Dec. 1, 1936. J. W. ARMBRUSTER 2,062,856

REFRIGERATING CABINET

Filed July 5, 1933

FIG. 1

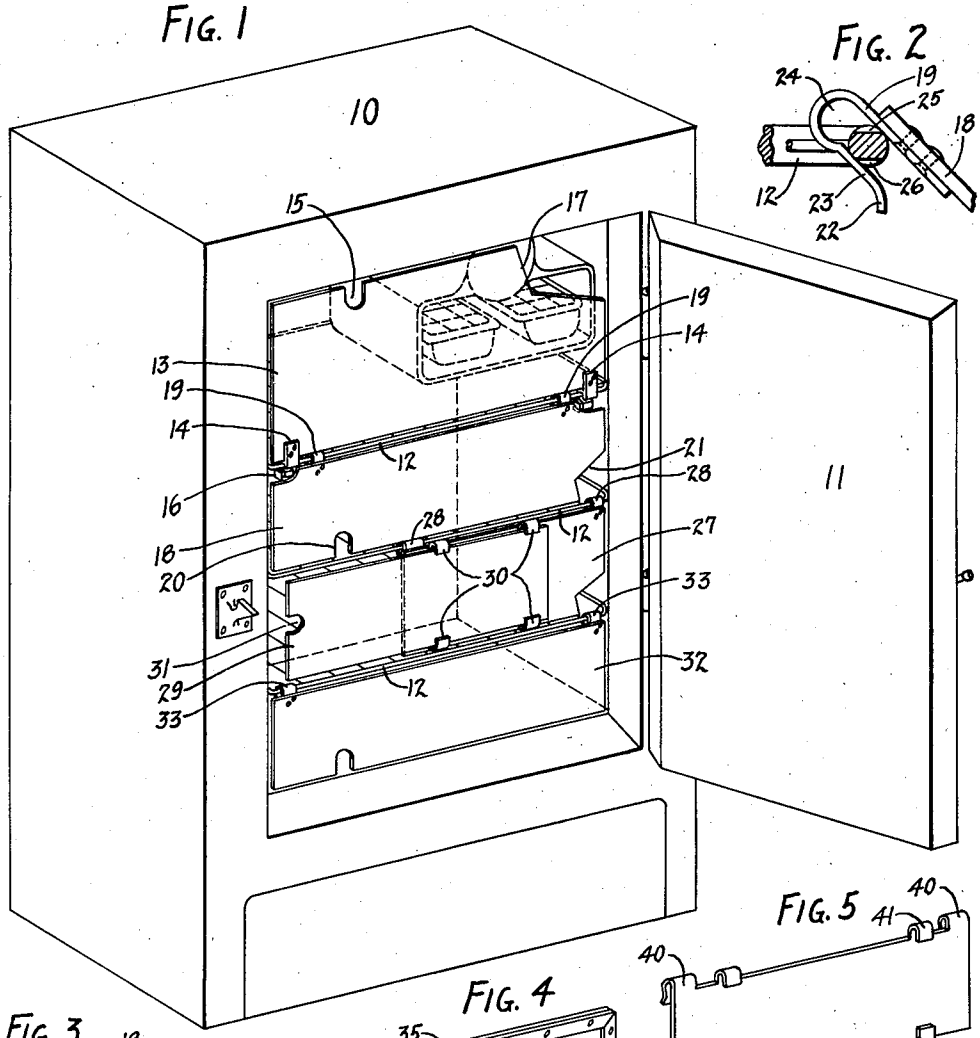


FIG. 2

FIG. 3

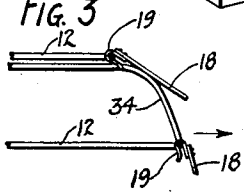


FIG. 4

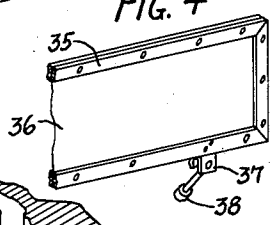


FIG. 5

FIG. 6

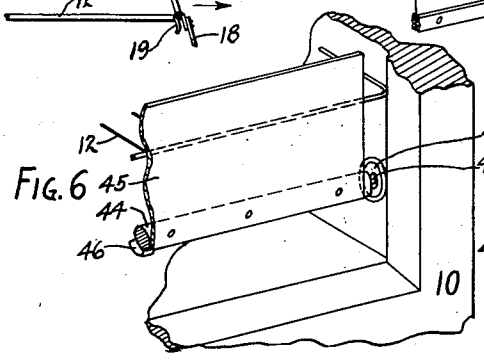
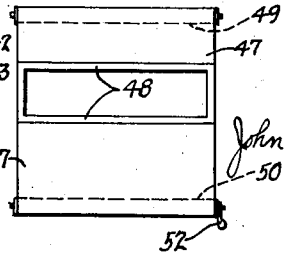


FIG. 7



INVENTOR

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UNITED STATES PATENT OFFICE

2,062,856

REFRIGERATING CABINET

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Application July 5, 1933, Serial No. 679,021

4 Claims. (Cl. 312—189)

This invention relates generally to improvements in refrigerating cabinets and more specifically concerns devices for retaining the cooled air in a cabinet and keeping warmer air out when a cabinet door is opened.

When a refrigerator door is opened, a suction is set up tending to draw cold air out and urge warm air in. Then, as the door is held open, the cold air seeks a lower level and tends to flow or pour out of the bottom and lower sides of the opening at the same time that warmer air flows in around the upper sides of the opening. If the door is opened for the extraction or insertion of a single article on one shelf, the exchange of air takes place over the entire opening. With the loss of the cooled air, there is a consequent use of more refrigerant or electricity, more wear on machinery if so constructed and quicker deterioration of food than would be the case if the cool air were retained in the greater part, being lost only over a small area where an opening is necessary for the extraction or insertion of an article.

Therefore, it is an object of the present invention to provide shutters, slides or curtains to hold cold air in and warm air out of the greater part of the opening in a refrigerating cabinet.

It is a feature of the invention to make such shutters, etc., transparent so that an article looked for may be quickly found and extracted.

It is an object to make the devices simple by using the front wire of a wire shelf or tray as a pivot for a shutter.

It is an object of the invention to make the shutters easy to open and adapted to stay in opened position when that is desired. A shutter is prevented from assuming a position obstructing the closing of the cabinet door. A counterbalance may be hung on the shutter to hold it erect.

It is an object to make the shutter and shelf so that the shutter is automatically opened when the shelf beneath it is drawn forward.

Another feature of the invention is the forming of a one piece shutter from pliant material.

The shutters or curtains may be held independent of the shelves by pivoting in suction cups or bearings affixed to the interior of the cabinet. Such a curtain may be wound on common shade rollers and provided with an aperture formed by a rigid frame at the midpoint of the curtain, which frame is movable to any shelf for the extraction or insertion of articles.

These and other features will be noted from the following description and the drawing which form part of the specification.

In the drawing:

Fig. 1 is an assembly view of a refrigerator cabinet with cold air retaining shutters assembled therein.

Fig. 2 is a detail view of the construction of the wire tray and a hook for holding a shutter thereon.

Fig. 3 is a detail view showing the automatic opening of the shutter on one tray by the sliding action of an adjacent tray.

Fig. 4 is a detail view of a shutter made up of a thin material held together by a stiff outer frame.

Fig. 5 shows a shutter made of one piece of material.

Fig. 6 is a view of a portion of a shutter which is mounted independently of the regular tray or shelf.

Fig. 7 is a front view of a cold air retainer in the form of a flexible rolling curtain wound on two rollers.

In Fig. 1 is shown a refrigerating cabinet 10 with a swinging door 11. On the interior of the cabinet there is any of the many well known forms of refrigerating apparatus and a series of wire trays or shelves 12. These shelves are shown as made up of a wire frame although they may take other forms and still be provided with bearings upon which the shutters, about to be described, may swing. The shelves 12 may be fixed or may slide out of the cabinet.

Pivotally mounted on the front wire of the top shelf 12 is a shutter 13. A pair of hooks or hinges 14 are secured to the shutter and form a loose and removable connection to the shelf. The shutter 13 may be grasped at the opening 15 and swung out and down about the front wire as a pivot. An article may then be removed from the top shelf and the shutter released. When free, the shutter returns to the normal upright position because of the weight of counter-balance 16 attached to the hooks 14. The shutter is cut out at 17 to clear the door 11 when it is partly open.

The shutter 13 and the other shutters about to be described may be made of any form of material such as wood or metal. The material should be moisture proof or coated to shed water. It is considered that a thin but stiff board of transparent material such as celluloid or cellophane may be used. The hooks may be riveted to the shutters or cemented or glued thereon. In another form of shutter described hereinafter the hooks are formed from the material comprising the shutter.

The shutter 18 is suspended from the front wire of the top shelf 12 by a pair of hooks 19 fixed to the shutter. The shutter 18 may be grasped at the opening 20 and swung out and up about the wire as a pivot. When released the shutter will swing back to normal vertical position. A portion of the shutter is cut out at 21

to avoid interference with the door 11. If the shelves are of the sliding type, the front wire of the lower shelf may be grasped through the same openings 20 or 21 for extraction. The shutters are shown separated at the shelves, but they may overlap.

The hook 19 and the tray wire 12 may be an ordinary straight hook and a plain rod or they may be formed with advantage as shown in the enlarged view in Fig. 2. There it is seen that the hook has a lip 22 for easy engagement with the tray wire, and a constricted portion 23 for frictional engagement with the wire and an enlarged circular end 24 for free rocking motion about the wire when fully hooked thereon. With such construction a shutter may be partially or fully lifted and given a short motion to the rear so that the constriction 23 takes a frictional hold on the wire and retains the shutter in the desired position. If it is desired to avoid having the shutter assume a horizontal position with the attendent possibility that it may be struck and shoved along the shelf by the closing door, the front wire of the shelf may be cut out at 25 and 26 so that no frictional hold is afforded the hook when the shutter is in or near a horizontal position. In all other positions it may be assumed that the door will cam the shutter back to normal position. The other hooks, including the hooks 14, may be formed to gain the advantages of the construction of hooks 19.

The third shutter from the top is shown with a sliding panel. The shutter 27 is pivoted on the front wire of the middle shelf 12 by a pair of hooks 28. The sliding panel 29 is loosely held on shutter 27 by a series of ears 30 which are attached to and project from the shutter. The panel may be grasped at the opening 31 and the panel slid to the right to make a small opening or pulled out so that both the panel and shutter swing as a unit to disclose a large opening.

The bottom shutter 32 is similar to shutter 18 but it is pivoted on the front wire of the lowest shelf 12 by a pair of hooks 33.

Although the shutters are shown to cover the space between two shelves, they may be made shorter or longer to cover less than one or more than one shelf space.

If the shelves are of the type adapted to be slid out of the cabinet, the shutter adjacent the moved shelf may be swung automatically out of the way as shown in Fig. 3. The lower shelf 12 has affixed thereon a cam wire 34 which cooperates with the shutter 18 suspended from the upper shelf. The shutter is cammed up, swinging about the front wire, as the lower shelf is moved in the direction of the arrow. A pair of the cam wires 34 may be affixed to the sides of a shelf or a single wire or solid extension may extend from the side or center of the shelf. When an upper shelf 12 such as the top tray shown in Fig. 1 is moved out, the upper and lower shutters 13 and 18 move along maintaining a vertical position.

A shutter may be constructed of a stiff outer frame and a thin inner sheet of moisture-proof transparent material as shown in Fig. 4. There it is noted that a stiff frame 35 is formed by rectangular strips which are riveted, glued or clamped together around the edge of a thin strip of material 36. The frame carries hooks 37 from which extend counterbalances 38.

A one piece shutter may be made by a method of heating and bending projections on a piece of stiff, transparent but pliant material such as celluloid. Such a shutter 39 is shown in Fig. 5 where it is noted that the hooks 40 and ears 41 are bent out of the body of the material. The shutter 39 is formed as a flat piece with projections. These projections are heated with a mild heat, made pliant and then clamped around blocks formed with the curvature desired, such as the form of hook 19, Fig. 2. Then the projections are cooled and the blocks removed.

The shutters may be pivoted independently of the shelves by the use of a suction cup 42 as shown in Fig. 6. This a rubber cup which may be pressed into place at any point in the cabinet and there acts as a bearing being held in place by suction. The cup 42 is provided with a metallic cylinder 43 which acts as a bearing for a trunnion on shaft 44. Attached to the shaft is the shutter 45 and a counterbalance 46. One of the trunnions on shaft 44 may be in the well known form of a spring plunger so that assembly and extraction of the shutter may be made easy.

The cold air retainer may be made in the form of a curtain as shown in Fig. 7. This modified form of construction is set forth in a copending application, Serial No. 81,995, filed May 27, 1936. In Fig. 7 it is seen that two thin but strong sheets of flexible transparent material 47 are joined by a stiff rectangular frame 48. The ends of the sheets are wound around rollers 49 and 50 of the type of well known shade rollers. The four trunnions of the rollers may be inserted in cups such as 42, Fig. 6, or in brackets riveted or screwed to the inside of the cabinet 10. The upper roller may be held detented in position in the well known manner, but it is desirable that the lower roller be free and spring urged to wind in all positions when assembled. Therefore the curtain may be moved up or down and held in position with frame 48 coinciding with any shelf which then is accessible for movement bodily or extraction or insertion of an article.

What I claim is:

1. In a refrigerating cabinet, a wire shelf, a shutter pivoted on the front wire of said shelf by hooks, said hooks being shaped with a constricted portion to grasp said front wire and hold the shutter in adjusted position, said wire being cut away at certain points to relieve the hooks and prevent the shutter from being held in certain positions.

2. In a refrigerating cabinet, a shelf, a front bar on said shelf formed with a reduced section, the axis of said reduced section lying in the horizontal, a shutter pivoted on the front bar of said shelf by hooks, said hooks having an enlarged end to permit free swinging of said shutter and being provided with constricted throats on said hooks for frictionally engaging said front bar when said shutter is shifted thereto, to hold said shutter in an adjusted position except when placed in a horizontal position.

3. In a refrigerating cabinet, a pair of shelves, a shutter pivoted on one of said shelves and a cam projection on the other of said shelves for automatically opening said shutter when said other shelf is slid out of the cabinet.

4. In a refrigerating cabinet, a wire tray, a shutter formed from one piece of stiff transparent water-proof material and hooks on said shutter formed from the same material for engaging a front wire on said tray so that said shutter may pivot thereon.

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