on the one hand, the curved guideway members 19, 20 and, on the other hand, the back interior wall 21 of the structure as shown in the drawing.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. In combination, a refrigerated storage structure including a heat insulated back wall, a sliding door arranged in said structure, said door being formed substantially in a quarter of an arc of a circle, said door including a curved transparent window, a curved cooperating guide way in said structure extending generally downwardly toward said back wall within which said door may be moved and guided when said door is moved to retracted open position, said guide way being curved to form substantially a quarter of an arc of a circle which is contiguous to and forms a continuation of the arc formed by said door when it is in closed position, refrigerant

pipes housed within said structure immediately below said guideway, said guideway extending and being disposed between said back wall and said refrigerant pipes, a guard plate mounted adjacent said refrigerant pipes and being mounted in front of the same, said guard plate sloping generally downwardly and rearwardly in the direction of said guideway to guard one from touching said pipes and to obscure vision of the door when in open position for purposes of appearance, the door being so arranged on the structure that its curve faces concavely downwardly in all positions thereof and the guideway being curved concavely downwardly and rearwardly to thereby allow the door to be maintained in either its open or closed position, in a position of stable equilibrium solely by gravity forces acting thereon.

2. In combination, a refrigerated storage structure arranged with an opening, said storage structure having a rear heat insulated wall, a complete curved door arranged to close said opening with the door facing concavely downwardly, refrigerant pipes housed within said structure in front of said back wall, means mounted on said structure for swinging said door in a path about an axis passing substantially through the center of the curvature of said door to a position between said refrigerant pipes and said back wall, said swinging means including a guideway curved to form substantially a quarter of a circle which is contiguous to and forms a continuation of the arc formed by said door when it is in closed position, said refrigerant pipes being mounted within said structure immediately below said guideway, a guard plate mounted in front of and adjacent said refrigerant pipes, said guard plate sloping generally downwardly and rearwardly in the direction of said guideway to guard one from touching said pipes and to obscure vision of the door when in open position for purposes of appearance, illuminating means mounted on and encased within said structure in front of said guard plate and above said guideway above the path of movement of said door, a curved transparent window in said door arranged to allow vision within said structure when said door is in closed position and to allow transmission of light from the illuminating means to the interior of said structure when the door is moved to its open position.

3. In combination, a refrigerated storage structure having a heat insulated back wall and a heat insulated front wall, said back and front wall defining a refrigerated storage space, a sliding door arranged in said structure, said door being formed substantially in a quarter of an arc of a circle, said door including a curved transparent window, a curved cooperating guideway in said structure extending generally downwardly and rearwardly in said structure within which said door may be moved and guided when said door is moved to retracted open position, said guideway being curved to form substantially a quarter of an arc of a circle which is contiguous to and forms a continuation of the arc formed by said door when it is in its closed position, a first set of refrigerant pipes housed within said structure immediately below said guideway, said guideway extending through a space defined, on the one hand by said first set of refrigerant pipes, and on the other hand by said heat insulated back wall, a guard plate mounted adjacent said refrigerant pipes sloping generally rearwardly and downwardly in the direction of said guideway to guard one from touching said pipes and to obscure vi-

sion of the door when in open position for purposes of appearance, a second set of refrigerant pipes mounted in said back wall, a third set of refrigerant pipes mounted in said front wall, said first, second and third sets of pipes being connected for the flow of refrigerant there-
 through, the door being so arranged on the struc-
 ture that its curve faces concavely downwardly,
 and the guideway being curved concavely down-
 wardly thereby to allow the door to be maintained
 in either its open or closed position in a condition
 of stable equilibrium solely by gravity forces act-
 ing thereon.

4. In combination, a refrigerated structure ar-
 ranged with an opening and including a front
 heat insulated wall and back heat insulated wall
 defining a storage space therebetween, a movable
 curved door arranged to close said opening with
 the door facing concavely downwardly, a first set
 of refrigerant pipes in said back wall, a second
 set of refrigerant pipes disposed in said front
 wall, said first and second sets of pipes being
 connected for the flow of refrigerant there-
 through, means mounted on said structure for
 swinging said door in a path about an axis pass-
 ing substantially through the center of curvature
 of said door and above said front and back walls,

said swinging means including a guideway curved
 to form substantially a quarter of a circle which
 is contiguous to and forms a continuation of the
 arc formed by said door when it is in closed posi-
 tion, illuminating means mounted on and en-
 cased within said structure above the path of
 movement of said door, a curved transparent win-
 dow in said door arranged to allow vision within
 said structure when said door is in closed position
 and to allow transmission of light from the il-
 luminating means therethrough to the interior of
 said structure when the door is moved to its open
 position.

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