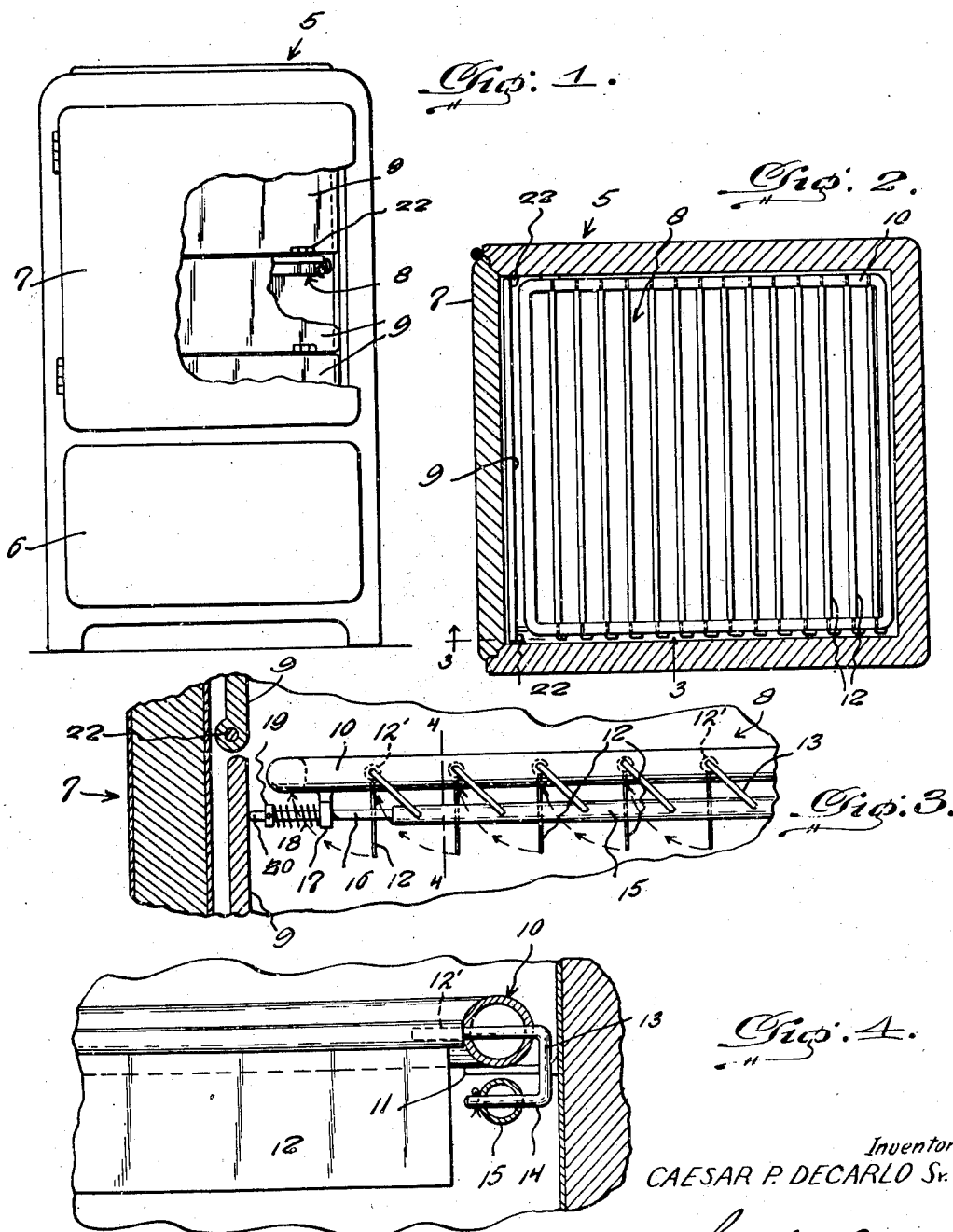


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C. P. DE CARLO, SR
LOUVER MEANS FOR CONTROLLING
AIR FLOW IN REFRIGERATORS
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LOUVER MEANS FOR CONTROLLING AIR FLOW IN REFRIGERATORS

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My invention relates to improvements in household and commercial refrigerators whereby the cold loss incidental to opening the main door of a refrigerator is confined to the particular cooling compartment to which access is had, instead of being shared in by all of the cooling compartments.

In particular, my invention has for its primary object the isolation of the various cooling compartments of a refrigerator which are defined by spaces between the lowest or bottom shelf and the bottom of the interior of the refrigerator and between the top of the interior of the refrigerator and the highest or top shelf, and the spaces between adjacent shelves and the top and bottom shelves, by providing each such compartment with a door, preferably transparent, to enable viewing the contents of the compartment, and by constructing the shelves with louvers instead of plain rods as now used, the louvers being so arranged that upon opening the door leading into any compartment to gain access thereto, the opening of the door will close the louvers of the next higher or the next lower shelf so as to substantially seal off the remainder of the interior of refrigerator and thereby prevent cold loss and entry of warm air into the interior of the refrigerator except as to the particular open compartment.

Another important object of the invention is to construct the above-described arrangement in a simple and efficient form which can be incorporated in specially constructed or in existing refrigerators with minimum difficulty and expense, as to some or all of the cooling compartments.

Other important objects and advantages of the invention will be apparent from the following description and appended drawings showing a merely illustrative embodiment of the invention.

In the drawings:

Figure 1 is a front elevation of a refrigerator partly broken away to an arrangement according to the invention therein.

Figure 2 is an enlarged horizontal section taken through the refrigerator above one of the special shelves and looking downwardly.

Figure 3 is an enlarged fragmentary vertical sectional view taken along the line 3-3 of Figure 2 showing a portion of a shelf in side elevation.

Figure 4 is a similar view taken along the line 4-4 of Figure 3.

Referring to the drawings in detail, the numeral 5 generally designates an illustrative type of refrigerator cabinet including on its front the mechanism access door 6 and the cooling compartment

access door 7 which is opened many times in a normal day and ordinarily thereby allows the escape of cool air and the ingress of warm air to all of the shelf compartments constituting the interior of the cabinet. Recovery of normal cooling temperature in the cabinet when the door 7 is enclosed puts a heavy burden on the mechanism or other cooling means and adds greatly to the operating expense which detracts from the value of the refrigerator as an efficient cooler or freezer of the contents of the compartments. However, this undesirable situation is to a very substantial extent eliminated by the present invention by substituting for at least one and preferably for each ordinary grate-type shelves of the refrigerator the special shelf 8, along with a door 9.

The special shelf 8 consists preferably of a tubular rectangular frame 10 of the proper size and dimensions to fit the interior of the refrigerator, as shown in Figures 2, 3 and 4 and supportably rests upon suitable brackets 11 on the walls of the cabinet so as to be removable, if desired, for cleaning purposes. Horizontally pivoted on and between the sides of the frame 10, in the place of the usual rods, are the louvers 12 which consist of flat plates 13 so that adjacent plates will overlap and form an imperforate wall when the louvers are swung upwardly from the dependent open positions shown in Figure 4, so that there can be no substantial transfer or exchange of cold or warm air with respect to the cooling compartments above and/or below the closed shelf, as is the case with an ordinary refrigerator shelf.

The louvers may be attached to tubes 12' containing a plain pivot in one end and crank pivots 13 in the opposite end, both pivots turning in the corresponding side members of the shelf frame 10. The cranks having inwardly turned pins 14 which pivotally traverse a tubular pitman 15 which terminates at its forward end in a rod portion 16 sliding in a bracket 17 depending from the frame 10. An expanding coil spring 18 is circumposed on the rod portion between the bracket 17 and a stop 19 against the forward tip 20 of the rod portion 16, whereby the louvers of the shelf have a positive urge toward their closed positions from the open positions shown in Figure 3.

The closed position of the louvers of the shelf is maintained by a closed position of the compartment door 9, which on being closed engages the pitman tip 20 and forces the pitman 15 rearwardly against the resistance of the spring 18, the louvers of the shelf thereby being kept open as long as the compartment door is closed, in which

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condition air can circulate freely through the shelf from adjacent compartments.

The compartment door is suitably hinged at its lower edge adjacent the shelf to which it relates by hinge brackets 22 on the cabinet just above the next lower shelf or the bottom of the cabinet to swing outwardly and downwardly to open position, and to swing upwardly and inwardly toward closed position, in approaching which the upper part of the door strikes the pitman tip 20 and pushes the pitman rearwardly to open the louvers 12. The doors 9 are arranged with respect to each other and fitted in the cabinet so as to provide the greatest closure practicable for the cooling compartments.

In operation, should the door 9 in the lower part of Figure 3 of the drawings be pulled open to gain access to the contents of the shelf below the shelf shown, the louvers of the shelf shown will close, thereby preventing the loss of cold and the ingress of warm air through the open door from rising through the shelf shown to compartments thereabove, provided the doors 9 of the compartments above are closed. In this way the refrigerated condition of all compartments above that opened is protected and conserved even though the main door 1 is open while access is being had to the particular compartment. Obviously, the expenditure of time and energy required for the restoration of the temperature and humidity of the compartment which was opened and of any compartment or compartments below it, after the opened compartment and the main door have been closed, is only a fraction of that required in an ordinary refrigerator not equipped according to the present invention.

I claim:

1. A refrigerator comprising a cabinet including a main door opening and a main door therefor affording access to the interior of the cabinet as a whole, and at least one shelf dividing said interior into compartments above and below the shelf, said shelf comprising horizontally pivoted louvers supported across the interior of the cabinet, means connecting all of the louvers for pivotal movement together toward and away from closed position in which the louvers define a substantially imperforate partition across the interior of the cabinet reaching to said main door opening, operating means for urging the louvers toward closed position, and a compartment door hinged on the cabinet in said main door opening in a position to operatively engage said operating means as the compartment door is moved from open toward closed position whereby the louvers of the shelf are opened as the compartment door reaches its closed position.

2. In a refrigerator, a cabinet containing shelves defining cooling compartments between them, a compartment door for each compartment hinged on the cabinet, each of said shelves comprising horizontally pivoted louvers, operating means on each shelf connecting its louvers for operation toward and away from closed position wherein the louvers constitute a substantially imperforate partition across the cabinet, means

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urging the louvers toward closed position, and means on each compartment door for engaging the operating means of the related shelf as the compartment door is closed for opening the louvers thereof.

3. In a shelf for enclosed area and the like, the combination, which comprises a shelf frame, a plurality of depending spaced louvers transversely positioned in said frame, means pivotally mounting the ends of the louvers in the frame, arms extending from the ends of said louvers, a rod pivotally attached to the arms of said louvers, and means resiliently urging said rod and arms to actuate the louvers to horizontal position wherein said louvers substantially close open areas through the shelf.

4. In a shelf for enclosed areas and the like, the combination, which comprises a shelf frame, a door associated with one end of the frame, means hingedly mounting said door adjacent the end of the frame, a plurality of depending spaced louvers transversely positioned in said frame, means pivotally mounting the ends of the louvers in the frame, arms extending from the ends of said louvers, a rod pivotally attached to the arms of said louvers, and means resiliently urging said rod and arms to actuate the louvers to horizontal positions wherein said louvers substantially close open areas through the shelf, said rod adapted to be held with the arms and louvers in the position of opening the louvers by the door with the door in the closed positions.

5. In a refrigerator having a box-like casing with a door, the combination, which comprises a plurality of shelves having frames substantially engaging the inner surfaces of the walls of the refrigerator casing, a plurality of depending spaced louvers transversely positioned in said frames, means pivotally mounting the ends of the louvers in the frames, arms extending from the ends of said louvers, rods pivotally attached to the arms of said louvers, springs on the rods resiliently urging said rods and arms to actuate the louvers to horizontal positions when released wherein said louvers substantially close open areas through the shelves, doors associated with the ends of the shelf frames, means hingedly mounting said doors adjacent the ends of the frames, and means suspending the rods from the frames wherein the ends of the rods are engaged by the doors when the doors are moved to closed positions whereby closing movement of the doors swings the louvers downward to open positions.

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