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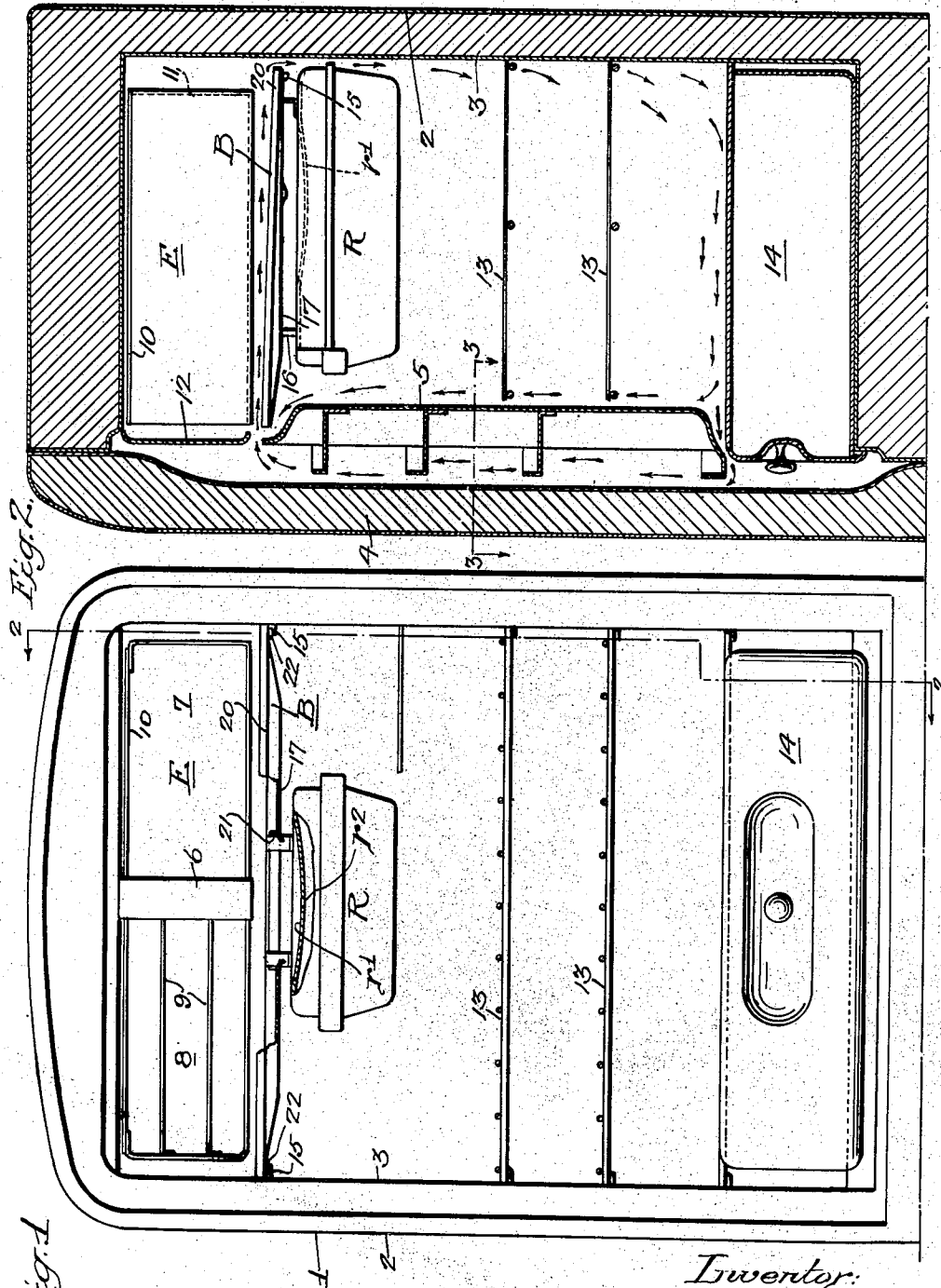
F. D. PELTIER

2,297,581

REFRIGERATOR

Filed July 25, 1940

2 Sheets-Sheet 1



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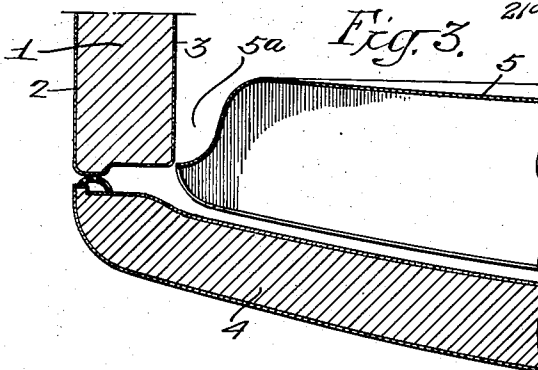
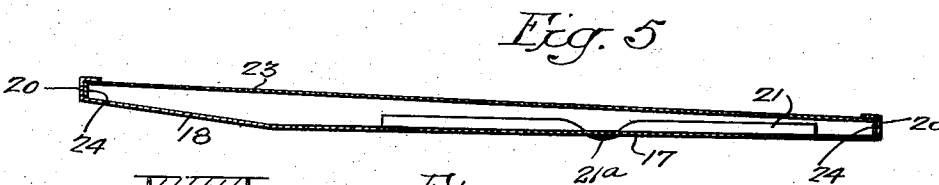
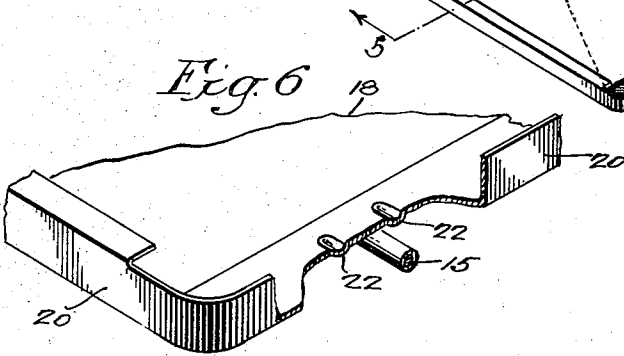
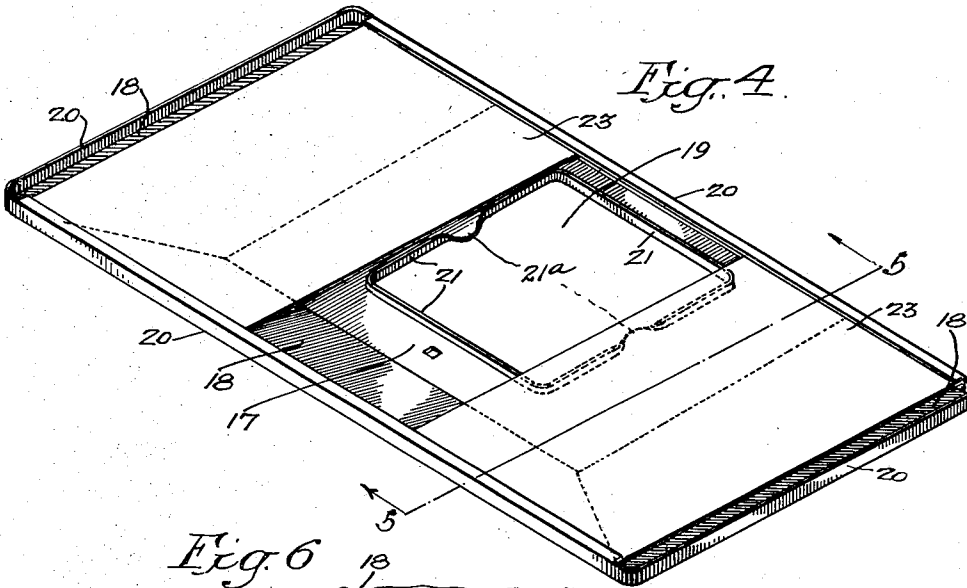
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,297,581

REFRIGERATOR

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Application July 25, 1940, Serial No. 347,526

7 Claims. (Cl. 62—89)

This invention relates to new and useful improvements in domestic refrigerators. More particularly the invention relates to a novel evaporator and associated air circulation system for a domestic refrigerator.

Since the advent and continued increasing use of frozen foodstuffs the domestic refrigerator industry has been confronted with the problem of providing in such a refrigerator suitable space for the proper preservation and storage of frozen foods. Proper preservation of such foods requires the provision of an adequately refrigerated compartment therefor and it has been proposed to embody or incorporate such a compartment within the refrigerated evaporator. Incorporation of a refrigerated frozen foods compartment within an evaporator unit presents certain problems, and primarily that of providing such a compartment in an evaporator without unduly sacrificing useable storage space within the refrigerator cabinet.

Also, in refrigerators employing the standard form of evaporator unit which is relatively tall and narrow with its sides spaced substantially from one or both side walls of the refrigerator compartment, the air within said compartment rises along the compartment side walls and is cooled by contact with the side walls of the evaporator after which it descends more or less centrally within the refrigerator compartment.

This downward circulation of the cooled air is immediately warmed by food on the upper refrigerator shelves with the result that the air rises toward the evaporator and no continuous circulation of air takes place around the lower portion of the food compartment.

The present invention, therefore is concerned with the provision of a novel evaporator unit having a refrigerated frozen foods compartment and, in conjunction therewith, the provision of an effective and efficient air circulation system.

Accordingly, and with the foregoing observations in mind, the principal object of the present invention is to provide a novel evaporator unit having a number of properly refrigerated separate compartments of relatively large value for the freezing of ice cubes and the preservation and storage of frozen foods without sacrificing useable food storage space within the refrigerator.

Another and equally important object of the invention is to provide an efficient system of controlled air circulation and cooling within a domestic refrigerator.

A further object of the invention is to provide, in conjunction with an evaporator of the type described, a novel arrangement and combination of

evaporator drip pan, air deflecting baffle and meat storage pan support.

These and other objects of the invention and the various features and details of the construction, arrangement and operation thereof are hereinafter fully set forth and described, and shown in the accompanying drawings, in which:

Figure 1 is a front elevation view of a domestic refrigerator embodying the present invention, the refrigerator and evaporator doors having been removed to expose the refrigerator interior to view and a portion of the drip pan and air baffle member being shown in section to better illustrate its construction.

Figure 2 is a view in section taken on line 2—2, Figure 1.

Figure 3 is a view in section taken on line 3—3, Figure 2.

Figure 4 is a view in perspective of the drip pan and air deflecting baffle member.

Figure 5 is a view in section taken on line 5—5, Figure 4; and

Figure 6 is an enlarged fragmentary view in perspective of the front corner of the member shown in Figure 4 illustrating the manner in which said member is supported within the refrigerator.

Referring now more particularly to the drawings, reference numeral 1 designates the usual refrigerator cabinet having an outer casing 2 and inner linings 3 which define the interior of the refrigerator. A door or other closure member 4 is, of course, provided and this may or may not have associated therewith a shelf-lined inner door 5 (see Figure 2). In the event that an inner door be provided, the sides thereof are preferably spaced from the sides of the inner lining 3 as shown in Figure 3 thereby to provide vertical passages 5a at either side of said inner door for a purpose that will later appear.

In accordance with the present invention, an evaporator unit E is mounted at the top of the refrigerator food storage compartment or interior. As shown in Figures 1 and 2 of the drawings, this evaporator is relatively shallow and of generally U or rectangular shape and extends substantially entirely across the top of the food storage compartment. Too, this evaporator E has substantially the same depth as the refrigerator compartment or interior, although there is provided as small a space between the evaporator and lining walls as will permit the formation of frost on the surface of said evaporator.

The particular evaporator illustrated is divided centrally by a vertical partition 6 into relatively

large frozen foods and ice cube freezing compartments 7 and 8 and the latter is further subdivided by shelves 9 into a plurality of superimposed sections for the reception of the usual ice cube trays.

The evaporator may employ any desired system of refrigerant circulation but it is desirable that passages for the circulation of refrigerant be provided on at least three, and preferably more, surfaces of said evaporator. In the event that the ends and bottom surfaces only of the evaporator are refrigerated directly then a top portion 10 of heavy metal having good heat conducting properties should be provided and thermally bonded to the said evaporator. Likewise, of course, the shelves 9 and partition 6 at all times should be of good heat conductivity and thermally bonded to the evaporator shell.

In order further to lower the temperature within the evaporator frosted food compartment 7 the latter is preferably provided with a rear wall 11 and, in addition, the entire front of the said evaporator preferably is closed by suitable hingedly mounted doors or the like 12 which function not only to maintain a lower temperature within the evaporator but also improve generally the appearance of the refrigerator interior when the outer door 4 thereof is open. Also, to obtain increased refrigeration in the evaporator the shelves 9, top portion 10, rear wall 11 and like portions of said evaporator may be directly refrigerated by bonding thereto a refrigerant tube of a character permitting partial expansion of the refrigerant supplied to the evaporator, and such a tube may be arranged in one or more courses of variable spacing in instances where greater refrigeration is desired in one portion of the evaporator than in another.

It will be seen that an evaporator unit embodying the foregoing features and construction provides entirely adequate refrigerated space 8 for the freezing of ice cubes and a refrigerated compartment 7 of unusually large volume for the preservation and storage of frozen foods such as are now commonly sold in package form. Particularly, however, will it be seen that the construction and arrangement of the evaporator and its arrangement within the cabinet, the volume within the refrigerator occupied by said evaporator is almost entirely useable for the storage of foods and there is substantially no waste or unuseable space about or above the evaporator. Such an evaporator, furthermore, is conveniently arranged for ease of construction and use, and for efficient and effective operation. It should be borne in mind, however, that apart from the general shape and size of the evaporator and its location within the cabinet 1, the various details of the construction and operation of said evaporator may vary widely and certain illustrative examples of such an evaporator embodying particular features of construction and operation are disclosed in co-pending applications Serial No. 335,579, filed May 16, 1940 and Serial No. 348,759, filed July 30, 1940.

Now in conjunction or association with an evaporator such as that hereinbefore described, it is desirable and preferable to employ a directed or controlled air circulation system in order to accomplish most efficient cooling and preservation of foodstuffs supported upon the usual food storage compartment shelves 13 and in hydrator 14 located at the bottom of the refrigerator compartment.

Accordingly, as a part of the present invention,

there is provided, and spaced just below the evaporator, an air directing or baffle member B of sheet metal. This member B is of generally flat or plate-like shape and extends entirely across the refrigerator compartment from side wall to side wall thereof, being supported by suitable pins or the like 15 which project inwardly from said walls. On the other hand, the front edge of the baffle B extends to a point forwardly of the evaporator E and the rear edge thereof terminates at a point rearwardly of the said evaporator but spaced from the rear wall portion of the cabinet lining 3 as shown in Figure 2 of the drawings.

Formation of the baffle B so that its edges reside beyond the periphery of the evaporator E enables the said baffle to function also as the conventional drip pan, and further provides a suitable structure from which may be suspended the customary receptacle R for the storage of meats and the like. The baffle B preferably slopes slightly toward the rear of the cabinet and sufficient space is provided between it and the evaporator and at its front and rear edges to permit the circulation of air between the baffle and evaporator from and to the refrigerator compartment which underlies said baffle member. Also, in order properly to cool the meat receptacle R a suitable opening should be provided in the baffle member B above said receptacle so that some of the air flowing between the said baffle and the evaporator may pass down through such opening and into contact with the receptacle R.

One suitable form of baffle member B is illustrated in the drawings and its construction and arrangement are more particularly shown in Figures 4, 5 and 6 thereof. This baffle consists of a generally flat central-bottom portion 17 and surrounding side and front portions 18 which incline outwardly at a relatively small angle. In the central flat portion 17 there is provided an opening 19 through which air passes as aforesaid to cool the receptacle R and in order that the baffle may be used as a drip pan the peripheral edge of said baffle is provided with an upstanding flange 20 which extends continuously around the baffle member. Likewise the aforesaid air opening 19 is defined by an upstanding flange 21 in opposite sides of which are provided lips 21a over which drip water from the evaporator E may be discharged. In addition, the cover of the receptacle R has a depression r^1 formed therein directly beneath the baffle opening 19 and in this depression there is located an opening r^2 opening to the interior of said receptacle R so that when defrosting the evaporator the water will drip onto baffle B, flow over flange lips 21a into said depression and then through its opening into the receptacle which can be removed and dumped when full of said water.

Of course, the baffle B is removable for cleaning and other purposes, and the position of said baffle within the refrigerator cabinet at all times is fixedly spaced with respect to the lining rear wall by providing pairs of spaced lugs 22 pressed out beneath the baffle at opposite sides thereof (see Figure 6) so as to reside at opposite sides of the baffle supporting pins 15 as shown.

In addition to the foregoing, and in order to prevent sweating of the baffle B, there are positioned upon the latter auxiliary baffle members or plates 23 at opposite sides of the opening 19. As shown in Figure 5 of the drawings, these plates 23 have downwardly turned end flanges 24 which

support said plates 23 in spaced relation above the baffle member B. Thus between the baffle 18 and the plate members 23 there are formed two dead air chambers which serve to effectively insulate the baffle member 18 from the cooling effect of the evaporator so that the baffle does not become sufficiently cool to condense moisture out of the circulating air within the food storage compartment. Of further help in preventing the sweating of the baffle is the rapid and controlled circulation of air between the evaporator and the baffle for with such controlled circulation there is no appreciable temperature difference between air in various portions of the food compartment and the moisture content of the air is likewise substantially uniform.

Now in operation of a refrigerator having an evaporator and a circulating baffle according to the present invention, the air in the main food storage compartment of the refrigerator is warmest adjacent the door 4 or the inner door 5 as the case may be, and hence this warm air will rise upwardly along the inner surface of the doors and, in the case of refrigerators having an inner door 5, will also rise upwardly within the previously mentioned passages 5a which function as flues. This rising warm air then passes rearwardly of the refrigerator between the evaporator and baffle structure where it is cooled and then flows off the back of said baffle passing downwardly along the compartment rear wall, some of the cooled air passing downwardly through the baffle opening 19 to cool the meat receptacle R, all as indicated by the several arrows in Figure 2 of the drawings. The above described baffle arrangement in addition to insuring a substantially uniform temperature within the box serves to conserve the space within the refrigerator since it is a most compact arrangement.

Such a circulation system as this, while particularly adaptable for use with evaporators of the present type, also has the distinct advantage that the flow of air is not disturbed by loading the shelves of the refrigerator and it is possible, therefore, to maintain the lower portion of the refrigerator compartment and the hydrator at a much lower temperature than with refrigerators of the conventional type.

Thus, from the foregoing, it will be seen that the present invention provides a refrigerator evaporator unit having a number of refrigerated compartments for the freezing of ice cubes and also a refrigerated compartment of unusually large volume for the preservation and storage of frosted foods. At the same time, this evaporator is constructed and arranged so that there is substantially no unuseable space within the refrigerator cabinet. The invention further provides in combination with such an evaporator a novel air baffle and drip pan member constructed and arranged within the refrigerator compartment to afford substantially improved utility and performance in the use and operation of domestic refrigerators.

While a particular embodiment of the present invention has been herein illustrated and described, it is not intended that the invention be limited to such disclosure but that changes and modifications may be embodied and incorporated therein within the annexed claims.

I claim:

1. A domestic refrigerator comprising a cabinet providing a food storage compartment, a door opening to said compartment, a relatively shallow evaporator within the upper portion of the

food storage compartment for cooling the latter, said evaporator having a width and depth substantially equal to the width and depth of said compartment, a baffle member spaced below said evaporator and extending substantially to the side walls of the compartment with its front and rear edges spaced respectively from the door and compartment rear wall, said baffle declining slightly rearwardly within said compartment so that air is directed rearwardly between the evaporator and the baffle and then downwardly along the said compartment rear wall, and an inner shelf-lined door carried by the first-mentioned door having side walls spaced from the food storage compartment side walls to form flues for the upward circulation of air from the bottom of said compartment to the evaporator.

2. A domestic refrigerator comprising a cabinet providing a food storage compartment, a door opening to said compartment, a relatively shallow evaporator within the upper portion of the food storage compartment for cooling the latter, said evaporator having a width and depth substantially equal to the width and depth of said compartment, a baffle member spaced below said evaporator and extending substantially to the side walls of the compartment with its front and rear edges spaced respectively from the door and compartment rear wall, said baffle declining slightly rearwardly within said compartment and the baffle and said evaporator being constructed and arranged within the compartment and with respect to each other so that substantially all of the circulating air is directed rearwardly between the evaporator and the baffle and then downwardly along the said compartment rear wall, a substantially closed receptacle disposed beneath the baffle approximately centrally thereof, said baffle having centrally therein an opening for the passage of air downwardly therethrough and about said closed receptacle, and plates disposed upon the baffle in spaced relation with respect thereto at opposite sides of said central opening therein for providing between the baffle and said plates a dead air space.

3. A domestic refrigerator comprising a cabinet providing a food storage compartment, a door opening to said compartment, a relatively shallow evaporator in the upper portion of the compartment for cooling the latter, said evaporator having a width and depth substantially equal to the width and depth of said compartment, a baffle member spaced below the evaporator and having its edges extending beyond said evaporator substantially to the compartment side walls with its front and rear edges spaced from said door and compartment rear walls, said baffle member being arranged so that air is directed thereby rearwardly between it and the evaporator and then downwardly along said compartment rear wall, and said baffle having upwardly turned edge flanges so that the baffle will retain drippings from said evaporator, a closed receptacle suspended from the baffle, said baffle having therein an opening for the passage of air therethrough and about said closed receptacle, and an inner shelf-lined door carried by the first-mentioned door having side walls spaced from the food storage compartment side walls to form flues for the upward circulation of air from the bottom of said compartment to the evaporator.

4. A domestic refrigerator comprising a cabinet providing a food storage compartment, a door opening to said compartment, a relatively

shallow evaporator in the upper portion of the compartment for cooling the latter, said evaporator having a width and depth substantially equal to the width and depth of said compartment, a baffle member spaced below the evaporator and having its edges extending beyond said evaporator substantially to the compartment side walls with its front and rear edges spaced from said door and compartment rear walls, said baffle member being arranged so that air is directed thereby rearwardly between it and the evaporator and then downwardly along said compartment rear wall, a closed receptacle suspended from the baffle, said baffle having therein an opening for the passage of air therethrough and about said closed receptacle, and an inner shelf-lined door carried by the first-mentioned door having side walls spaced from the food storage compartment side walls to form flues for the upward circulation of air from the bottom of said compartment to the evaporator.

5. A domestic refrigerator comprising a cabinet providing a food storage compartment, a door opening to said compartment, an evaporator within said compartment for cooling the same and having a width and depth substantially equal to the width and depth of said food storage compartment, a baffle member spaced below said evaporator and operable to direct the circulation of air within the cabinet food storage compartment, and an inner door carried by the first-mentioned door having side wall portions spaced from the food storage compartment side walls to provide passages for the circulation of air between the bottom of said compartment and the evaporator.

6. A domestic refrigerator comprising a cabinet providing a food storage compartment, a door opening to said compartment, a relatively shallow evaporator in the upper portion of the compartment for cooling the latter, said evaporator having a width and depth substantially equal to the width and depth of said compart-

ment, a baffle member spaced below the evaporator and having its edges extending beyond said evaporator substantially to the compartment side walls with its front and rear edges spaced from said door and compartment rear walls, said baffle member being arranged so that air is directed thereby rearwardly between it and the evaporator and then downwardly along said compartment rear wall, and said baffle having an opening therein for the downward passage of air therethrough, a substantially closed receptacle disposed below the baffle and the opening therein so that air passing said opening will contact said closed receptacle, upturned flanges disposed peripherally of the baffle and the opening therein for retaining drippings from the evaporator, and lip portions formed in the flanges at the periphery of the baffle opening through and over which drippings from the evaporator may be discharged onto the underlying receptacle.

7. A domestic refrigerator comprising a cabinet providing a food storage compartment, a door opening to said compartment, a relatively shallow evaporator within the upper portion of the food storage compartment for cooling the latter, said evaporator having a width and depth substantially equal to the width and depth of said compartment, a baffle member spaced below said evaporator and extending substantially to the side walls of the compartment with its front and rear edges spaced respectively from the door and compartment rear wall, said baffle declining slightly rearwardly within said compartment so that air is directed rearwardly between the evaporator and the baffle and then downwardly along the said compartment rear wall, and means positioned in the front opening portion of the food storage compartment when the door is closed arranged for cooperation with the food storage compartment side walls to form flues for the upward circulation of air from the bottom of said compartment to the evaporator.

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