

July 9, 1963

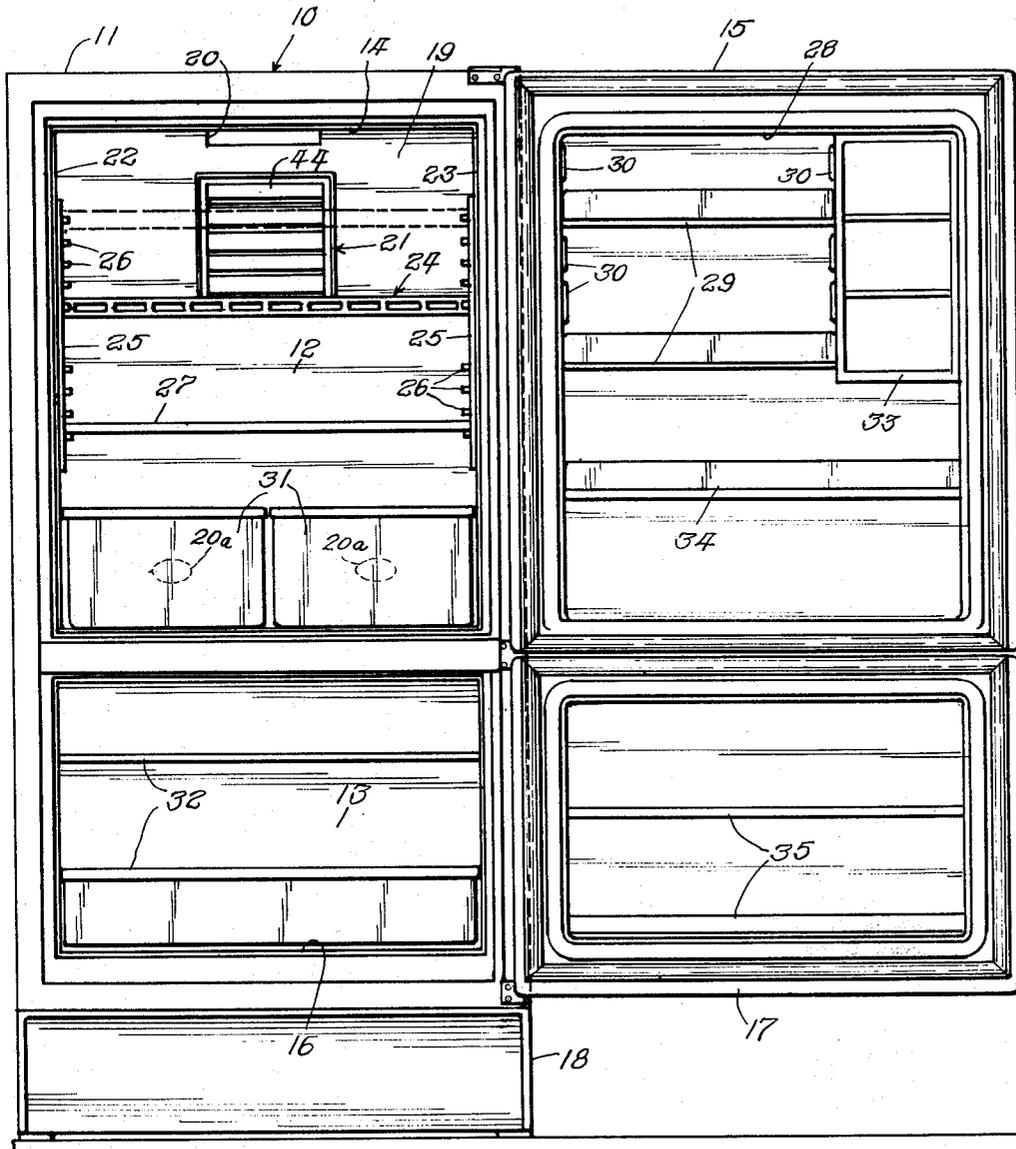
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Fig. 1.



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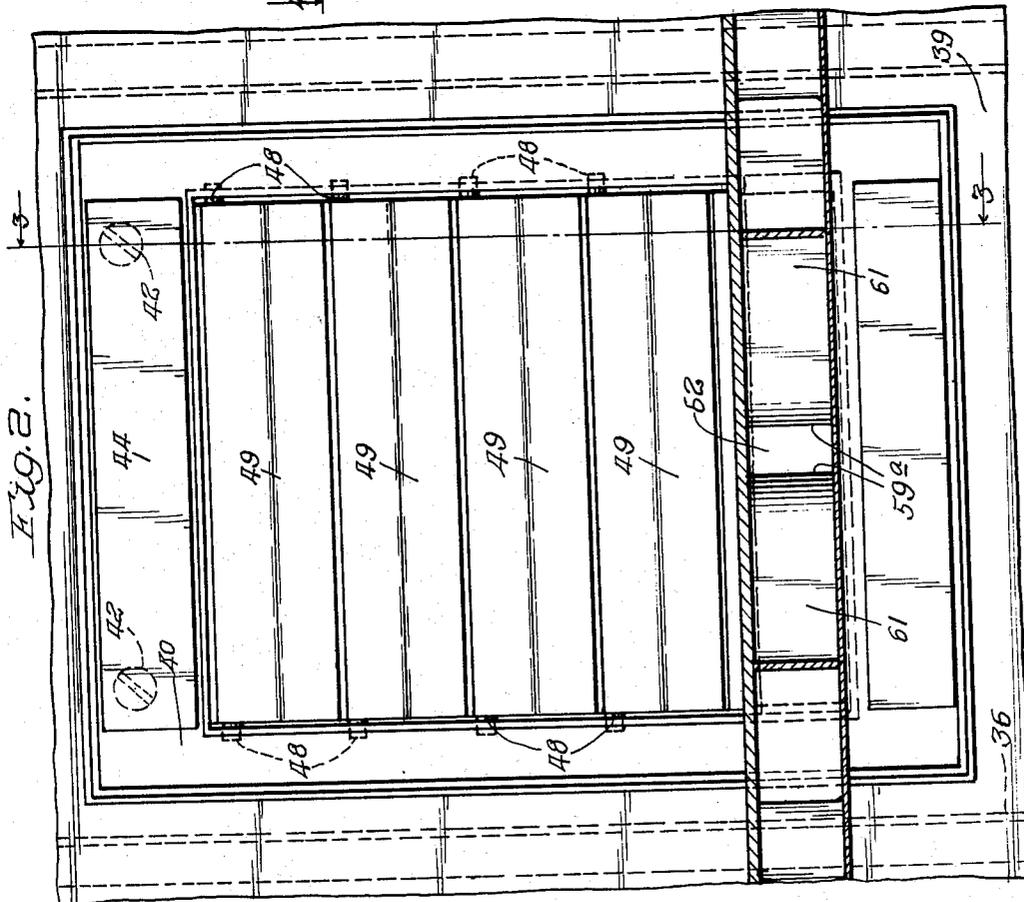
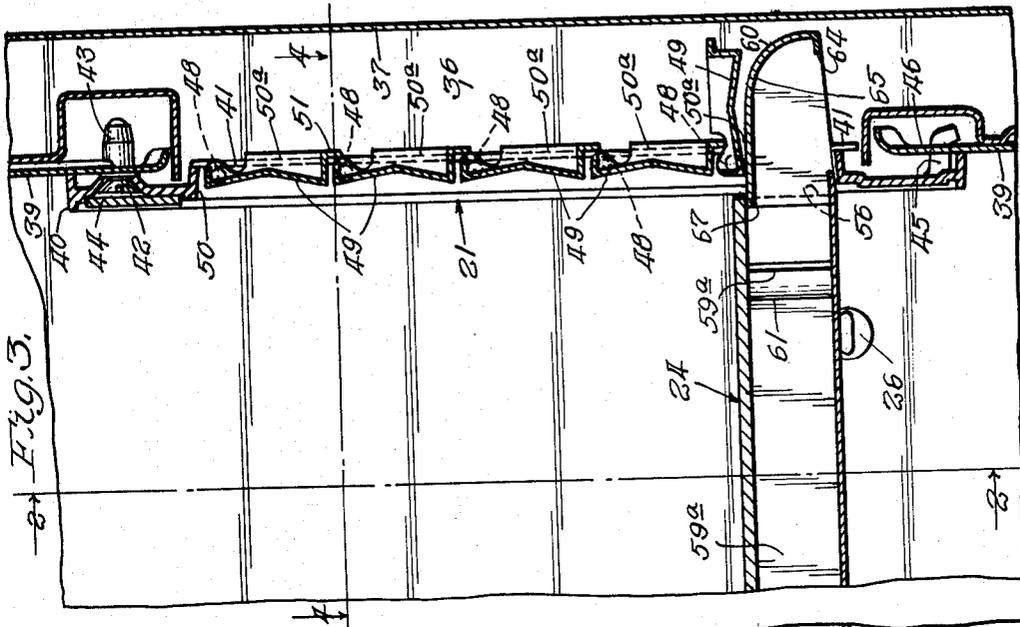
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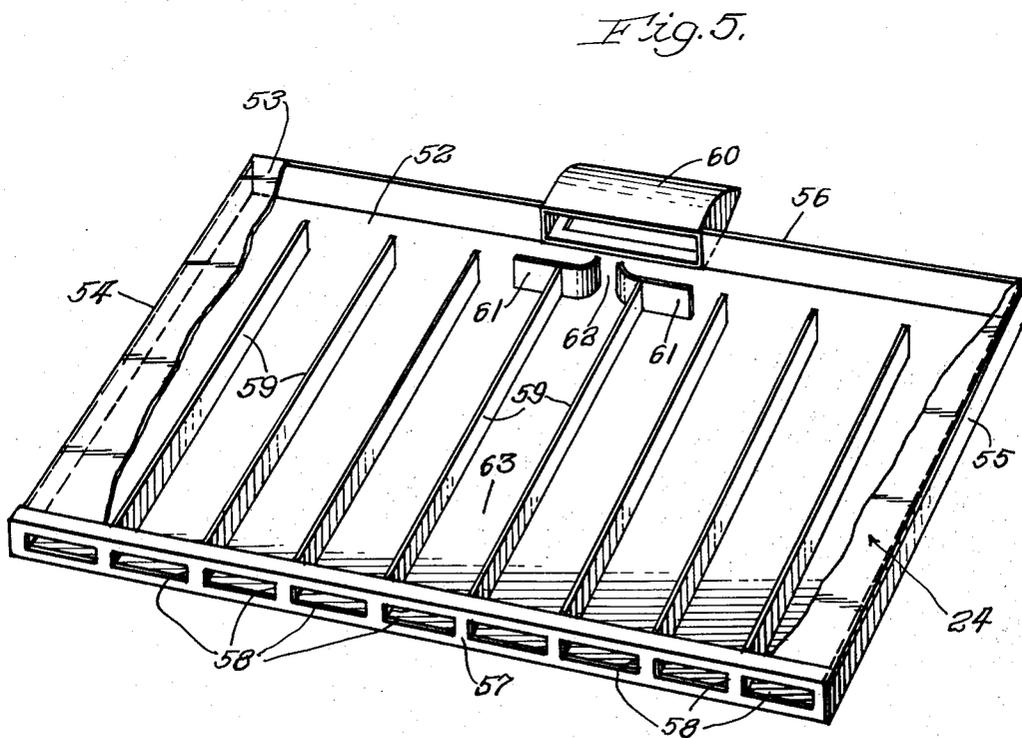
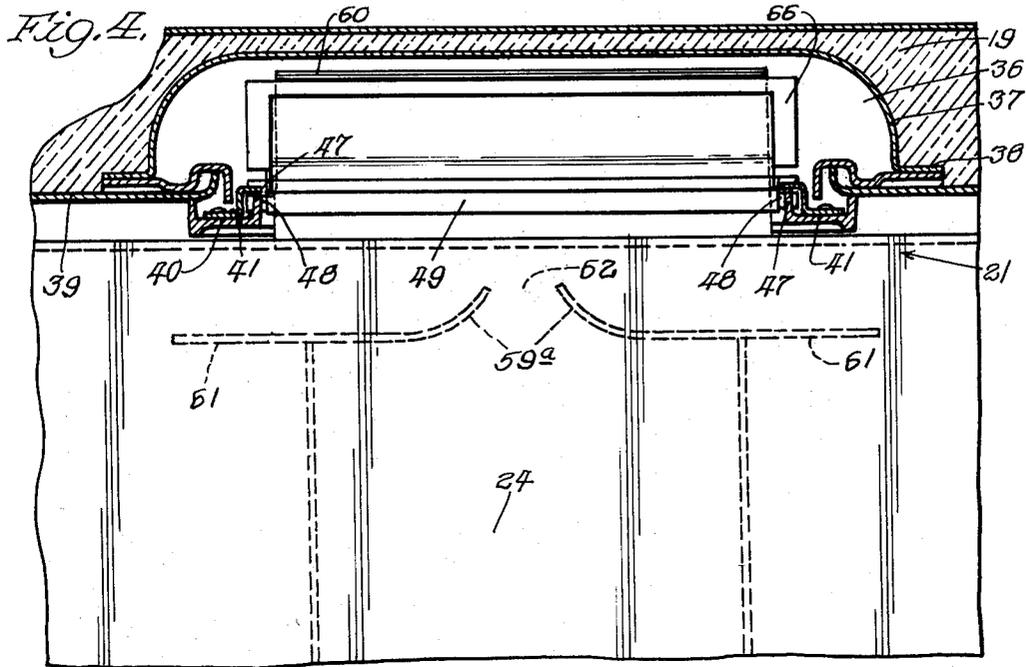
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HOME APPLIANCE

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7 Claims. (Cl. 62—265)

This invention relates to refrigeration apparatus and in particular to cold shelf means for use in a refrigerator.

In one form of modern frost-free type refrigerator, refrigerated air is circulated to different portions of the refrigerated space by means of suitable ducts. An improved form of shelf has been developed for use in such refrigerators wherein a portion of the refrigerated air is passed through the hollow interior of the shelf to provide a quick chilling of objects placed on the shelf and from the shelf directly into the refrigerated space and compartments defined by the refrigerator door for quick chilling of foodstuffs and the like placed therein. The known hollow shelf structures, however, have had the disadvantage of fixed installation within the refrigerator thereby limiting the adaptability of the refrigerated space for holding different sized objects and reducing the efficiency of space utilization in general. The present invention comprehends a cold shelf structure providing the desirable features of the known cold shelf structures while effectively eliminating the discussed disadvantages thereof.

Thus, a principal feature of the present invention is the provisions of a new and improved cold shelf refrigeration apparatus.

Another feature of the invention is the provision of such a refrigeration apparatus arranged for selective positioning of the cold shelf in any one of a plurality of different positions.

A further feature of the invention is the provision of such a refrigeration apparatus wherein the cold shelf is provided with means for facilitated connection to a refrigerated air supply at any one of a plurality of different portions thereof.

Still another feature of the invention is the provision of such refrigeration apparatus wherein the selective positioning of the cold shelf is co-ordinated with the selected positioning of adjustable shelf means carried by a portion of the refrigerator enclosure.

A yet further feature of the invention is the provision of such refrigeration apparatus wherein the hollow cold shelf is provided with a first portion defining an inlet, and a second portion defining an outlet, the refrigeration apparatus includes a wall defining a flow passage for refrigerated air, and means are provided in the wall defining a plurality of normally closed openings for selectively receiving the inlet portion of the cold shelf.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a front elevation of a refrigerator provided with cold shelf apparatus embodying the invention;

FIGURE 2 is a fragmentary, enlarged vertical section thereof taken substantially along the line 2—2 of FIGURE 3;

FIGURE 3 is a fragmentary, enlarged vertical section

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thereof taken substantially along the line 3—3 of FIGURE 2;

FIGURE 4 is a fragmentary horizontal section taken substantially along the line 4—4 of FIGURE 3;

FIGURE 5 is a perspective view of a cold shelf embodying the invention with portions broken away to illustrate the internal construction thereof.

In the exemplary embodiment of the invention as disclosed in the drawing, a refrigeration apparatus generally designated 10 is shown to comprise a refrigerator-freezer combination apparatus wherein a cabinet 11 defines an upper, above-freezing chamber 12, and a lower, below-freezing chamber 13. The cabinet 11 defines an upper front opening 14 providing access to refrigerator space 12, opening 14 being selectively closed by an upper door 15. The cabinet further defines a front opening 16 providing access to freezing chamber 13, opening 16 being selectively closed by a lower door 17. The base portion of the cabinet is arranged to house suitable conventional refrigeration equipment (not shown) for effecting the desired refrigeration of the air delivered to chambers 12 and 13.

As shown in FIGURES 1, 3 and 4, the refrigeration of chamber 12 is effected by a delivery of the refrigerated air thereto through rear wall 19 of cabinet 11 to a discharge opening 20 at the upper portion of chamber 12, the air being returned to the cooling means through a pair of return outlets 20a in the rear wall adjacent the bottom of the chamber 12. The rear wall 19 is further provided with an outlet structure generally designated 21 spaced below opening 20 intermediate the side walls 22 and 23 of the cabinet. A hollow cold shelf 24 extends across the chamber 12 between side walls 22 and 23 forwardly from the outlet structure 21. The outlet structure 21 and cold shelf 24 are co-operatively arranged so that the cold shelf may be disposed in any one of a plurality of vertically spaced substantially horizontal positions including a lowermost position shown in full lines in FIGURE 1, and an uppermost position shown in dotted lines in FIGURE 1. Shelf supports 25 may be provided on each of the side walls 22 and 23, the supports 25 including a plurality of vertically spaced pegs 26 for supporting the cold shelf 24 in each of the vertically spaced positions thereof and for supporting a lower conventional shelf 27 spaced below the cold shelf 24. Door 15 defines a rearwardly opening recess 28 in which is received a plurality of shelves 29 carried on side supports 30 to be positioned in any one of a plurality of vertically related positions generally horizontally aligned with the different positions of cold shelf 24.

The refrigerator may be provided with additional shelves and compartments as desired. Herein, the refrigerator 10 includes a pair of conventional crispers 31 disposed in the lower portion of chamber 12, a plurality of shelves 32 extending across the freezer compartment 13, a holder 33 in the upper portion of door 15 for storing butter, cheese and the like, a shelf 34 in door 15 below shelves 29 for storing relatively tall objects such as bottles and cartons, and shelves 35 in door 17 for storing frozen food packages and the like.

Referring now more specifically to FIGURES 2, 3 and 4, the flow of refrigerated air in rear wall 19 is through a vertically extending flow passage 36 defined by

a rear cover 37 and a front panel 33 disposed rearwardly of rear wall liner 39. As best seen in FIGURES 3 and 4, the outlet structure 21 includes a grill 40 carrying a retainer 41. The upper portion of the grill 40 is secured to the liner 39 by means of screws 42 and nylon screw grommets 43, the screws being covered by a front panel 44 extending across the top portion of the grill 40. The lower end of grill 40 is secured to the liner 39 by a rearwardly projecting, downturned leg 45 extending through an opening 46 in the liner 39. As best seen in FIGURE 4, grill 40 includes a pair of rearwardly turned side edge portions 47 in which pivot pin portions 48 at the opposite ends of closure 49 are pivotally mounted. As shown in FIGURE 3, in the illustrated embodiment, five such closures are provided one above the other within an opening 50 defined by the grill 40 to provide five separate openings 50a each of which is selectively closed by a corresponding closure 49. The pivot pins 48 are disposed at the upper portion of the closure so that the closure tends to hang substantially straight downwardly, normally closing the opening. As best seen in FIGURE 3, the lower end of each closure is downturned as at 51. Because of the weight of the closure acting about pivot pins 48, this downturned portion 51 is pivoted into sealing relation with the subjacent closure.

Cold shelf 24 is arranged for selective association with wall 19 to extend forwardly therefrom at any one of the five different levels of the openings 50a. As shown in FIGURE 5, the cold shelf 24 comprises a hollow enclosure including a bottom wall 52 having a width substantially equal to the spacing between side walls 22 and 23 of refrigerator cabinet 11, a removable top wall 53 generally similar to bottom wall 52, a left side wall 54, a right side wall 55, a rear wall 56, and a front grill 57 having a plurality of laterally spaced openings 58. A plurality of divider walls 59 are provided within the shelf extending rearwardly from grill 57 and terminating short of rear wall 56. The dividing walls 59 are aligned intermediate the openings 58 and thus define a plurality of fore and aft passages through the cold shelf for delivering refrigerated air in a plurality of streams from adjacent the rear wall 56 forwardly through the cold shelf and outwardly therefrom through the openings 58. The refrigerated air is scooped from the duct 36 into the cold shelf by means of a deflector, or scoop, 60 extending rearwardly from the mid portion of rear wall 56. A pair of baffles 61 are provided within the cold shelf directly in front of the scoop 60 to deflect the air laterally along rear wall 56 to assure a uniform distribution of the refrigerated air throughout the cold shelf. The innermost ends 59a of the baffles 61 are spaced apart thereby providing an opening 62 through which a portion of refrigerated air may flow forwardly through center passage 63.

As seen in FIGURE 3, scoop 60 extends rearwardly from rear wall 56 substantially the depth of duct 36 and defines a downwardly opening inlet 64 and a forwardly opening outlet 67. The scoop serves to divert to the cold shelf 24 a portion of the refrigerated air moving upwardly through duct 36 to discharge opening 20. The upper rear portion 65 is rounded to cause a smooth transition in the air flow from the upward direction to the forward direction into the cold shelf, and further provides a means for facilitating the urging of the closure door 49 in a counterclockwise direction as seen in FIGURE 3 as the scoop is inserted into the duct.

Thus, cold shelf 24 may be installed selectively in any of the vertically spaced positions corresponding to the opening 50a, thereby providing substantial control over the arrangement of the storage space in the refrigerator compartment 12 as well as providing substantial control of the refrigerated air delivered through the cold shelf in correspondence with the positioning of the door shelves 29. Alternatively, the cold shelf may be completely removed from the refrigerator allowing each of the closures

49 to be retained in its vertical, closed position. In this position, the lateral edge portions 66 of the closures seal against the retainers 41 and the downturned portions 51 of the closures seal against the subjacent elements to sealingly close the entire outlet structure 21 permitting all of the refrigerated air delivered through duct 36 to pass outwardly through opening 20 at the top of chamber 12.

While we have shown and described one embodiment of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. Refrigeration apparatus comprising: a wall; means within said wall defining a first flow passage for refrigerated air; a hollow shelf defining a second flow passage, said shelf having a portion defining an inlet to said second flow passage and a portion defining an outlet from said second flow passage, said shelf inlet portion being provided with a deflector for directing refrigerated air from said first flow passage into said second flow passage; means associated with said first flow passage means defining a plurality of openings for selectively receiving said shelf inlet portion for delivery of refrigerated air from said first flow passage through said second flow passage; and closure means adjacent each of said openings for selective sealing thereof, said closure means being movable to an open position by engagement thereof with said shelf deflector.

2. The refrigeration apparatus of claim 1 wherein said first flow passage is vertical, and said deflector extends substantially across said first flow passage to define by-pass passages in said first flow passage at the lateral ends of the deflector.

3. Refrigeration apparatus comprising: an upright wall; means within said wall defining a first, vertical flow passage for refrigerated air; a horizontal shelf defining a said second flow passage, said shelf having a deflector defining an inlet to said second flow passage and a portion defining an outlet from said second flow passage; means associated with said first flow passage means defining a plurality of openings for selectively receiving said deflector for directing refrigerated air from said first flow passage through said second flow passage; and a normally vertical closure means pivotally mounted adjacent each of said openings for selective sealing thereof, said deflector further being arranged to pivot said closure means to an open position upon entry of said deflector into one of said openings.

4. The refrigeration apparatus of claim 3 including means pivotally mounting said closures on said means associated with said first flow passage means at an upper portion of said closures whereby the closures hang downwardly across said openings to close the same.

5. A refrigerator cabinet comprising: an upright wall; means within said wall defining a first flow passage for refrigerated air; a door member spaced forwardly of said wall; means on said door member defining a plurality of spaces to be refrigerated; a hollow shelf defining a second flow passage, said shelf having a rear portion defining an inlet to said second flow passage and a forward portion defining an outlet from said second flow passage in confronting relation to said space defining means; means associated with said first flow passage means defining a plurality of openings for selectively receiving said shelf inlet portion for delivery of refrigerated air from said first flow passage through said second flow passage, and from said shelf outlet selectively to any of said spaces.

6. The refrigerator cabinet of claim 5 wherein said space defining means comprises a recess in said door member, an article supporting means and means for retaining said article supporting means in said recess in any one of a plurality of positions.

7. A refrigerator cabinet comprising: an upright wall; means within said wall defining a first flow passage for refrigerated air; a door member spaced forwardly of said wall; means on said door member defining a plurality of spaces to be refrigerated; a hollow shelf defining a second flow passage, said shelf having a rear portion defining an inlet to said second flow passage and a forward portion defining an outlet from said second flow passage in confronting relation to said space defining means; means associated with said first flow passage means defining a plurality of openings for selectively receiving said shelf inlet portion for delivery of refrigerated air from said first flow passage through said second flow passage, and from said shelf outlet selectively to any of said spaces;

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and closure means selectively closing said openings and arranged to be moved to an open position by engagement of the rear portion of the shelf therewith.

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