Aug. 31, 1943. G. L. C. EARLE 2,328,130

METHODS OF ASSEMBLING MECHANICAL REFRIGERATORS

Filed Feb. 10, 1940 2 Sheets-Sheet 1

FIG. 2

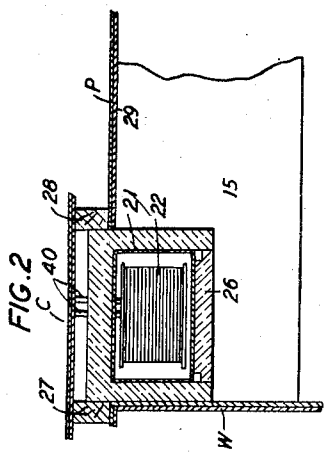


FIG. 5

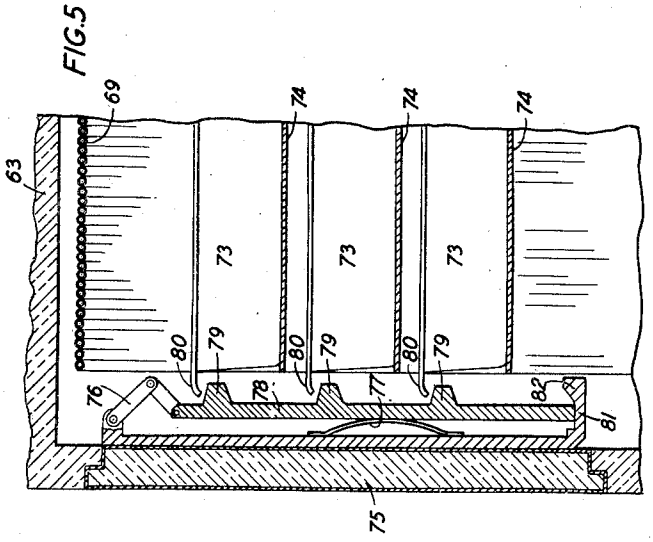
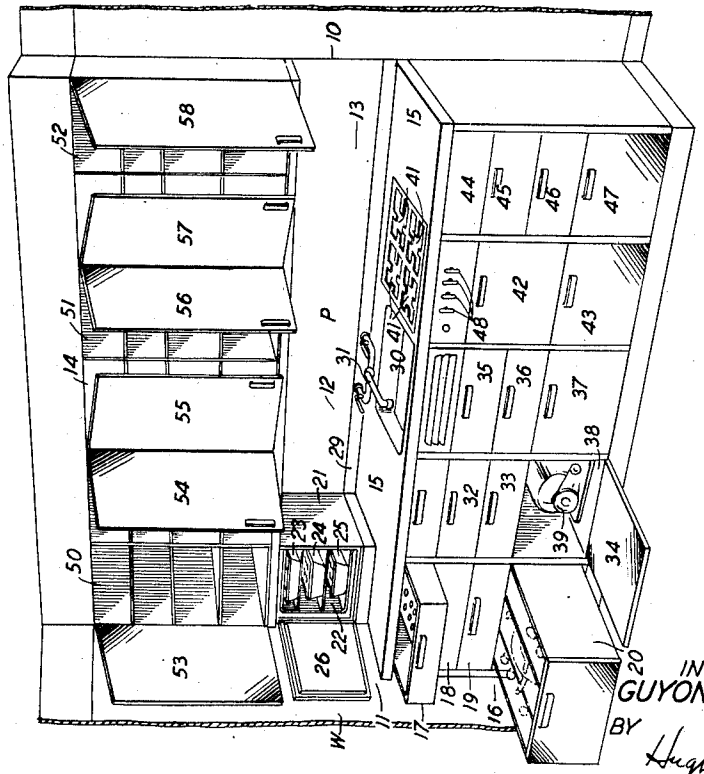


FIG. 1



INVENTOR
GUYON L.C. EARLE
BY Hugh S. Wertz
ATTORNEY

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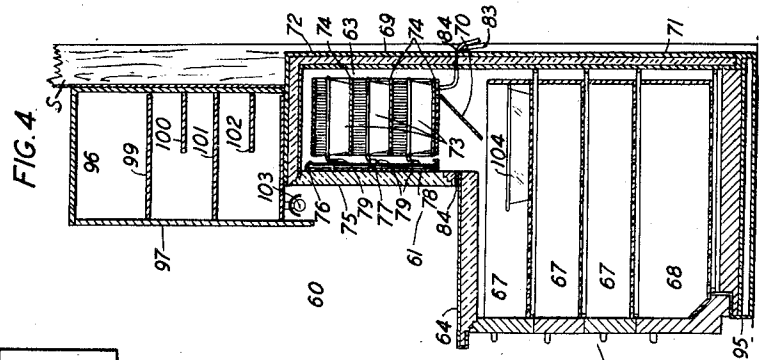


FIG. 4

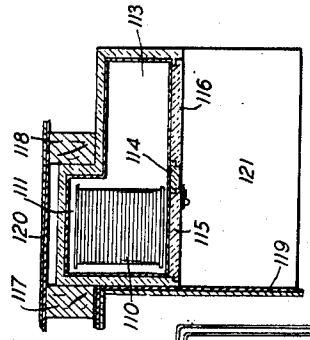


FIG. 6

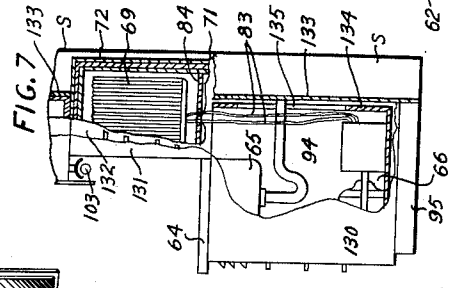


FIG. 7

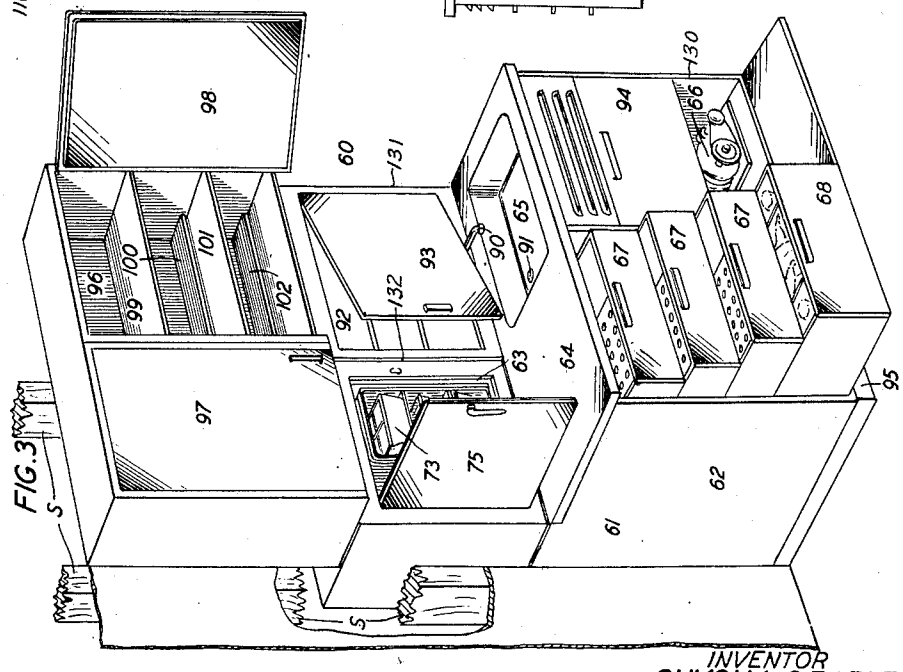


FIG. 3

INVENTOR
GUYON L.C.EARLE

BY Hugh S. Wertz.

ATTORNEY

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METHOD OF ASSEMBLING MECHANICAL REFRIGERATORS

Guyon L. C. Earle, Forest Hills, N. Y., assignor to Genevieve M. Earle, Forest Hills, N. Y.

Application February 10, 1940, Serial No. 318,224

3 Claims. (Cl. 62—89)

This application relates to refrigerators and more specifically but not necessarily to refrigerators adapted to be built into kitchens and to methods of assemblying them.

It is an object of this invention to provide improved methods for assembling a mechanical refrigerator unit.

In Patent 2,180,460, issued November 21, 1939, to Guyon L. C. Earle, there is disclosed a mechanical refrigerator having a relatively large bottom portion adapted to be refrigerated, a smaller upper refrigerated portion the front of which is set back from the front of the bottom portion, and a table top member located above the bottom portion and in front of the top portion. The upper portion is preferably partly divided into two compartments by a vertical partition member, one of these compartments containing the cooling coil and a plurality of ice cube trays and the other compartment containing shelves for articles which are to be maintained in a cold condition.

There is briefly described in Patent 2,180,459, issued November 21, 1939, to Guyon L. C. Earle, and more fully in a copending application of the same inventor, Serial No. 318,223, filed February 10, 1940, and which issued as Patent No. 2,312,325 on March 2, 1943, a refrigerator of the type having an upper set-back portion in which the lower portion is closed by a plurality of drawers or similar closure members. The present invention provides a method of mounting the cooling unit in refrigerators of this type during the assembling process.

It is another object of this invention to provide a method of assembling the cooling unit within a refrigerator of the type described above by making the upper and lower portions of the refrigerator in separate pieces, mounting the cooling unit within the upper portion, and then fastening the upper portion to the lower portion, the tubes from the evaporator unit to the liquefying unit passing through a gasket between the two units. Preferably the evaporator unit, the liquefying unit and the tubes therebetween comprise a sealed refrigerating unit and this unit is mounted in the refrigerator without breaking the tube connections.

This latter object is accomplished by placing the evaporator unit of a sealed refrigerating unit within the upper set-back portion of the refrigerator, fastening it therein, mounting the liquefying unit outside both upper and lower portions of the refrigerator (preferably at the side of the lower portion) without breaking the tube connections between the evaporator and liquefying units, and securing the upper portion of the refrigerator to the lower portion thereof in such a manner that the tubes from the evaporator unit passes between the two portions of the refrigerator.

In the preferred embodiment of this invention, there is provided a refrigerator unit comprising upper and lower portions arranged together so that the front wall of the upper portion is set back from and is preferably parallel to the bottom front wall. A table top member is mounted on top of that part of the bottom portion of the refrigerator unit not covered by the top portion of the refrigerator unit, which in the preferred embodiment is both in front of and to the side of the upper portion of the refrigerator. In a modification, the top portion of the unit is divided into two compartments one of which is made substantially deeper than the other so that the deeper compartment projects beyond the rear of the other compartment and of the lower portion of the refrigerator. The single upper compartment of the preferred embodiment or the deeper upper compartment of the modification contains the cooling unit and, within the coils thereof, a plurality of ice cube trays placed behind an inner door. The other compartment in the upper portion of the modification is adapted to be refrigerated and contains racks for small articles such as eggs, cheese, etc. Above the top portion of the refrigerator itself is a cabinet the front of which preferably projects beyond the front of the upper portion of the refrigerator but which is set-back from the front of the lower portion thereof. In the bottom of the refrigerator is a large and deep refrigerated space which is preferably closed by a number of sliding closure members such as drawers and the like. Below this refrigerated space may be a compartment for the liquefying unit of the electrical refrigerator (or the equivalent apparatus for the gas type mechanical refrigerator) although this compartment may be included in the refrigerated space and the liquefying unit located elsewhere, as, for example, beneath the sink if a sink unit is located adjacent the refrigerator unit. The liquefying unit is preferably mounted on a base insulated for quiet.

In assembling the above described unit, the lower portion is made up and mounted on the recessed base. The cooling unit is then placed in the deep upper compartment and fastened therein. The upper member is then mounted on the lower member, being separated therefrom by gaskets, and preferably fastened to the lower member by any suitable means. The tubes leading to the cooling unit from the liquefying unit are brought out preferably through a side or rear gasket without breaking connection between the liquefying and evaporating units. The table top member, if it is other than the finished top of the bottom portion of the refrigerator, is then mounted on top of the bottom portion and in front of the upper portion.

The invention will be more readily understood

by referring to the following description and the accompanying drawings forming a part thereof, in which:

Fig. 1 shows a kitchen unit embodying a novel refrigerator assembled in accordance with this invention;

Fig. 2 is a horizontal cross-sectional view through the evaporator unit of the refrigerator shown in Fig. 1;

Fig. 3 is a modification of the refrigerator shown in Fig. 1, the refrigerator being placed next to a sink to make a unit therewith;

Fig. 4 is a vertical cross-sectional view of the unit shown in Fig. 3 taken through the left hand portion of Fig. 3;

Fig. 5 is an enlarged vertical cross-sectional view of a portion of Fig. 4 showing a novel arrangement for loosening the inner door and the ice cube trays from their supporting shelves;

Fig. 6 is a horizontal cross-sectional view of a modification of the refrigerator shown in the unit of Fig. 1; and

Fig. 7 is a side elevation view taken from the right hand side of the unit of Fig. 3, with parts broken away.

Referring more particularly to the drawings, Fig. 1 shows a kitchen unit 10 in which the novel refrigerator of this invention is a part. The unit 10 comprises a refrigerator unit 11, a sink unit 12, a stove unit 13, wall cabinets 14, and a common table top member 15.

The refrigerator 11 comprises a lower portion 16 which is preferably closed by four drawers 17, 18, 19, 20 (although it is to be understood that any number of drawers or one relatively large door may be used instead), and an upper portion 21. The upper drawers 17, 18 and 19 may contain foraminated bottoms, as indicated in the pulled out drawer 17 in Fig. 1, to allow the circulation of air therebetween. As a modification, each drawer may consist of a hollow frame supporting a plurality of removable trays, the two outside trays each containing a roller member which rides along a track the rear portion of which is sloped downwardly and rearwardly so that the drawer is assisted in closing by this gravity pull which also serves to keep the drawer closed until force is applied to open it. For a more complete description of this drawer briefly described above reference may be made to a copending application of Guyon L. C. Earle, Serial No. 318,223, filed February 10, 1940, and which issued as Patent 2,312,325 on March 2, 1943.

The upper portion 21 contains the evaporator 22, the coils of which are shown in the horizontal cross-sectional view of Fig. 2. Cold air from the evaporator 22 is caused to circulate through the lower portion 16, the width and depth of which are substantially larger than the width and depth of the upper portion 21, in a manner similar to the operation of the refrigerator described in Patent 2,180,460, issued November 21, 1939, to Guyon L. C. Earle. Included within the space bounded by the coils 22 are the ice cube trays 23, 24 and 25. While only three ice cube trays have been shown, it is obvious that a larger or smaller number may be provided as desired. An insulated door 26 preferably closes the compartment 21.

In accordance with this invention, the upper portion 21 overhangs the rear of the lower portion 16 and projects into the wall of the kitchen preferably between adjacent studs 27 and 28 (see Fig. 2). In this figure the table top member 15 is shown in front of and to the side of the compartment 21 and terminates in a splash back member 29 which is placed against the plaster coating P of the kitchen wall. As the refrigerator is shown in this figure as being in a corner of the room, the plaster coating W of the end wall is also shown. The coating C behind the studs 27 and 28 is a portion of the wall of the room behind the kitchen. By projecting the upper portion 21 of the refrigerator back into the wall of the room, preferably between adjacent studs, as much as three more inches of desirable table space may be obtained in front of the upper portion 21 without decreasing the size thereof. By placing the evaporator unit 22 entirely in the upper portion 21, all of the lower portion 16 can be used as refrigerated storage space. As pointed out in the copending Earle application mentioned above, the use of drawers instead of one large door permits the storage of an unusually large amount of food.

It is a feature of this invention that the upper portion 21 is made into a unit and the lower portion 16 is made into a second unit. Then the evaporator is placed inside the upper portion through the relatively large opening in the bottom thereof. It is then fastened within the upper portion 21 and the upper portion 21 mounted on and fastened to the lower portion 16. This permits the refrigerator to be finally assembled at the place where it is to be used without disconnecting the liquefying unit from the evaporator (if desired) and makes it possible to install an evaporator larger than the distance between adjacent drawers after the lower portion 16 has been completely made and, even more important, makes it possible to take the evaporator 22 out of the refrigerator (or if desired, the entire upper portion 21) without sending the whole refrigerator back to the factory or take out the complete refrigerating unit in the situation where it is a completely factory sealed unit and something goes wrong with it.

The refrigerator 11 is positioned next to a sink unit 12 which includes a sink 30, a water supply 31, a plurality of closure members 32 to 37, inclusive, which may be drawers, doors, or sliding members containing racks for towels, etc. Within the compartment 38 behind the door 34 (which is preferably hinged at the bottom) is a liquefying unit 39 for the refrigerator. This unit 39 is connected to the evaporator 22 by flexible tubes 40 (not shown in this figure but shown in Fig. 2). The liquefyer 39 may be a part of either an electric or gas unit and it may be placed in any other convenient spot (such as behind the door 37, for example), if desired, instead of in the compartment 38. The table top 15 serves as a drainboard for the sink 30.

On the other side of the sink 30 is placed the stove unit 13. This unit preferably comprises upper burners 41, an oven compartment 42, a broiler compartment 43, a plurality of drawers 44 to 47 (which may be simply cabinet drawers and not part of the stove at all) and controls 48 for the burners on top of the stove and in the oven. The burners 41 are preferably set into the table top member 15. While a conventional stove has been shown (the stove per se being no part of this invention) it is obvious that a set-back stove of the type disclosed and claimed in Patent 2,180,459, issued November 21, 1939, to Guyon L. C. Earle, may be used instead.

Above the upper portion 21 of the refrigera-

tor and preferably projecting out in front of it are cabinets 50, 51 and 52 having doors 53 to 58 therefor. These cabinets may have any desired type or types of shelves therein. While the fronts of all the doors have been shown in a single plane it is obvious that in "cut-corner" kitchens, they may be in two or more planes.

Reference will now be made to Figs. 3, 4 and 7 which show a modification of a portion of the arrangement shown in Fig. 1. In these figures there is shown a combined refrigerator and sink unit 60 comprising a refrigerator 61 having a lower portion 62, an upper portion 63 and a table top member 64, and a sink 65, the liquefying unit 66 for the refrigerator 61 being placed below the sink.

The lower portion 62 includes a plurality of upper drawers 67 and a lower drawer 68, the lower drawer 68 being preferably made larger than the others to accommodate bottles, etc. The upper one of the drawers 67 may have a defrosting tray 104 put in it when desired. The bottoms of the drawers (with the exception, perhaps, of the lower drawer 68) are preferably made with holes therein or of mesh material so as not to impede the circulation of cold air from the evaporator 69 in the upper portion. A deflecting member 70 to assist in the circulation of air is shown but this member may be replaced by a fan, flue or duct or omitted entirely, as desired. The top one of the drawers 67 may serve as the cold distributing member. Unlike the arrangement shown in Fig. 1, the lower portion 62 of the refrigerator projects back into the wall between adjacent studs S and thus the rear wall 71 of the lower portion 62 is in the same plane as the rear wall 72 of the upper portion 63. Preferably (as shown in Fig. 7) the rear wall of the sink unit does not project back into the wall at all and in fact may even be set out from the wall to permit the passage of pipes between the wall of the room and the back of the sink unit. It is to be understood, of course, that it is within the scope of this invention to provide a refrigerator unit in which both upper and lower portions project back into the wall of the room but by different amounts.

The upper portion 63 of the refrigerator contains the evaporator 69 within the coils of which are arranged any convenient number of ice cube trays 73 supported by shelves 74. An outer door 75 closes the upper compartment 63 of the refrigerator to which is attached by a toggle 76 and a spring 77 (see Fig. 5 for an enlarged view) an inner door 78 having a plurality of horizontal rib members 79 positioned to engage lips 80 on the ice cube trays 73. An upwardly curving elbow member 81 is fastened to the outer door 75 and supports the inner door 78. Assume that the ice cube trays 73 are frozen to their shelves 74 and that the inner door 78 closing the ice cube tray compartment is also frozen to its jamb. The opening of the outer door 75 will exert tension on the spring 77 tending to pull the door 78 open. Moreover when the upwardly projecting portion 82 of the elbow 81 engages the inner door 78, the latter will be given a sharp upward thrust which causes the ribs 79 to engage the lips 80 of the ice cube trays 73 thus freeing them from their supporting shelves 74. The combination of the forces exerted by the spring 77 and the upward thrust of the door 78 tends to free this door from its jamb. When the outer door 75 is closed, the spring 77 forces the inner door 78 closed also.

The evaporator 69 is connected to the liquefying unit 66 by means of flexible tubes 83 which pass out the side or back of the unit through a gasket 84 between the upper and lower portions of the refrigerator. As explained above with respect to Fig. 1, the evaporator 69 is fastened within the upper portion 63 and then the upper portion is placed on the gaskets 84 and fastened to the lower portion 62. Thus if trouble should occur after installation a whole new upper portion containing a new evaporator unit can be installed without disturbing the lower portion (or, of course, a new evaporator could be installed in the old upper portion or a complete new refrigerating unit could be installed).

Reference will now be made to Fig. 7 which illustrates more clearly the method of assembling a sealed refrigerating unit in a refrigerator of the type having an upper "set-back" portion. This figure is a side elevation of the unit shown in Fig. 3 taken from the right hand side of the unit. Parts of the side walls 130 and 131 of the upper and lower portions of the sink unit and of the wall 132 between the upper portions of the sink and refrigerator units, respectively, have been broken away to show the evaporator unit 69 in the upper portion of the refrigerator unit (in the upper left hand portion of Fig. 3), the liquefying unit 66 (in the lower right hand portion of Fig. 3), tubes 83 between the evaporator and liquefying units, which pass through gasket 84 between the upper and lower portions of the refrigerator unit, and the sink 65 with a portion of its associated plumbing. The back wall 72 of the upper portion and the back wall 71 of the lower portion of the refrigerator are behind the wall 133 of the kitchen while the back wall 134 of the sink unit, having a relatively large opening 135 therein, is in front of the wall 133. During the assembly process, which in the case of large units preferably takes place in the kitchen, the lower cabinet portions of the refrigerator and sink units are placed in position (if desired, with the rear of the lower portion of the refrigerator unit, or of both refrigerator and sink units, projecting back into the wall of the room), the evaporator unit 69 is placed within and secured in its proper position within the upper portion of the refrigerator unit (the tubes 83 not being disassembled during this step, nor, for that matter, during the entire process of assembling), the upper portion of the refrigerator is mounted on the lower portion thereof with the gasket 84 therebetween through which the tubes 83 pass, and the liquefying unit 66 is secured in the bottom of the cabinet of the sink unit. The liquefying unit 66 may be placed in position through the top of the lower portion of the sink cabinet (before the sink 65 has been put in place and its plumbing connected) in the case where the tube connections 83 pass out of the side of the refrigerator unit as shown in Fig. 7, or through the opening 135 in the back wall 134 of the sink cabinet when the tubes 83 pass out of the back of the refrigerator unit, as indicated in Fig. 4. The table top 64 and the sink 65 may then be put in position and fastened and the plumbing for the sink 65 connected. Obvously, the gasket 84 may be of one piece and form a part of the apparatus accompanying the sealed refrigerating unit or be made of several pieces and put together in the kitchen. In this latter situation, packing material may be desirable around the holes through which the tubes 83 pass. It is obvious that the order of performing certain of the steps given above may be varied. By means of this method of assembly, the services of a skilled refrigerator installation mechanic are not necessary as any person capable of installing

the cabinets is capable of assembling the refrigerator also.

The table top member 64 in addition to serving as a support for articles being placed in and taken out of the refrigerator serves as the drainboard of the sink 65. A faucet 90 supplies water to the sink 65. The waste 91 is located in the bottom of the sink. For simplicity of illustration, the plumbing for the sink has not been shown.

Behind and above the sink is a cabinet 92 closed by a door 93 which cabinet may be used for storage purposes, as part of the refrigerator or, as described in a copending application of Guyon L. C. Earle, Serial No. 314,402, filed January 18, 1940, utilized as a dish washing and drying compartment. Preferably this cabinet does not project back into the wall. Below the sink 65 is a space 94 which may be utilized for storage or, as described in the last mentioned Earle application, used as a towel rack. The entire unit is mounted on a recessed base 95.

Above the upper portion 63 of the refrigerator 61 and set forward from the front of the refrigerator upper portion is arranged a cabinet 96 closed by doors 97 and 98. This cabinet has shelves 99 to 102 therein, the fronts of the shelves 100 and 102 being shown as set-back from the fronts of the shelves 99 and 101. Obviously, any type of shelves may be used, as desired. The doors 97 and 98 may provide an overhang behind which may be located one or more soffit lights 103 which may be actuated by hand or by opening a door. Obviously, similar lights may also be provided in the lower portion of the refrigerator. If desired, and by proper insulation, the cabinet space 96 or a portion of it may be used as refrigerated storage space.

In Fig. 6, a modification of the invention of Fig. 1 is shown in horizontal cross-section. In the arrangement of Fig. 6, the upper portion 110 of the refrigerator comprises an ice cube tray compartment 111 having an evaporator 112 therein and an upper refrigerated compartment 113 to the side thereof. A common jamb 114 is provided for the two doors 115 and 116 although one or more drawers may be used instead of the door 116. The compartment 111 projects back into the wall between adjacent studs 117 and 118. Portions of the wall 119 of the kitchen and of the wall 120 of the room behind the kitchen are shown. The table top 121 is located in front of both compartments 111 and 113 and on top of the lower portion of the refrigerator which may be similar to the lower portion of the refrigerator shown in Fig. 1, the width of the two compartments 111 and 113 together being equal to, less than or more than the width of the lower portion of the refrigerator, as desired.

Suitable insulation is provided for all walls, doors, tops bottoms and drawer fronts of the refrigerators of this invention. Any convenient materials may be used. The insulation is thickened adjacent the front lower portion of the bottom drawer because of the recessed base 95.

Obviously, many modifications may be made in the embodiments described above without departing from the spirit of this invention, the scope of which is indicated by the appended claims. In the claims the terms "deep" and "narrow" have reference to the horizontal dimension at right angles to the front planes of the unit. Moreover, it will be understood that the claims are not to be construed as limited to the steps recited therein being performed in the order given.

What is claimed is:

1. The method of assembling at the site where it is to be used a mechanical refrigerator including a relatively deep lower portion having an opening in the upper part thereof, a relatively narrow upper portion having an opening in the lower part thereof of substantially the same size as the opening in said lower portion, and a sealed refrigerating unit including an evaporator unit, a liquefying unit and tubes for the flow of refrigerant between these units, without disassembling the tube connections between the evaporator and liquefying units, which comprises placing and securing within said upper portion said evaporator unit, positioning said liquefying unit outside of both of said portions of the refrigerator, placing the upper portion on the lower portion in such a way that the two openings coincide and the said tubes pass between said two portions, and securing said upper portion to said lower portion.

2. The method of assembling at the site where it is to be used a mechanical refrigerator including a relatively deep lower portion having an opening in the upper part thereof, a relatively narrow upper portion having an opening in the lower part thereof of substantially the same size as the opening in said lower portion, and a sealed refrigerating unit including an evaporator unit, a liquefying unit and tubes for the flow of refrigerant between these units, without disassembling the tube connections between the evaporator and liquefying units, which comprises placing and securing within said upper portion said evaporator unit, positioning said liquefying unit outside of both of said portions of the refrigerator, placing the upper portion on the lower portion in such a way that the two openings coincide and the said tubes pass between said two portions, said portions and said openings therein being so arranged that a part, at least, of the upper portion projects back to a plane which is beyond the rear plane of the lower portion of the refrigerator, and securing said upper portion to said lower portion.

3. The method of assembling at the site where it is to be used a mechanical refrigerator including a relatively deep lower portion having an opening in the upper part thereof, a relatively narrow upper portion having an opening in the lower part thereof of substantially the same size as the opening in said lower portion, and a sealed refrigerating unit including an evaporator unit, a liquefying unit and tubes for the flow of refrigerant between these units, without disassembling the tube connections between the evaporator and liquefying units, which comprises placing and securing within said upper portion said evaporator unit, positioning said liquefying unit outside of both of said portions of the refrigerator, placing the upper portion on the lower portion in such a way that the two openings coincide and the said tubes pass between said two portions, and securing said upper portion to said lower portion, said refrigerator being positioned so that at least the rear part of the upper portion projects back into the wall of the room containing the refrigerator.

GUYON L. C. EARLE.